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A REPORT TO
RBS & EJS FERGUS G.P. INC.

A GEOTECHNICAL INVESTIGATION FOR PROPOSED RESIDENTIAL DEVELOPMENT

6410 FIRST LINE AND 8076 WELLINGTON ROAD 19

TOWNSHIP OF CENTRE WELLINGTON (FERGUS)

REFERENCE NO. 2603-S021

MAY 2026

DISTRIBUTION

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1.0 INTRODUCTION

In accordance with written authorization dated March 6, 2026, from Ms. Catherine Pan, of RBS & EJS Fergus G.P. Inc., a geotechnical investigation was carried out at 6410 First Line and 8076 Wellington Road 19, and along a portion of Wellington Road 19 in the Township of Centre Wellington (Fergus).

The purpose of this investigation was to reveal the subsurface conditions and determine the engineering properties of the disclosed soils for the design and construction of a proposed residential development. The geotechnical findings and resulting recommendations are presented in this Report.

2.0 SITE AND PROJECT DESCRIPTION

The Township of Centre Wellington (Fergus) is situated on Guelph Drumlin Field; the area dominantly consists of stoney drift with sand and gravel terraces of meltwater spillways formed during the past glacial retreat. The overburden beds onto limestone bedrock of Guelph Formation at moderate depths.

The subject site, approximately 29.9 hectares in area, is located at the northwest corner of First Line and Wellington Road 19, in the Township of Centre Wellington (Fergus). At the time of investigation, majority of the site was farm land, with tree covers along the southwest limit of the property. A single-detached dwelling with associated garage is located midway along the south limit of the property. A review of the topographic survey of the site indicates that the site gradient generally descends towards the southwest direction.

Based on the Draft Proposed Land Use Plan prepared by Weston Consulting, dated January 23, 2026, the property will be subdivided into lots and blocks for residential uses. The development will be provided with municipal roadways and services, and with blocks reserved for park and a stormwater management facility.

3.0 FIELD WORK

The field work, consisting of ten (10) boreholes extending to depths between 6.2 and 8.0 m below the prevailing ground surface, was carried out on March 25, 26 and 27, 2026. Upon completion of the borehole drilling, a monitoring well was installed in nine (9) selected borehole locations to facilitate the hydrogeological assessment, of which the study will be presented under a separate cover. Details of the monitoring wells are shown on the corresponding Borehole Logs.

The boreholes were advanced at intervals to the sampling depths by a track-mounted machine equipped with solid stem augers and split spoon sampler for soil sampling. Standard Penetration Tests, using the procedures described on the enclosed "List of Abbreviations and Terms," were performed at the sampling depths. The test results are recorded as the Standard Penetration Resistance (or 'N' values) of the subsoil. The compactness of the cohesionless strata and the consistency of the cohesive strata are inferred from the 'N' values. Split-spoon samples were recovered for soil classification and laboratory testing. The field work was supervised and the findings were recorded by a Geotechnical Technician.

The field work was supervised and the findings were recorded by a Geotechnical Technician. The ground elevation at each of the present borehole location was obtained using the Global Navigation Satellite System (GNSS). All boreholes and monitoring well locations are shown on the Borehole and Monitoring Well Location Plan, Drawing No. 1.

4.0 SUBSURFACE CONDITIONS

The investigation revealed that beneath a topsoil veneer, or beneath the pavement structure with a layer of earth fill along Wellington Road 19; the site is underlain by strata of sandy silt till, silt and sandy silt.

Detailed descriptions of the encountered subsurface conditions from the boreholes are presented on the Borehole Logs, comprising Figures 1 to 10, inclusive. The revealed stratigraphy is plotted on the Subsurface Profiles, Drawing No. 2. The engineering properties of the disclosed soils are discussed herein.

4.1 Topsoil

A layer of topsoil, approximately 15 to 30 cm in thickness, was contacted in all boreholes except Boreholes 9 and 10 located along Wellington Road 19. Thicker topsoil may be contacted in areas beyond the borehole locations, particularly in low-lying areas.

4.2 Pavement Structure

Boreholes 9 and 10 were carried out along Wellington Road 19, which consists of asphalt, approximately 50 mm to 180 mm thick, overlying granular fill, approximately 400 mm to 750 mm in thickness.

4.3 Earth Fill

Beneath the pavement structure on Wellington Road 19, a layer of earth fill was contacted in Boreholes 9 and 10, extending to depths of 1.4 m to 1.5 m below the existing ground surface. It consists of a mixture of sandy silt or gravelly sand with occasional organics inclusion. Deeper earth fill may exist beyond the borehole locations, especially in the vicinity of existing underground utilities.

One must be aware that the samples retrieved from the borehole may not be truly representative of the geotechnical quality of the earth fill. The extent of the fill and the quality of the fill can be assessed by laboratory testing and/or test pits if necessary.

4.4 Sandy Silt Till

The sandy silt till predominates the soil stratigraphy within the investigated depth of all boreholes except Boreholes 1, 2, 4 and 6, generally along First Line and Wellington Road 19. It consists of a random mixture of soil particle sizes ranging from clay to gravel with the silt and sand being the predominant fractions. Grain size analyses were performed on 2 representative samples of the sandy silt till; the results are plotted on Figure 11.

The recorded ‘N’ values range from 15 to over 100, with a median of 56 blows per 30 cm of penetration, indicating the sandy silt till is compact to very dense, being generally very dense in compactness. The natural water content values range from 8% to 16%, with a median of 10%, indicating that the sandy silt till is generally in moist to very moist, generally moist condition.

The engineering properties of the sandy silt till are given below:

- High frost susceptibility and high soil-adfreezing potential.
- Low water erodibility.
- In excavation, the sandy silt till will be relatively stable in steep cut and may slough under prolonged exposure as water seepage percolates from the sand or silt seams in the till.

4.5 Silt

The native silt deposit was contacted at various depths in Boreholes 1, 3, 4 and 5. It contains traces of sand and clay. Grain size analysis was performed on 3 representative samples of the silt; the results are plotted on Figure 12.

The recorded ‘N’ values range from 4 to 21, with a median of 12 blows per 30 cm of penetration, indicating the silt is very loose to compact, generally being compact in compactness. The surficial silt deposit is weathered, generally extending to a depth of 0.6 to 1.2 m below the prevailing ground surface.

The natural water content values of the silt deposit range from 16% to 28%, with a median of 20%, indicating that the silt is in a very moist to wet, generally wet condition.

The engineering properties of silt are listed below:

- High frost susceptibility, with high soil-adfreezing potential.
- High water erodibility; it is susceptible to migration through small openings, particularly under seepage pressure.
- The wet silt is susceptible to impact disturbance, which will induce a build-up of pore pressure, resulting in soil dilation and a reduction in shear strength.
- In excavation, the silt will slowly slump, run with groundwater seepage, and boil under a piezometric head of 0.4 m.

4.6 <u>Sandy Silt</u>

The native sandy silt deposit was contacted at various depths in Boreholes 1 to 8, inclusive. The sandy silt contains a trace of clay. Grain size analysis was performed on 2 representative samples of the sandy silt; the results are plotted in Figure 13.

The recorded ‘N’ values range from 0 (i.e. weight of hammer) to 33, with a median of 15 blows per 30 cm of penetration, indicating the sand is very loose to dense, being generally compact in compactness. Low ‘N’ values of 0 and 2 blows observed in Borehole 2, was due to disturbance from the hydrostatic pressure.

The natural water content values range from 10% to 27%, with a median of 19%, indicating that the sandy silt is generally in a moist to wet, generally wet condition.

The engineering properties of the sandy silt are presented below:

- High frost susceptibility, with high soil-adfreezing potential.
- High water erodibility; its fine particles are susceptible to migration through small openings, particularly under seepage pressure.
- The strength of the wet silt is susceptible to impact disturbance, which will induce a build-up of pore pressure within the soil mantle, resulting in soil dilation and a reduction in shear strength.

- In excavation, the silt will slough readily, run with seepage and boil under a piezometric head of 0.3 m

4.7 Compaction Characteristics of the Revealed Soils

The obtainable degree of compaction is primarily dependent on the soil moisture and, to a lesser extent, on the type of compactor used and the effort applied. As a general guide, the typical water content values of the revealed soils for Standard Proctor compaction are presented in Table 1.

Table 1 - Estimated Water Content for Compaction

Soil Type	Determined Natural Water Content (%)	Water Content (%) for Standard Proctor Compaction	
		100% (optimum)	Range for 95% or +
Earth Fill	6 to 14 (median 10)	12	9 to 15
Sandy Silt Till	8 to 16 (median 10)	13	8 to 17
Silt	16 to 28 (median 20)	13	8 to 17
Sandy Silt	10 to 27 (median 19)	12	8 to 16

* The above values are provided as a guideline. Standard Proctor Tests must be performed on bulk samples collected from site during construction prior to backfill and compaction.

5.0 GROUNDWATER CONDITION

The boreholes were checked for the presence of groundwater on the completion of drilling. The groundwater levels observed on borehole completion are summarized in Table 2.

Table 2 - Groundwater Levels on Completion

Borehole No.	Ground Elevation (m)	Borehole Depth (m)	Monitoring Well Depth (m)	Groundwater Levels on Completion	
				Depth (m)	Elevation (m)
1	425.5	6.6	6.1	1.8	423.7
2	427.1	6.6	4.6	2.1	425.0
3	423.7	6.6	6.1	Dry on completion	
4	424.3	6.6	5.0	0.9	423.4
5	420.5	6.2	6.1	1.2	419.3
6	425.7	6.6	6.1	5.5	420.2
7	419.1	6.6	No Well	4.6	414.5

Table 2 - Groundwater Levels on Completion (Cont'd)

BH No.	Ground Elevation (m)	Borehole Depth (m)	Monitoring Well Depth (m)	Groundwater Levels on Completion	
				Depth (m)	Elevation (m)
8	419.3	8.0	7.6	7.3	412.0
9	422	7.9	7.6	Dry on completion	
10	419.7	7.7	7.6	Dry on completion	

The observed groundwater level in 7 of the 10 boreholes ranges from 0.9 to 7.3 m below the prevailing ground surface, or between El. 412.0 m and El. 425.0 m. The remaining 3 boreholes remained dry and open on completion of the boreholes. The groundwater level on the property is subject to seasonal fluctuations.

Groundwater level was recorded in the monitoring wells on 2 occasions and summarized in Table 3.

Table 3 - Groundwater Levels in Monitoring Wells

BH/MW No.	Ground El. (m)	Well Depth (m)	January 24, 2025		July 24, 2025	
			Depth (m)	El. (m)	Depth (m)	El. (m)
1	425.5	5.9	0.3	425.2	0.2	425.3
2	427.1	4.5	1.1	426.0	0.8	426.3
3	423.7	5.7	0.9	422.8	0.2	423.5
4	424.3	4.0	0.0	424.3	-0.1*	424.4
5	420.5	5.7	0.4	420.1	0.2	420.3
6	425.7	5.8	2.9	422.9	2.1	423.7
8	419.3	7.3	0.4	418.9	0.5	418.8
9	422.0	7.6	0.9	421.1	0.9	421.1
10	419.8	7.6	1.4	418.3	1.3	418.4

* Above ground level

The groundwater level measured in the monitoring wells ranges from 0.1 m above the ground surface to 2.9 m below the ground surface, or between El. 418.3 m and El. 426.3 m. Further groundwater monitoring data and the groundwater level interpretation will be presented in the hydrogeological assessment under separate cover.

6.0 DISCUSSION AND RECOMMENDATIONS

The investigation revealed that beneath a topsoil veneer within the farm land, or beneath the pavement structure with a layer of earth fill within the existing road; the site is underlain by strata of sandy silt till, silt and sandy silt.

The groundwater level was measured in the monitoring wells on 2 occasions. The recorded water level ranges from 0.1 m above the ground surface to 2.9 m below the ground surface, or between El. 418.3 m and El. 426.3 m.

A review of the Draft Proposed Land Use Plan indicates that the land will be subdivided into residential lots and blocks which will be provided with municipal services and roadways with blocks reserved for park and stormwater management facility. A new external service connection will also be completed along Wellington Road 19. The geotechnical findings which warrant special consideration are presented below:

1. The topsoil must be removed from the area of construction. It can be stockpiled and reused in landscaping areas only. Any surplus will have to be disposed off-site.
2. The cavity of any demolished structure must be properly backfilled with compacted inorganic soil prior to site grading. All debris must be removed off-site.
3. The existing earth fill and weathered soils, in their present state, are not suitable to support any structure sensitive to moment. It must be subexcavated, sorted free of organics and other deleterious material before reusing for structural backfill or engineered fill construction. If they cannot be sorted, they must be removed off site.
4. Where the site will be graded with additional fill, the earth fill can be constructed in an engineered manner for foundation, site services and pavement construction.
5. The proposed structures can be constructed on conventional spread and strip footings founded on the undisturbed native soils or on engineered fill.
6. A Class ‘B’ bedding, consisting of compacted 19-mm Crusher Run Limestone (CRL) or equivalent, is recommended for the construction of the underground services, where erodible soils or extensive dewatering is required, a Class ‘A’ concrete bedding can be considered.
7. Any excavation must be carried out in accordance with the O. Reg. 213/91.

The recommendations appropriate for the project described in Section 2.0 are presented herein. One must be aware that the subsurface conditions may vary between boreholes. Should this become apparent during construction, a geotechnical engineer must be consulted to determine whether the following recommendations require revision.

6.1 Site Preparation

Topsoil must be stripped for site development and can be used for landscaping purpose only. Any surplus must be removed off-site. Any existing structures must be demolished and the cavities should be properly backfilled with inorganic soil, compacted to engineered fill specifications.

Where additional fill is required for site grading, the earth fill should be constructed in an engineered manner for foundation support, pavement and underground services constructions. The engineering requirements for a certifiable fill are presented below:

1. After removal of topsoil and unsuitable material, the exposed soil subgrade must be inspected and proof-rolled prior to any fill placement. Any badly weathered or soft soils should also be subexcavated to competent ground. The excavated material must be sorted free of topsoil inclusions and deleterious materials, if any, aerated before reusing for engineered fill construction.
2. Inorganic soils must be used for engineered fill construction, and they must be uniformly compacted in 20 cm thick lifts to at least 98% Standard Proctor Maximum dry density (SPMDD) up to the proposed finished grade. The soil moisture must be properly controlled near the optimum. If the foundations are to be built soon after the fill placement, the densification process for the engineered fill must be increased to 100% SPMDD.
3. If the engineered fill is compacted with the moisture content on the wet side of the optimum, the underground services and pavement construction should not begin until the pore pressure within the fill mantle has completely dissipated. This must be further assessed at the time of the engineered fill construction.
4. If imported fill is to be used, it should be inorganic soils, free of deleterious or any material with environmental issue (contamination). Any potential imported earth fill from off site must be reviewed for geotechnical and environmental quality by the appropriate personnel as authorized by the developer or agency, before it is hauled to the site.
5. The engineered fill must not be placed during the period where freezing ambient temperatures occur either persistently or intermittently. This is to ensure that the fill is free of frozen soils, ice and snow.
6. The fill operation must be supervised and monitored on a full-time basis by a technician under the direction of a geotechnical engineer.
7. The engineered fill envelope and finished elevations must be clearly and accurately defined in the field, and they must be precisely documented.

8. The footing and underground services subgrade must be inspected by the geotechnical consulting firm that supervised the engineered fill placement. This is to ensure that the foundations are placed within the engineered fill envelope, and the integrity of the fill has not been compromised by interim construction, environmental degradation and/or disturbance by the footing excavation.
9. Any excavation carried out in certified engineered fill must be reported to the geotechnical consultant who supervised the fill placement in order to document the locations of the excavation and/or to supervise reinstatement of the excavated areas to engineered fill status. If construction on the engineered fill does not commence within a period of 2 years from the date of certification, the condition of the engineered fill must be assessed for re-certification.
10. Foundations founded on engineered fill must be reinforced and designed by a structural engineer to allow distribution of stress induced by the abrupt differential settlement in engineered fill.

6.2 **Foundations**

The property will be subdivided into lots and blocks for a residential development. With consideration of the groundwater level and saturated silt in areas, it is prudent that the basement of the residential dwellings must be found at least 1.0 m above the recorded groundwater level to allow conventional basement construction.

These structures with basement placed at least 1.0 m above the groundwater can be supported on conventional footings founded on engineered fill or sound native soils. The recommended soil bearing pressures for the design of footings are provided below:

- Maximum Soil Bearing Pressure, at Serviceability Limit State (SLS) = 75 to 150 kPa
- Factored Ultimate Bearing Pressure, at Ultimate Limit State (ULS) = 120 to 225 kPa

The total and differential settlements of the conventional spread and strip footings, designed for the bearing pressure at SLS, are estimated to be 25 mm and 20 mm, respectively.

It should be noted that the above values are provided for general guidance for the design of foundations for the residential dwellings. Additional review of the grading plan and underside of footings should be carried out at later stage for verification of design bearing pressure as necessary.

The footing subgrade must be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer, to assess its suitability for bearing the designed foundations.

Footings exposed to weathering, or in unheated areas, should have at least 1.4 m of earth cover for protection against frost action, or must be properly insulated.

The foundations should meet the requirements specified in the latest Ontario Building Code, and the structure should be designed to resist an earthquake force using Site Classification 'D' (stiff soil).

6.3 Basement Structures

The proposed basement should be at least 1.0 m above the stabilized groundwater level profile as established by the hydrogeologist on record.

The perimeter walls should be designed to sustain a lateral earth pressure calculated using the soil parameters stated in Table 6. Any applicable surcharge loads adjacent to the basement must also be considered in the wall design.

In conventional design of a basement, the foundation walls must be provided with perimeter subdrain at wall base, connected to a positive outlet. The subdrains should be encased in fabric filter and connected into a positive outlet. Details of the perimeter subdrains are illustrated on Drawing No. 3.

The basement floor subgrade should consist of sound native soils or engineered fill. The subgrade must be inspected prior to the placement of granular bedding. Any soft/weak subgrade encountered, it must be subexcavated and replaced with approved inorganic soils compacted to 98% SPMDD.

Where the basement is less than 1.0 m but remain at least 0.5 m above the stabilized groundwater level profile, an underfloor subdrain system should be provided beneath the basement slab, connected to a positive outlet. Details of underfloor subdrain system layouts are presented in Drawing No. 4.

6.4 Underground Services

The subgrade for the underground services should be founded on sound native soil or properly compacted inorganic earth fill. A Class 'B' bedding, consisting of 19-mm CRL or equivalent, is recommended for construction of the underground services. Where erodible wet silt subgrade is encountered or where extensive dewatering is required, a Class 'A' concrete bedding should be considered.

The pipe joints connecting into manholes and catch basins should be leak-proof or wrapped with an appropriate waterproof membrane to prevent the subgrade migration. Openings to subdrains and catch basins should be shielded with a fabric filter to prevent blockage by silting.

In order to prevent pipe floatation when the service trench is deluged with water, a soil cover with a thickness equal to the diameter of the pipe should be in place at all times after completion of the pipe installation.

All metal fittings for the underground services should be protected against soil corrosion. For estimation of anode weight requirements, the estimated electrical resistivity of the disclosed soils presented in Table 6 can be used. The proposed anode weight must meet the minimum requirement as specified by the Township standard.

6.5 **Backfilling in Trenches and Excavated Areas**

The backfill in service trenches should be compacted to at least 95% SPMDD in 20 cm layers, or the lift thickness should be determined by test strips. Below slab-on-grade and in the zone within 1.0 m below the pavement subgrade, the material should be compacted to at least 98% SPMDD with the water content at 2% to 3% drier than the optimum.

The in-situ native soils are generally suitable for 95% or + Standard Proctor compaction. Any wet soil will require aeration prior to compaction. Aeration can be achieved by spreading the wet soil thinly on the ground in the dry and warm weather. All soils must be sorted free of concentrated topsoil and organics inclusions, before aeration for reuse as structural backfill. The existing fill must be sorted free of topsoil inclusions and deleterious materials, if any, prior to its use as structural backfill.

When compacting the till on the dry side of the optimum, the compactive energy will frequently bridge over the chunks in the soil and be transmitted laterally into the soil mantle. Therefore, the lifts must be limited to 20 cm or less (before compaction). Boulders over 15 cm in size must be sorted and removed from the backfill.

In normal construction practice, the problem areas of settlement largely occur adjacent to manholes, catch basins, service crossings, foundation walls and columns. In areas which are inaccessible to a heavy compactor, sand backfill should be used for compaction with a smaller vibratory compactor.

One must be aware of the possible consequences during trench backfilling and exercise caution as described below:

- To backfill a deep trench, one must be aware that future settlement is to be expected, unless the sides is flattened to 2H:1V, and the lifts of the fill and its moisture content are stringently controlled; i.e., lifts should be no more than 20 cm (or less if the backfilling conditions dictate) and uniformly compacted to achieve at least 98% SPDD, with the moisture content on the wet side of the optimum. In confined areas where the desired slope cannot be achieved or the proper operation of a kneading-type roller cannot be facilitated, imported sand fill, which can be appropriately compacted by using a smaller vibratory compactor, must be used.
- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is an open cut or is stabilized by a trench box, particularly in the sector close to the trench walls or the sides of the box. These sectors must be backfilled with sand and the compaction must be carried out diligently prior to the placement of the backfill above this sector, i.e., in the upper sloped trench section. This measure is necessary in order to prevent consolidation of inadvertent voids and loose backfill which will compromise the compaction of the backfill in the upper section.
- In areas where groundwater movement is expected in the pipe bedding or trench backfill mantle, anti-seepage collars (OPSS 802.095) should be provided.
- When construction is carried out in freezing weather, frozen soil layers may inadvertently be mixed with the structural trench backfill. Should the in situ soils have a water content on the dry side of the optimum, it would be impossible to wet the soils due to the freezing condition, rendering difficulties in obtaining uniform and proper compaction. Furthermore, the freezing condition will prevent wetting of the backfill or when it is required, such as when the trench box is removed. The above will invariably cause backfill settlement in the next few years.
- In areas where the underground services construction is carried out during winter months, prolonged exposure of the trench walls will result in frost heave within the soil mantle of the walls. This may result in some settlement as the frost recedes, and repair costs will be incurred prior to final surfacing of the new pavement.

6.6 **Pavement Design**

The recommended pavement design for local and collector residential roads is presented in Table 4.

Table 4 - Pavement Design (Town Road)

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL3
Asphalt Binder Local Collector	 50 60*	HL4
Granular Base	150	Granular 'A'
Granular Sub-base Local Collector	 450 600	Granular 'B'

* If the road is designated as a transit route, the asphalt binder must be thickened to 100 mm.

In preparation of pavement subgrade, all topsoil and compressible material should be removed. The final subgrade must be proof-rolled. Any soft spot as identified must be rectified by subexcavation and replacing with selected dry inorganic material. The subgrade within 1.0 m below the underside of the granular sub-base must be compacted to at least 98% SPMDD, with the water content at 2% to 3% drier than its optimum.

All the granular bases should be compacted in 150 to 200 mm lifts to 100% SPMDD.
The pavement subgrade will suffer a strength regression if water is allowed to saturate the mantle. The following measures should, therefore, be incorporated in the construction procedures and road design:

- The subgrade should be properly crowned and smooth-rolled to allow interim precipitation to be properly drained prior to pavement construction.
- Lot areas adjacent to the roads should be properly graded to prevent ponding of large amounts of water. Otherwise, the water will seep into the subgrade mantle and induce a regression of the subgrade strength, with costly consequences for the pavement construction.
- Fabric filter-encased curb subdrains connecting to a positive outlet of catch basin, will be required on both sides of the roadway.
- If the pavement is to be constructed during wet seasons and extensively soft subgrade occurs, the granular sub-base should be thickened in order to compensate for the inadequate strength of the subgrade. This can be assessed during construction.

Wellington Road 19

Following the completion of the services installing along Wellington Road 19, the road is expected to be restored. The pavement structure should match the existing pavement along the roadway. Otherwise, if a new design is required, the recommended pavement design is presented in Table 5.

Table 5 - Pavement Design (County Road)

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	50	HL1
Asphalt Binder	100	HL8 (2 lifts)
Granular Base	150	Granular 'A'
Granular Sub-base	450	Granular 'B'

At the transition between the existing pavement structure and the new structure, the surface and binder courses must overlap the existing pavement to avoid water penetration at the pavement joint. A 300 mm longitudinal step joint should be provided to ensure proper transition when paving the new lane along the road.

6.7 Stormwater Management Facilities

At the time of report preparation, detailed design of the SWM facilities were not available for review; however, it is understood that SWM facilities are proposed in the southeast portion of the property. A summary of the subsurface condition at each of the proposed SWM block are summarized in Table 6.

Table 6 - Summary of Subsurface Condition at SWM Block

Borehole No.	Revealed Soils	Highest Groundwater Levels	
		Depth (m)	El (m)
8	Sandy Silt and Sandy Silt Till	0.4	418.9

The estimated coefficient of permeability for revealed soils can be found in Table 6. Subject to the design of the SWM pond, where the bottom and sides of the pond consist of significant sand or silt deposit, an impervious liner (clay liner or a geosynthetic clay liner) will be required for water retention purposes. Detailed design for the SWM pond should be further reviewed once the design becomes available.

Where a clay liner is proposed, it should consist of inorganic material having at least 30% in clay content. The liner thickness must be reviewed based on the proposed pond bottom and the groundwater level in the area. Where the source of clay is not available, geosynthetic clay liner (GCL) should be used instead. A ballast should be placed on top of the GCL to hold the GCL in place. The thickness of the ballast should match the thickness of the clay liner to withstand the uplift pressure.

The clay should be compacted to 98% SPMDD in lifts no more than 20 cm thick, while the ballast should be compacted in accordance with the GCL's manufacturer or supplier specifications. Where lighter material is to be used for liner construction, the thickness of the clay/ballast must be increased accordingly.

The side slopes of the SWM facility should be designed in accordance with the 2002 Stormwater Management Design Manual prepared by Ministry of Environment.

Where earth berm is proposed around the SWM facility, topsoil must be removed prior to construction. The subgrade must be proof-rolled before placement of earth fill for the berm. Selected on site material, free of organics, can be used for the berm compacted to 98% SPMDD in 20 cm layers.

All exposed side slopes must be vegetated and/or sodded to prevent surface erosion.

Where inlet, outlet and control structures are proposed, they should be designed according to the recommendations in Sections 6.2.

It is recommended that additional review must be performed once the design of the SWM facilities is available.

6.8 Soil Parameters

The recommended soil parameters for the project design are given in Table 7.

Table 7 - Soil Parameters

Unit Weight and Bulk Factor	**Unit Weight γ (kN/m^3)**		**Estimated Bulk Factor**	
	Bulk	**Submerged**	**Loose**	**Compacted**
Earth Fill/Weathered Soils	20.5	10.5	1.25	1.00
Silty Silt Till	22.5	12.5	1.30	1.05
Sandy Silt	20.5	10.8	1.20	1.00
Silt	21.0	11.0	1.20	1.00

Table 7 - Soil Parameters (Cont'd)

Lateral Earth Pressure Coefficients	**Active K_a**	**At Rest K_o**	**Passive K_p**
Earth Fill	0.39	0.56	2.56
Sandy Silt Till	0.32	0.48	3.12
Sandy Silt/Silt	0.33	0.50	3.00
Estimated Coefficient of Permeability (K) and Percolation Time (T)		**K (cm/sec)**	**T (min/cm)**
Sandy Silt Till		10^{-4} to 10^{-6}	12 to 50
Sandy Silt		10^{-4}	12
Silt		10^{-4} to 10^{-5}	12 to 20
Estimated Electrical Resistivity		**ohm·cm**	
Sandy Silt Till		3500 ohm.cm	
Silt		5000 ohm.cm	
Sandy Silt		5500 ohm.cm	
Coefficients of Friction			
Between Concrete and Granular Base			0.50
Between Concrete and Sound Native Soils			0.35
Maximum Allowable Soil Pressure (SLS) For Thrust Block Design			
Engineered Fill and Sound Native Soils			75 kPa

6.9 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. The types of soils are classified in Table 8.

Table 8 - Classification of Soils for Excavation

Material	Type
Sandy Silt Till	2
Earth Fill, Weathered Soils, drained Silt and Sand	3
Saturated Silt and Sand	4

Excavation into the till containing boulders may require extra effort and the use of a heavy-duty excavator.

The groundwater yield from the sandy silt till may be small and limited and can be controlled by pumping from sumps. However, the yield from the silt and sand will likely be moderate to appreciable and persistent. Vigorous pumping from closely spaced sumps or, if necessary, the use of a well-point dewatering system, should be considered. Further the dewatering requirement will be presented in the hydrogeological assessment under separate cover.

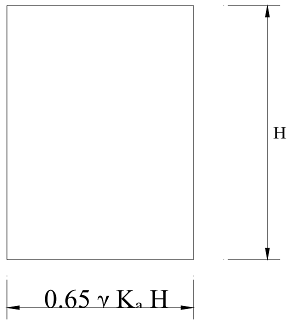
External Servicing

It is understood that a sanitary sewer and watermain connection will be carried out along Wellington Road 19 from an existing connection at the watercourse crossing to the development.

If the services are to be cut close to existing underground services. One must be aware that the backfill for the existing services is amorphous in structure, and is susceptible to sloughing and sudden side collapse. Extreme caution must be exercised when excavating the existing backfilled services trenches; the sides of the cuts in the backfill will readily slough and may collapse suddenly.

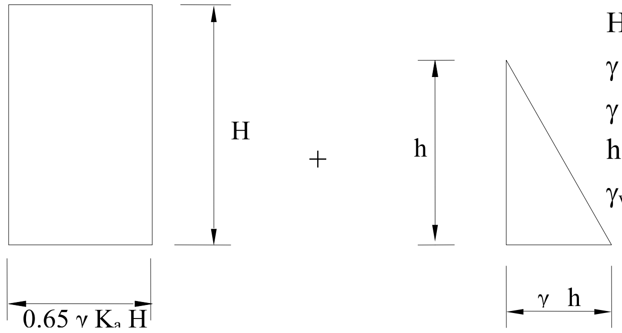
Where safe sloped excavation is not feasible, or in areas where a vertical cut is necessary, the use of trench boxes will be required. The recommended lateral earth pressure distribution for the revealed soils is given in Diagrams 1 and 2:

Diagram 1 - Lateral Earth Pressure (Drained Earth Fill, Sandy Silt Till and Silts)



H - Height of Pit in metres
γ - Bulk Density
K_a- Active Lateral Earth Pressure
refer to Soil Parameter Section

Diagram 2 - Lateral Earth Pressure (Silts below groundwater)



H - Height of Pit in metres
γ - See Soil Parameter Section (Bulk)
γ - See Soil Parameter Section (Submerged)
h - Height of groundwater level
γ_w - 9.8 kN/m^3

In calculating the lateral earth pressure for the shoring structure, the soil parameters are provided in the soil parameter table below. The soils above the trench box must be cut at 1.5 Horizontal (H):1 Vertical (V). The stability of adjacent structures and utilities should also be considered in the excavation.

In order to provide a stable subgrade for construction, the groundwater should be depressed to at least 1.0 m below the subgrade. The appropriate method of dewatering should be determined by a test pit program or test pumping to be carried out by a contractor prior to tendering and construction of the project when the intended bottom of excavation is determined. Additional recommendations will be presented in the hydrogeological assessment, to be presented under separate cover.

Prospective contractors must be asked to assess the in situ subsurface conditions for soil cuts by digging test pits to at least 1.0 m below the intended bottom of the excavation. These test pits should be allowed to remain open for a few hours to assess the stability and trenching conditions.

7.0 **LIMITATIONS OF REPORT**

This report was prepared by Soil Engineers Ltd. for the account of RBS & EJS Fergus G.P. Inc., and for review by its designated consultants and government agencies. Use of this report is subject to the conditions and limitations of the contractual agreement.

The material in the report reflects the judgement of Poh Fung Kwok, M.Sc. and Kelvin Hung, P.Eng., in light of the information available to it at the time of preparation. Any use which a Third Party makes of this report, 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 report.

SOIL ENGINEERS LTD.

Poh Fung Kwok, M.Sc.

LICENSED PROFESSIONAL ENGINEER
5/22/26
K. W. K. HUNG
100124295
KH
PROVINCE OF ONTARIO

Kelvin Hung, P.Eng.
PFK/KH

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

Standard Penetration Resistance or 'N' Value:

The number of blows of a 63.5 kg hammer falling from a height of 76 cm required to advance a 51 mm outer diameter drive open sampler 30 cm into undisturbed soil, after an initial penetration of 15 cm.

Plotted as '○'

Dynamic Cone Penetration Resistance:

A continuous profile showing the number of blows per each 30 cm of penetration of a 51 mm diameter, 90° point cone driven by a 63.5 kg hammer falling from a height of 76 cm.

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/30 cm)	Compactness
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
> 50	very dense

Cohesive Soils:

Undrained Shear Strength (kPa)	'N' (blows/30 cm)	Consistency
<12	<2	very soft
12 to <25	2 to <4	soft
25 to <50	4 to <8	firm
50 to <100	8 to <15	stiff
100 to 200	15 to 30	very stiff
>200	>30	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

METRIC CONVERSION FACTORS

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

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JOB NO.: 2603-S021

LOG OF BOREHOLE: 1

FIGURE NO.: 1

PROJECT DESCRIPTION: Proposed Residential Development

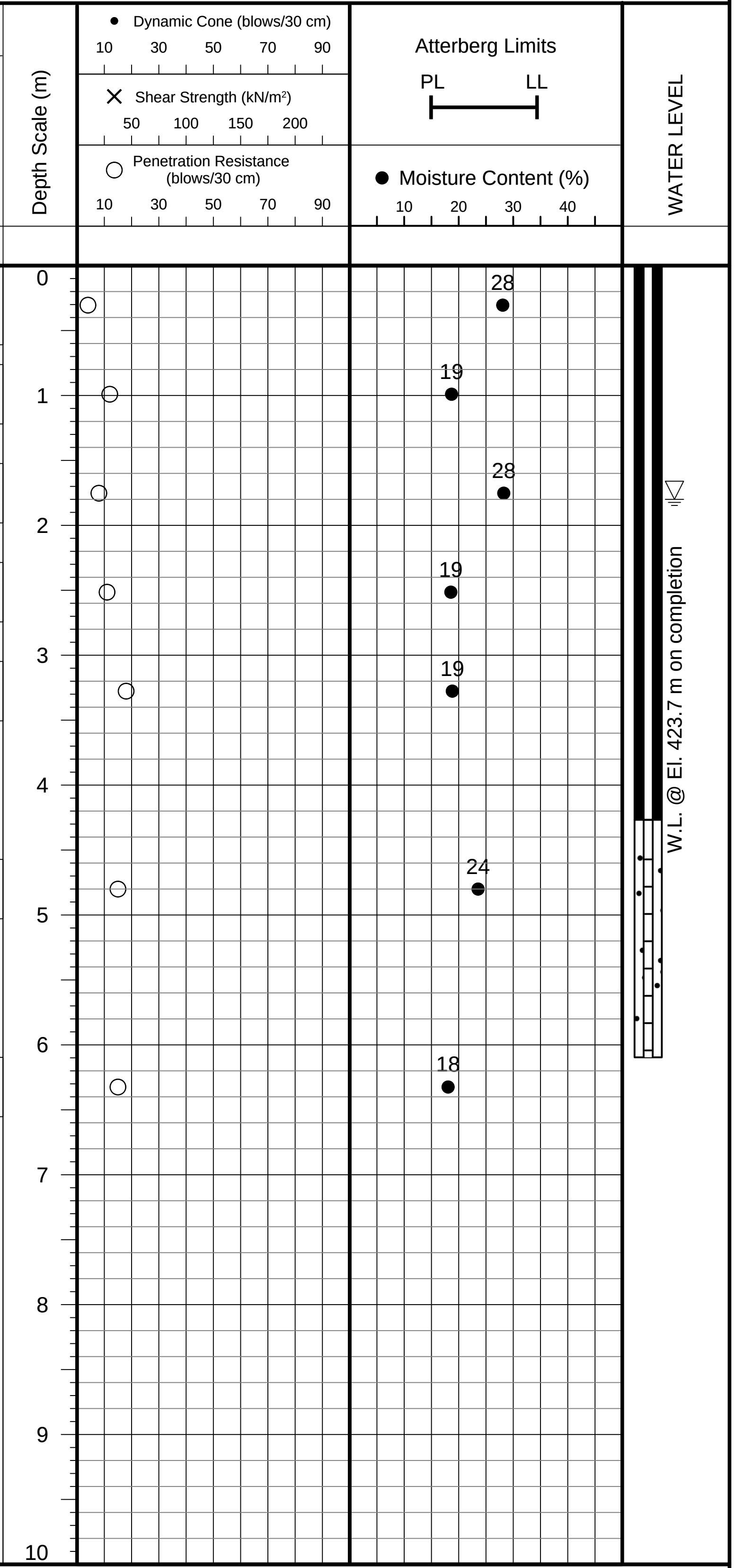
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 26, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES		
		Number	Type	N-Value
425.5	Ground Surface			
0.0	**18 cm TOPSOIL** Brown, very loose to compact **SILT** traces of clay and sand weathered	1	DO	4
		2	DO	12
	wet	3	DO	8
423.4 2.1	Brown, compact, wet **SANDY SILT** a trace of clay	4	DO	11
		5	DO	18
421.5 4.0	Compact, wet **SILT** traces of clay and sand	6	DO	15
	brown grey	7	DO	15
418.9 6.6	**END OF BOREHOLE**			

Installed 50 mm Ø PVC monitoring well
to 6.1 m with 1.5 m screen
Sand backfill from 4.3 to 6.1 m
Bentonite seal from 0.0 m to 4.3 m
Provided with monument casing



Soil Engineers Ltd.

JOB NO.: 2603-S021

LOG OF BOREHOLE: 10

FIGURE NO.: 10

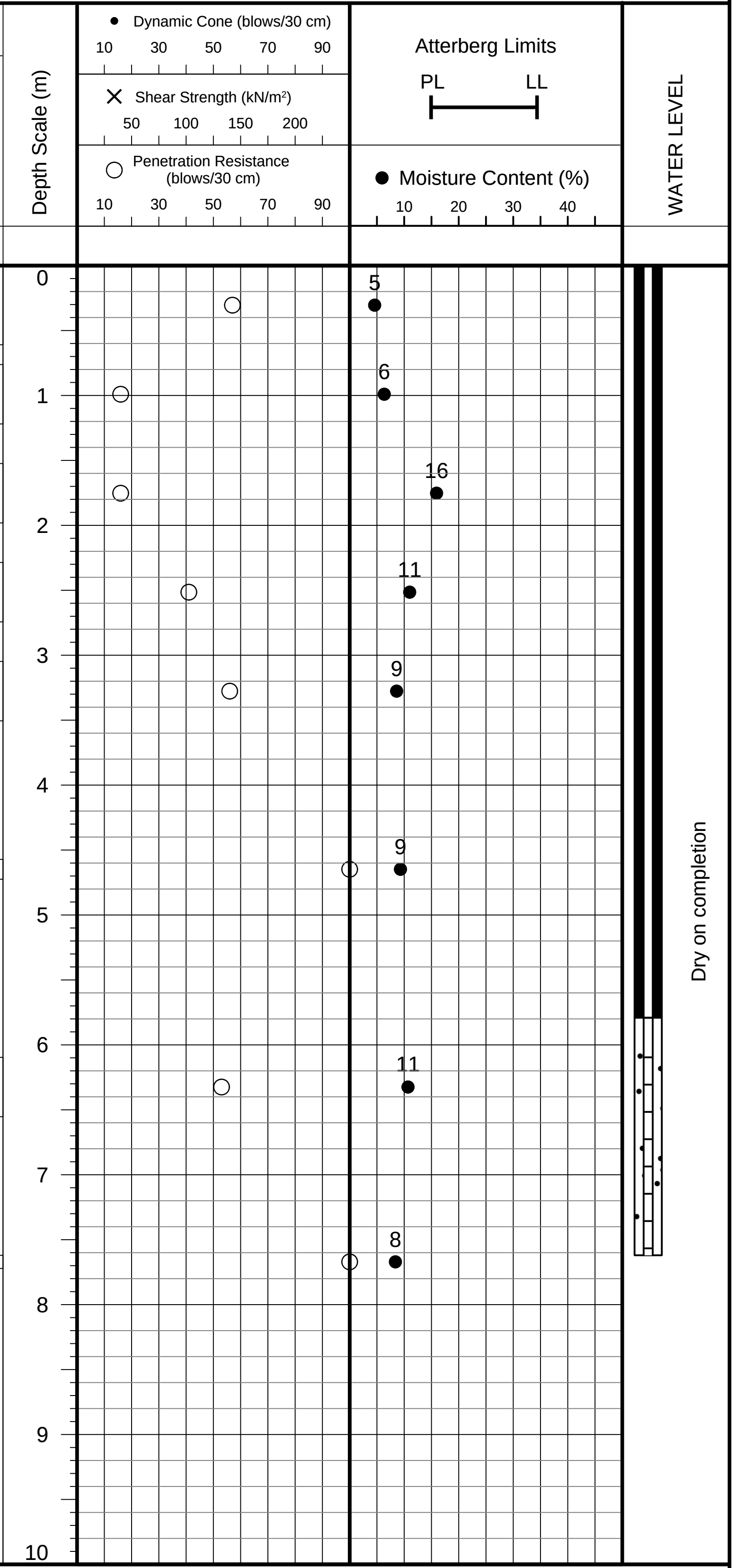
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 27, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
419.7	Pavement Structure			
0.0	**50 mm ASPHALT** **400 mm GRANULAR FILL**	1	DO	57
	Dark brown **EARTH FILL** gravelly sand organics inclusion	2	DO	16
418.3 1.4	Compact to very dense **SANDY SILT TILL** traces of clay and gravel	3	DO	16
		4	DO	41
	brown grey			
		5	DO	56
		6	DO	50/15
		7	DO	53
		8	DO	50/10
412.0 7.7	**END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 7.6 m with 1.5 m screen Sand backfill from 5.8 to 7.6 m Bentonite seal from 0.0 m to 5.8 m Provided with flushmount cover			



Soil Engineers Ltd.

JOB NO.: 2603-S021

LOG OF BOREHOLE: 2

FIGURE NO.: 2

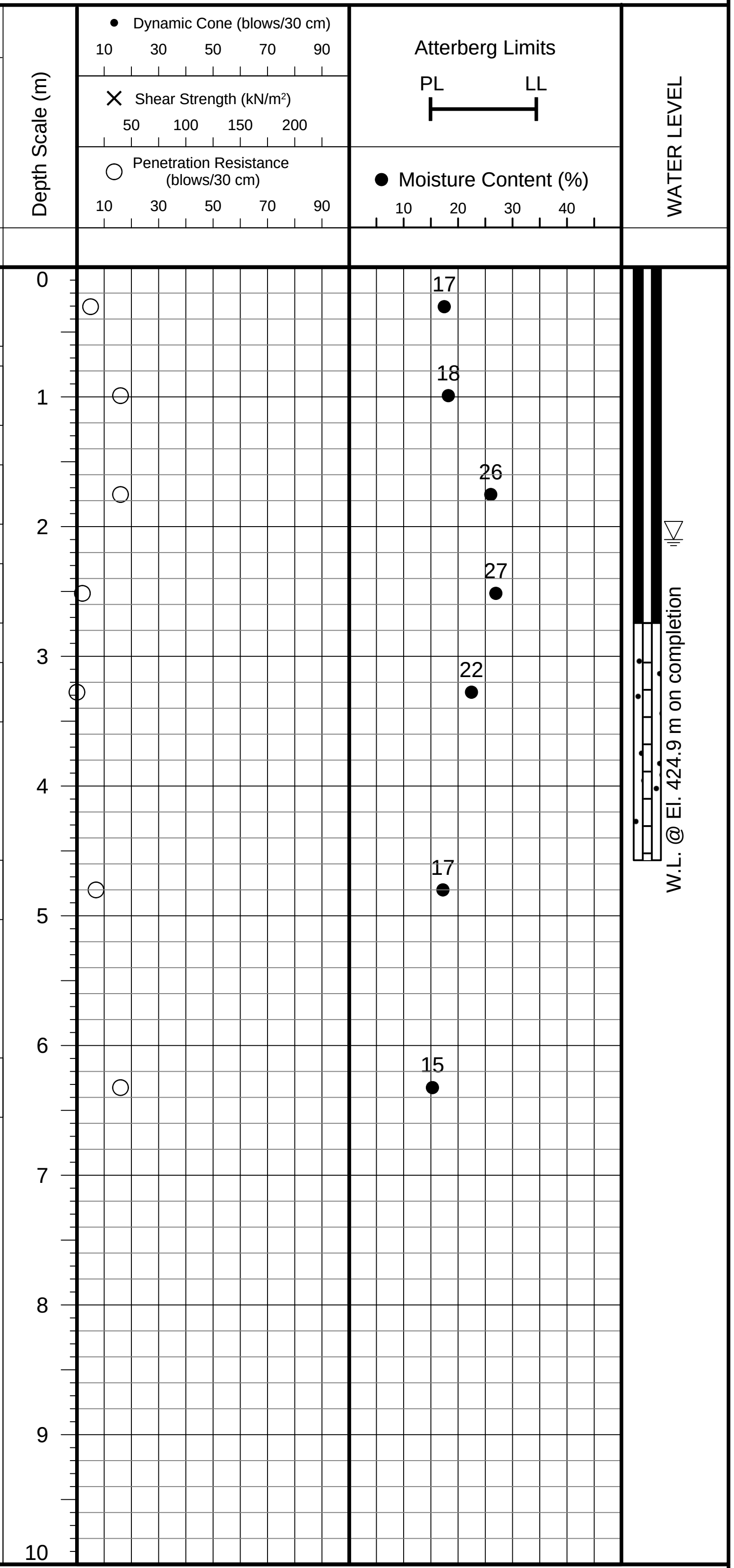
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 26, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
427.1	Ground Surface			
0.0	**15 cm TOPSOIL** Very loose to compact, wet **SANDY SILT** a trace of clay	1	DO	5
	weathered	2	DO	16
		3	DO	16
	dark brown brown	4	DO	2
	disturbed	5	DO	0
	brown grey	6	DO	7
420.5 6.6		7	DO	16
	END OF BOREHOLE Installed 50 mm Ø PVC monitoring well to 4.6 m with 1.5 m screen Sand backfill from 2.7 to 4.6 m Bentonite seal from 0.0 m to 2.7 m Provided with monument casing			



JOB NO.: 2603-S021

LOG OF BOREHOLE: 3

FIGURE NO.: 3

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

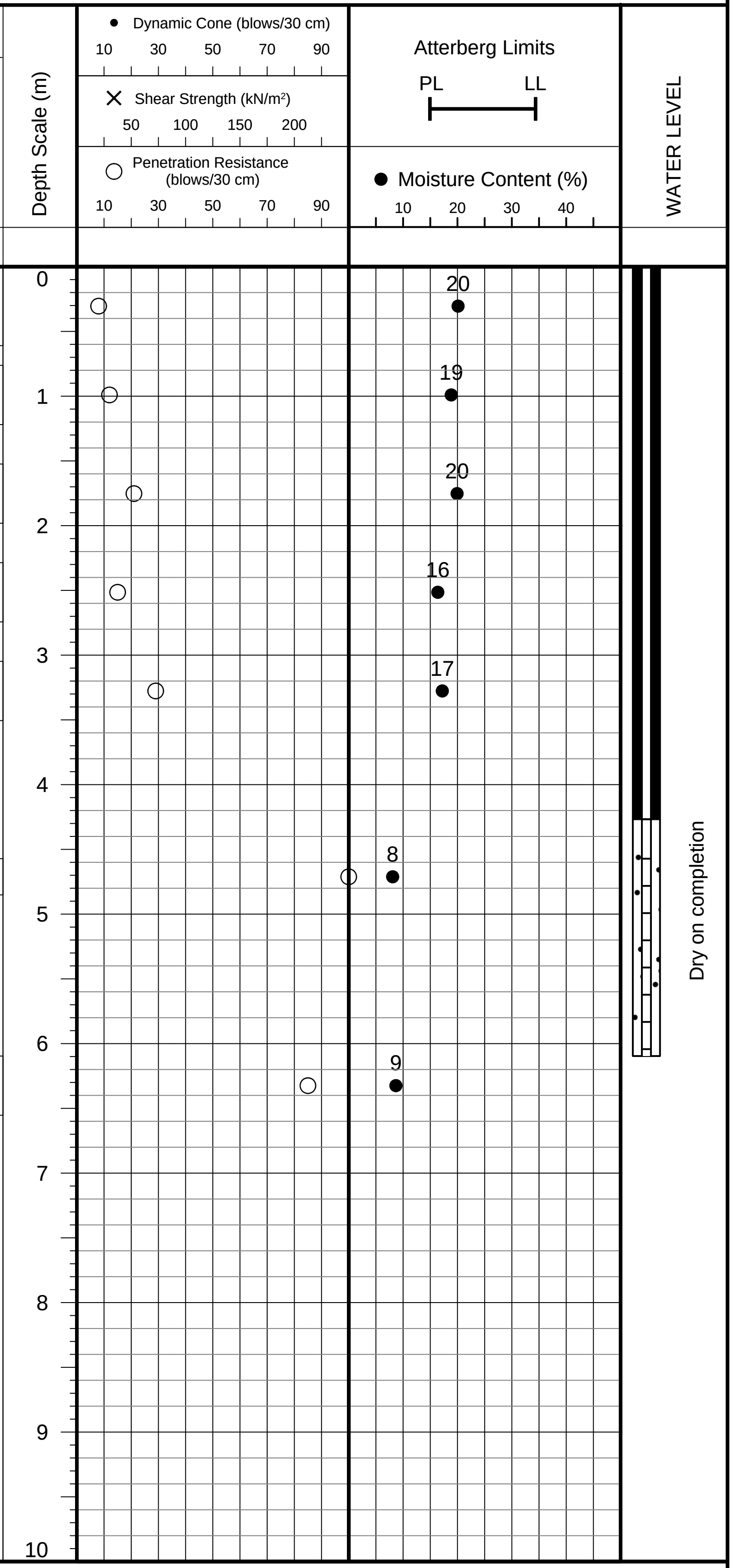
PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 25, 2026

El. (m) Depth (m)	SOIL DESCRIPTION
423.7	Ground Surface
0.0	**25 cm TOPSOIL**
	Brown, loose to compact, wet **SILT** traces of clay and sand weathered
421.6 2.1	Brown, compact, wet **SANDY SILT** a trace of clay
419.7 4.0	Grey, very dense **SANDY SILT TILL** traces of clay and gravel
417.1 6.6	**END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 6.1 m with 1.5 m screen Sand backfill from 4.3 to 6.1 m Bentonite seal from 0.0 m to 4.3 m Provided with monument casing

SAMPLES

Number	Type	N-Value
1	DO	8
2	DO	12
3	DO	21
4	DO	15
5	DO	29
6	DO	50/13
7	DO	85



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JOB NO.: 2603-S021

LOG OF BOREHOLE: 4

FIGURE NO.: 4

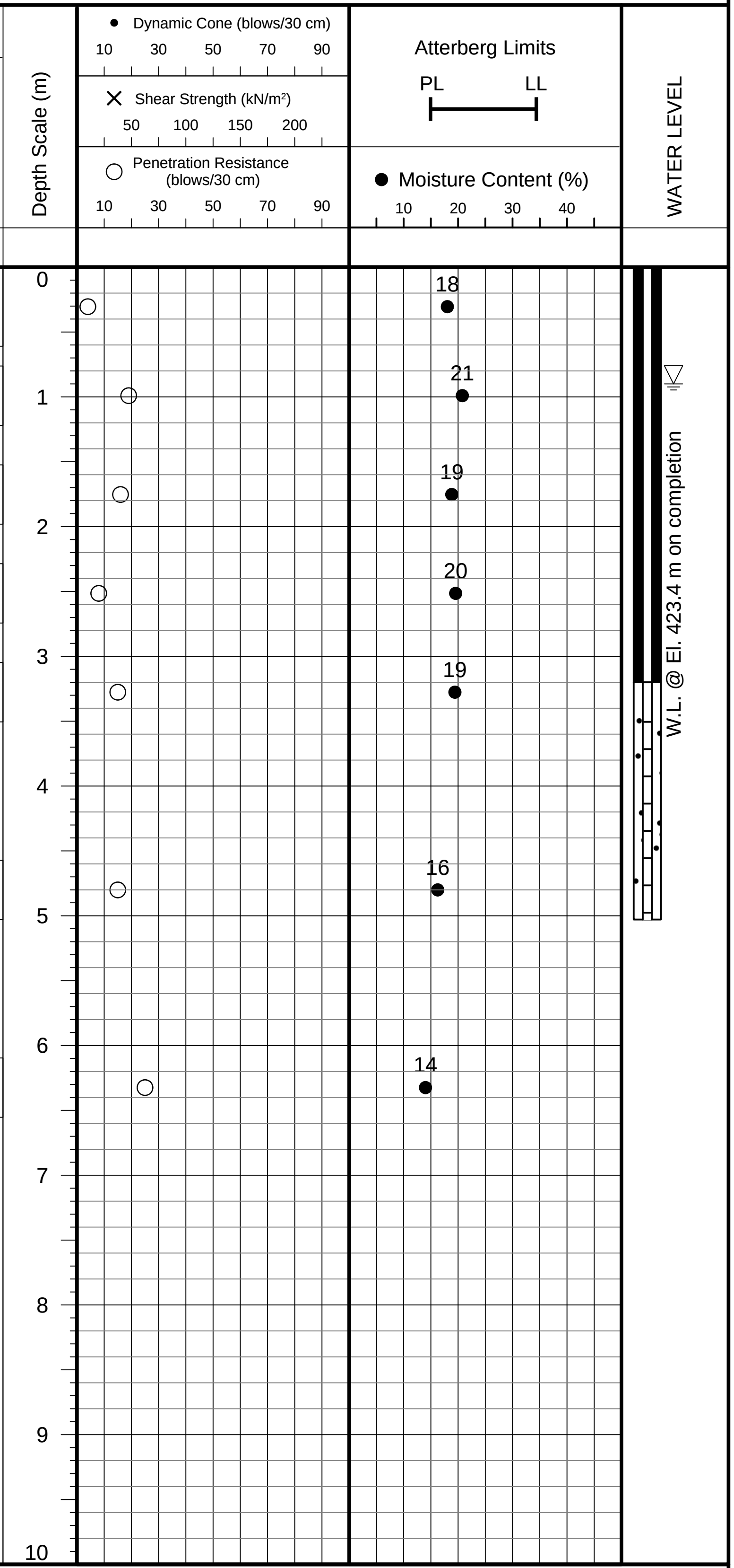
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 26, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
424.3	Ground Surface			
0.0	**18 cm TOPSOIL** Brown, very loose to compact **SILT** traces of clay and sand weathered	1	DO	4
		2	DO	19
423.1 1.2	Loose to compact, wet **SANDY SILT** a trace of clay	3	DO	16
		4	DO	8
		5	DO	15
		6	DO	15
	brown grey			
		7	DO	25
417.7 6.6	**END OF BOREHOLE** Installed 50 mm Ø PVC monitoring well to 5.0 m with 1.5 m screen Sand backfill from 3.2 to 5.0 m Bentonite seal from 0.0 m to 3.2 m Provided with monument casing			



Soil Engineers Ltd.

JOB NO.: 2603-S021

LOG OF BOREHOLE: 5

FIGURE NO.: 5

PROJECT DESCRIPTION: Proposed Residential Development

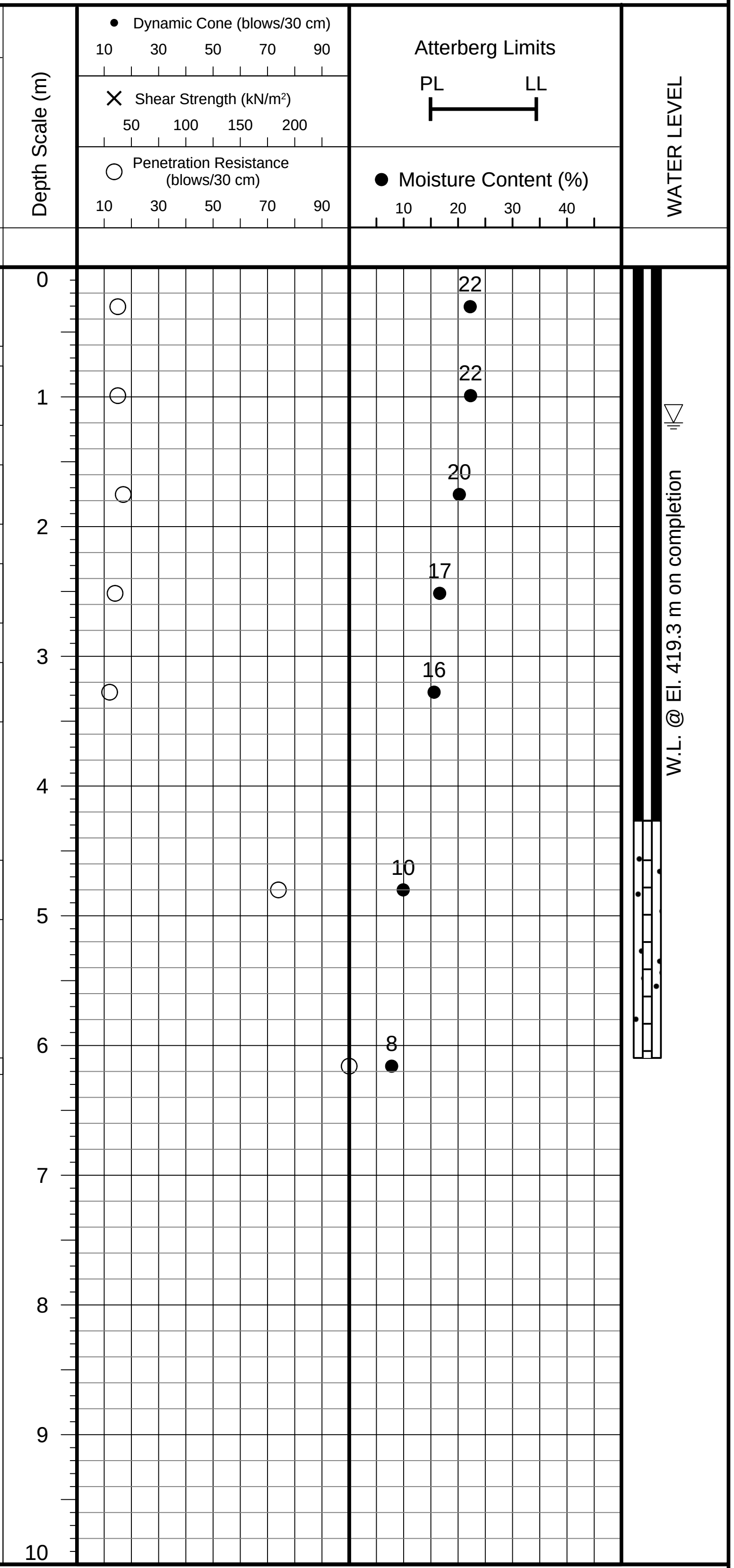
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 25, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
420.5	Ground Surface			
0.0	**25 cm TOPSOIL**			
	Brown, compact, wet **SANDY SILT** a trace of clay	1	DO	15
	weathered	2	DO	15
419.1 1.4	Compact, wet **SILT** traces of clay and sand	3	DO	17
		4	DO	14
	brown grey	5	DO	12
416.5 4.0	Grey, very dense **SANDY SILT TILL** traces of clay and gravel	6	DO	74
		7	DO	50/13
414.3 6.2	**END OF BOREHOLE**			

Installed 50 mm Ø PVC monitoring well
to 6.1 m with 1.5 m screen
Sand backfill from 4.3 to 6.1 m
Bentonite seal from 0.0 m to 4.3 m
Provided with monument casing



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JOB NO.: 2603-S021

LOG OF BOREHOLE: 6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

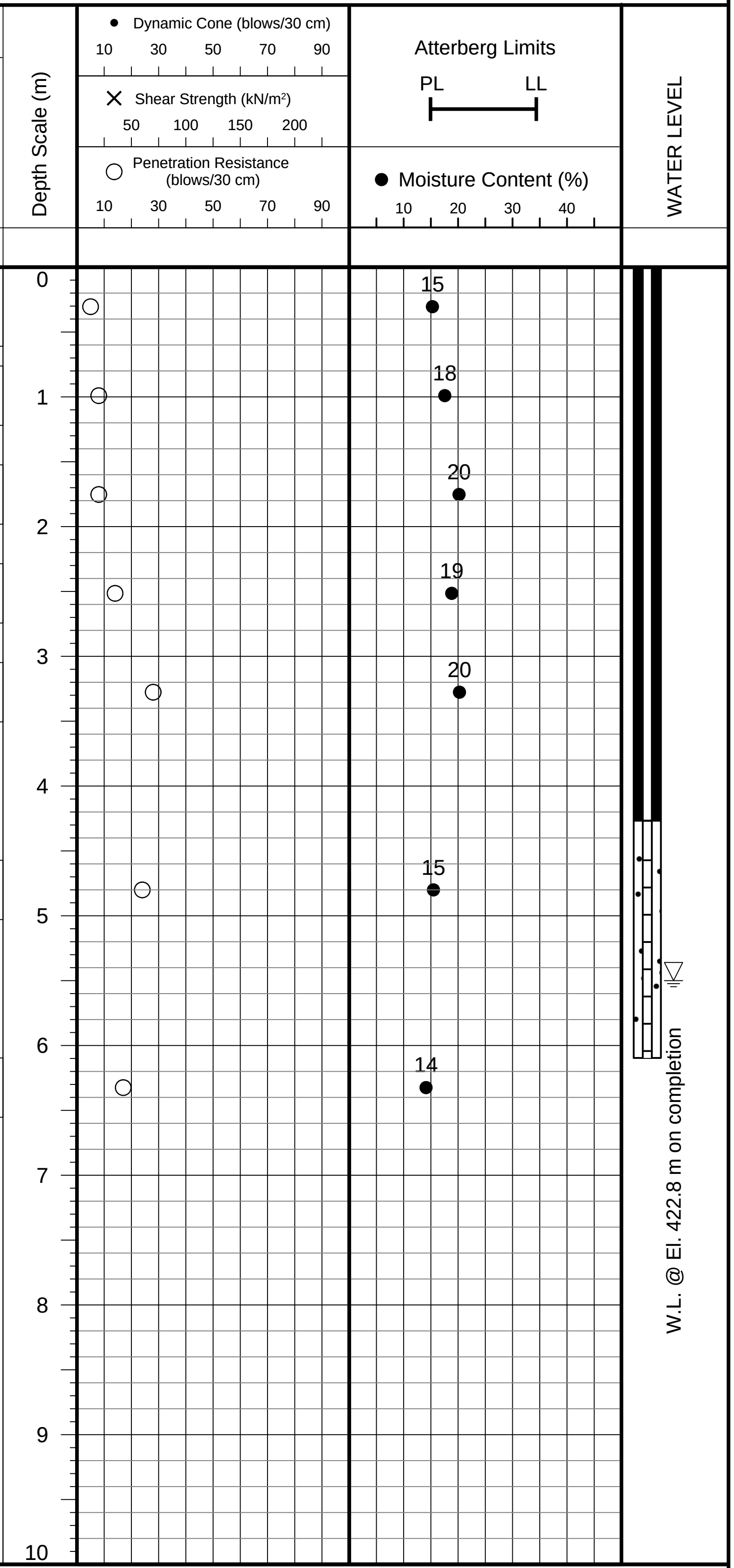
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 26, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value	Moisture Content (%)
425.7	Ground Surface				
0.0	**30 cm TOPSOIL**				
	Brown, loose to compact, very moist **SANDY SILT** a trace of clay	1	DO	5	15
		2	DO	8	18
	weathered	3	DO	8	20
		4	DO	14	19
	wet	5	DO	28	20
		6	DO	24	15
		7	DO	17	14
419.1 6.6	**END OF BOREHOLE**				

Installed 50 mm Ø PVC monitoring well
to 6.1 m with 1.5 m screen
Sand backfill from 4.3 to 6.1 m
Bentonite seal from 0.0 m to 4.3 m
Provided with monument casing



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JOB NO.: 2603-S021

LOG OF BOREHOLE: 7

FIGURE NO.: 7

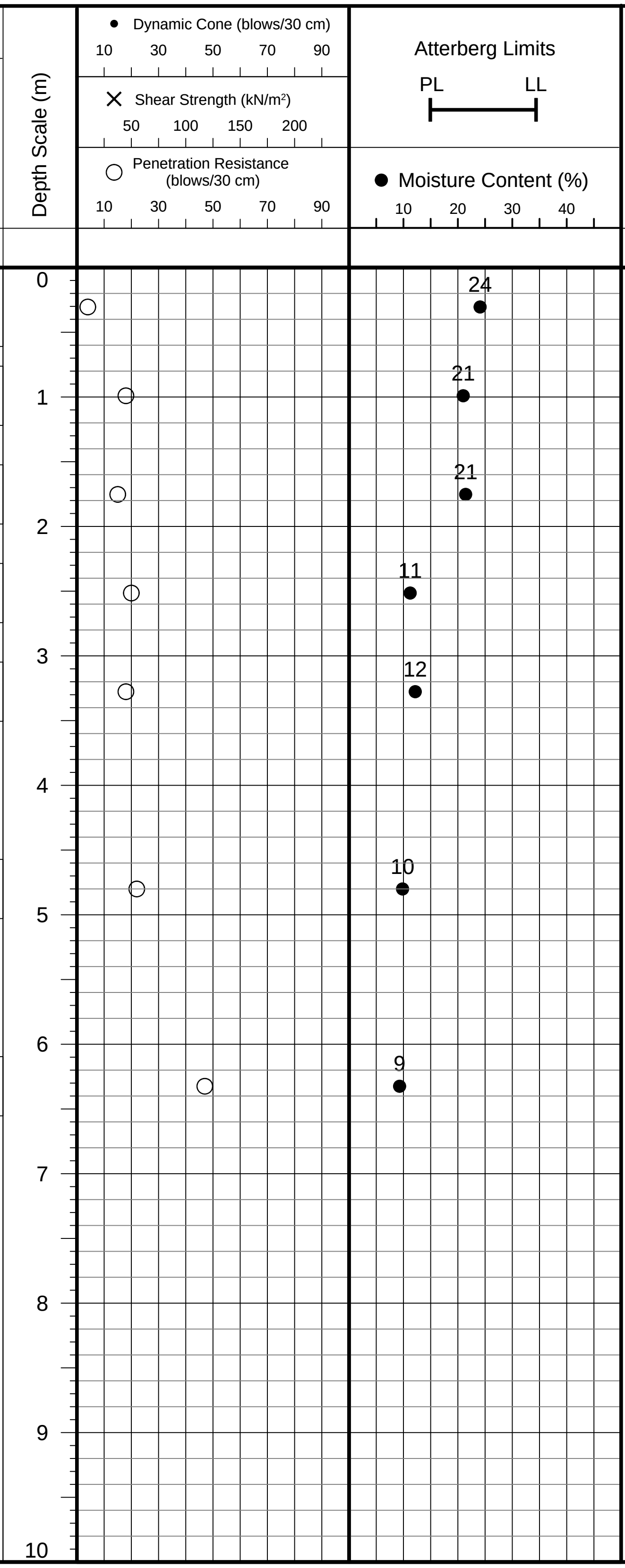
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 26, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
419.1	Ground Surface			
0.0	**23 cm TOPSOIL**			
	Brown, very loose to compact, wet **SANDY SILT** a trace of clay ploughed	1	DO	4
	weathered	2	DO	18
		3	DO	15
417.0 2.1	Brown, compact to dense **SANDY SILT TILL** traces of clay and gravel	4	DO	20
		5	DO	18
	brown grey			
		6	DO	22
		7	DO	47
412.5 6.6	**END OF BOREHOLE**			



WATER LEVEL

W.L. @ El. 414.5 m on completion ▽

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JOB NO.: 2603-S021

LOG OF BOREHOLE: 8

FIGURE NO.: 8

PROJECT DESCRIPTION: Proposed Residential Development

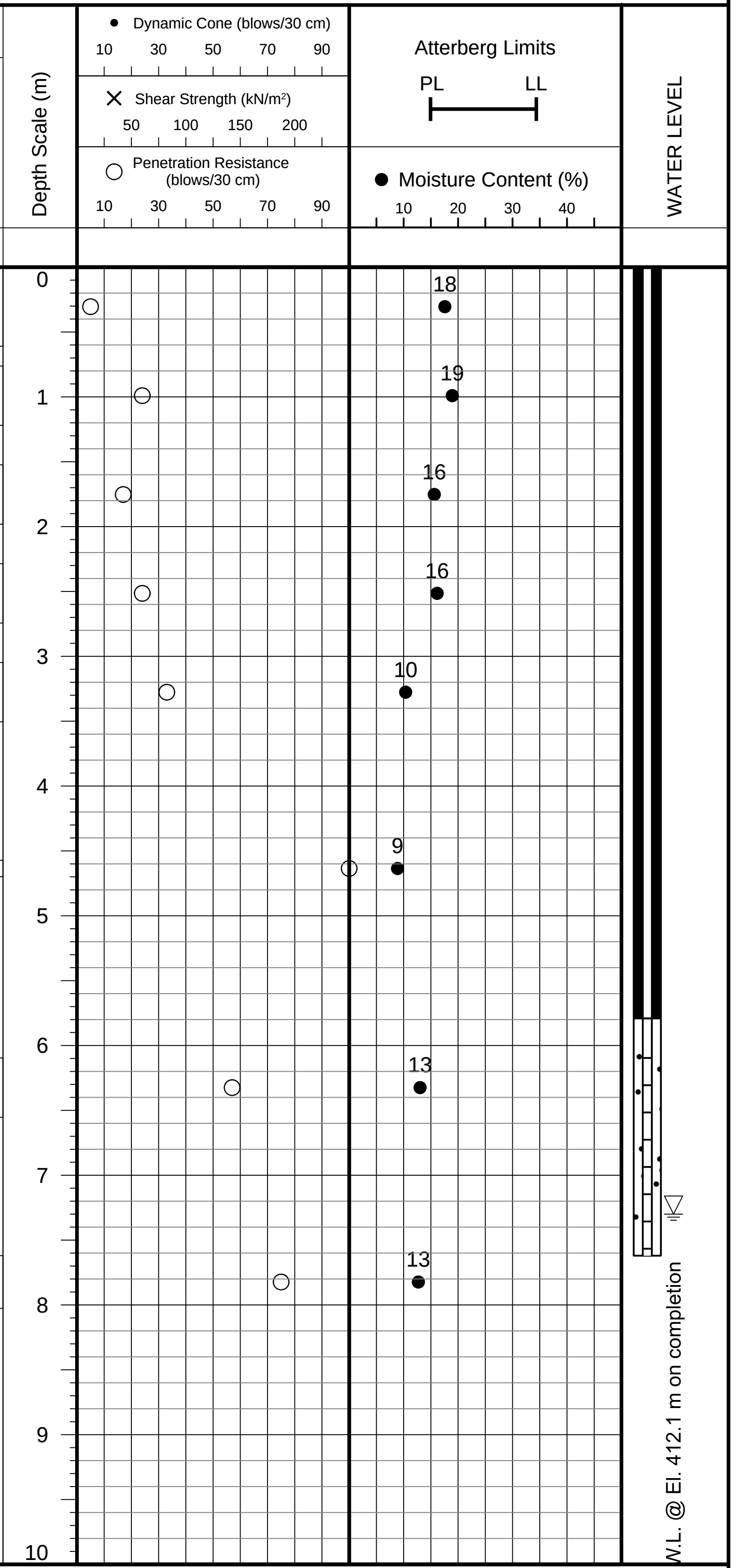
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 25, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	Type	N-Value
419.3	Ground Surface			
0.0	**25 cm TOPSOIL**			
	Brown, loose to dense, moist **SANDY SILT** a trace of clay	1	DO	5
		2	DO	24
	weathered			
		3	DO	17
		4	DO	24
416.0 3.3	Grey, very dense **SANDY SILT TILL** traces of clay and gravel	5	DO	33
		6	DO	50/13
		7	DO	57
		8	DO	75/25
411.3 8.0	**END OF BOREHOLE**			

Installed 50 mm Ø PVC monitoring well
to 7.6 m with 1.5 m screen
Sand backfill from 5.8 to 7.6 m
Bentonite seal from 0.0 m to 5.8 m
Provided with monument casing



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JOB NO.: 2603-S021

LOG OF BOREHOLE: 9

FIGURE NO.: 9

PROJECT DESCRIPTION: Proposed Residential Development

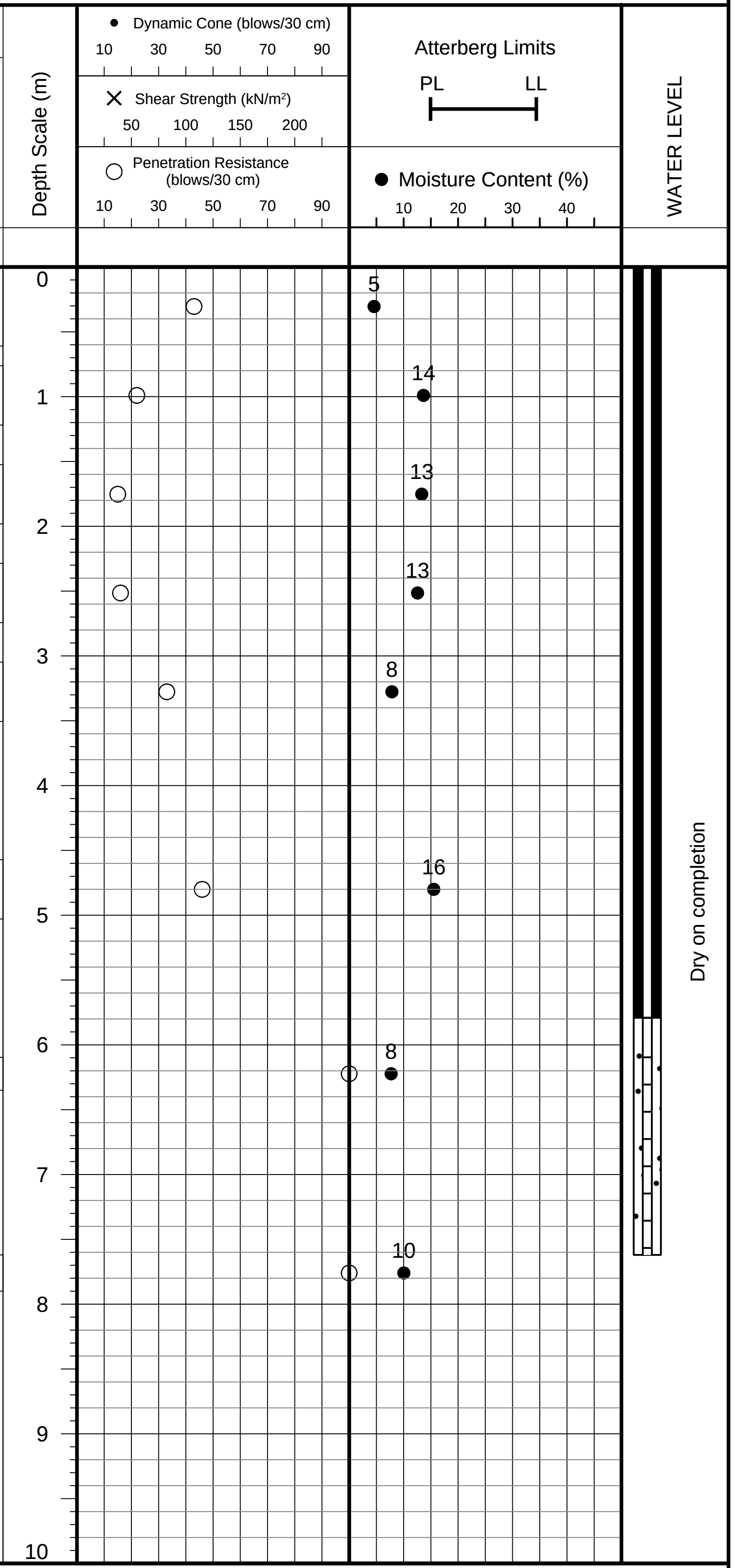
METHOD OF BORING: Solid Stem Augers

PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

DRILLING DATE: March 27, 2026

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES Number	SAMPLES Type	SAMPLES N-Value
422.0	Pavement Structure			
0.0	**175 mm ASPHALT** **400 mm GRANULAR FILL**	1	DO	43
	Dark brown **EARTH FILL** sandy silt organics inclusion	2	DO	22
420.5 1.5	Compact to very dense **SANDY SILT TILL** traces of clay and gravel	3	DO	15
		4	DO	16
		5	DO	33
	brown grey			
	seepage	6	DO	46
		7	DO	50/10
		8	DO	50/13
414.1 7.9	**END OF BOREHOLE**			

Installed 50 mm Ø PVC monitoring well to 7.6 m with 1.5 m screen
Sand backfill from 5.8 to 7.6 m
Bentonite seal from 0.0 m to 5.8 m
Provided with flushmount cover



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Page: 1 of 1

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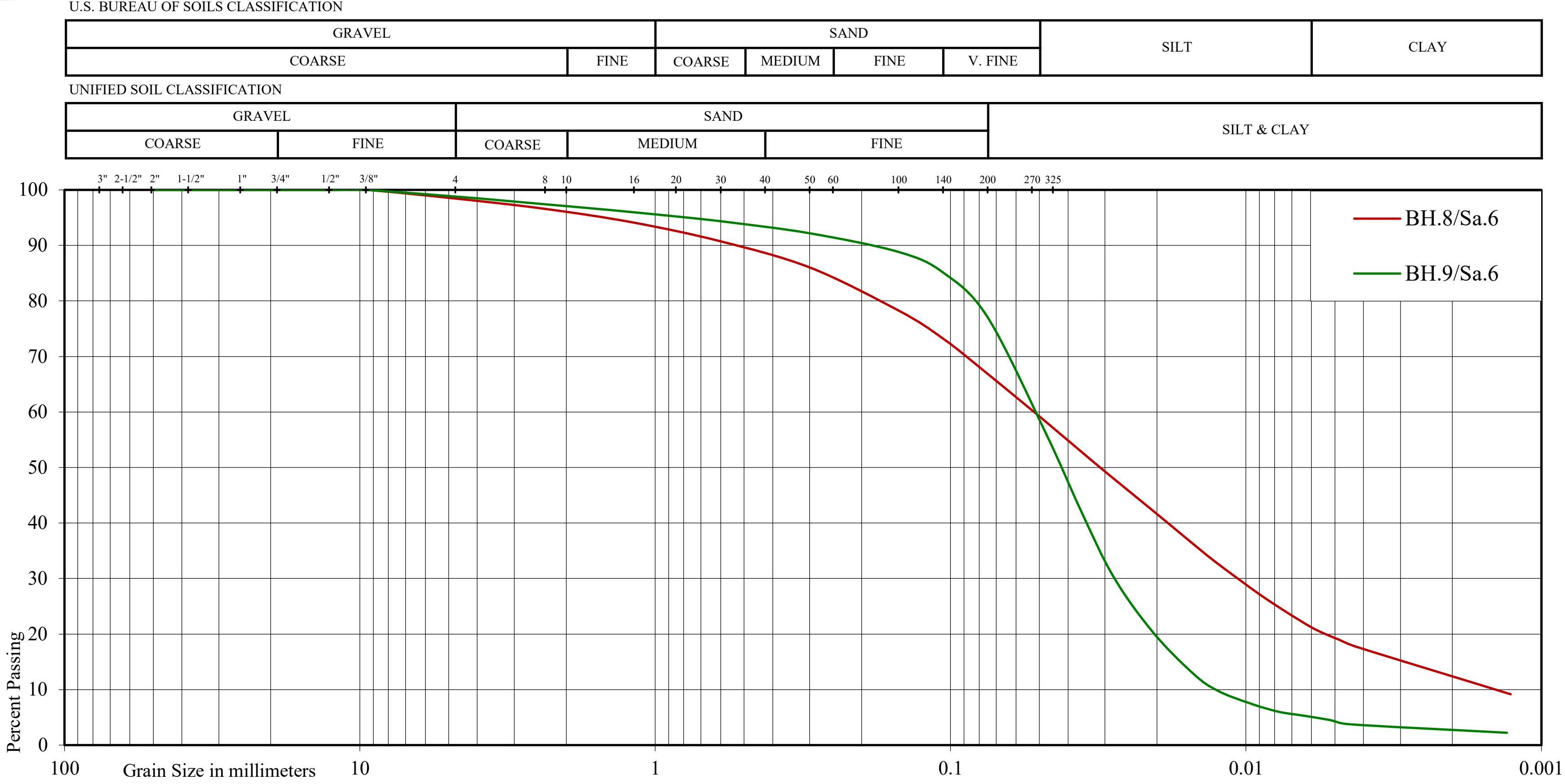
GRAIN SIZE DISTRIBUTION

Reference No: 2603-S021



Project: Proposed Residential Development

Location: 6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)

Borehole No:	8	9
Sample No:	6	6
Depth (m):	4.6	4.6
Elevation (m):	414.8	417.4

BH./Sa.	8/6	9/6
Liquid Limit (%) =	-	-
Plastic Limit (%) =	-	-
Plasticity Index (%) =	-	-
Moisture Content (%) =	9	16
Estimated Permeability (cm./sec.) =	10^{-6}	10^{-4}

Classification of Sample [& Group Symbol]: SANDY SILT TILL

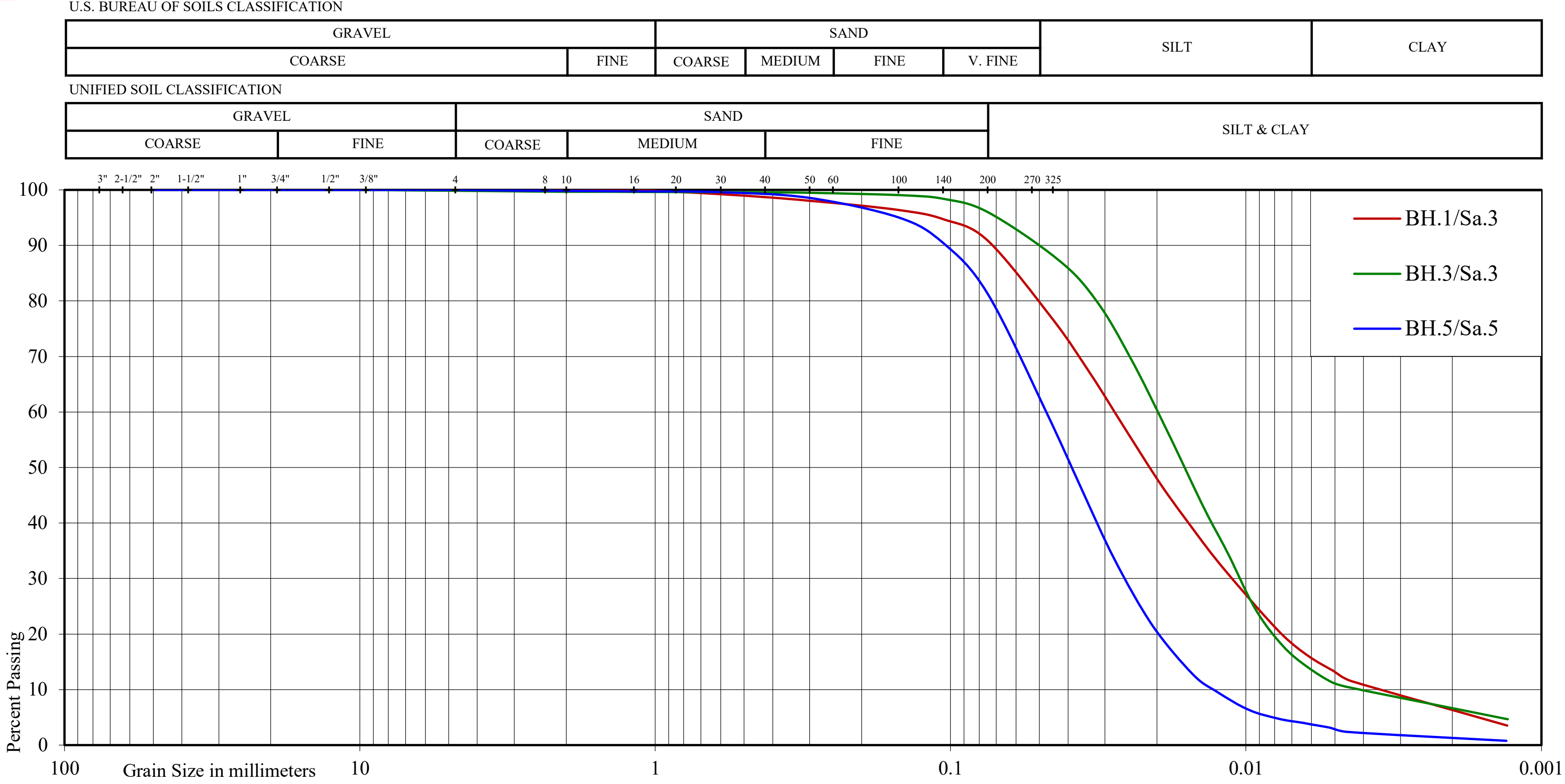
a trace to some clay, a trace of gravel

Figure: 11

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

Reference No: 2603-S021



Project: Proposed Residential Development

Location: 6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)

Borehole No:	1	3	5
Sample No:	3	3	5
Depth (m):	1.5	1.5	3.0
Elevation (m):	424.0	422.2	417.4

BH./Sa.	1/3	3/3	5/5
Liquid Limit (%) =	-	-	-
Plastic Limit (%) =	-	-	-
Plasticity Index (%) =	-	-	-
Moisture Content (%) =	28	20	16
Estimated Permeability (cm./sec.) =	10^{-5}	10^{-5}	10^{-4}

Classification of Sample [& Group Symbol]: SILT
traces of clay and sand

Figure: 12

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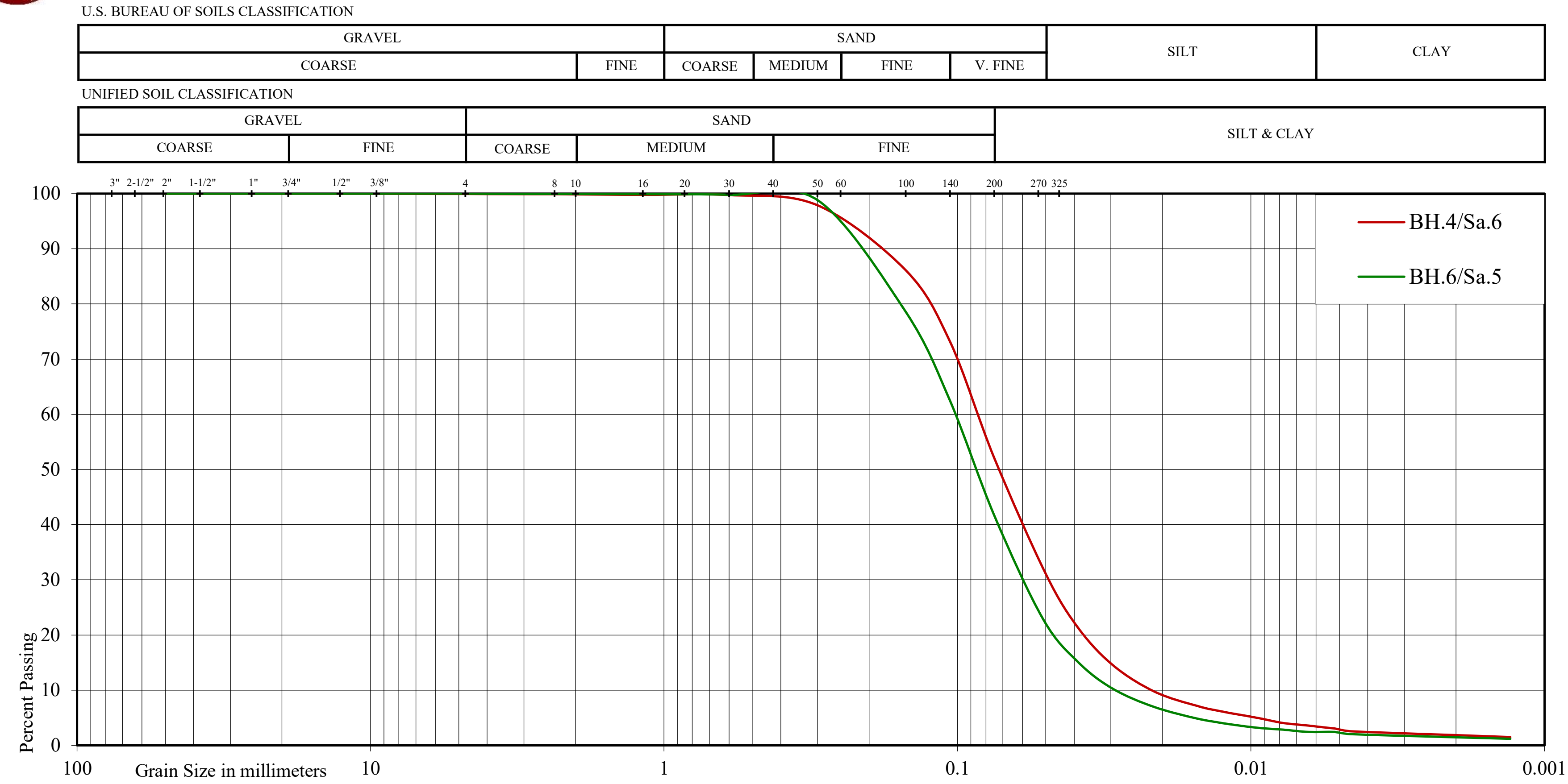
GRAIN SIZE DISTRIBUTION

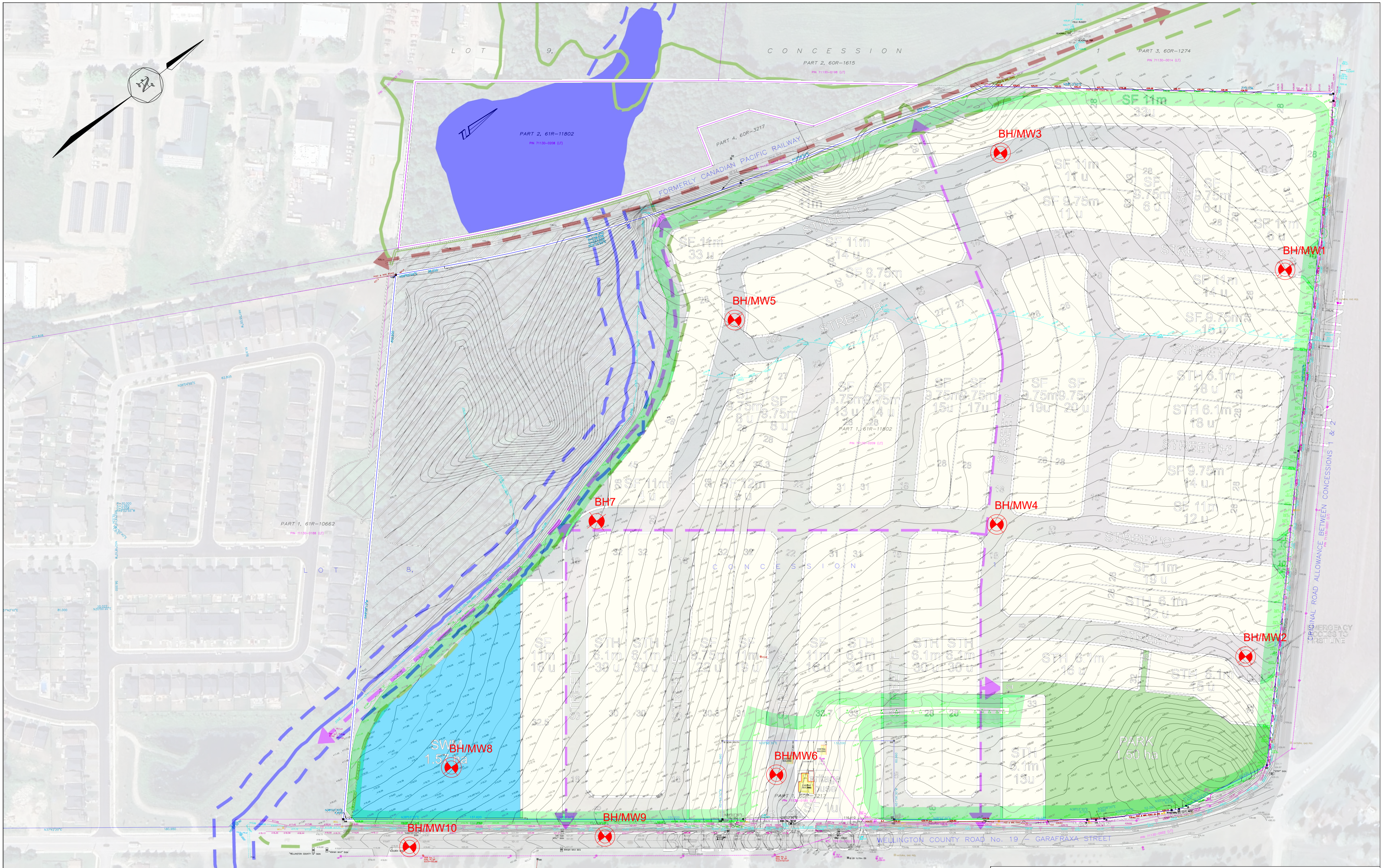
Reference No: 2603-S021



Project:	Proposed Residential Development				
Location:	6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)		BH./Sa.	4/6	6/5
			Liquid Limit (%) =	-	-
Borehole No:	4	6	Plastic Limit (%) =	-	-
Sample No:	6	5	Plasticity Index (%) =	-	-
Depth (m):	4.6	3.0	Moisture Content (%) =	16	20
Elevation (m):	419.8	422.7	Estimated Permeability (cm./sec.) =	10^{-4}	10^{-4}

Classification of Sample [& Group Symbol]: SANDY SILT
a trace of clay

Figure: 13



Notes:

- Property Boundary is provided by Van Harten Surveying Inc., dated January 20, 2016
- Not based on engineering, floodplain or grading analysis.
- Areas and dimensions are approximate and subject to confirmation by survey.
- Air photo from Google Earth, dated 2021.
- Grand River Conservation Authority (GRCA) constraints provided by EnVision, dated May 2024
- Density ranges based on Wellington Official PlanSection 4.4.4., and Centre Wellington Official Plan Section D2.4, and Northwest Fergus Secondary Plan

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90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

Borehole and Monitoring Well Location Plan

SITE: 6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)

DESIGNED BY: P.K. **CHECKED BY:** K.H. **DWG NO.:** 1

SCALE: 1:4,000 **REF. NO.:** 2603-S021 **DATE:** April 2026 **REV** -

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SUBSURFACE PROFILE
DRAWING NO. 2
SCALE: AS SHOWN

JOB NO.: 2603-S021
REPORT DATE: May 2026
PROJECT DESCRIPTION: Proposed Residential Development

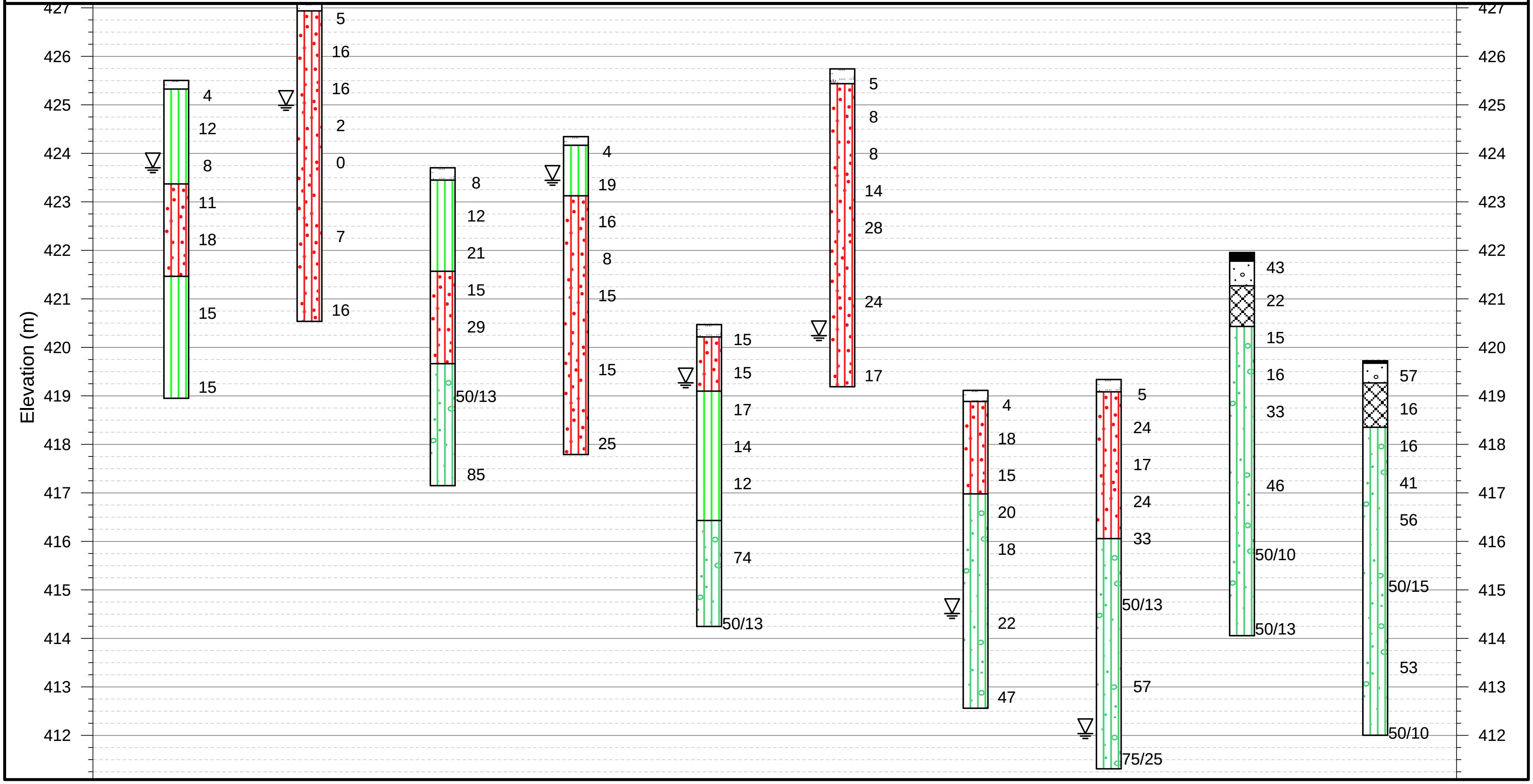
PROJECT LOCATION: 6410 First Line and 8076 Wellington Road 19
Township of Centre Wellington (Fergus)

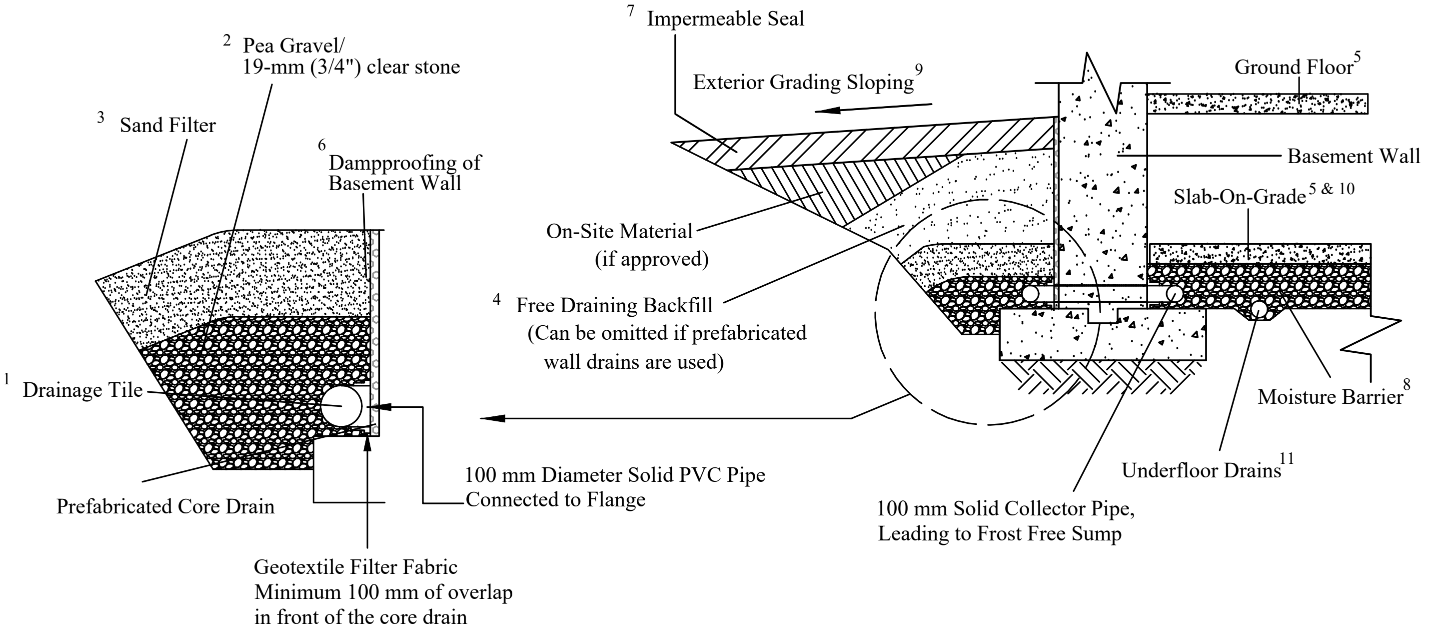
LEGEND

- ■ ASPHALT
- ▨ FILL
- ⁘ GRANULAR
- 🟥 SANDY SILT
- 🟩 SANDY SILT TILL
- 🟩 SILT
- ▤ TOPSOIL

▽ WATER LEVEL (END OF DRILLING)

BH No.:	1	2	3	4	5	6	7	8	9	10
El. (m):	425.5	427.1	423.7	424.3	420.5	425.7	419.1	419.3	422	419.7





NOTES:

1. **Drainage tile**: consists of 100 mm (4") diameter weeping tile or equivalent perforated pipe leading to a positive sump or outlet. Invert to be at minimum of 150 mm (6") below underside of basement floor slab.

2. **Pea gravel**: at 150 mm (6") on the top and sides of drain. If drain is not placed on concrete footing, provide 100 mm (4") of pea gravel below drain. The pea gravel may be replaced by 19-mm (3/4") clear stone provided that the drain is covered by a porous geotextile membrane of Terrafix 270R or equivalent.

3. **Filter material**: consists of C.S.A. fine concrete aggregate. A minimum of 300 mm (12") on the top and sides of gravel. This may be replaced by an approved porous geotextile membrane of Terrafix 270R or equivalent.

4. **Free-draining backfill**: OPSS Granular 'B' or equivalent, compacted to 95% to 98% (maximum) Standard Proctor dry density. Do not compact closer than 1.8 m (6') from wall with heavy equipment. This may be replaced by on-site material if prefabricated wall drains (Miradrain) extending from the finished grade to the bottom of the basement wall are used.

5. **Do not backfill** until the wall is supported by the basement floor slab and ground floor framing, or adequate bracing.

6. **Dampproofing** of the basement wall is required before backfilling

7. **Impermeable backfill seal** of compacted clay, clayey silt or equivalent. If the original soil in the vicinity is a free-draining sand, the seal may be omitted.

8. **Moisture barrier**: 19-mm (3/4") clear stone. The thickness of this layer should be 150 mm (6") minimum.

9. **Exterior Grade**: slope away from basement wall on all the sides of the building.

10. **Slab-On-Grade** should not be structurally connected to walls or foundations.

11. **Underfloor drains**[*] should be placed in parallel rows at 6 to 8 m (20'-25') centre, on 100 mm (4") of pea gravel with 150 mm (6") of pea gravel on top and sides. The spacing should be at least 300 mm (12") between the underside of the floor slab and the top of the pipe. The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

[*] Underfloor drains can be omitted where not required.

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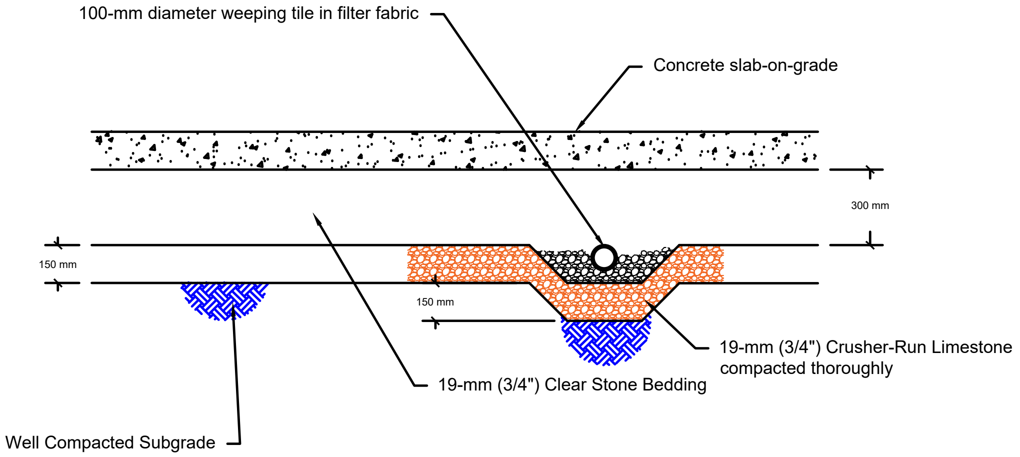
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE
90 WEST BEAVER CREEK ROAD, SUITE #100, RICHMOND HILL, ONTARIO L4B 1E7 · TEL: (416) 754-8515 · FAX: (905) 881-8335

Permanent Perimeter Drainage System

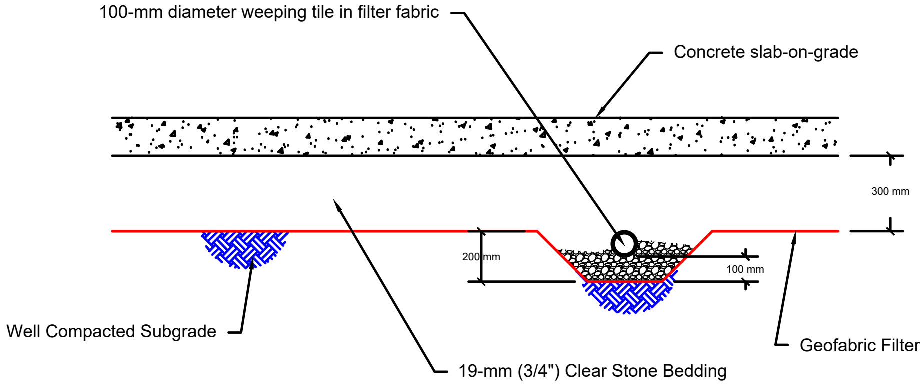
SITE: 6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)

DESIGNED BY: K.L.	**CHECKED BY:** B.L.	**DWG NO.:** 3

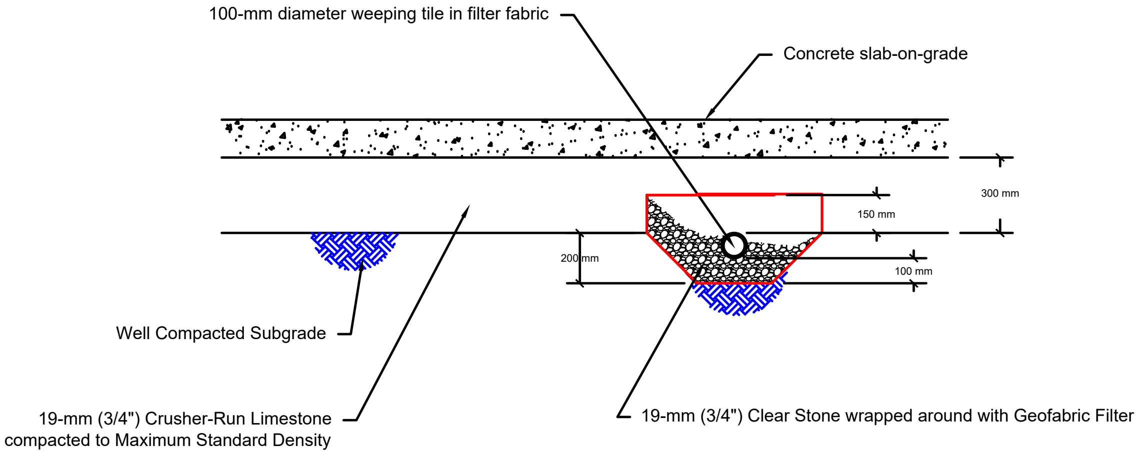
SCALE: N.T.S.	**REF. NO.:** 2603-S021	**DATE:** May 2026	**REV** -



Option 'A'



Option 'B'



Option 'C'

Note:

1. Weepers should be placed in 6 m grids, draining in a positive gradient towards an outlet or a sump pit for removal by pumping.
2. A 15-mil polyethylene sheet should be specified between the gravel bedding and concrete slab.

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Underfloor Subdrain Details

SITE: 6410 First Line and 8076 Wellington Road 19, Township of Centre Wellington (Fergus)

DESIGNED BY: K.L.
CHECKED BY: B.L.
DWG NO.: 4
SCALE: N.T.S.
REF. NO.: 2603-S021
DATE: May 2026
REV -