Soil Engineers Ltd.

CONSULTING ENGINEERS

GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

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

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

A REPORT TO
FLATO DEVELOPMENTS INC.

A GEOTECHNICAL INVESTIGATION FOR
PROPOSED RESIDENTIAL DEVELOPMENT

2 IDA STREET
TOWNSHIP OF SOUTHGATE (DUNDALK)

REFERENCE NO. 2210-S028A

JANUARY 2023

DISTRIBUTION

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ENCLOSURES

1.0 INTRODUCTION

In accordance with a written authorization from Ms. Nazy Majidi of Flato Developments Inc. dated September 20, 2022, Soil Engineers Ltd. was retained to carry out a geotechnical review based on the monitoring well logs and groundwater monitoring data prepared by SLR Consulting (Canada) Ltd. (SLR) on a land parcel located at the northwest of Ida Street and County Road 9 in the Township of Southgate.

The purpose of this review was to evaluate the subsurface conditions and determine the engineering properties of the disclosed soils from SLR boreholes for the design and construction of the proposed residential development. The geotechnical findings and resulting recommendations are presented in this report.

2.0 SITE AND PROJECT DESCRIPTION

The Township of Southgate (Dundalk) is situated in the physiographic region known as Dundalk Till Plain, where moraines and eskers occur in areas that have been partly eroded by glacial Lake Algonquin and filled with lacustrine sands, silts, and reworked till.

The subject site, approximately 35 hectares in area, is located at the northwest of Ida Street and County Road 9 in the Township of Southgate. Based on the aerial photographs, the subject site is mainly used for agricultural purposed with multiple residential dwellings. The existing site gradient is undulating, and generally dropping towards the southwest.

Based on the concept plan provided by Croizier Consulting Engineers, the subject site will be developed into a residential subdivision with park blocks and two stormwater management (SWM) ponds. The subdivision will be serviced with municipal sewers and roadways meeting urban standards.

3.0 FIELD WORK AND LABORATORY TESTS

The field work, consisting of nine (9) boreholes extending to depths of 5.79 to 10.67 m, was supervised by SLR between April 11 and 18, 2022. Upon the completion of drilling and sampling, ten (10) monitoring wells were also installed to facilitate groundwater monitoring and hydrogeological study, where a pair of nested wells were installed in one of the borehole locations. All borehole and monitoring well locations are shown on the Borehole and Monitoring Well Location Plan, Drawing No.1.

Standard Penetration Tests (SPT) were performed at regular sample interval to determine the Standard Penetration Resistance (or 'N' values) of the subsoil. The relative density of the non-cohesive strata is inferred from the 'N' values. The results of the SPT were documented in the Monitoring Well Logs in Appendix A of this report.

Aside from the SPT during the field work, grain size analyses were also performed on selected soil samples to determine the gradation of the subsoils. The gradation graphs were presented in Appendix B of this report.

4.0 SUBSURFACE CONDITIONS

The investigation revealed that beneath a topsoil veneer, the site is underlain by sandy silt till/silty sand till deposits, with localized sand layers.

Detailed descriptions of the encountered subsurface conditions are presented on SLR Monitoring Well Logs attached in the Appendix A. The engineering properties of the disclosed soils are discussed herein.

4.1 Topsoil

The topsoil veneer, 10 to 43 cm in thickness, was contacted at the ground surface in all boreholes. Thicker topsoil may be encountered in areas beyond the borehole locations, especially in low lying areas and treed areas.

4.2 Sand/Silty Sand

Layers of sand was encountered beneath the topsoil and within the till stratum in MW22-403 to MW22-407, inclusive, at various depths. The sand is generally fine to medium grained with a trace of silt to being silty. In some locations, the sand becomes coarse grained and gravelly.

The obtained 'N' values of the sand range between 4 and over 50 blows per 30 cm of penetration, indicating the sand is loose to dense in relative density.

The loose sand was generally encountered near the ground surface, which may have been disturbed by farming activities and/or weathering process. This sand deposit is generally in moist condition. Where the sand layer was contacted within the till deposit at a deeper depth, the sand layer appeared to be in wet condition.

The engineering properties of the sand deposit are given below:

- Low to high frost-susceptibility, depending on its fine content.
- High water erodibility; the fine particles are susceptible to migration under seepage condition.
- In excavation, the sand will slough to its angle of repose, run with water seepage and boil with a piezometric head of about 0.3 m.

4.3 Silty Sand Till/Sandy Silt Till

The native silty sand till/sandy silt till predominates the soil stratigraphy within the depth of the investigation. It consists of a random mixture of soil particle sizes ranging from clay to gravel, with silt and sand being the dominant influence on its soil properties. Four grain size analyses were carried out in selected till samples and the gradations are presented in Appendix B of this report.

Generally, the till stratum is in moist to very moist conditions, with occasional wet sand layers as noted by SLR during drilling and sample examinations.

The obtained 'N' values of the till samples range from 4 to over 50, with a median of over 50 blows per 30 cm of penetration, indicating the till deposit is loose to very dense, being generally very dense in relative density. Large cobbles and possible rock fragments were identified within the till samples by SLR.

The engineering properties of the till deposit are listed below:

- High frost susceptibility and low water erodibility.
- The till will be stable in relatively steep excavation; however, localized sheet collapse may occur under prolonged exposure.

5.0 GROUNDWATER CONDITION

Groundwater levels were recorded in the monitoring wells on July 13, 2022, and the records are presented on the logs and summarized in Table 1.

Table 1 - Groundwater Level in Monitoring Wells

Monitoring Well No.	Well Depth (m)	Ground Elevation (m)	July 13, 2022	
			Depth (m)	Elevation (m)
MW22-401	6.10	518.60	3.38	515.22
MW22-402	6.10	516.82	2.09	514.73
MW22-403	6.10	514.27	1.85	512.42
MW22-404	6.10	514.16	0.93	513.23
MW22-405D	10.67	512.10	1.86	510.24
MW22-405S	6.10	512.06	1.80	510.26
MW22-406	5.79	511.50	1.11	510.39
MW22-407	6.10	509.61	1.61	508.00
MW22-408	6.10	509.31	1.21	508.10
ESA-1	4.57	514.16	1.44	512.72

Groundwater was recorded at a depth of 0.93 to 3.38 m from the prevailing ground surface, or between El. 508.00 m and El. 515.22 m. On-going groundwater monitoring will be completed by SLR and presented in the hydrogeological report under separate cover.

6.0 DISCUSSION AND RECOMMENDATIONS

The investigation revealed that beneath a topsoil veneer, the site is underlain by sandy silt till/silty sand till deposits, with localized sand layers.

Groundwater was recorded at a depth of 0.93 to 3.38 m from the prevailing ground surface, or between El. 508.00 m and El. 515.22 m.

It is understood that subject site will be developed into a residential subdivision with park blocks and two SWM ponds. The geotechnical findings warranting special consideration for the proposed development are presented below:

- The topsoil must be removed for site development. The topsoil can be re-used for landscaping only. Any surplus should be removed off-site
- Where the surface soil is weathered or disturbed, it should be subexcavated and inspected before reusing for structural backfill.

- In areas where the site will be regraded with additional fill, the earth fill can be placed in an engineered manner for foundation, site services and pavement construction.
- The proposed residential houses can be supported on conventional spread and strip footings founded on engineered fill or undisturbed native subsoil. The foundation subgrade must be inspected by a geotechnical engineer, or a senior geotechnical technician, to ensure that the revealed conditions are compatible with the design of foundations.
- For conventional basement design, the foundation wall should be damp-proofed and provided with perimeter subdivisions at wall base. Where wet subgrade is evident below the basement slab, underfloor weepers must be considered.
- A Class 'B' bedding, consisting of compacted 19-mm Crusher-Run Limestone (CRL), or equivalent, is recommended for the construction of the underground utilities. Where wet subgrade or dewatering is required, A Class 'A' concrete bedding should be used instead.

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

6.1 **Site Preparation**

In areas where the site will be regraded with additional fill, the earth fill should be place in an engineered manner for foundation, site services and pavement construction. The engineering requirements for a certifiable fill are presented below:

1. All the existing topsoil must be removed. Any weathered/disturbed soil encountered on the ground surface should be subexcavated, sorted free of organics or deleterious material, if any, aerated before reusing for structural backfill. The exposed subgrade must be inspected and proof-rolled prior to any fill placement.
2. Inorganic soils must be used, and they must be uniformly compacted in 20 cm thick lifts to at least 98% Standard Proctor dry density (SPDD) 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% SPDD.
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. If the engineered fill is to be left over the winter months, adequate earth cover, or equivalent, must be provided for protection against frost action.
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 foundations and underground services subgrade must be inspected by the geotechnical consulting firm that inspected 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. Despite stringent control in the placement of the engineered fill, variations in soil type and density may occur in the engineered fill. Therefore, the foundations must be reinforced and designed by a structural engineer.
11. In sewer construction, the engineered fill is considered to have the same structural proficiency as a natural inorganic soil.

6.2 **Foundations**

The proposed residential dwellings can be constructed on conventional footings founded on the undisturbed native soil or engineered fill. The recommended bearing pressures for conventional footing design are presented below:

- Maximum Soil Bearing Pressure at Serviceability Limit State (SLS) = 150 kPa
- Factored Ultimate Bearing Pressure at Ultimate Limit State (ULS) = 250 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.

The footing subgrade must be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer; this is to ensure that the subgrade conditions are compatible with the foundation design requirements.

Where water seepage is encountered during footing excavations, or where the subgrade of the foundations is found to be wet, the subgrade should be protected by a concrete mud-slab immediately after exposure and inspection. This will prevent construction disturbance and costly rectification.

Footings exposed to weathering or in unheated areas, should have at least 1.6 m of earth cover for protection against frost action or must be adequately insulated.

The foundations shall meet the requirements specified in the latest Ontario Building Code. The proposed development should be designed to resist an earthquake force using Site Classification ‘D’ (stiff soil).

6.3 Basement Construction

The basement walls should be designed to sustain a lateral earth pressure calculated using the soil parameters stated in Section 6.8. Any applicable surcharge loads beside the basement must also be included in the design of underground structure.

In conventional design, perimeter subdrains and damp-proofing of the foundation walls will be required. The subdrains should be encased in a fabric filter to protect them against blockage by silting and connected to a positive outlet. Typical details of the perimeter subdrain are illustrated on Drawing No. 2.

Where wet subgrade is evident below the basement, underfloor weepers should be implemented. In addition, a vapour barrier should also be placed between the concrete slab and the granular bedding to prevent upfiltration of water vapour. Details of the underfloor weepers are illustrated on Drawing No. 3. The necessity of the underfloor weepers should be further verified once the basement elevation is available for review.

The subgrade must consist of sound native soils or properly compacted inorganic fill. Any weak or wet soil should be subexcavated and replaced with suitable inorganic soil compacted to at least 98% SPDD. The final subgrade must be inspected and assessed by proof-rolling prior to placement of granular bedding.

The basement floor slab should be constructed on a granular bedding, at least 20 cm in thickness, consisting of 19-mm CRL, or equivalent, compacted to 100% SPDD. Where underfloor weepers are required, the thickness of the granular bedding should be increased to 30 cm in thickness.

The exterior grading around the buildings must be such that it directs runoff away from the structures.

6.4 Underground Services

The subgrade for underground services should consist of properly compacted inorganic earth fill or sound native soils. Where weak or wet subgrade is encountered, it can be further subexcavated to competent soil and replaced with bedding material compacted to 98% SPDD in lifts no more than 20 cm in thickness.

A Class ‘B’ bedding, consisting of compacted 19-mm CRL or equivalent, is recommended for the design of the underground services construction. Where saturated soils and/or dewatering is required for the construction of the underground services, Class ‘A’ concrete bedding should be used instead.

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

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

All metal fittings for the underground services should be protected against soil corrosion. The in-situ soils have moderately high corrosivity to buried metal. In determining the mode of protection, an estimated electrical resistivity of the disclosed soil should be used and must meet the minimum requirement as specified by the Municipality.

6.5 Backfilling in Trenches and Excavation

The on-site inorganic soils are suitable in general to be reused for structural backfill. However, the wet soils, if any, should be spread thinly on the ground to allow aeration in warm and dry weather prior to be reused for structural backfill. They should be free of deleterious materials or oversized (over 15 cm) boulders and cobbles.

The backfill in service trenches or beside foundation walls should be compacted to at least 95% SPDD. In zone within 1.0 m below the pavement subgrade or floor slab, the subgrade must be compacted to at least 98% SPDD. The lift thickness should be limited to 20 cm, or the lift thickness should be determined by test strips.

In normal construction practice, the problem areas of pavement settlement largely occur adjacent to foundation walls, manholes, catch basins and services crossings. In areas which are inaccessible to a heavy compactor, granular backfill should be used in order to achieve the compaction with a light equipment.

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

- When construction is carried out in freezing winter weather, allowance should be made for these following conditions. Despite stringent backfill monitoring, 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 when it is required, such as in a narrow vertical trench section, or when the trench box is removed. The above will invariably cause backfill settlement that may become evident within 1 to several years, depending on the depth of the trench which has been backfilled.
- In areas where the construction is carried out during the 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 and the slab-on-grade construction.
- In deep trench backfill, one must be aware that future settlement may occur, unless the side of the cut is flattened to at least 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 controlled near the optimum.

- It is often difficult to achieve uniform compaction of the backfill in the lower vertical section of a trench which is stabilized by a trench box. These sectors must be backfilled with sand or non shrinkable fill, 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 trench backfill, anti-seepage collars (OPSS 802.095) should be provided.

6.6 Garages and Driveways

Due to the frost susceptible characteristics of the subgrade soils, heaving of the pavement is anticipated during cold weather and the surface structures should be designed to tolerate the movement.

The driveway leading to the garage should be backfilled with non-frost susceptible granular material with a frost taper at a slope of 1H:1V or gentler. The subgrade of the garage floor and the interior garage foundation walls should be insulated with 75-mm Styrofoam, or its thermal equivalent.

The ground surface must be graded to direct water away from the structures to minimize the frost heave phenomenon generally associated with the disclosed soil.

6.7 Pavement Design

The recommended pavement design for both Local Road and Collectors is presented in Table 2.

Table 2 - Pavement Design

Course	Thickness (mm)	OPS Specifications
Asphalt Surface	40	HL3
Asphalt Binder - Local Road - Collectors	 50 70	HL4
Granular Base	150	Granular 'A' or equivalent
Granular Sub-base	450	Granular 'B' or equivalent

In preparation of the pavement subgrade, the subgrade must be proof-rolled. Any soft spot identified must be subexcavated, and replaced with inorganic material and properly compacted to at least 98% SPDD, with the water content 2% to 3% drier than the optimum in 20 cm layers, or the lift thickness should be determined by test strips. All the granular bases should be compacted to 100% SPDD.

The pavement subgrade will suffer a strength regression if water is allowed to infiltrate prior to paving. The following measures should be incorporated in the construction procedures and pavement design:

- The lot areas adjacent to the pavement should be properly graded to prevent ponding of water.
- The pavement subgrade should be properly crowned and smooth-rolled to allow interim precipitation to be properly drained.
- Fabric filter-encased curb subdrains on both sides of the roadway are required to meet the Town's requirements.
- If the pavement is to be constructed during the wet seasons and extremely soft subgrade occurs, the granular sub-base may require thickening. This can be further assessed during construction.

6.8 Stormwater Management Areas

Based on the concept plan, two SWM areas were proposed within the subject site: one is located to the southeast corner of the site and the other one is located at the southwest corner of the site. Details of both SWM areas are not available for review at the time of preparation of this report.

MW22-408 and ESA-1 were completed at the SWM areas, which consists of silty sand till, extending to the maximum investigated depths of the boreholes. Groundwater was recorded

at 1.21 m and 1.44 m below the ground surface, or at El. 508.10 m and El. 512.72 m, in MW22-408 and ESA-1, respectively. Where the SWM facility is to be constructed by subexcavation, a clay liner will likely be required. Where necessary, perimeter and under pond subdrains may be required. This should be confirmed once the SWM design is available for review.

Where the bottom of the SWM facility is deeper than the depths of the boreholes, additional boreholes, extending to at least 1.0 m below the bottom of the SWM facility, will be required.

6.9 Soil Parameters

The recommended soil parameters for the project design are given in Table 3.

Table 3 - Soil Parameters

Unit Weight and Bulk Factor	**Unit Weight (kN/m^3)**		**Estimated Bulk Factor**	
	Bulk	**Submerged**	**Loose**	**Compacted**
Silty Sand/Sand	20.5	10.5	1.20	1.00
Silty Sand Till/Sandy Silt Till	22.5	12.5	1.25	1.03
Lateral Earth Pressure Coefficients		**Active K_a**	**At Rest K_0**	**Passive K_p**
Sand		0.29	0.46	3.36
Silty Sand Till/Sandy Silt Till/Silty Sand		0.30	0.40	3.33
Estimated Coefficient of Permeability (K) and Percolation Time (T)			**K (cm/sec)**	**T (min/cm)**
Sand			10^{-2} to 10^{-3}	4 to 8
Silty Sand			10^{-4}	15
Silty Sand Till/Sandy Silt Till			10^{-4} to 10^{-6}	15 to 50
Estimated California Bearing Ratio				
Sand			15%	
Silty Sand/Silty Sand Till/Sandy Sit Till			5% to 8%	

Table 4 - Soil Parameters (cont'd)

Estimated Electrical Resistivity	
Sand	5500 ohm.cm
Silty Sand/Silty Sand Till/Sandy Silt Till	4500 ohm.cm
Maximum Allowable Soil Pressure (SLS) For Thrust Block Design	
Engineered Fill and Sound Native Soils	75 kPa
Coefficients of Friction	
Between Concrete and Granular Base	0.50
Between Concrete and Sound Native Soil	0.35

6.10 Excavation

Excavation should be carried out in accordance with Ontario Regulation 213/91. The types of excavated soils are classified in Table 5.

Table 5 - Classification of Soils for Excavation

Material	Type
Silty Sand Till/Sandy Silt Till	2
Disturbed/weathered Soils, drained Soils	3
Saturated Soils	4

Water seepage within the till deposits, if any, will likely be slow in rate and limited in quantity, and can be removed by pumping from sumps. Where the excavation extends into the saturated soils, the water seepage will be appreciable and likely persistent. Dewatering from closely spaced sumps and sump wells may be required. Details related to the rate and volume of dewatering will be discussed in the hydrogeological assessment. The method of dewatering should be confirmed with the hydrogeological consultant and the dewatering contractor.

Prospective contractors should assess the in situ subsurface conditions for excavation by digging test pits to at least 0.5 m below the intended bottom of excavation prior to excavating. These test pits may be allowed to remain open for a few hours to assess its seepage and stability conditions.

7.0 LIMITATIONS OF REPORT

This report was prepared by Soil Engineers Ltd. for the account of Flato Developments Inc. and for review by the designated consultants, financial institutions, and government agencies. Use of the report is subject to the conditions and limitations of the contractual agreement.

The material in the report reflects the judgment of Poh Fung Kwok and Kin Fung Li, 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, and/or any reliance on decisions to be made based on it are 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 (Derek) Kwok, M.Sc.

Kin Fung Li, P.Eng.

PFK/KFL

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

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APPENDIX A

MONITORING WELL LOGS

REFERENCE NO. 2210-S028A

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: ESA-1
SURFACE ELEVATION: 514.16 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: SPT Count / % Moisture	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	514.16	**TOPSOIL** Dark brown, organics (rootlets), moist, soft									514
	513.73	**Silty SAND TILL** Fine-medium, brown, trace silt, soft, moist		0-2.5	75.0		5			bentonite seal	
1				*2.5-5 / DUP-1C	33.3		6				513
	512.64	Silty, light brown, gravel (sub-angular), trace clay, dense, moist to dry		*5-7.5	70.8		12				
2				*7.5-10	50.0		>50				512
3				10-12.5	50.0		49			silica sand 50 mm 010 slot PVC pipe	511
4				12.5-15	12.5		>50				510
				15-17.5	12.5		>50			end cap	
5										bentonite seal	509
				17.5-20	50.0		>50				
6											
		End of monitoring well at 508.06 m Well Completion Details: Screened interval from 512.64 m to 509.59 m Elevation at top of pipe (TOP) = 515.16 m Groundwater Information: Depth to groundwater from TOP = 2.44 m (July 13, 2022) * denotes soil sample taken for lab analysis									

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 13, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-401
SURFACE ELEVATION: 518.60 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: ■SPT Count (10 20 30 40 50) ◆ % Moisture (20 40 60 80 100)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	518.60	**TOPSOIL** Dark brown, organict (rootlets), soft, moist								silica sand	
	518.32	**Silty SAND TILL** Fine-medium, some gravel, some silt, brown, soft, moist		0-2.5	45.8		4				518
1				*2.5-5	33.3		8				
	517.08	Increasing gravel and fines with depth		*5-7.5	50.0		8				517
2											
	516.31	**Sandy SILT TILL** Silty fine sand, gravel (sub-angular/sub-rounded), orange mottling, light brown, dense, dry		7.5-10	83.3		33			bentonite seal	516
3				10-12.5	75.0		48		▼		
	514.79	No orange mottling, wet, loose									515
4				12.5-15	58.3		40				
				15-17.5	29.2		>50				514
5										silica sand 50 mm 010 slot PVC pipe	
				17.5-20	0		>50				513
6										end cap	
		End of monitoring well at 512.50 m Well Completion Details: Screened interval from 514.03 m to 512.50 m Elevation at top of pipe (TOP) = 519.50 m Groundwater Information: Depth to groundwater from TOP = 4.28 m (July 13, 2022) * denotes soil sample taken for lab analysis									

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 13, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR BOREHOLE LOG (MOISTURE) 209.30125.00001_AM_2022.11.18_2.GPJ SLR_CAN V5.2 MOISTURE.GDT 11/30/22

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-402
SURFACE ELEVATION: 516.82 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: SPT Count / % Moisture	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	516.82	**TOPSOIL** Brown, moist, soft		0-1	50.0		15			silica sand	
	516.52	**Silty SAND TILL** Silty, gravel (sub-angular), trace clay, some organics, brown, moist, soft-dense, increasing gravel content with depth		2.5-3.0	45.8		5				516
1											
				5.5-6.5	83.3		15				515
2										bentonite seal	
				7.5-10	100.0		>50				514
3											
				11-12	79.2		>50				513
4											
				14-15	50.0		>50				512
5											
				17-17.5	33.3		>50			silica sand 50 mm 010 slot PVC pipe	
				18-20	100.0		>50				511
6										end cap silica sand	
				20.5-22.5	87.5		>50			bentonite seal	510

End of monitoring well at 509.96 m

Well Completion Details:
Screened interval from 512.25 m to 510.72 m
Elevation at top of pipe (TOP) = 517.68 m

Groundwater Information:
Depth to groundwater from TOP = 2.95 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 11, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-403
SURFACE ELEVATION: 514.27 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: SPT Count (■) / % Moisture (◆)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	514.27	**TOPSOIL**									
	514.02	Dark brown, some organics (rootlets), soft, moist								silica sand	
		SAND									
		Fine-medium, brown, trace clay, soft, moist		1-2.5	66.7		4				514
	513.51	**Sandy SILT TILL**									
1		Silty, light brown, gravel (sub-angular), trace clay, soft, moist, increasing gravel content with depth		4.5-5	20.8		5				513
2				6.5-7.5	37.5		24				
	511.98	Cobbles, dry, dense								bentonite seal	512
3				9-10	66.7		>50				
				11.5-12.5	58.3		>50				511
4				14-15	62.5		>50				
5				16.5-17.5	50.0		>50			silica sand 50 mm 010 slot PVC pipe	510
	508.94	Moist from 5.33 m to EOH									509
6				19-20	66.7		>50			end cap silica sand	
										bentonite seal	508
	507.49	~~Largest cobble at 6.78 m~~		22-22.5	37.5		>50				
		End of monitoring well at 507.41 m									

Well Completion Details:
Screened interval from 509.70 m to 508.17 m
Elevation at top of pipe (TOP) = 515.21 m

Groundwater Information:
Depth to groundwater from TOP = 2.79 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 11, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-404
SURFACE ELEVATION: 514.16 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: ■SPT Count (10 20 30 40 50) ◆ % Moisture (20 40 60 80100)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	514.16	**TOPSOIL**									514
	513.96	Dark brown, organics (rootlets), moist, soft									
		SAND		0-2.5	66.7		4			silica sand	
		Brown, some silt, organics, (rootlets), moist, soft									
	513.40	**Silty SAND TILL**									
1		Medium sand, brown, orange mottling, gravel (sub-angular/angular), soft, compact, wet		*2.5-5 / DUP-1B	66.7		12		▼		513
	512.64	Medium-fine silty sand, some gravel (sub-angular/angular), compact/dense, wet		*5-7.5	75.0		44				
2											512
	511.87	No recovery			0		>50			bentonite seal	
3	511.11	**Silty SAND TILL**									511
		Grey-brown, gravel (sub-angular/angular), some silt, wet, loose		10-12.5	91.7		>50				
	510.30	**Sandy SILT TILL**									
4		Silty fine sand, gravel (sub-angular/angular), grey-brown, dry, dense		12.5-15	66.7		>50				510
				15-17.5	54.2		>50				
5	508.83	Increasing fines and density with depth								silica sand 50 mm 010 slot PVC pipe	509
				17.5-20	70.8		>50				
6										end cap silica sand	508
				20-22.5	0		>50			bentonite seal	

End of monitoring well at 507.30 m

Well Completion Details:
Screened interval from 509.59 m to 508.06 m
Elevation at top of pipe (TOP) = 515.00 m

Groundwater Information:
Depth to groundwater from TOP = 1.77 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 13, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON
NO RECOVERY

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-405D
SURFACE ELEVATION: 512.10 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE ID	% Recovery	SPT Count	% Moisture	WELL COMPLETION NOTES	ELEVATION (m)
0	512.10	**TOPSOIL**					silica sand	512
	511.87	Dark brown, organics (rootlets), moist, soft						
		SAND	1.5-2.5	70.8	4			
	511.34	Medium sand, light brown, organics (rootlets), moist, soft						
1		**Silty SAND TILL**	*2.5-5 / DUP-1A	58.3	9			511
		Silty fine sand with gravel (sub-angular), trace clay, light brown, moist, soft						
			*5-7.5	37.5	12			
2								510
			7.5-10	75.0	22			
3	509.05							509
	508.99	**Gravelly SAND**	10-12.5	66.7	>50			
		Coarse sand and gravel (sub-angular), some fine sand, trace silt, light brown, wet, loose						
		Silty SAND TILL	12.5-15	79.2	>50			
4		Silty fine sand with gravel (sub-angular), trace clay, light brown-grey, dry, dense						508
							bentonite seal	
			15-17.5	66.7	>50			
5								507
			17.5-20	45.8	>50			
6								506
			20-22.5	37.5	>50			
7			2.5-25	87.5	50			505
			25-27.5	70.8	>50			
8								504
			27.5-30	58.3	>50			
9								503
				0	>50			
							silica sand 50 mm 010 slot PVC pipe	
10			32.5-35	0	47			502
							end cap	

End of monitoring well at 501.43 m

Well Completion Details:
Screened interval from 502.96 m to 501.43 m
Elevation at top of pipe (TOP) = 513.05 m

Groundwater Information:
Depth to groundwater from TOP = 2.81 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)

DRILL DATE: April 12, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON
NO RECOVERY

SLR BOREHOLE LOG (MOISTURE) 209.30125.00001_AM_2022.11.18_2.GPJ SLR_CAN V5.2 MOISTURE.GDT 11/30/22

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-405S
SURFACE ELEVATION: 512.06 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: ■SPT Count (10 20 30 40 50) ◆ % Moisture (20 40 60 80100)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	512.06	**TOPSOIL** Dark brown, organics (rootlets), moist, soft								silica sand	512
	511.83	**SAND** Medium sand, light brown, organics (rootlets), moist, soft									
	511.30	**Silty SAND TILL** Silty fine sand with gravel (sub-angular), trace clay, light brown, moist, soft									
1											511
2										bentonite seal	510
3	509.01										509
	508.95	**Gravelly SAND** Coarse sand and gravel (sub-angular), some fine sand, trace silt, light brown, wet, loose									
		Silty SAND TILL Silty fine sand with gravel (sub-angular), trace clay, light brown-grey, dry, dense									
4											508
5										silica sand 50 mm 010 slot PVC pipe	507
6										end cap	506

End of monitoring well at 505.96 m

Well Completion Details:
Screened interval from 507.49 m to 505.96 m
Elevation at top of pipe (TOP) = 513.05 m

Groundwater Information:
Depth to groundwater from TOP = 2.79 m (July 13, 2022)

* denotes soil sample taken for lab analysis

MW22-405S was straight drilled adjacent to MW22-405D

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)

DRILL DATE: April 12, 2022
LOGGED BY: RH
DRILLED BY: Geo-Environmental

Notes:

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: **MW22-406**
SURFACE ELEVATION: 511.50 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: SPT Count (■) / % Moisture (◆)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	511.50	**TOPSOIL**								cement	
	511.40	**SAND** Fine sand, trace silt, trace organics, brown, grey mottling, moist, soft, loose		0-2.5	66.7		■ 4				511
	510.74	**Silty SAND TILL** Grey, brown mottling, silty, trace gravel, trace clay, cobbles, moist, firm, compact		2.5-5	62.5		■ 5		▼		
1				5-7.5	54.2		■ 9				510
2										bentonite seal	
	509.21	Brown-grey, gravelly									
	509.01	Dry		7.5-10	100.0		■ 36				509
3				10-12.5	100.0		■ 35				508
	507.69	**GRAVEL** Brown-grey, crushed rock/gravel (angular), trace silt, saturated, loose		12.5-15	41.7		■ 40				
4	506.93	**FINE SAND**									507
	506.78	Brown, gravel, saturated, loose									
		GRAVEL Brown, angular, trace fine sand, trace cobble, wet, loose		15-17.5	54.2		■ 36			silica sand 50 mm 010 slot PVC pipe	
5	506.17	**Silty SAND TILL** Brown-grey, silty, some gravel, dry, dense		17.5-19	66.7		■ >50				506
		End of monitoring well at 505.71 m								end cap	

Well Completion Details:
Screened interval from 507.23 m to 505.71 m
Elevation at top of pipe (TOP) = 512.31 m

Groundwater Information:
Depth to groundwater from TOP = 1.92 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 18, 2022
LOGGED BY: MJ
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: MW22-407
SURFACE ELEVATION: 509.61 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: SPT Count / % Moisture	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	509.61	**TOPSOIL**								cement	
	509.38	**Silty SAND** Brown, silty, trace cobble, moist, soft		0-2.5	37.5		7				509
1				2.5-5	16.7		6				
	508.09	**Sandy SILT TILL** Grey-brown,some clay, trace gravel, dry-moist, firm, compact		5-7.5	70.8		12				508
2	507.32	increase in gravel content (sub-angular/angular)								bentonite seal	
				7.5-10	83.3		>50				507
3				10-12.5	41.7		>50				506
4				12.5-15	100.0		>50				
				15-17.5	95.8		>50				505
5										silica sand 50 mm 010 slot PVC pipe	
				17.5-20	70.8		>50				504
6										end cap	

End of monitoring well at 503.51 m

Well Completion Details:
Screened interval from 505.04 m to 503.51 m
Elevation at top of pipe (TOP) = 510.46 m

Groundwater Information:
Depth to groundwater from TOP = 2.46 m (July 13, 2022)

* denotes soil sample taken for lab analysis

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 18, 2022
LOGGED BY: MJ
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR BOREHOLE LOG (MOISTURE) 209.30125.00001_AM_2022.11.18_2.GPJ SLR_CAN V5.2 MOISTURE.GDT 11/30/22

SLR CONSULTING (CANADA) LTD.

CLIENT: **Flato Developments Inc.**
PROJECT:
ADDRESS: **2 Ida Street Southgate, ON**
SLR JOB NO: **209.30125.00001**

Monitoring Well LOG

BOREHOLE NO: **MW22-408**
SURFACE ELEVATION: 509.31 m

DEPTH (m)	ELEVATION (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE ID	% Recovery	SOIL TYPE	TEST DATA: ■SPT Count (10 20 30 40 50) ◆ % Moisture (20 40 60 80100)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
0	509.31	**TOPSOIL**								cement	509
	509.18	**Silty SAND TILL** Brown, silty, some clay, trace gravel, trace organics, moist-wet, occasional cobbles, loose-dense, increasing gravel content with depth		*0-5	100.0		5				
1											508
				5-7.5	45.8		9				
2											
	507.02	Saturated, hard, compact		*7.5-10	70.8		21			bentonite seal	507
3	506.26	Set, very hard, very dense		10-12.5	75.0		>50				506
4				12.5-15	70.8		>50				505
				15-17.5	37.5		>50				
5	503.98	Brown-grey, moist-wet, dense, soft								silica sand 50 mm 010 slot PVC pipe	504
				17.5-20	62.5		>50				
6										end cap silica sand	503
				20-22.5	16.7		>50			bentonite seal	
		End of monitoring well at 502.45 m Well Completion Details: Screened interval from 504.74 m to 503.21 m Elevation at top of pipe (TOP) = 510.28 m Groundwater Information: Depth to groundwater from TOP = 2.18 m (July 13, 2022) * denotes soil sample taken for lab analysis									

DRILLING METHOD: Hollow Stem Auger Drilling
BOREHOLE DIAMETER: 0.2 m (OD)
DRILL DATE: April 18, 2022
LOGGED BY: MJ
DRILLED BY: Geo-Environmental

Notes: SPLIT SPOON

SLR BOREHOLE LOG (MOISTURE) 209.30125.00001_AM_2022.11.18_2.GPJ SLR_CAN V5.2 MOISTURE.GDT 11/30/22

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

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

APPENDIX B

GRAIN SIZE DISTRIBUTION GRAPHS

REFERENCE NO. 2210-S028A

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

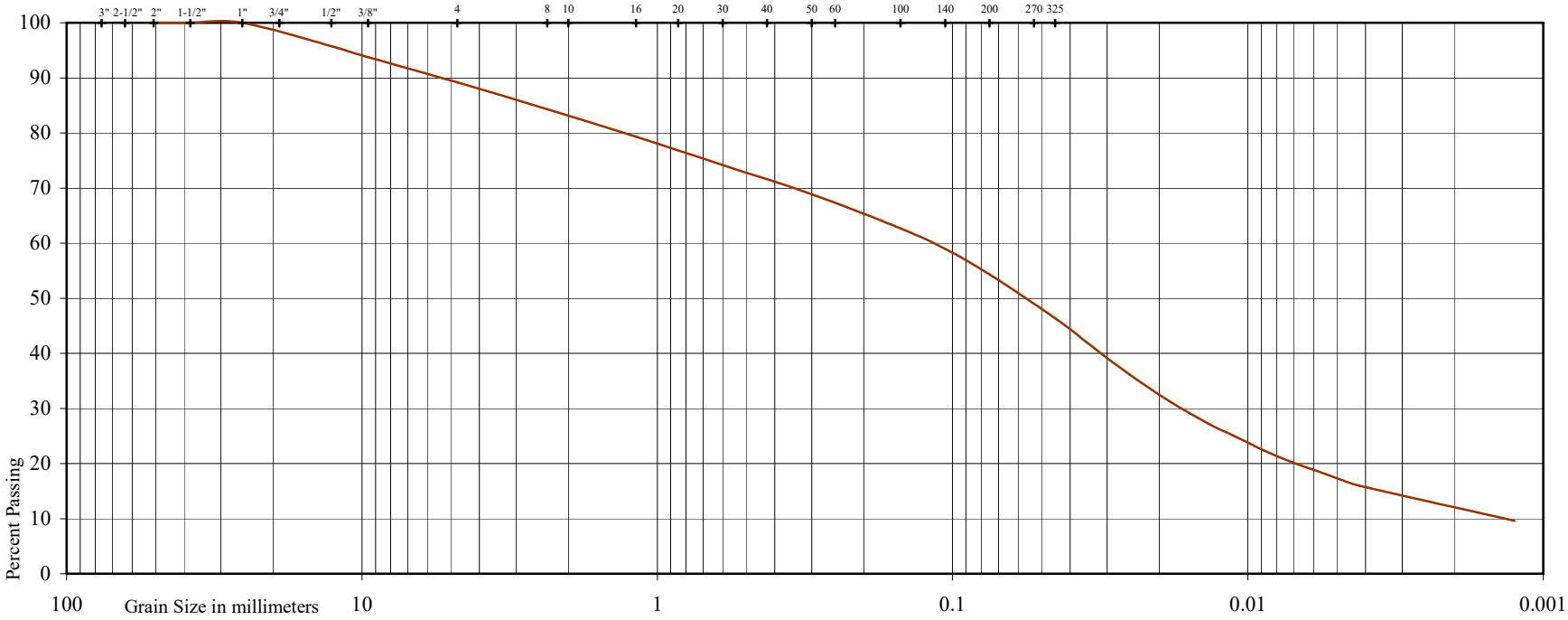
Reference No: 2210-S028A

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 2 Ida Street, Township of Southgate (Dundalk)

Borehole No: MW22 -401

Sample No: 10 - 12.5

Depth (m): 3.4

Elevation (m): 515.2

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-6}

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

Figure: 1

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

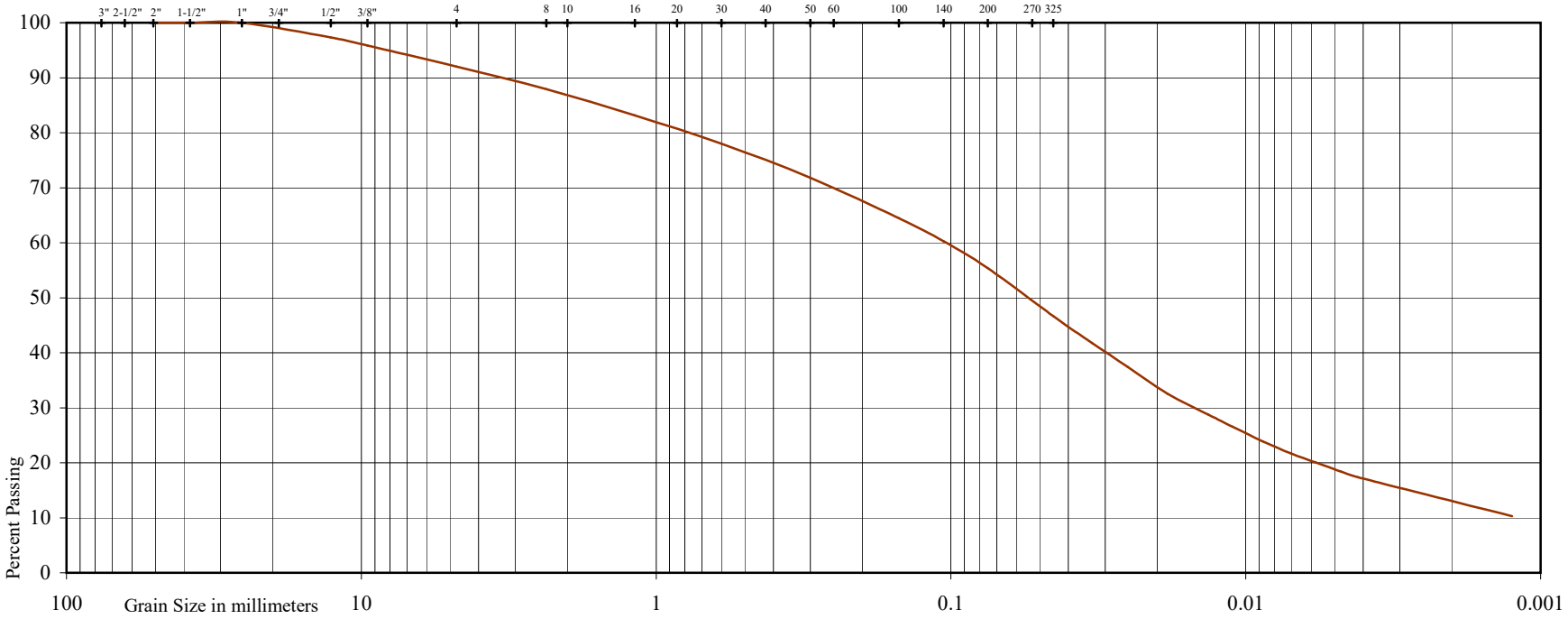
Reference No: 2210-S028A

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 2 Ida Street, Township of Southgate (Dundalk)

Borehole No: MW22 -404

Sample No: 15 - 17.5

Depth (m): 5.0

Elevation (m): 509.2

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SANDY SILT, TILL
some clay, a trace of gravel

Figure: 2

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

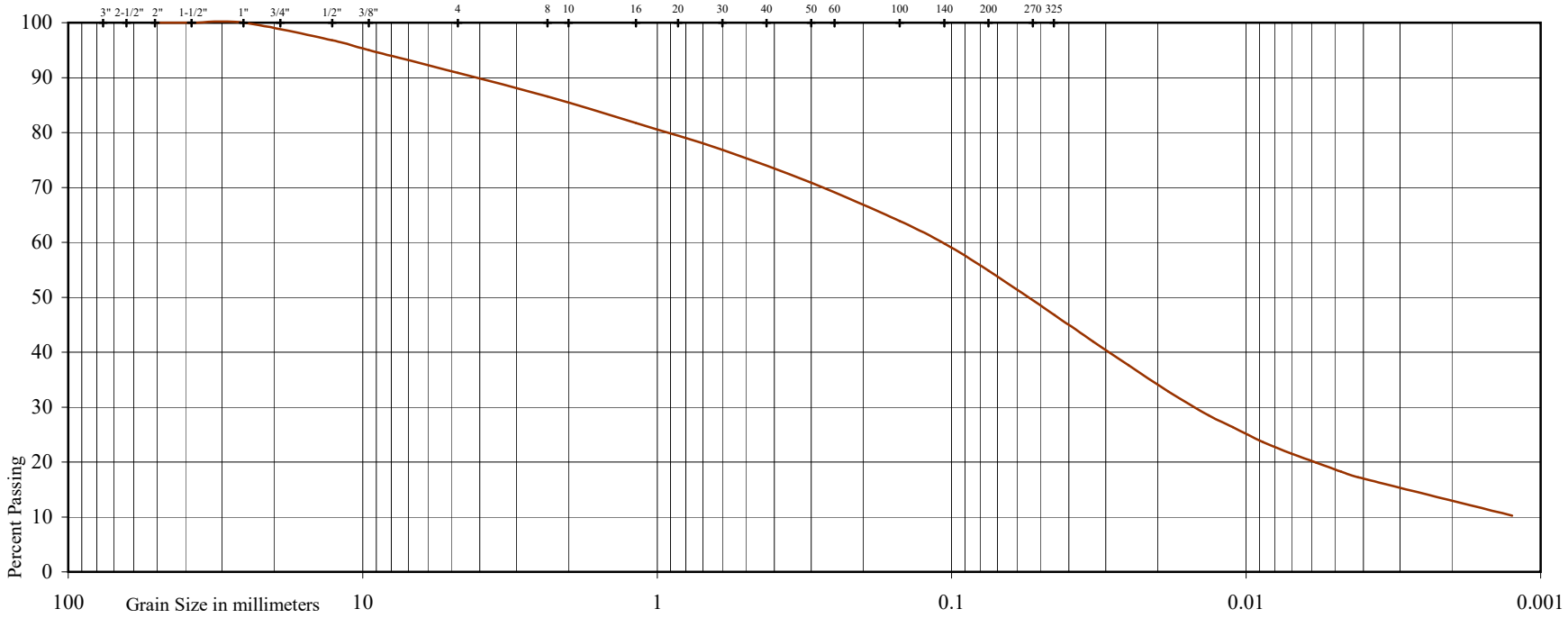
Reference No: 2210-S028A

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 2 Ida Street, Township of Southgate (Dundalk)

Borehole No: MW22 -407

Sample No: 5 - 7.5

Depth (m): 1.9

Elevation (m): 507.7

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SANDY SILT, TILL
some clay, a trace of gravel

Figure: 3

Soil Engineers Ltd.

GRAIN SIZE DISTRIBUTION

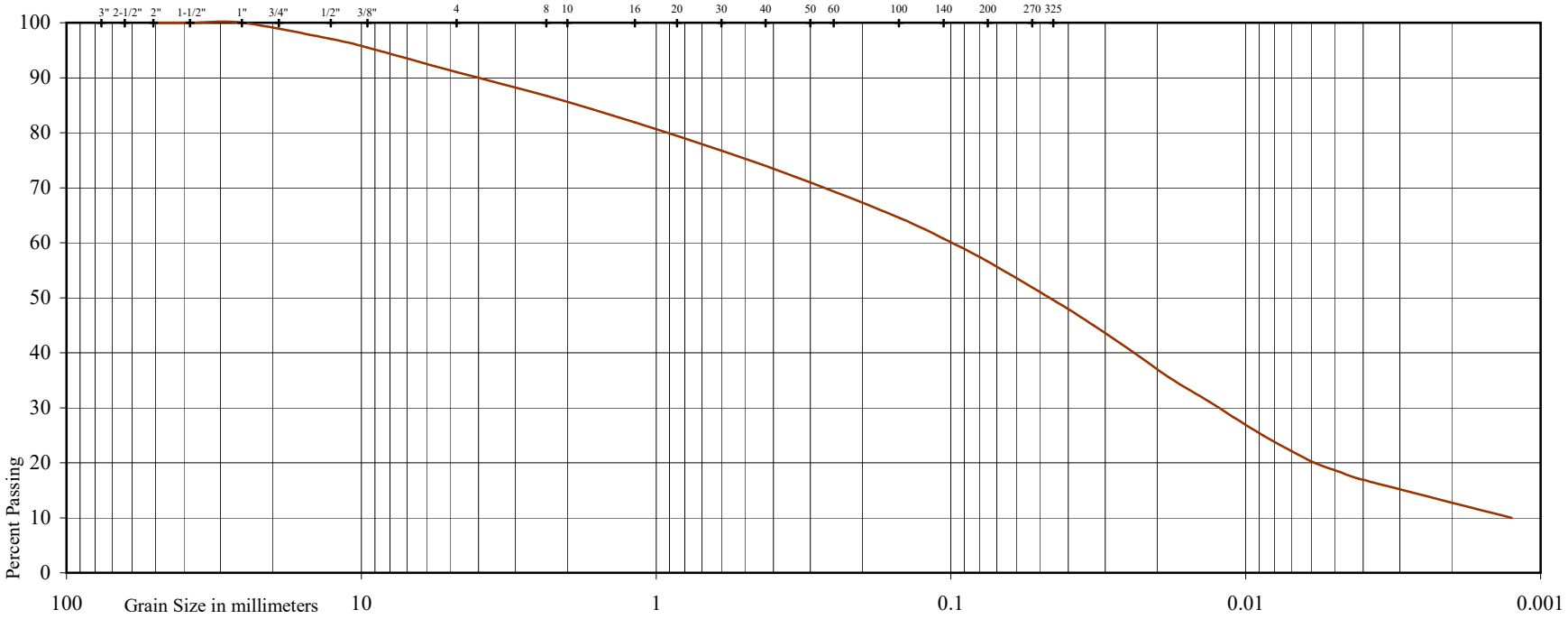
Reference No: 2210-S028A

U.S. BUREAU OF SOILS CLASSIFICATION

GRAVEL		SAND				SILT	CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	V. FINE		

UNIFIED SOIL CLASSIFICATION

GRAVEL		SAND			SILT & CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



Project: Proposed Residential Development

Location: 2 Ida Street, Township of Southgate (Dundalk)

Borehole No: MW22 -408

Sample No: 12.5 - 15

Depth (m): 4.2

Elevation (m): 505.1

Liquid Limit (%) = -

Plastic Limit (%) = -

Plasticity Index (%) = -

Moisture Content (%) = -

Estimated Permeability (cm./sec.) = 10^{-6}

Classification of Sample [& Group Symbol]: SANDY SILT, TILL
some clay, a trace of gravel

Figure: 4

DUNDALK WEST
CONCEPT PLAN

MW22-407
MW22-405 S/D
MW22-403
PARK
MW22-401
PARK
ENVIRONMENTAL PROTECTION
MW22-404
MW22-402
DUNDALK SETTLEMENT BOUNDARY
IDA STREET
MW22-406
MW22-408
SWM AREA
SWM AREA
ESA-1
COUNTY ROAD 9

JANUARY 13, 2022

LEGEND

SLR Borehole/Monitoring Well

Soil Engineers Ltd.
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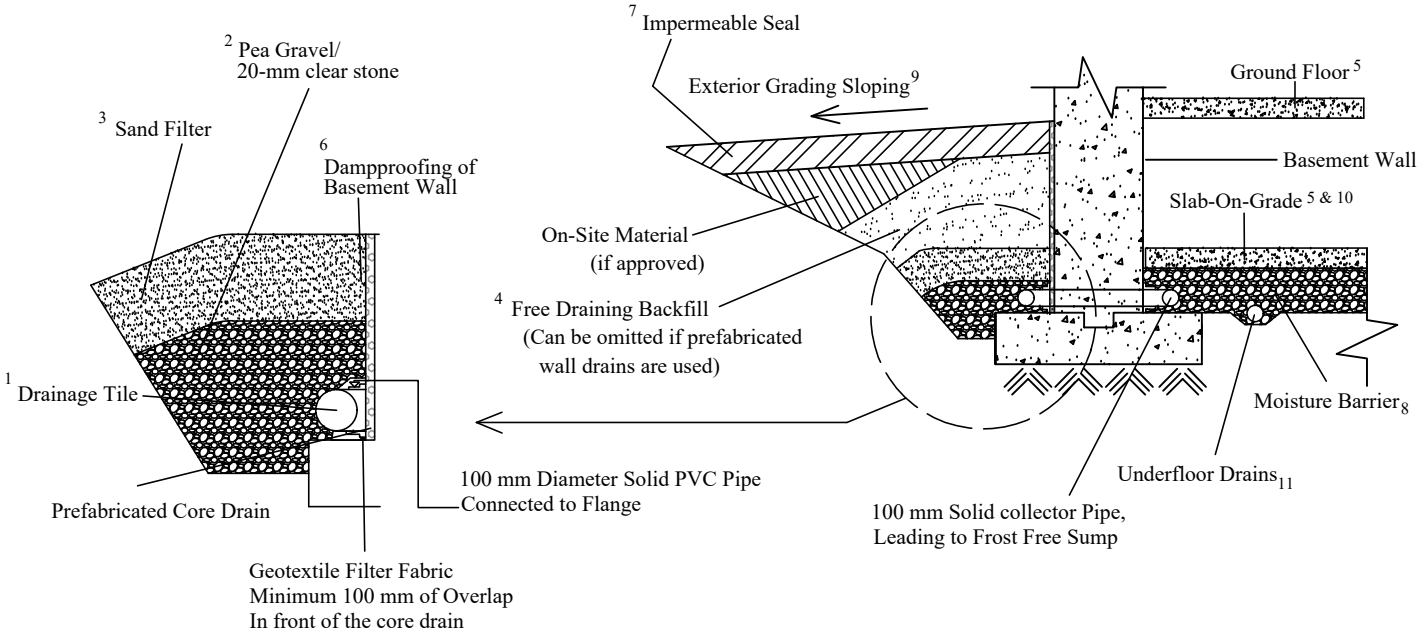
Borehole and Monitoring Well Location Plan

SITE: 2 Ida Street Southgate, ON

DESIGNED BY: D.K.	**CHECKED BY:** K.L.	**DWG NO.:** 1	
SCALE: 1:5000	**REF. NO.:** 2210-S028A	**DATE:** January 2023	**REV** -



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 20 mm 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 adquate 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**: 20-mm clear stone or compacted OPSS Granular 'A', or equivalent. 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 invert should be at least 300 mm (12") below the underside of the floor slab.
    The drains should be connected to positive sumps or outlets. Do not connect the underfloor drains to the perimeter drains.

* Underfloor drains can be deleted where not required.

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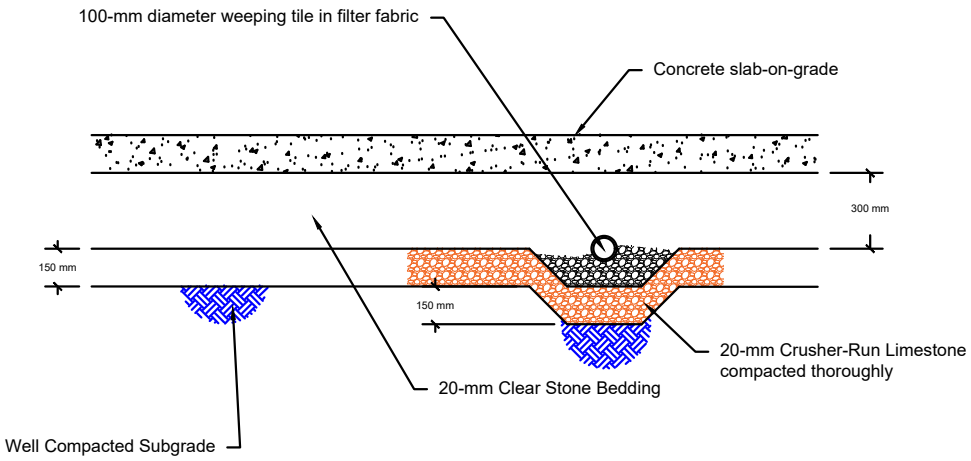
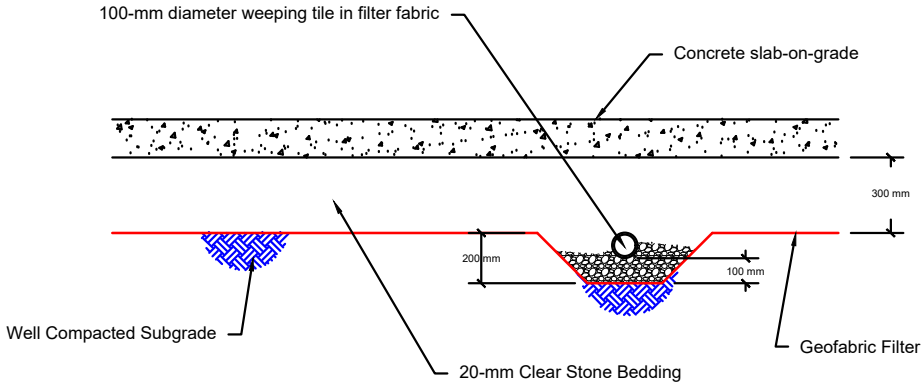
90 WEST BEAVER CREEK, SUITE 100, RICHMOND HILL, ONTARIO · TEL: (416) 754-8515 · FAX: (416) 754-8516

Details of Permanent Perimeter Drainage System

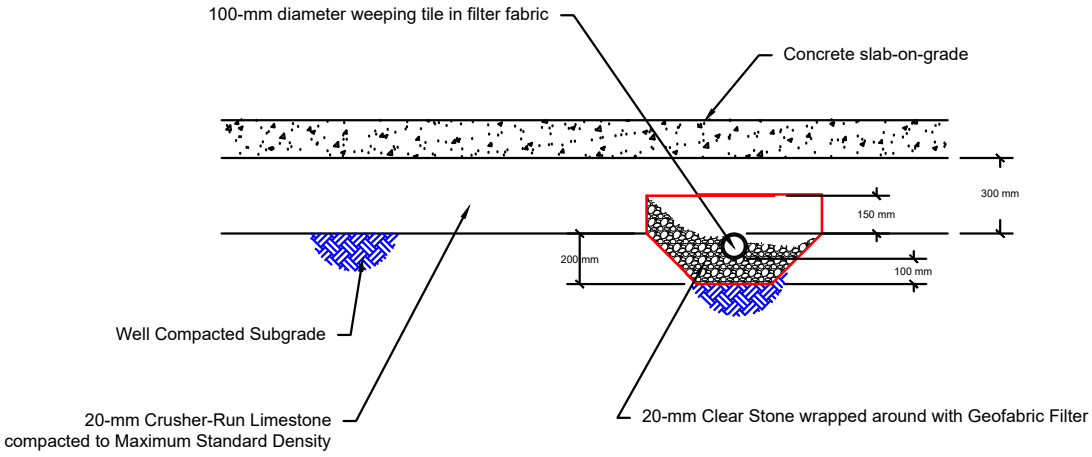
SITE 2 Ida Street, Township of Southgate (Dundalk)			
DESIGNED BY K.L.	**CHECKED BY** B.S.	**DWG NO.** 2	
SCALE N.T.S.	**REF. NO.** 2210-S028A	**DATE** January 2023	**REV** -



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 10-mil polyethylene sheet should be specified between the gravel bedding and concrete slab.

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Underfloor Subdrain Details

SITE: 2 Ida Street, Township of Southgate (Dundalk)			
DESIGNED BY: K.L.	**CHECKED BY:** B.L.	**DWG NO.:** 3	
SCALE: N.T.S.	**REF. NO.:** 2210-S028A	**DATE:** January 2023	**REV** -