



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
TEL: (705) 721-7863
FAX: (705) 721-7864

MISSISSAUGA
TEL: (905) 542-7605
FAX: (905) 542-2769

OSHAWA
TEL: (905) 440-2040
FAX: (905) 725-1315

NEWMARKET
TEL: (905) 853-0647
FAX: (905) 881-8335

GRAVENHURST
TEL: (705) 684-4242
FAX: (705) 684-8522

HAMILTON
TEL: (905) 777-7956
FAX: (905) 542-2769

November 30, 2022

Reference No. 2206-S054

Page 1 of 4

Beachcroft Investments Inc. (Ballantry Homes)
20 Cachet Woods Court, Suite 6
Markham, Ontario
L6C 3G1

Attention: Ms. Uzo Rossouw

**Re: Preliminary Geotechnical Assessment
Proposed Residential Development
63 and 63A Trafalgar Road
Town of Erin**

Dear Madam:

As per your request, we have completed the subsurface investigation for the captioned project and herein present our preliminary findings and recommendations.

SITE CONDITION

The subject site is located on the east side of Trafalgar Road and about 500 m north of Wellington 22 in the Town of Erin. At the time of investigation, the site is a farm field, consisting of soy bean crops. The existing site gradient is undulating with a grade difference of more than 10 m.

Based on the preliminary concept plan prepared by KLM Planning Partners Inc., the property will be developed with low rise residential dwellings serviced with municipal sewers and access roadway.

FIELD WORK

The field work, consisting of eleven (11) sampled boreholes with monitoring wells, extending to a depth of 4.7 to 6.7 m, was completed at the site between November 18 and 25, 2022. The borehole and monitoring well locations are shown on Drawing No. 1, enclosed. The depths and details of the monitoring wells are shown on the Borehole Logs.



The field work was supervised and the findings were recorded by a Geotechnical Technician. The ground elevation at each borehole location was obtained using a hand-held Global Navigation Satellite System (GNSS) equipment.

SOIL AND GROUNDWATER CONDITIONS

Detailed descriptions of the encountered subsurface conditions are presented on the enclosed Borehole Logs comprising Figures 1 to 11, inclusive. The revealed stratigraphy is plotted on the Subsurface Profile, Drawing No. 2.

The boreholes were performed on the farm field, where topsoil and ploughed soil were contacted at the ground surface in all boreholes. The thickness of the revealed topsoil is approximately 36 cm with the ploughed soil extending to a depth of 0.5 to 0.9 m below the prevailing ground surface. Beneath the ploughed soil, the site is underlain by predominantly sand and gravelly sand deposits. Sandy silt till and silt deposits were generally contacted in the lower stratigraphy in some of the boreholes. A localized sandy silt deposit was contacted near the ground surface below the ploughed soil in Borehole 6.

Based on sample examination, the sands and silt appeared to be in a wet state and may be water bearing at lower depths.

All boreholes were checked for the presence of groundwater upon completion of borehole drilling. Groundwater was recorded in Boreholes 3 and 6 at a depth of 5.5 m below grade or at El. 428.4 m and 428.7 m, respectively.

DISCUSSION AND RECOMMENDATIONS

Based on the borehole findings, the preliminary geotechnical considerations pertaining to the preliminary design of the development are presented below:

1. The topsoil and ploughed soil must be removed from the area of construction. They can be stockpiled and reused in landscaping areas only. Any surplus will have to be disposed off-site.
2. In areas where the site will be re-graded with additional earth fill, the earth fill should be placed in an engineered manner for underground services, building foundations and pavement construction.
3. The proposed structures can be supported on conventional footings, founded on engineered fill or sound native soil. The recommended soil bearing pressures of 150 kPa at Serviceability Limit State (SLS) and 240 kPa at Ultimate Limit State (ULS) can be



used for the design of spread and strip footings. 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.

4. The footing subgrade must be inspected by a geotechnical engineer, or a geotechnical technician under the supervision of a geotechnical engineer. 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 adequately insulated.
5. Based on the borehole findings and the latest Ontario Building Code, the proposed development should be designed to resist an earthquake force using Site Classification 'D' (stiff soil).
6. Where the proposed structures have a basement, the basement should be maintained at least 1.0 m above the highest groundwater level. The perimeter walls should be damp-proofed and provided with a perimeter drainage system. The subdrain must be encased in a fabric filter to protect them against blockage by silting and connected into a positive outlet.
7. The subgrade for slab-on-grade construction should consist of sound native soil or well compacted earth fill. The floor slab should be placed on a granular bedding of at least 15 cm thick, consisting of 19-mm Crusher-Run Limestone (CRL) or equivalent, compacted to its maximum Standard Proctor dry density (SPDD).
8. Where the separation between the basement and the groundwater is less than 1.0 m, underfloor subdrain system should also be implemented
9. Class 'B' bedding, consisting of compacted 19-mm CRL, or equivalent, is recommended for the construction of the underground utilities. Where saturated soils is evident in the subgrade soils or where dewatering is required, a Class 'A' concrete bedding should be considered. The service pipes must consist of leak-proof joints, or the joints must be wrapped with a waterproof membrane.
10. The on-site inorganic soils are generally suitable for trench backfill. Any wet soils must be pre-drained before reusing for backfill. The backfill in service trenches should be compacted to at least 95% SPDD in 20 cm layers or the lift thickness should be determined by test strips. In the zone within 1.0 m below the road subgrade or below the slab on grade, the material should be compacted to 98% SPDD with the water content at 2% to 3% drier than the optimum. This is to provide the required stiffness for the floor and pavement construction.



- 11. Excavation should be carried out in accordance with Ontario Regulation 213/91. The types of material are classified in the table below:

Material	Type
Sandy Silt Till	2
Drained Sand, Gravelly Sand, Sandy Silt and Silt	3
Saturated Soils	4

- 12. For excavation extending below the groundwater level or into the saturated soils, the yield is expected to be appreciable and persistent. Dewatering by closely spaced sumps will be required.

This report is preliminary in nature and is subject to change in the comprehensive report.

We trust the above satisfies your present requirements. Should you have any further queries, please feel free to contact this office.

Yours truly,

SOIL ENGINEERS LTD.

Cedric Ramos
 Cedric Ramos, B.A.Sc.

Kin Fung Li
 Kin Fung Li, P.Eng.
 CR/KFL



ENCLOSURES

Logs of Boreholes.....	Figures 1 to 11
Borehole and Monitoring Well Location Plan.....	Drawing No. 1
Subsurface Profile.....	Drawing No. 2

This letter/report/certification was prepared by Soil Engineers Ltd. for the account of the captioned clients and may be relied upon by regulatory agencies. The material in it reflects the writer's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this letter/report/certification, or any reliance on or decisions to be made based upon 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 letter/report/certification.

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

SOIL DESCRIPTION

Cohesionless Soils:

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

Cohesive Soils:

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

PENETRATION RESISTANCE

Dynamic Cone Penetration Resistance:

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

Plotted as '—●—'

Standard Penetration Resistance or 'N' Value:

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

Plotted as '○'

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

Method of Determination of Undrained Shear Strength of Cohesive Soils:

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

△ Laboratory vane test

□ Compression test in laboratory

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

METRIC CONVERSION FACTORS

1 ft = 0.3048 metres

1lb = 0.454 kg

1 inch = 25.4 mm

1ksf = 47.88 kPa



Soil Engineers Ltd.

CONSULTING ENGINEERS

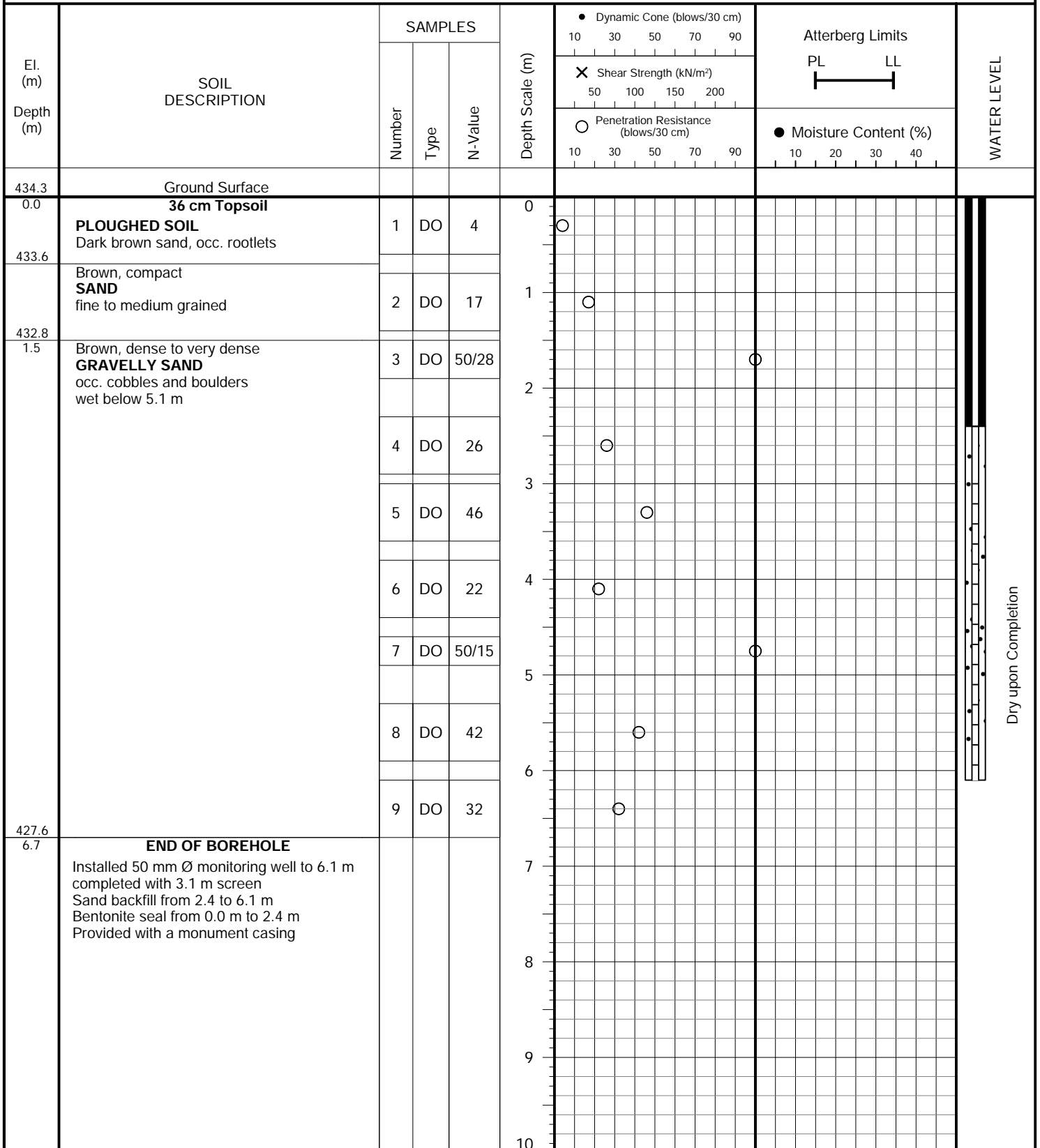
GEOTECHNICAL • ENVIRONMENTAL • HYDROGEOLOGICAL • BUILDING SCIENCE

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 22, 2022

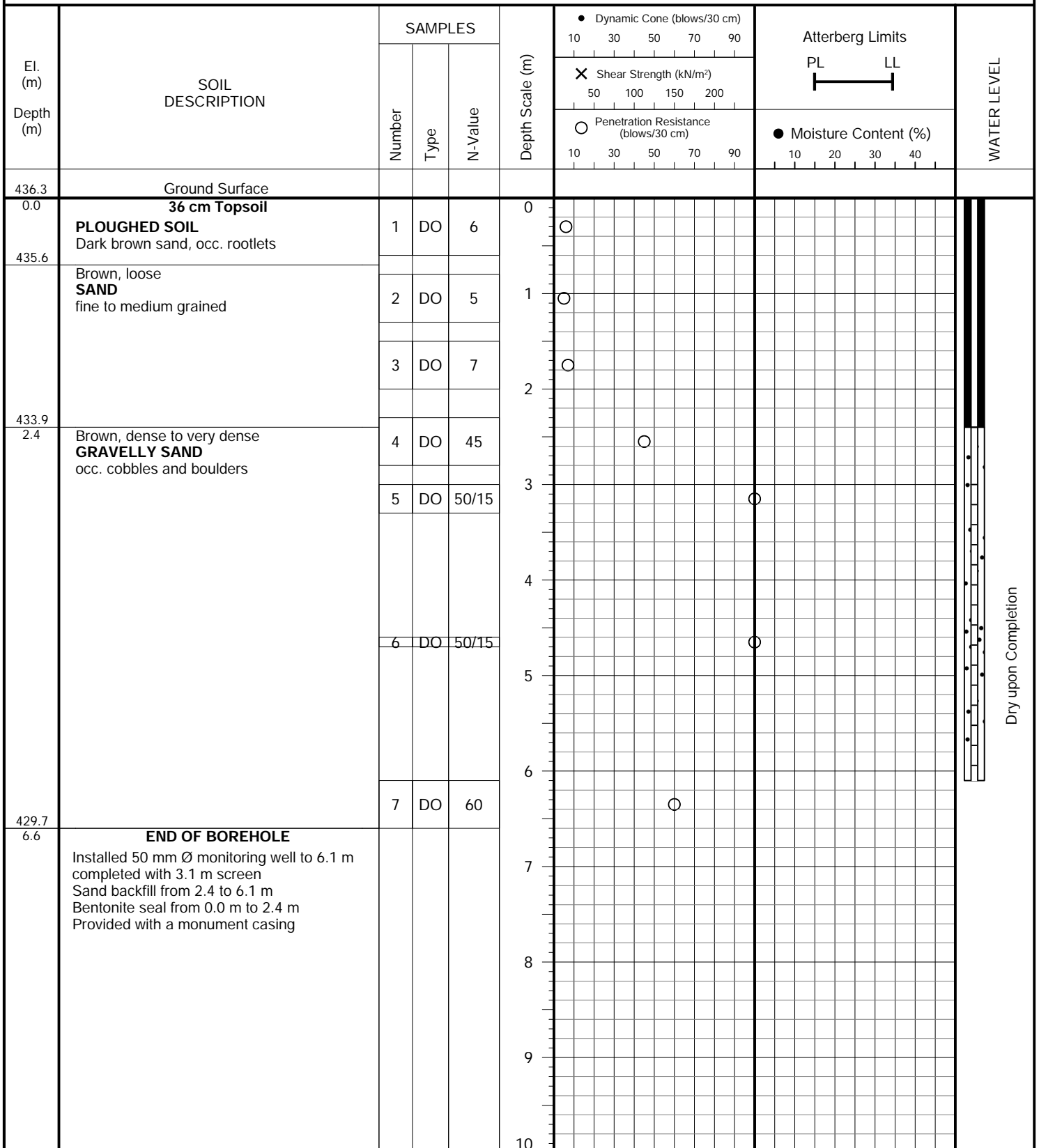


PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 22, 2022

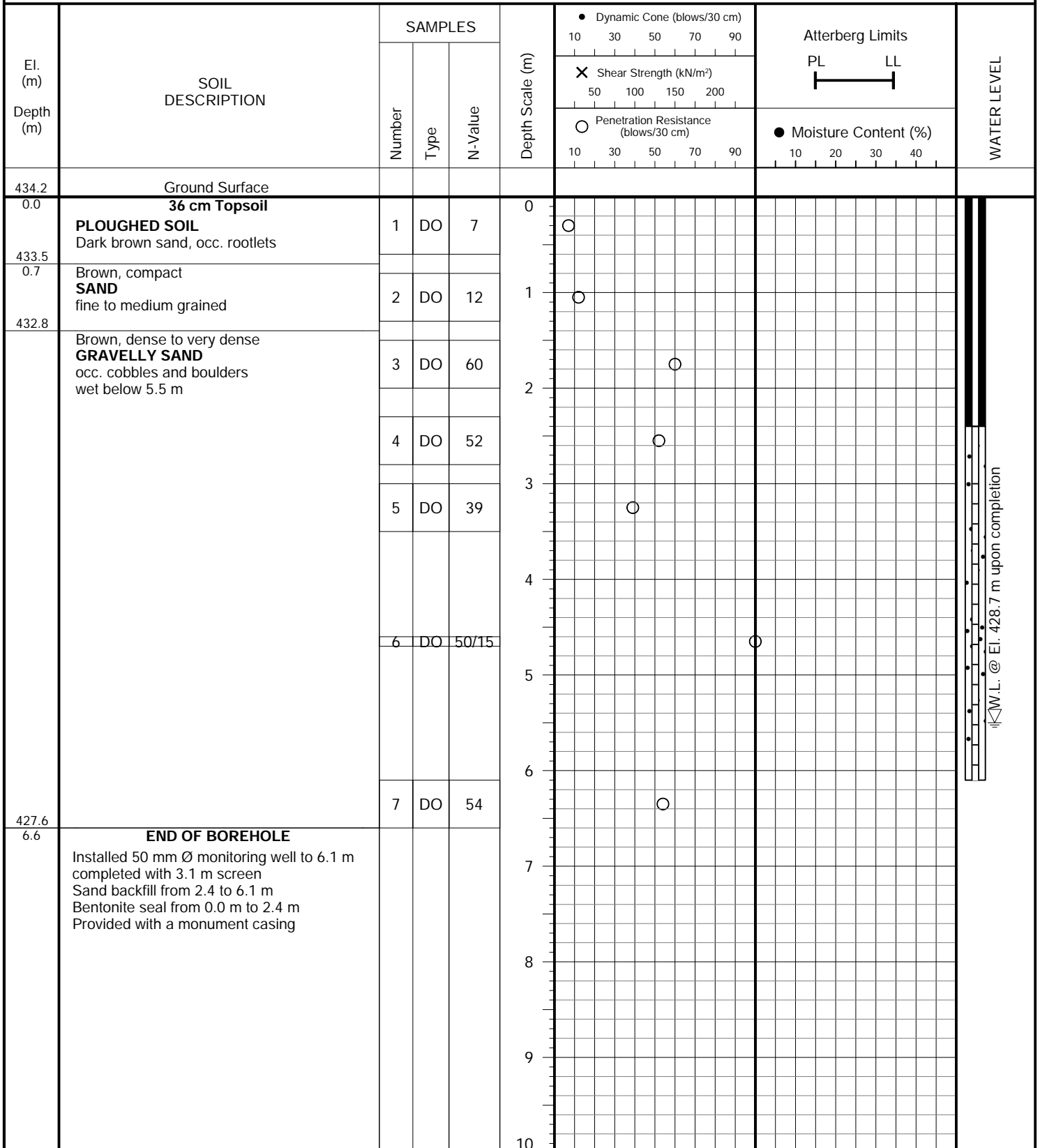


PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 24, 2022

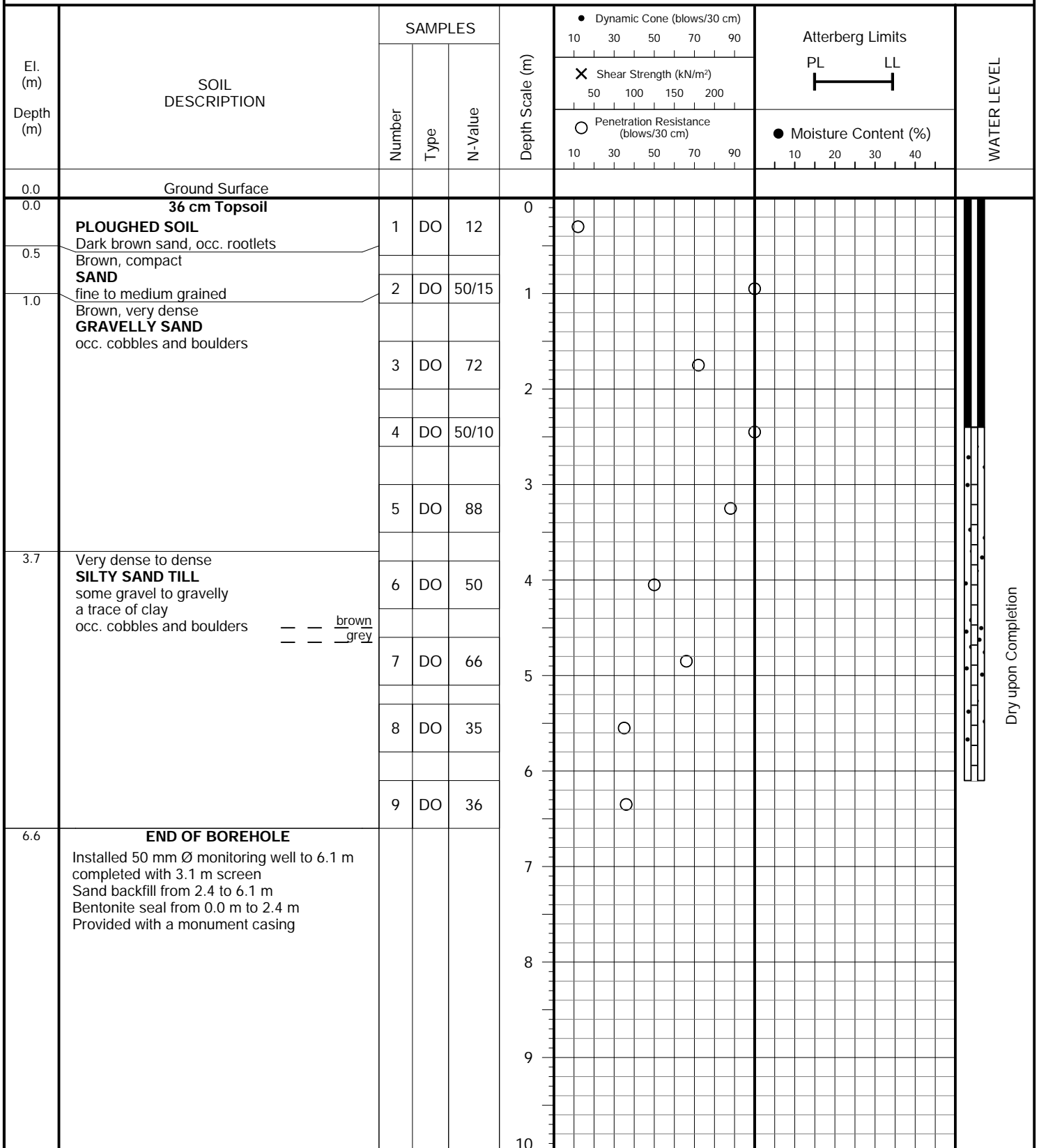


PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 18, 2022



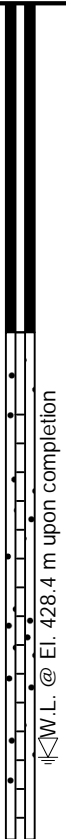
PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 24, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	Dynamic Cone (blows/30 cm)		Atterberg Limits		WATER LEVEL
		Number	Type	N-Value		10	30	50	70	
433.9	Ground Surface									
0.0	36 cm Topsoil PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	4	0					
433.2	Brown, compact SAND fine grained some silt	2	DO	7	1					
0.7		3	DO	4	2					
		4	DO	21	3					
		5	DO	27	4					
429.8		Brown, dense GRAVELLY SAND occ. cobbles and boulders	6	DO	42	5				
4.1					6					
428.3	Brown, dense SANDY SILT TILL traces of gravel and clay occ. cobbles and boulders	7	DO	40	7					
5.6					8					
427.3	END OF BOREHOLE Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				9					
6.6					10					



JOB NO.: 2206-S054

LOG OF BOREHOLE: 6

6

FIGURE NO.: 6

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 21, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	Dynamic Cone (blows/30 cm)		Atterberg Limits		WATER LEVEL
		Number	Type	N-Value		10	30	50	70	
443.7	Ground Surface									
0.0	36 cm Topsoil PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	10	0					
443.0	Brown, compact SANDY SILT some gravel	2	DO	12	1					
0.7		3	DO	10	2					
441.5		Brown, compact to very dense SANDY GRAVEL occ. cobbles and boulders	4	DO	25	3				
2.2	5		DO	38	4					
	6		DO	24	5					
438.7	7		DO	50/28	6					
5.0	END OF BOREHOLE Installed 50 mm Ø monitoring well to 4.6 m completed with 3.1 m screen Sand backfill from 0.9 to 4.6 m Bentonite seal from 0.0 m to 0.9 m Provided with a monument casing				7					



PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 23, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	Dynamic Cone (blows/30 cm) 10 30 50 70 90		Atterberg Limits PL LL		WATER LEVEL
		Number	Type	N-Value		Shear Strength (kN/m ²) 50 100 150 200		Moisture Content (%) 10 20 30 40		
442.3	Ground Surface									
0.0	36 cm Topsoil									
	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	6	0					
441.6										
0.7	Brown, very loose to very dense SAND fine to well graded a trace to some gravel	2	DO	3	1					
		3	DO	18	2					
		4	DO	48	3					
		5	DO	34	4					
		6	DO	50/23	5					
		7	DO	45	6					
435.7										
6.6	END OF BOREHOLE Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				7					
					8					
					9					
					10					

Dry upon Completion



PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 23, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	Dynamic Cone (blows/30 cm)		Atterberg Limits		WATER LEVEL
		Number	Type	N-Value		10	30	50	70	
439.7	Ground Surface									
0.0	36 cm Topsoil									
439.2	PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	9	0					
0.5	Brown, dense to very dense GRAVELLY SAND occ. cobbles and boulders	2	DO	37	1					
		3	DO	58	2					
		4	DO	50/10	2.5					
		5	DO	50/15	3					
		6	DO	50/15	4.5					
434.2	Brown, very dense SILT fine grained	7	DO	56	6					
433.1	END OF BOREHOLE Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing				6.6					

Dry upon Completion



JOB NO.: 2206-S054

LOG OF BOREHOLE: 9

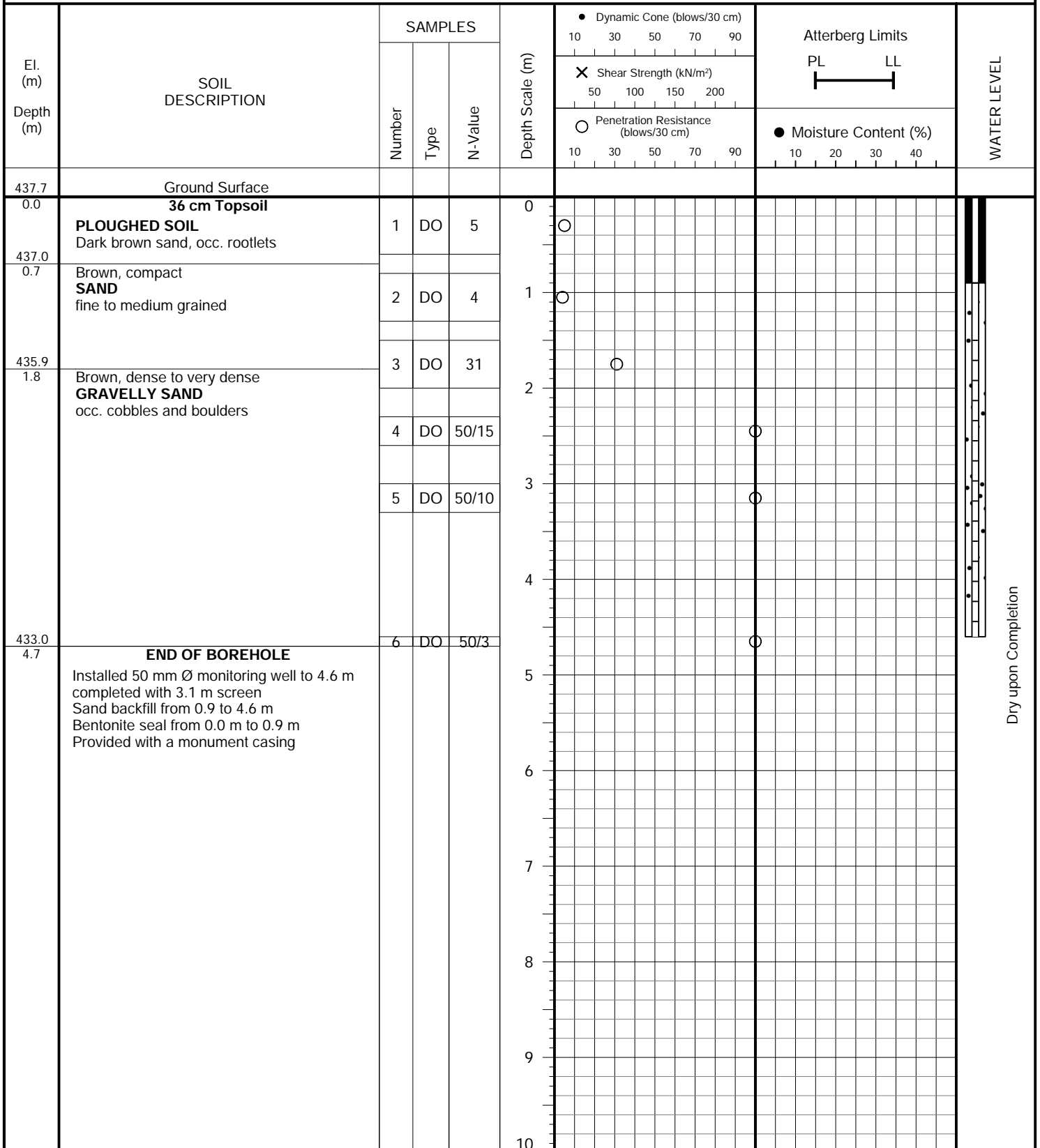
FIGURE NO.: 9

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 24, 2022



Dry upon Completion



JOB NO.: 2206-S054

LOG OF BOREHOLE: 10

FIGURE NO.: 10

PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 25, 2022

El. (m) Depth (m)	SOIL DESCRIPTION	SAMPLES			Depth Scale (m)	Dynamic Cone (blows/30 cm)		Atterberg Limits		WATER LEVEL
		Number	Type	N-Value		10	30	50	70	
438.0	Ground Surface									
0.0	36 cm Topsoil PLOUGHED SOIL Dark brown sand, occ. rootlets	1	DO	11	0					
437.1	Brown, dense to very dense GRAVELLY SAND occ. cobbles and boulders	2	DO	50/5	1					
0.9		3	DO	50/15	2					
		4	DO	34	3					
		5	DO	38	4					
		6	DO	50/15	5					
431.6	END OF BOREHOLE Installed 50 mm Ø monitoring well to 6.1 m completed with 3.1 m screen Sand backfill from 2.4 to 6.1 m Bentonite seal from 0.0 m to 2.4 m Provided with a monument casing	7	DO	50/10	6					
6.4					7					

Dry upon Completion

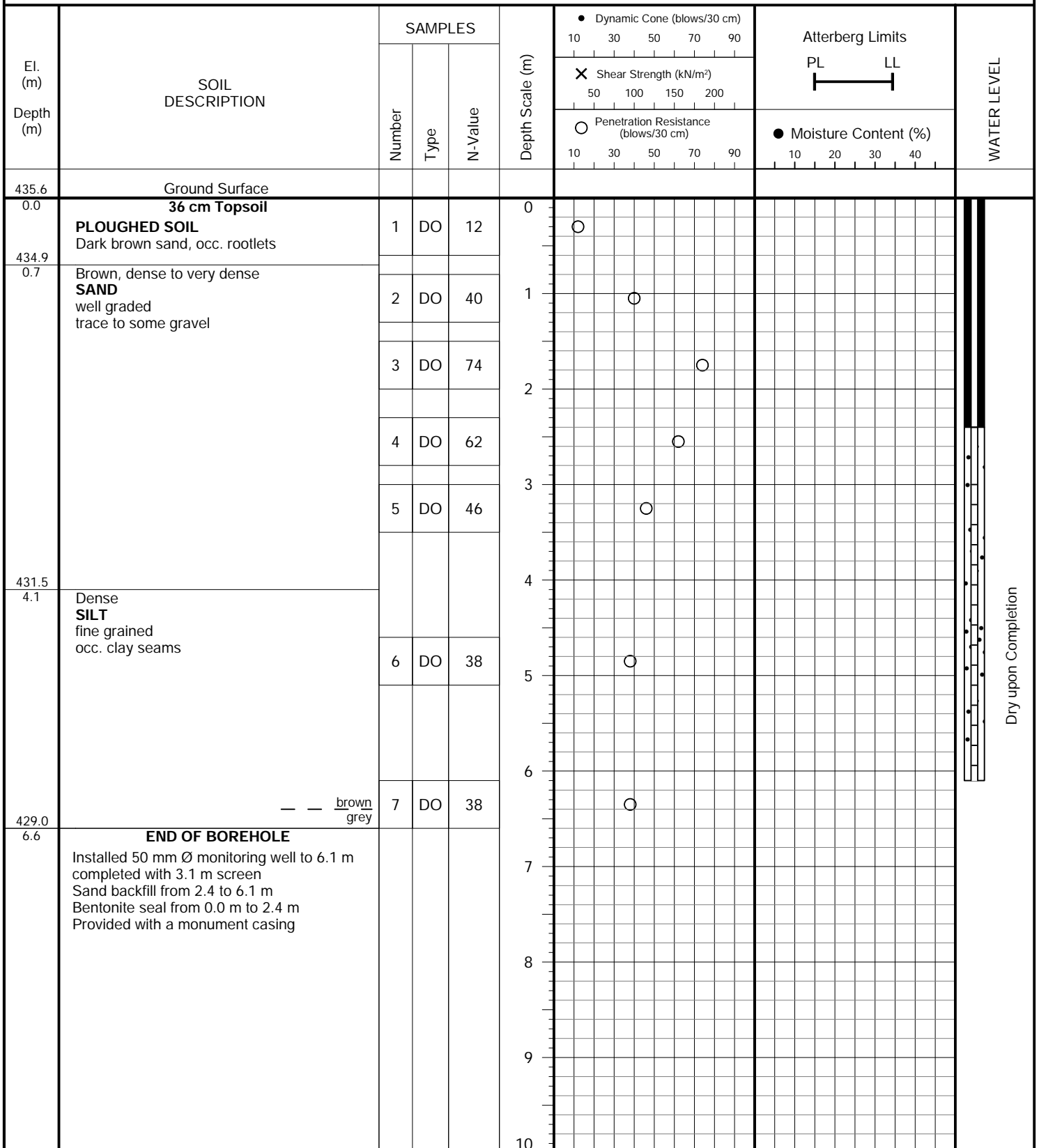


PROJECT DESCRIPTION: Proposed Residential Development

METHOD OF BORING: Flight Auger

PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

DRILLING DATE: November 25, 2022





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

Borehole and Monitoring Well Location Plan

SITE: 63 and 63A Trafalgar Road, Town of Erin

DESIGNED BY: C.R.	CHECKED BY: K.F.L.	DWG NO.: 1
SCALE: 1:4000	REF. NO.: 2206-S054	DATE: November 2022
		REV



Soil Engineers Ltd.

CONSULTING ENGINEERS
GEOTECHNICAL | ENVIRONMENTAL | HYDROGEOLOGICAL | BUILDING SCIENCE

SUBSURFACE PROFILE DRAWING NO. 2 SCALE: AS SHOWN

JOB NO.: 2206-S054
REPORT DATE: November 2022
PROJECT DESCRIPTION: Proposed Residential Development
PROJECT LOCATION: 63 and 63A Trafalgar Road, Town of Erin

LEGEND

- GRAVELLY SAND
- SANDY SILT
- SILT
- PLOUGHED SOIL
- SAND
- SANDY SILT TILL

▽ WATER LEVEL (END OF DRILLING)

