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**GEOTECHNICAL INVESTIGATION
PROPOSED AUDREY MEADOWS ESTATE SUBDIVISION
PART OF LOTS 18 AND 19, CONCESSION 8
TOWNSHIP OF PUSLINCH, ONTARIO
for
AUDREY MEADOWS LIMITED
c/o GEORGE R. GOOD CONSTRUCTION**



Naylor
Engineering
Associates Ltd.
CONSULTING ENGINEERS

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November 25, 2004

Audrey Meadows Limited
c/o George R. Good Construction
P.O. Box 1805
Guelph, Ontario
N1H 7A1

Attention: Mr. George Good

Dear Sir:

**Re: Geotechnical Investigation
Proposed Audrey Meadows Estate Subdivision
Part of Lots 18 and 19, Concession 8
Township of Puslinch, Ontario**

Naylor Engineering Associates Ltd. is pleased to submit this report for the geotechnical investigation recently completed for the above-referenced project. This work was authorized by Mr. George Good of George R. Good Construction on August 13, 2004.

The project involves the proposed construction of a 48 lot residential subdivision on the west side of Victoria Road near Aberfoyle, Ontario at the location shown on Drawing 1, appended. The subdivision will cover an area of about 28 ha and will be serviced by individual private wells and private septic systems.

The purpose of the geotechnical investigation was to determine subsurface soil and groundwater conditions at the site and, based on that information; provide geotechnical recommendations for site grading, site servicing, stormwater management, houses, and pavements.

Concurrently with this geotechnical investigation, Naylor Engineering Associates Ltd. is carrying out a Stage 1 Hydrogeological Study of the site. The results of our Stage 1 Hydrogeological Study are provided in our Report Number 5360H1.

Fieldwork

The fieldwork for the geotechnical investigation was carried out on August 31, and September 1, 3, and 7, 2004 and involved the excavation of thirty-two test pits (Test Pits 1 to 32) and the drilling of ten boreholes (Boreholes 1 to 8, 1A and 5A) at the locations shown on Drawing 2, appended.

The boreholes were advanced with a CME-55 track-mounted drillrig equipped with continuous flight hollow and solid stem augers supplied and operated by a licensed well drilling contractor. The test pits were excavated with a rubber-tired hydraulic backhoe supplied by an excavating contractor.

In the boreholes and test pits, representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard Penetration Tests (SPT) were carried out during sampling operations in the boreholes using conventional split spoon equipment. The SPT N-values recorded are plotted on the appended borehole logs.

Samples of the cohesive soils were tested using a handheld pocket penetrometer to determine approximate shear strengths. The pocket penetrometer test results are plotted on the borehole logs.

Groundwater observations were carried out in the open boreholes and test pits during and upon completion of drilling and excavating. The observations are summarized on the borehole and test pit logs.

Monitoring wells and/or piezometers were installed in the boreholes for measuring the stabilized groundwater levels, testing hydraulic conductivity, and obtaining groundwater samples.

The monitoring wells and piezometers were installed by inserting the screen and pipe into the hollow stem of the augers and then pulling back the augers. Sand was added as the augers were removed in order to pack the screen in place. Sand filter material was added until the level of the sand was appropriately 600 mm above the top of the screen. Bentonite seals were placed above the sand pack at all monitoring well/piezometer location to prevent the infiltration of surface water. A protective steel cover was installed at the ground surface and concreted in place at Borehole 7, and lockable caps were installed at the other monitoring wells. The tops of the riser pipes were vented to allow accurate measurement of stabilized groundwater levels. The monitoring wells were equipped with dedicated Waterra inertial pumps for obtaining groundwater samples.

Single well hydraulic response of slug tests were carried out in the monitoring wells installed at Boreholes 1, 3, 5, 6, and 7 on September 16, 2004. The slug tests consist of removing a volume of groundwater, then measuring the water level response back to static conditions in the well. The data was analyzed using the methods of Hvorslev and the results are provided in our Hydrogeology Report.

The fieldwork was supervised throughout by a member of our geotechnical engineering staff who directed the drilling and excavating procedures; conducted SPT and pocket penetrometer tests; documented the soil stratigraphies; monitored groundwater conditions; installed the piezometers and monitoring wells; conducted hydraulic conductivity testing; and, cared for the recovered soil samples.

The boreholes locations and ground surface elevations were surveyed by BSRD Limited. It is understood that the elevations are related to a geodetic datum.

Laboratory Testing

All soil samples secured during this investigation were returned to our laboratory for visual examination as well as moisture content tests. The moisture content test results are plotted on the appended borehole and test pit logs. The laboratory testing also comprised six particle size distribution analyses, with results presented on Figures 1 and 2, appended.

The soil samples will be stored for a period of four months from the date of sampling. After this time, they will be discarded unless prior arrangements have been made for longer storage.

Summarized Conditions

Site Description

The entire subject property covers about 50 ha and is located on the west side of Victoria Road, about 400 m north of Township Road 34 in Puslinch Township, Ontario. The ground surface at the site comprises gently rolling hills with a total topographic relief of about 12 m. The ground surface generally slopes downward towards the south. Two manmade ponds are located at the southeast corner of the property, and Mill Creek flows between the ponds then westerly near the south boundary. A tributary to Mill Creek crosses through the west end of the site.

The property is generally used for agricultural crops. Several farm buildings are situated on the east central part of the site and a residential dwelling exists at the southeast corner near the ponds.

Regional Geology

A Quaternary Geology map of the area is provided on Drawing 3, appended. The property is located within the physiographic region of Southern Ontario known as the Horseshoe Moraine. The region is composed of irregular hills and ridges with small enclosed basins (kettles) and some broad spillway terraces. The dominant soil material is the coarse textured Wentworth Till with interbeds of sand, silt and sand and gravel. Peat and muck occur in the low-lying areas between the hills.

The region is underlain by dolostone of the Guelph Formation which dips gently toward the southwest. The soil cover over the bedrock is 20 to 30 m thick.

Subsoil Conditions

We refer to the appended borehole and test pit logs for detailed soil descriptions and stratigraphies, results of SPT and pocket penetrometer testing, moisture content profiles, details of piezometer and monitoring well installations, and groundwater measurements. We also refer to Drawings 4, 5, and 6 for simplified cross-sections of the soil stratigraphy. In general, the subsurface stratigraphy contacted at the site comprises topsoil or peat overlying native deposits of silt, sand, sand and gravel, and glacial till. Descriptions of the various soil deposits encountered are provided in the following paragraphs.

Topsoil was contacted throughout the site and generally ranged in thickness from 300 to 500 mm. The topsoil is up to 1000 mm thick in some of the low lying areas (see Test Pits 5, 9, 11, and 27). The topsoil typically comprises dark brown silt that was moist to very moist at the time of the fieldwork. Peat was contact at the ground surface in Borehole 8 that was drilled between the manmade ponds at the southeast end of the site. The peat is 400 mm thick and comprises black amorphous peat.

Fill was contacted on the south side of the north pond in Test Pit 28. The fill comprises layered topsoil, silty sand and gravel, and silt with some clay and sand. The fill is 800 mm thick and is underlain by topsoil.

The major native deposits encountered at the site are glacial till, sand, silt, and sand and gravel. The glacial till was typically encountered in the higher topographic area at the northeast, and typically caps silt and sand deposits. The texture of the glacial till is generally silt with some sand and gravel, and trace clay. SPT N-values range from 9 to 35 blows per 300 mm penetration of the split spoon sampler indicating a compact relative density. The moisture content of the silt till typically ranges from 10 to 18% indicating moist to very moist conditions.

Major deposits of sand were encountered beneath the glacial till at the northeast and near the ground surface throughout the south half of the property. The sand extends below the termination depths of many of the test pits and boreholes, and ranges in texture from silty sand to coarse sand with trace silt. The sand typically has a compact relative density and is moist to saturated.

Silt deposits were contacted interlayered with the sand in about half of the test holes. The silt deposits are typically between 0.5 and 1.5 m thick and have a loose to compact relative density. The natural moisture content of the silt ranges from 10 to 25% indicating moist to wet conditions.

Sand and gravel deposits were contacted in ten of the test holes done along the south boundary of the site. The sand and gravel typically extends below the test hole termination depths and comprises fine to coarse sand and gravel with trace to some silt. The sand and gravel deposits have a dense to very dense relative density and are saturated in most test holes.

Groundwater

Groundwater observations and measurements carried out in the open test pits and in the piezometers and monitoring wells installed in the boreholes are provided on the appended test pit and borehole logs. The groundwater elevations are also shown on Drawing 2. The groundwater typically occurs under unconfined conditions in the major sand, and sand and gravel deposits. The surface of the groundwater table generally reflects the ground surface and ranges from about Elevation 328 along the north property line, to about Elevation 321 at the south. The direction of the horizontal hydraulic gradient is southwards towards Mill Creek. The water levels in the ponds at the southeast end of the site are close to the stabilized groundwater level.

The vertical hydraulic gradient at the site is variable. An upward hydraulic gradient was noted at Borehole 4; downward hydraulic gradients were noted at Boreholes 1 and 8; and, even vertical hydraulic gradients were noted at Boreholes 2 and 6.

The hydraulic conductivity of the subsurface soils was measured at Boreholes 1, 3, 5, 6, and 7 using single well hydraulic response of slug tests. The slug tests consist of removing a volume of groundwater from a well and measuring the response in the well. Data was analyzed using the methods of Hvorslev and the results are provided in our Hydrogeology Report. The average hydraulic conductivity of the layered silt and glacial till which is present at the surface in most of the north part of the site is relatively low, with measured values in the order of 10^{-4} cm/sec. The hydraulic conductivity of the native sand was greater, with values ranging from 10^{-2} to 10^{-3} cm/sec.

Further details regarding the hydrogeology of the site are provided in our Hydrogeological Report No. 5360H1.

Discussion and Recommendations

General

The proposed residential development will cover about 28 ha on the west side of Victoria Road about 400 m north of Township Road 34 in the Township of Puslinch, Ontario. The new development contemplates forty-eight estate lots (all lots at least 1 acre in size) that will be serviced by individual drilled wells (into the bedrock) and individual septic beds.

The property is presently used for agricultural purposes and contains several farm buildings near the centre of the east half of the property. A residential dwelling is located at the southeast corner of the site.

Two manmade ponds are also located at the southeast corner of the site. Mill Creek flows between the ponds, and then in a westerly direction near the south boundary of the site. A tributary to Mill Creek crosses the west end of the property.

Subsurface soil conditions below this site generally comprise topsoil overlying complex layered deposits of silt, sand, sand and gravel, and glacial till. The stabilized groundwater table occurs at 1 to 6 m below existing grade, and the horizontal hydraulic gradient is from the north to the south.

Based on the results of this investigation, the subsurface conditions at the site are considered quite suitable for the proposed residential subdivision. The following subsections of this report provide geotechnical recommendations pertaining to development of the property including site grading, site servicing, pavement design, residential foundations, stormwater infiltration, and septic systems.

Site Grading

Some regrading of the site will be required to prepare the land for construction of the proposed residential subdivision. Prior to carrying out any area grading, the surficial topsoil should be stripped from cuts and critical fill areas. In calculating the approximate quantity of topsoil to be stripped, we recommend that the topsoil thickness provided on the individual borehole and test pit logs be increased by 50 mm to account for variations, and some stripping of the mineral soil immediately beneath the topsoil layer. It should be noted that the topsoil thicknesses throughout the site are typically in the order of 300 to 500 mm, with some locations of thicker topsoil accumulations. The topsoil material may be used for landscaping fill to raise grades in rear yards of the house lots.

Fill placed during the site grading work should be laid down in maximum 300 mm thick lifts and compacted to the following minimum percentages of standard Proctor maximum dry density (SPMDD):

Fill Use	Minimum Compaction Required
Structural fill to support houses	98% SPMDD
Subgrade fill beneath streets	95% SPMDD
Bulk fill in landscaped areas	90% SPMDD

Subgrade fill placed in the septic bed areas should comprise native sand compacted to between 93 and 95% SPMDD.

The predominant native soil to be encountered in the anticipated cut areas near the north comprises silt till with some sand. The native soil will be quite suitable for compaction in fill areas if the work is carried out during normally drier summer months.

Structural fill should extend 1.0 m beyond the footing edge of any residential building, and down to the subgrade level of 45° to the horizontal. Full time inspection by experienced geotechnical personnel should be carried out during fill placement and compaction to examine and approve various fill materials, and to monitor the placement and verify compaction by insitu density testing.

The texture of the native sand and gravel at the south ranges from sandy gravel to gravelly sand with trace to some silt. During construction, sampling of the sand and gravel for possible conformance to Granular 'B' specifications should be carried out.

Site Servicing

It is anticipated that the storm sewers for this development will be at nominal depths of 2.0 to 4.0 m below final grades.

Temporary excavations for installation of underground storm sewers must comply with the Ontario Occupational Health and Safety Act and Regulations. The predominant soil materials expected to be encountered following the site grading work would be classified as Type 3 soils, and the temporary side slopes should be cut at an inclination of 1 horizontal to 1 vertical from the base of the excavations.

Groundwater seepage will be encountered during excavation of trenches in low-lying areas, and it may be necessary to flatten the excavation side slopes in order to ensure stability.

Pipe bedding for the storm services should be conventional Class 'B' pipe bedding, comprising a 150 mm layer of OPSS Granular 'A' aggregate below the pipe invert. The Granular 'A' type aggregate should be provided around the pipe to at least 300 mm above the top. The pipe bedding should be compacted to a minimum 95% SPMDD, as verified by insitu density testing during pipe placement.

The trenches above the specified pipe bedding should be backfilled with the excavated on-site material, placed in 300 mm maximum thick lifts and compacted to a minimum of 95% SPMDD. The excavated silt, sand, and sand and gravel materials are expected to be re-compactable to 95% SPMDD.

To minimize potential problems, backfilling operations should follow closely after excavation so that only a minimal length of trench is exposed. Care should be taken to protect the side slopes of excavations by diverting surface runoff. If construction extends into the winter, then the backfilling operations should be planned so that exposure of the backfill material to freezing conditions is kept to a minimum, and to ensure that frozen material is not used as backfill.

Full time inspection and testing by experienced geotechnical personnel should be carried out to monitor fill placement, approve backfill materials, and verify that the specified percent compaction has been achieved by insitu density testing.

Septic System Design

The native mineral soils at the site are suitable for sewage disposal by conventional Class 4 Private On-Site Sewage Systems. Class 4 Sewage Systems typically consist of a septic tank connected to a building sewer, a leaching bed, and the piping and pumps that transport the tank effluent to the leaching bed.

The percolation time of the predominant soils at the subdivision have been assessed based on physical characteristics as described in Supplementary Guideline SG-6 of the Ontario Building Code, 1997, and the results of our particle size distribution analyses (see Figures 1 and 2). The estimated design percolation T-times are summarized in the following table:

Soil Type	Percolation Time (T in min/cm)
silt till	20 – 50
silt	20 – 50
sand	4 – 12
sand and gravel	2 – 8

The actual T-time must be determined in the field following site grading. Based on the results of our test holes, it is estimated that the septic bed areas at Lots 1 to 18 and 26 to 48 will have a percolation T-time of 35 min/cm, and Lots 19 to 25 will have T-times of 5 to 10 min/cm.

The percolation time of the soil is dependant upon the density, structure, moisture content, gradation, and other factors. It is the responsibility of the sewage system designate to carry out field investigations at the time of final design to confirm the soil and groundwater conditions.

Pavement Design

Following site grading, the subgrade along the proposed streets will comprise predominantly recompacted sand and silt material. The following pavement component thicknesses are recommended based on the proposed pavement usage, and the frost susceptibility, and strength of the subgrade soils expected:

Pavement Component	Thickness
Asphaltic Concrete	80 mm
Granular 'A' Base	150 mm
Granular 'B' Subbase	400 mm

The pavement subgrade soils should be thoroughly proof-rolled prior to placement of the Granular 'B' subbase course. If any unstable areas are noted, then the Granular 'B' thickness may need to be increased to support pavement construction traffic. The native sand and gravel from the south end of the site may be suitable for reuse at Granular 'B' subgrade to gradation testing at the time of construction.

Samples of both the Granular 'A' and Granular 'B' aggregates should be checked for conformance to OPSS 1010 specifications prior to utilization during construction. The texture of the on-site sand and gravel ranges from sandy gravel to gravelly sand, with trace to some silt, therefore on-going sampling for conformance to OPSS 1010 specifications should be performed.

The Granular 'A' base and Granular 'B' subbase courses must be compacted to 100% SPMDD, as verified by insitu density testing.

The asphaltic concrete should comprise a binder layer HL4 and a surface layer of HL3. It is recommended that the compacted thicknesses be 45 mm of HL4 binder and 35 mm of HL3 surface. The asphaltic concrete pavement material should conform to the requirements of OPSS 1150, and should be placed and compacted in accordance with OPSS 310.

The pavement subgrade soils will generally be free-draining and therefore subdrains will not be required in most areas.

Foundations

The undisturbed native mineral soils are considered suitable to support residential foundations. Where footing levels will be above existing native mineral soil grade, structural fill will probably be used. The house footings constructed on approved undisturbed native soil or structural fill may be proportioned for the minimum footing sizes provided in the Ontario Building Code.

The structural fill may be constructed with on-site excavated mineral soil following removal of all topsoil and approval of the subgrade.

All founding surfaces for residential dwellings on native mineral soil or structural fill should be inspected by a geotechnical engineer prior to placement of structural concrete to ensure that the subgrade soils are capable of supporting the house foundations and to confirm that the house envelopes do not extend beyond the limits of any structural fill pads.

The subgrade soils are considered to be frost-susceptible and must be protected from freezing at all times, including during construction. Exterior footings, as well as footings outside of heated areas, must be provided with a minimum 1.20 m of soil cover upon final grading for frost protection.

Basements

House basements at this site should be designed at least 0.5 m above the stabilized groundwater table. Based on the results of the investigation, groundwater occurs at less than 2.0 m below existing grade in several lots particularly along the south property line. It is recommended that Naylor Engineering Associates Ltd. review the preliminary lot grading plans to ensure that the basement levels are at least 0.5 m above the stabilized groundwater level.

The house basements at this site must be provided with perimeter weeping tile systems, as per the Ontario Building Code. The exterior drain tile or pipe should be laid on undisturbed or well-compacted soil so that the top of the pipe is below the bottom of the basement floor slab. The weeping tile must drain to a suitable frost-free outlet or sump.

The portion of the exterior basement walls below finished ground level should be damp-proofed as per the OBC. The basement wall backfill should be graded to allow drainage away from the foundation.

The subgrade for the basement floor slabs should comprise undisturbed native soil or well-compacted fill. A minimum 100 mm thick layer of coarse, clean granular material should be placed beneath the slabs as per the Ontario Building Code.

Stormwater Infiltration

At-source infiltration of water from roof leaders for houses within this subdivision should be considered. Soak-away pits or infiltration galleries can be used when located in areas where the natural groundwater level is below the bottom of the pit/gallery and the native soils are relatively free draining.

Based on the results of this geotechnical investigation, the majority of the native soils below the south half of the site would be considered free draining; however, the groundwater table is shallow in many areas. The lot grading plans should be reviewed by Naylor Engineering Associates Ltd. to determine the most appropriate areas for at-source stormwater infiltration.

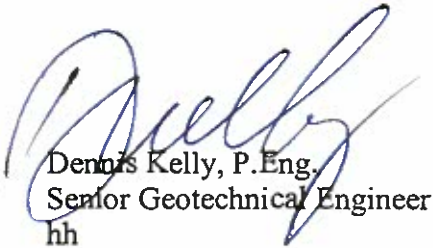
Conclusions

The findings in this geotechnical investigation for the proposed Audrey Meadows Subdivision can be summarized as follows:

- Subsurface stratigraphy generally comprises topsoil overlying native deposits of silt, sand, sand and gravel, and glacial till.
- The stabilized groundwater level occurs at 1 to 6 m below existing grade.
- The topsoil thickness ranged between 300 to 500 mm with thicker accumulations in the low lying areas.
- The native mineral soils are suitable to support houses with footings designed for the minimum sizes specified in the Ontario Building Code.
- The native soils cut from the higher areas of the site will be suitable for reuse as engineered structural fill or road subgrade fill to raise grades in the low lying areas.
- The septic system T-time of the native soils will be suitable for conventional in-ground systems.
- At-source stormwater infiltration will be suitable in areas with sand or sand and gravel subgrade soils.
- Conventional asphaltic concrete pavements may be used for the new streets.

It is important to note that the geotechnical investigation involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered. The subsurface conditions between and beyond the test holes will differ from those encountered at the test holes. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

Respectfully submitted,


Dennis Kelly, P.Eng.
Senior Geotechnical Engineer
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Att.

- Encl. List of Abbreviations
- Encl. Figures 1 and 2 - Particle Size Distribution Analyses
- Encl. Borehole Logs - Boreholes 1 to 8
- Encl. Test Pit Logs - Test Pits 1 to 32
- Encl. Drawing 1 - Location Plan
- Encl. Drawing 2 - Site Plan
- Encl. Drawing 3 - Quaternary Geology
- Encl. Drawings 4 to 6 - Geologic Cross-Sections

LIST OF ABBREVIATIONS

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

Sample Types		Soil Tests and Properties	
AS	auger sample	SPT	Standard Penetration Test
CS	chunk sample	UC	unconfined compression
RC	rock core	FV	field vane test
SS	split spoon	ϕ	angle of internal friction
TW	thin-walled, open	γ	unit weight
WS	wash sample	w_p	plastic limit
		w	water content
		w_l	liquid limit
		I_L	liquidity index
		I_p	plasticity index
		PP	pocket penetrometer

Penetration Resistances

Dynamic Penetration Resistance The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used.

Standard Penetration Resistance, N (ASTM D1586) The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a standard split spoon sampler 0.30 m (12 in.)

WH sampler advanced by static weight of hammer

PH sampler advanced by hydraulic pressure

PM sampler advanced by manual pressure

Soil Description

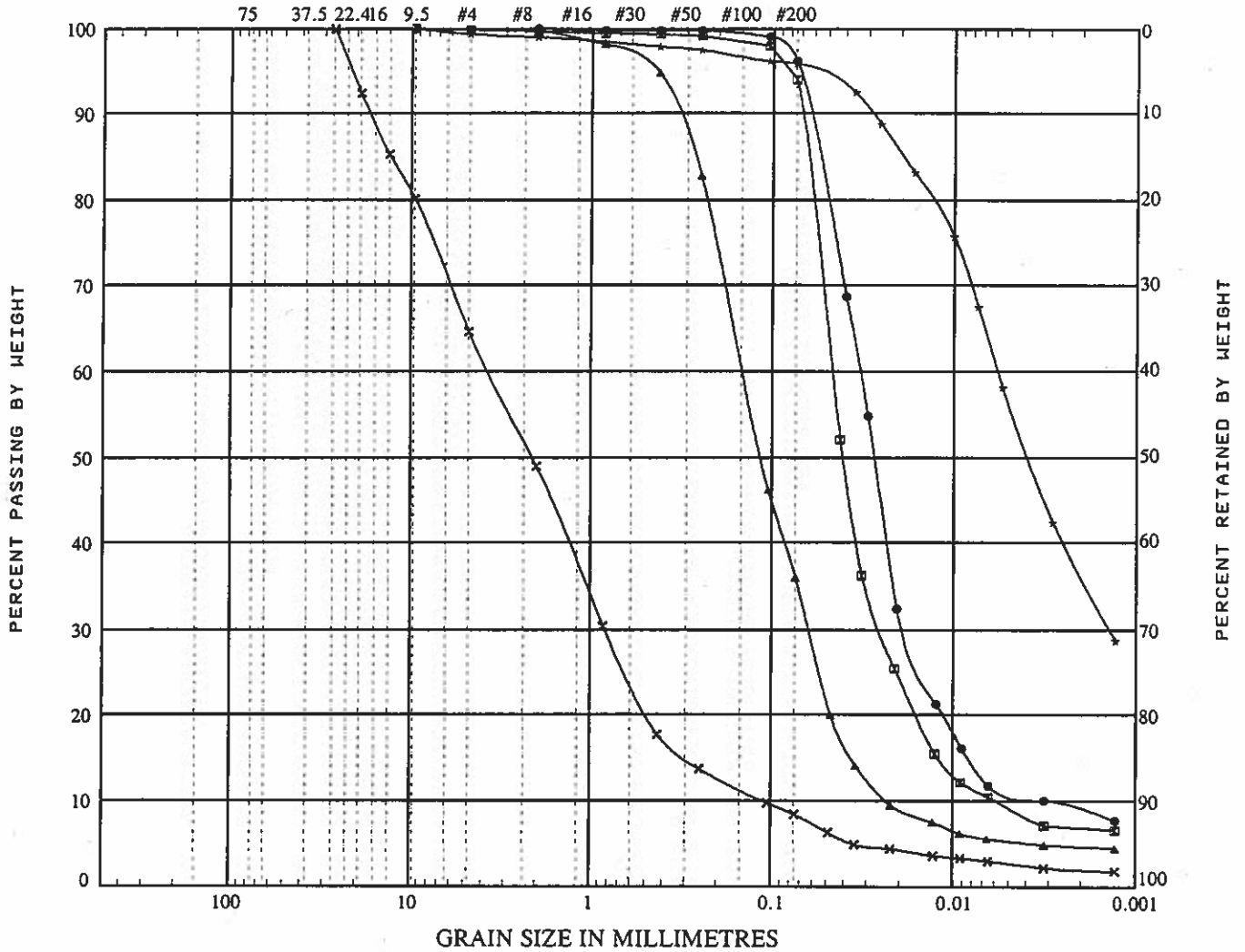
Cohesionless Soils	SPT 'N' Value	D _r (%)
Relative Density (D_r)	(blows per 0.30 m)	
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	over 50	80 to 100

Cohesive Soils	Undrained Shear Strength (C _u)	
Consistency	kPa	psf
Very Soft	less than 12	less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000

DTPL Drier than plastic limit
 APL About plastic limit
 WTPL Wetter than plastic limit

UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			U.S. STANDARD SIEVE No.			HYDROMETER



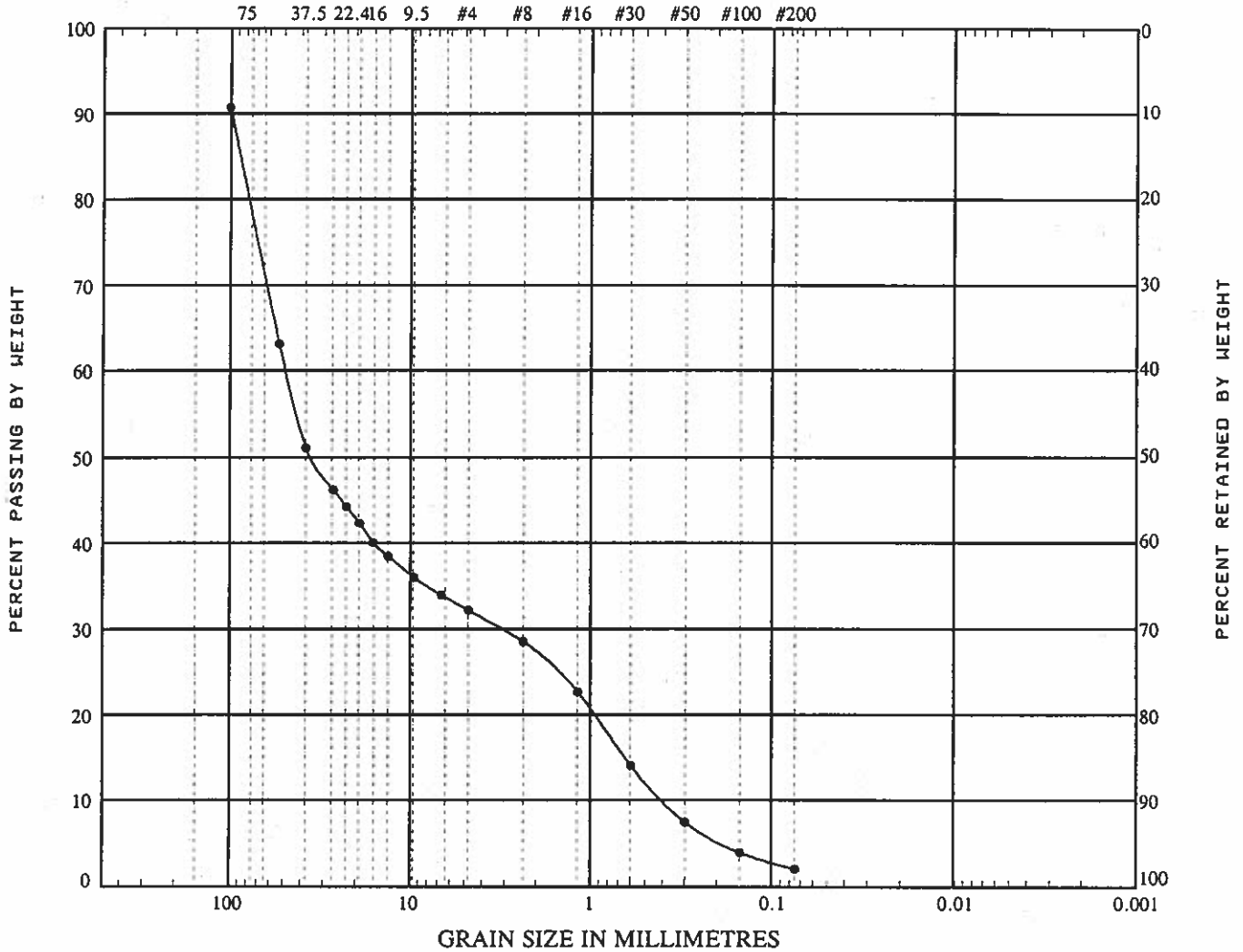
PROJECT Proposed Audrey Meadows Estate Subdivision
 LOCATION Part Lots 18 and 19, Concession 8, Pushlinch Township, ON JOB NO. 5360G01

CURVE ID	BOREHOLE/TEST PIT	SAMPLE NO.	DEPTH (m)	SOIL DESCRIPTION
●	BH3	2	1.52-2.13	SILT, trace Clay and Sand
■	BH4	2	1.52-1.98	SILT, trace Sand and Clay
▲	BH5	5	3.81-4.27	Silty SAND, trace Clay
*	BH6	2	1.52-1.98	SILT TILL
×	BH8	2	1.52-1.98	Gravelly SAND, trace Silt

REMARKS _____

UNIFIED SOIL CLASSIFICATION

<i>COBBLES</i>	<i>GRAVEL</i>		<i>SAND</i>			<i>SILT OR CLAY</i>
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			U.S. STANDARD SIEVE No.			HYDROMETER



PROJECT Proposed Audrey Meadows Estate Subdivision
 LOCATION Part Lots 18 and 19, Concession 8, Pushtinch Township, ON JOB NO. 5360G01

CURVE ID	BOREHOLE/TEST PIT	SAMPLE NO.	DEPTH (m)	SOIL DESCRIPTION
•	TP7	BS	0.50-1.20	SAND AND GRAVEL, trace Silt

REMARKS _____



Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

Borehole Number: 1

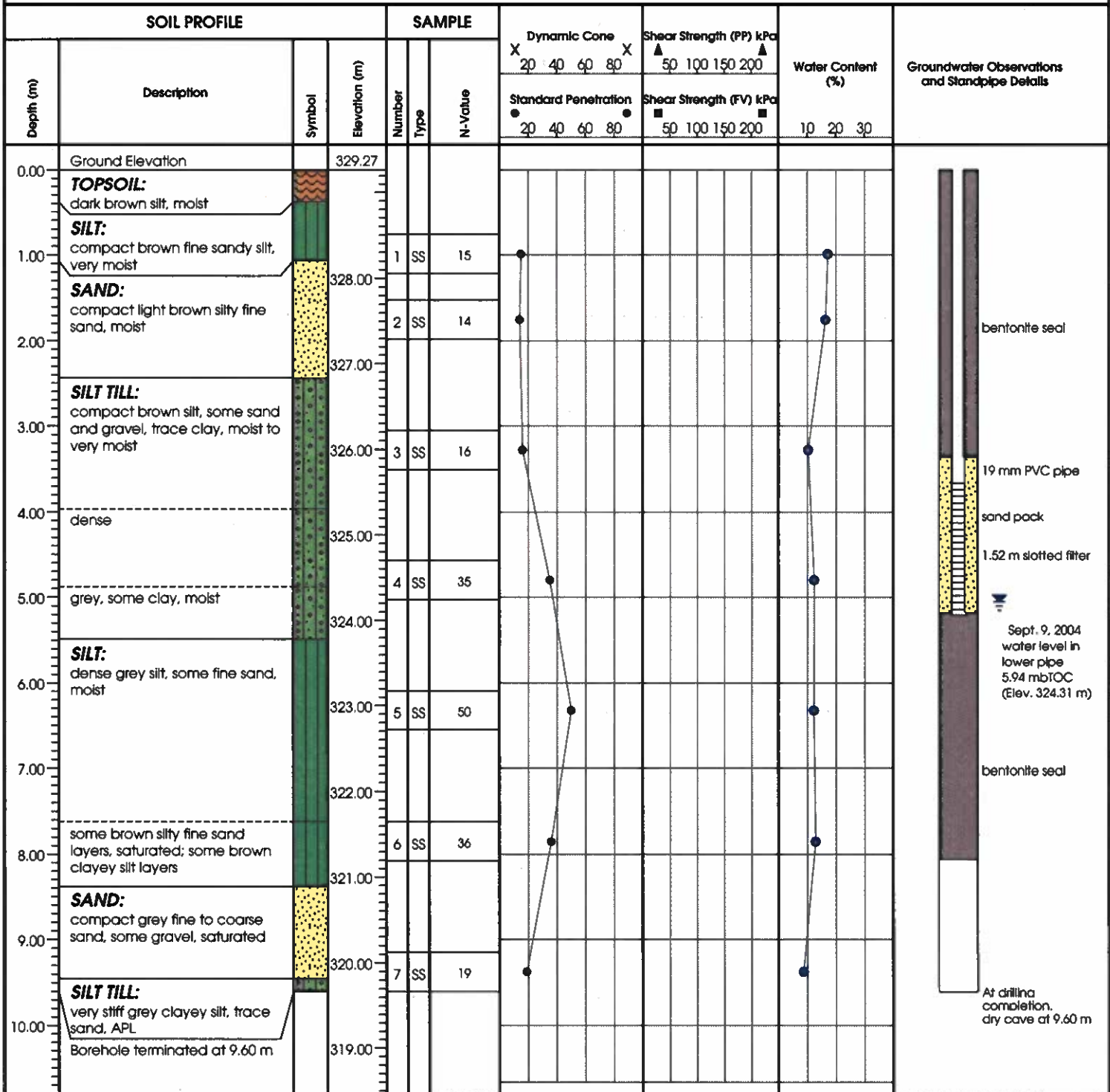
Ground Elevation: 329.27 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Drill Date: September 3, 2004



Reviewed by: DK

Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

Borehole Number: 1A

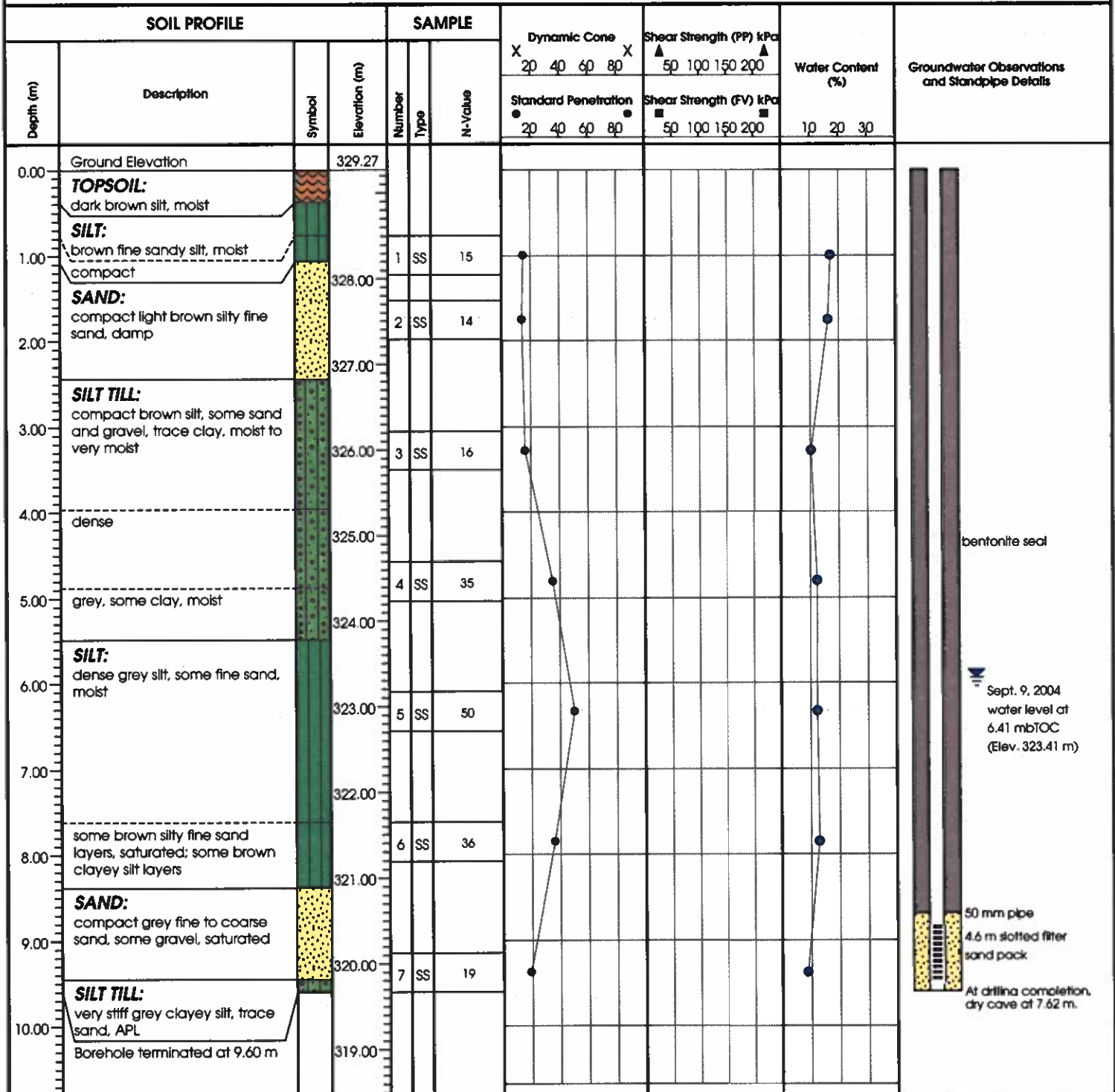
Ground Elevation: 329.27 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Drill Date: September 3, 2004



Reviewed by: DK

Field Tech.: RM

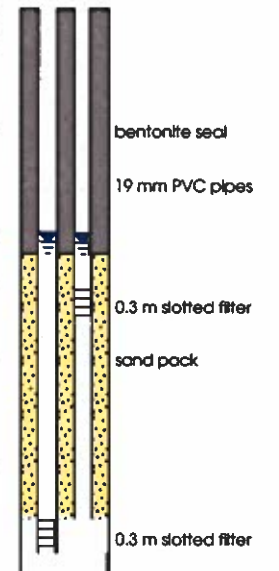
Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes: Soil profile interpreted from Borehole 1.

Drafted by: DC (01a)

SOIL PROFILE			SAMPLE			Dynamic Cone		Shear Strength (PP) kPa		Water Content (%)	Groundwater Observations and Standpipe Details
Depth (m)	Description	Symbol	Elevation (m)	Number	Type	N-Value	X	X	▲		
							●	●	■	■	
0.00	Ground Elevation		323.93								
0.00 - 0.10	TOPSOIL: dark brown silt, moist										
0.10 - 1.00	SAND: brown silty sand, moist										
1.00 - 1.50	brown fine to coarse sand, some silt and gravel, damp dense to very dense		323.00	1	AS						
1.50 - 2.00	some silty sand layers, moist			2	SS	55					
2.00 - 3.00	SAND AND GRAVEL: very dense brown sand and gravel, trace silt, saturated			3	SS	38 \ 150mm					
3.00 - 5.03	Borehole terminated at 5.03 m			4	SS	39					
5.03			319.00								
6.00			318.00								
7.00			317.00								
8.00			316.00								
9.00			315.00								
10.00			314.00								



At drilling completion, dry cave at 5.03 m

Sept. 9, 2004 water level in shallow pipe at 2.32 mbTOC (Elev. 321.87 m)

water level in lower pipe at 2.30 mbTOC (Elev. 321.87 m)

Reviewed by: DK

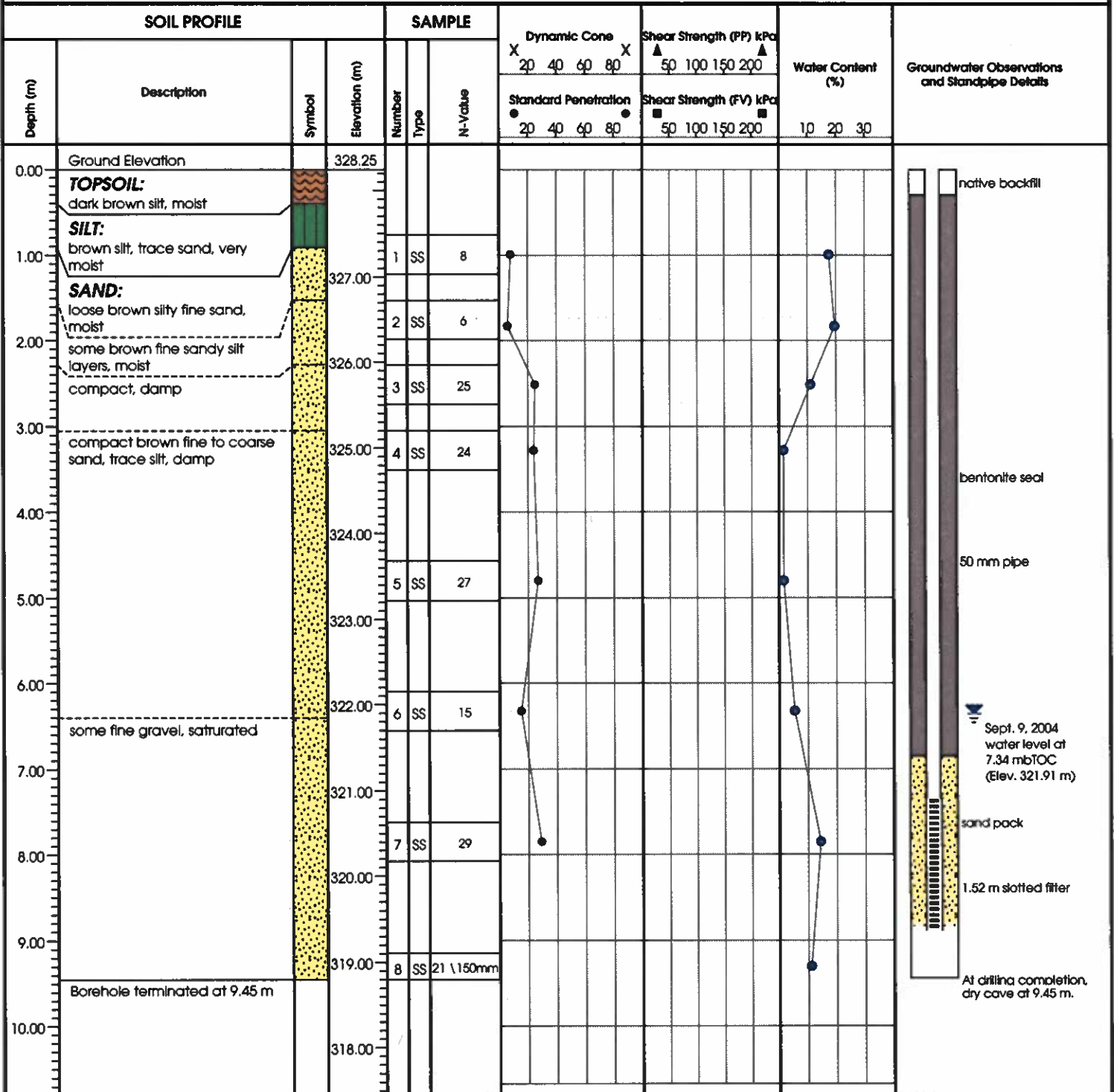
Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Reviewed by: DK

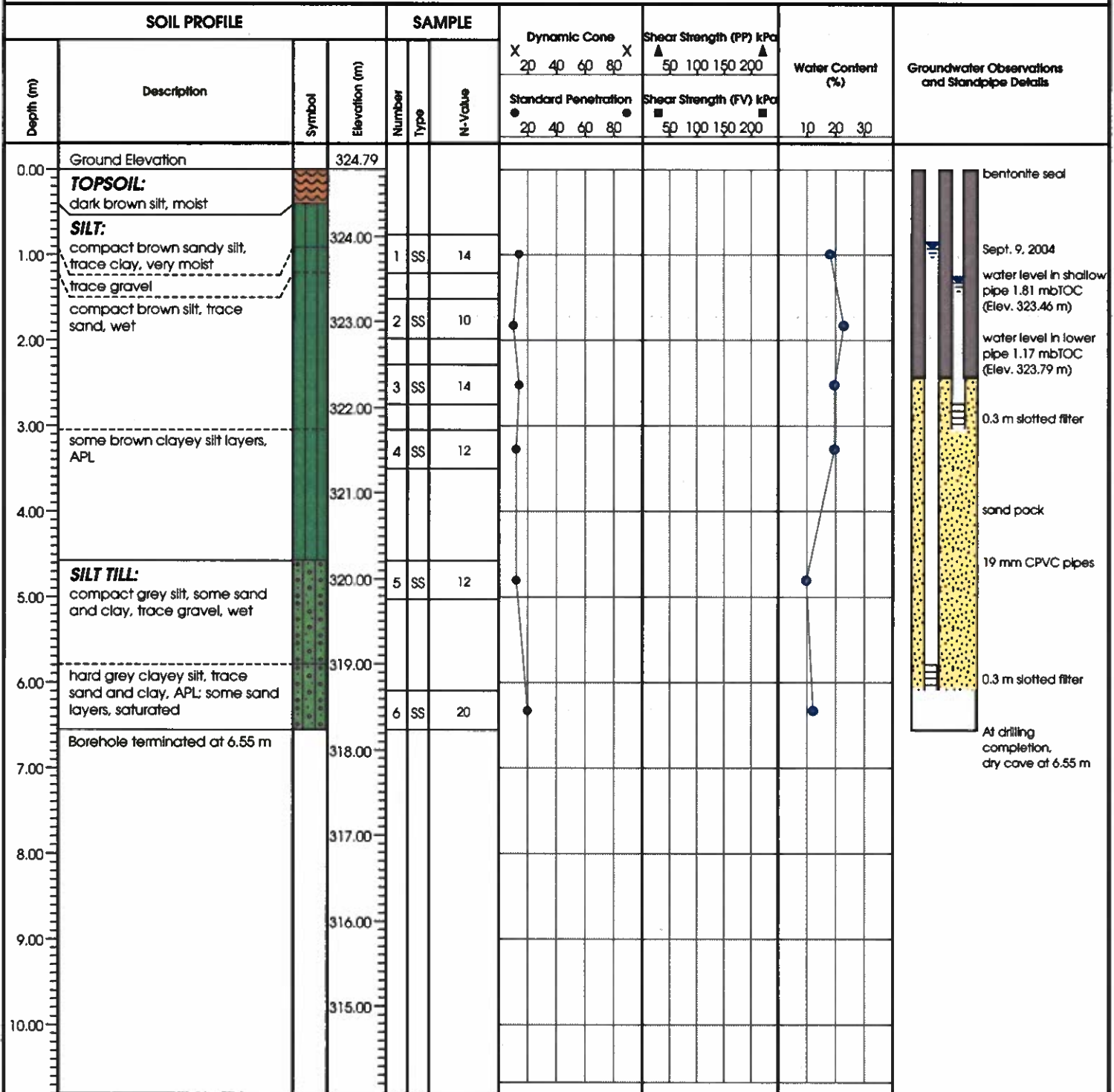
Drill Method: Hollow Stem Auger

Notes:

Field Tech.: RM

Sheet: 1 of 1

Drafted by: DC (01a)



Reviewed by: DK

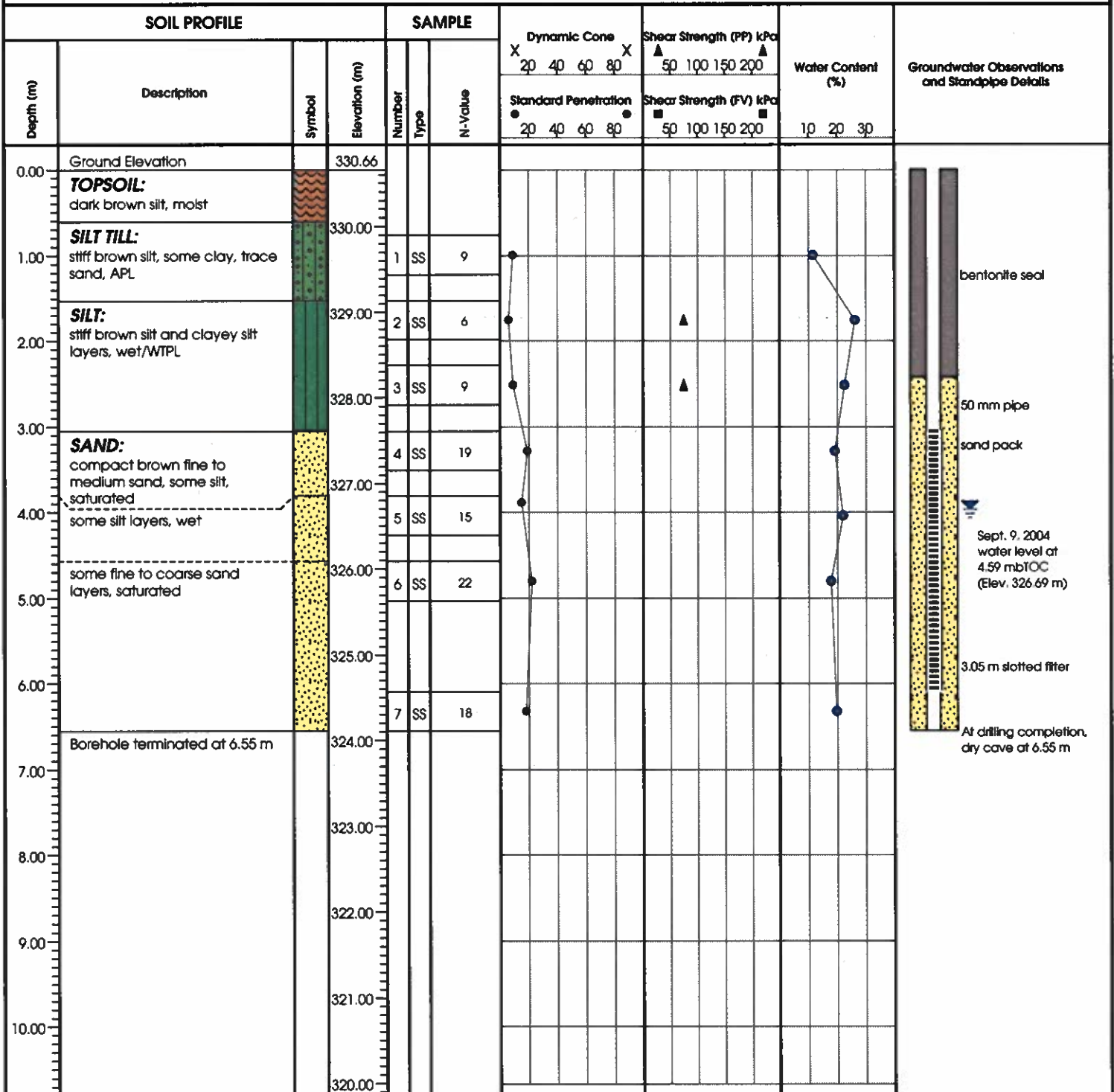
Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Reviewed by: DK

Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

Borehole Number: 5A

Ground Elevation: 330.77 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Drill Date: September 7, 2004

SOIL PROFILE			SAMPLE			Dynamic Cone X 20 40 60 80 X	Shear Strength (PP) kPa ▲ 50 100 150 200 ▲	Water Content (%) 10 20 30	Groundwater Observations and Standpipe Details
Depth (m)	Description	Symbol	Elevation (m)	Number	Type				
0.00	Ground Elevation		330.77						<p>bentonite seal 1.52 m slotted filter sand pack 50 mm pipe</p> <p>At drilling completion, dry cave at 2.44 m Sept. 9, 2004 Standpipe dry</p>
0.00 - 0.50	TOPSOIL: dark brown silt, moist								
0.50 - 1.00	SILT TILL: stiff brown silt, some clay, trace sand, APL		330.00						
1.00 - 2.44	SILT: stiff brown silt and clayey silt layers, wet/WTPL		329.00						
2.44	Borehole terminated at 2.44 m		328.00						
3.00			327.00						
4.00			326.00						
5.00			325.00						
6.00			324.00						
7.00			323.00						
8.00			322.00						
9.00			321.00						
10.00									

Reviewed by: DK

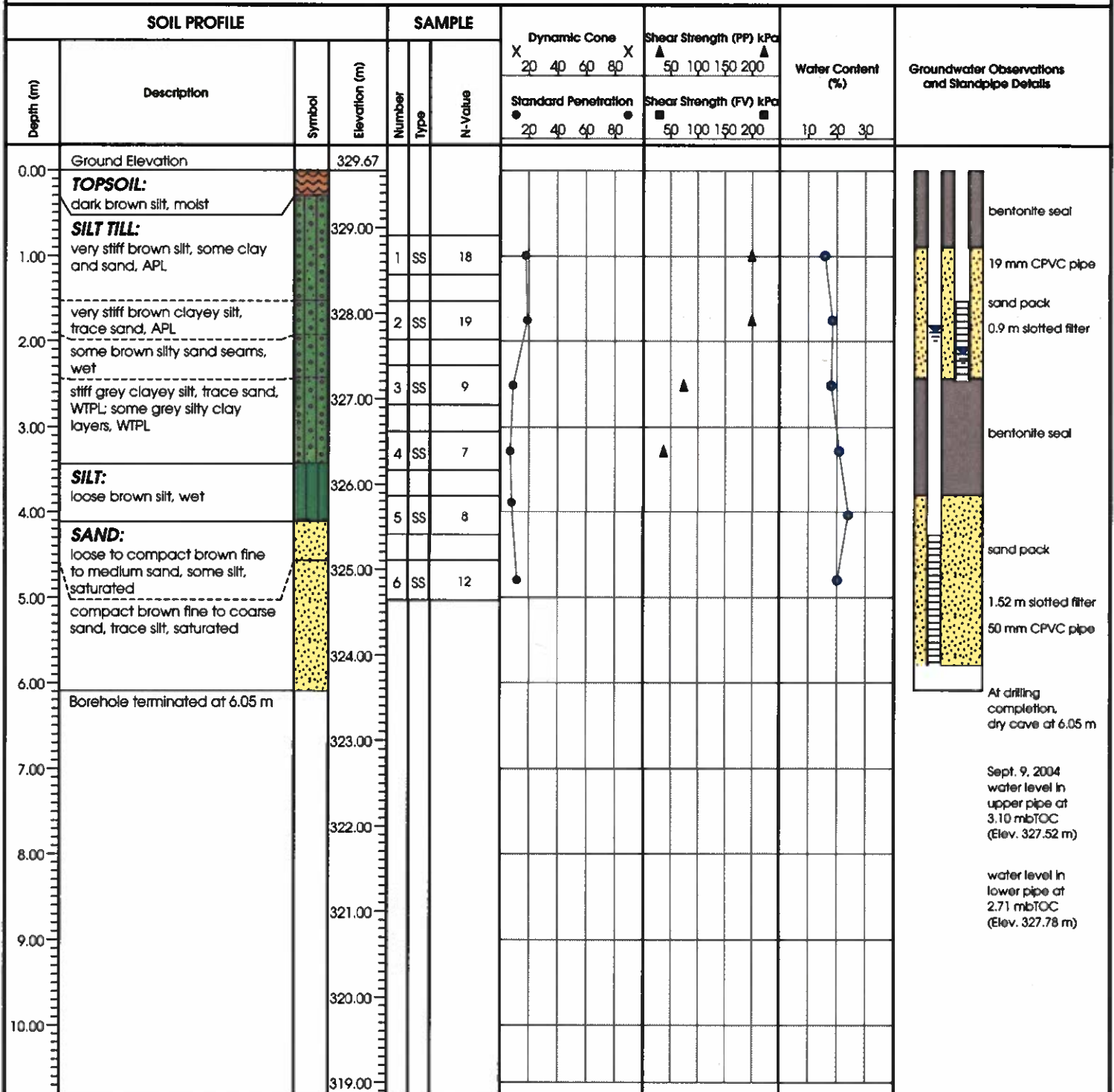
Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Reviewed by: **DK**

Field Tech.: **RM**

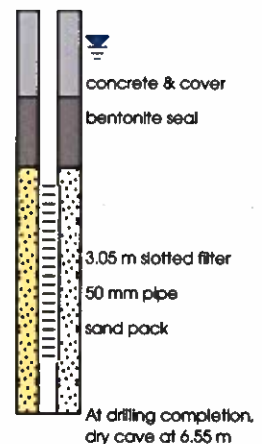
Drill Method: **Hollow Stem Auger**

Sheet: **1 of 1**

Notes:

Drafted by: **DC (01a)**

SOIL PROFILE			SAMPLE			Dynamic Cone		Shear Strength (PP) kPa		Water Content (%)	Groundwater Observations and Standpipe Details
Depth (m)	Description	Symbol	Elevation (m)	Number	Type	N-Value	X	X	▲		
							20	40	60	80	50
0.00	Ground Elevation		323.57								
0.00 - 0.20	TOPSOIL: dark brown silt, moist										
0.20 - 0.80	SILT: brown silt, some clay, wet some gravel		323.00	1	SS	17					
0.80 - 2.00	CLAY: firm brown silty clay, WTPL		322.00	2	SS	6					
2.00 - 3.00	SILT: compact brown silt, some clay, saturated		321.00	3	SS	11					
3.00 - 3.51	SILT TILL: hard brown silt, some clay, trace sand, APL		320.00	4	SS	17					
3.51 - 10.00	Borehole terminated at 3.51 m										
			319.00								
			318.00								
			317.00								
			316.00								
			315.00								
			314.00								
			313.00								



Sept. 9, 2004
water level at
1.00 mbTOC
(Elev. 323.26 m)

Reviewed by: DK

Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Naylor Engineering Associates Ltd.
CONSULTING ENGINEERS

Borehole Number: 8

Ground Elevation: 323.02 m.

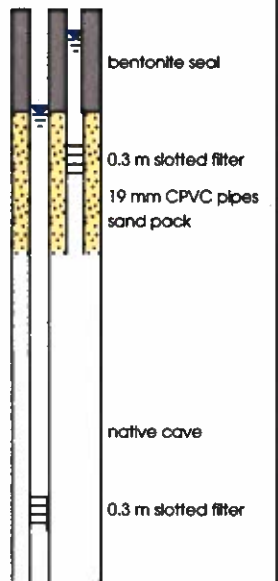
Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Drill Date: September 7, 2004

SOIL PROFILE			SAMPLE			Dynamic Cone		Shear Strength (PP) kPa		Water Content (%)		Groundwater Observations and Standpipe Details		
Depth (m)	Description	Symbol	Elevation (m)	Number	Type	N-value	X	X	▲	▲	10		20	30
							20	40	60	80				
0.00	Ground Elevation		323.02											
0.00 - 0.10	PEAT: black amorphous peat, wet													
0.10 - 0.20	SILT: grey/brown silt, some sand and clay, moist													
0.20 - 5.03	SAND: compact grey fine to coarse sand, some fine gravel, saturated													
0.00			322.00	1	SS	18	●				●			
1.00			321.00	2	SS	28	●				●			
2.00			320.00											
3.00			319.00	3	SS	22	●				●			
4.00			318.00	4	SS	25	●				●			
5.00	Borehole terminated at 5.03 m		318.00											
6.00			317.00											
7.00			316.00											
8.00			315.00											
9.00			314.00											
10.00			313.00											



At drilling completion, water level at 0.35 m

water level in upper pipe at 0.73 mbTOC (Elev. 322.75 m)

water level in lower pipe at 1.35 mbTOC (Elev. 322.02 m)

Reviewed by: DK

Field Tech.: RM

Drill Method: Hollow Stem Auger

Sheet: 1 of 1

Notes:

Drafted by: DC (01a)



Test Pit Number: 1

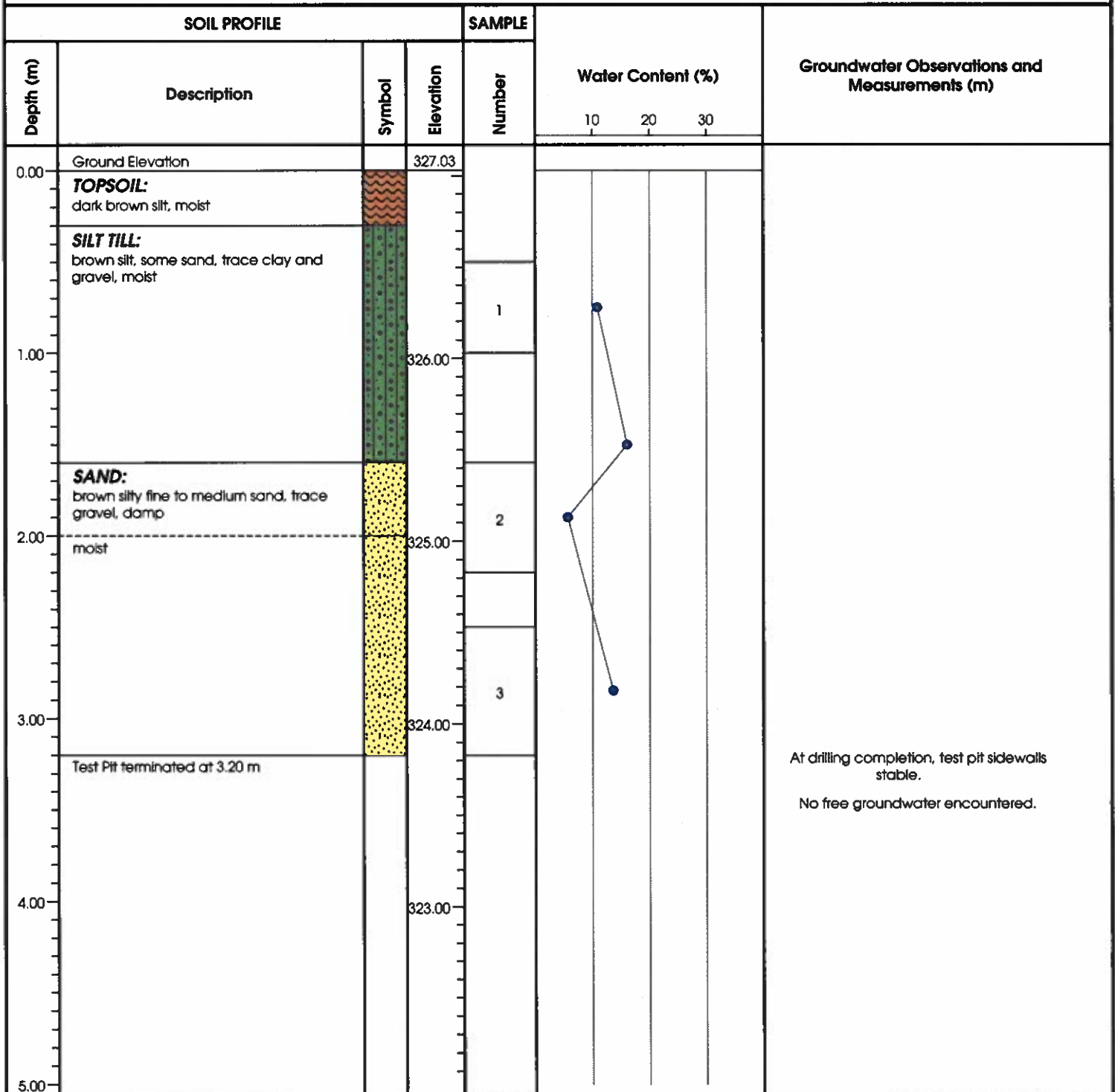
Ground Elevation: 327.03 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 2

Ground Elevation: 329.31 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE		Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number			
0.00	Ground Elevation		329.31				
	TOPSOIL: dark brown sandy silt, moist		329.00				
	SAND: light brown fine to medium sand, occasional coarse sand seams, trace silt, damp			1			
1.00			328.00				
2.00			327.00				
3.00			326.00	2			
	Test Pit terminated at 3.30 m						
4.00			325.00				
5.00							

At drilling completion, test pit sidewalls stable.
No free groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 1.00 to 1.50 m.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 3

Ground Elevation: 327.91 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		327.91			
	TOPSOIL: dark brown silt, moist					
	SILT: brown silt, trace sand, very moist			1		
1.00	SAND: light brown fine to medium sand, some silt, moist		327.00			
	SILT: brown layered silt and clayey silt, moist; APL			2		
2.00			326.00			
3.00			325.00			
	Test Pit terminated at 3.20 m					
4.00			324.00			
5.00			323.00			

At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
No free groundwater 4 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 1.60 to 2.00 m.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 4

Ground Elevation: 327.14 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		327.14			
	TOPSOIL: dark brown silt, moist					
	SILT TILL: brown silt, some sand and clay, trace fine gravel, very moist			1		
1.00			326.00			
2.00	some brown clayey silt layers. APL		325.00	2		
3.00			324.00			
	Test Pit terminated at 3.30 m					
4.00			323.00			
5.00						



At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
Water level at 3.20 m 4 hours after excavation.

Reviewed by: CF
Field Tech: RM
Notes:

Sheet: 1 of 1
Drafted by: DC (04a)



Test Pit Number: 5

Ground Elevation: 325.07 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		325.07			
0.00 - 1.00	TOPSOIL: dark brown silt, very moist					
1.00 - 2.00	SILT: mottled brown silt, some clay, APL		324.00	1		
2.00 - 3.30	SILT TILL: brown silt, some clay, some clayey silt layers, trace sand, APL		323.00	2		
			322.00	3		
3.30 - 5.00	Test Pit terminated at 3.30 m		321.00			At drilling completion, test pit sidewalls stable. No free groundwater encountered. Water level at 3.20 m 4 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 6

Ground Elevation: 323.02 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE			SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation		
0.00	Ground Elevation		323.02		
	TOPSOIL: dark brown silt, moist				
	SILT TILL: brown silt, some clay, some clayey silt layers, trace sand, APL				
1.00			322.00	1	
2.00	SILT: brown silt, trace fine sand and clay, very moist		321.00		
	grey, wet			2	
3.00	Test Pit terminated at 3.00 m		320.00		
4.00			319.00		
5.00			318.00		

At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
Water level at 2.45 m 3 hours later.
Seepage at 1.50 m 3 hours later.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 7

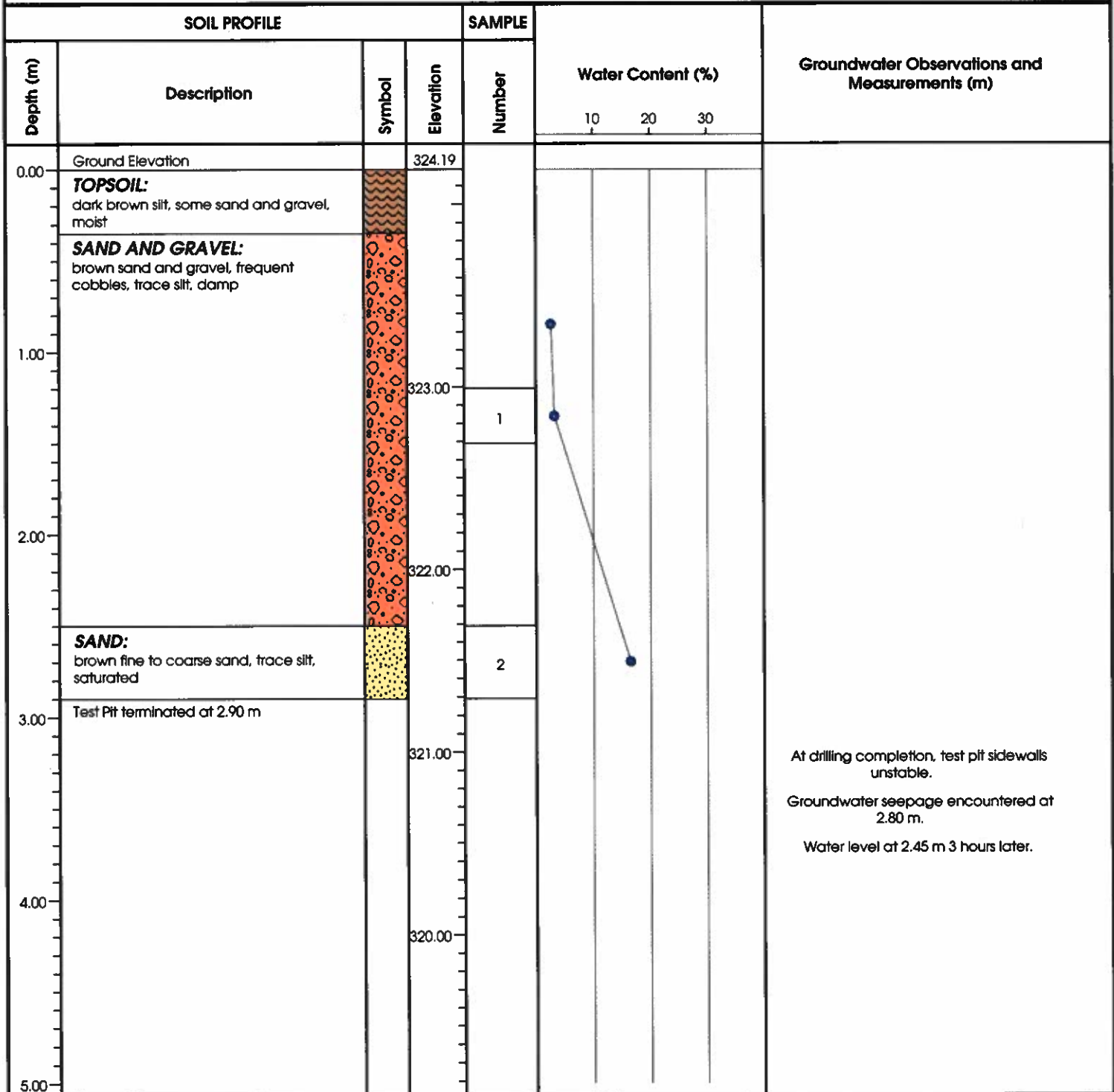
Ground Elevation: 324.19 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004



Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 0.50 to 1.20 m.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 8

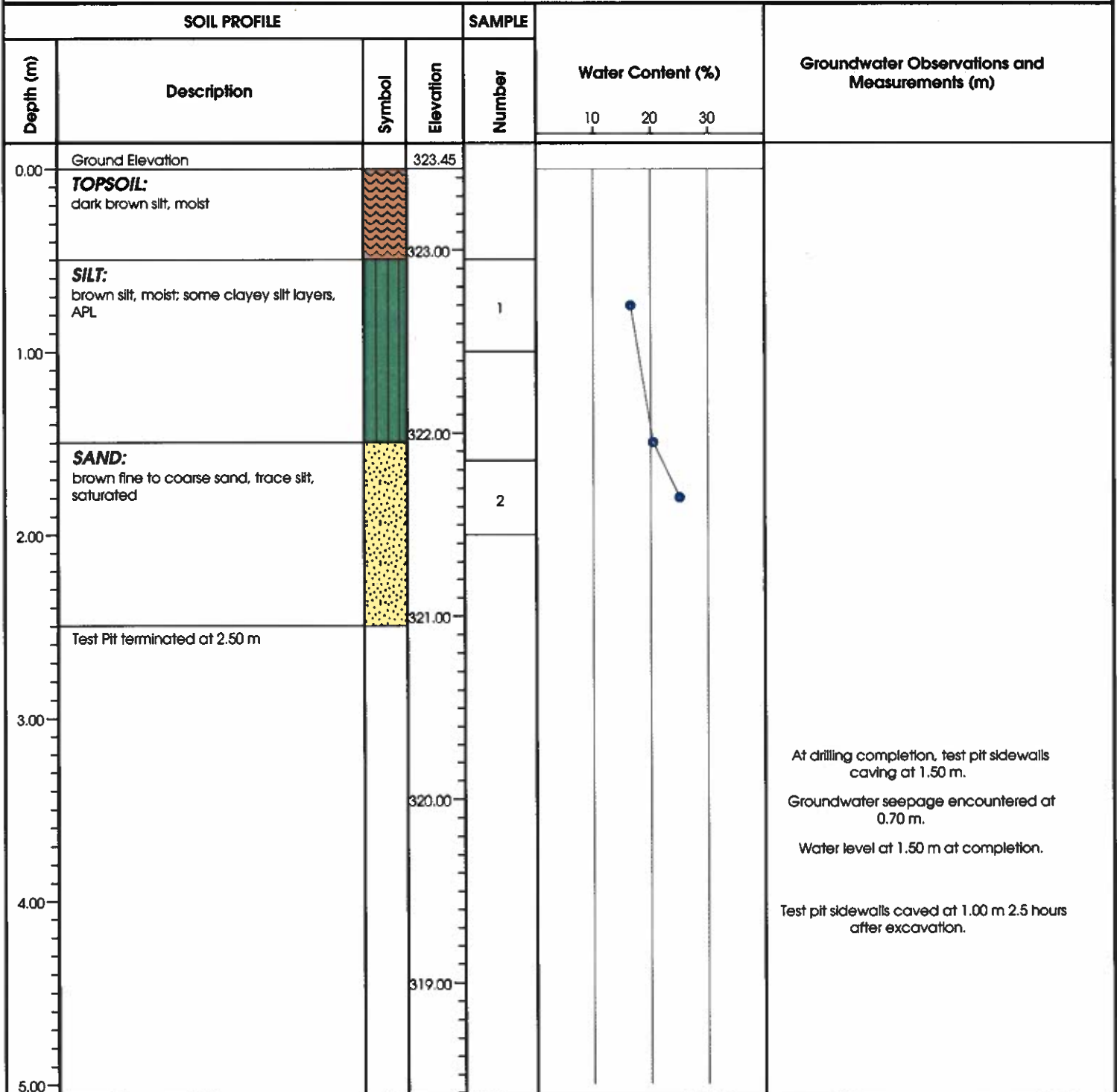
Ground Elevation: 323.45 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 9

Ground Elevation: 323.72 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE			SAMPLE		Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		323.72			
0.00 - 0.80	TOPSOIL: dark brown silt, very moist					
0.80 - 2.00	SILT: grey/brown silt, some fine sand, very moist		323.00	1		
2.00 - 3.00	SAND: brown fine to medium sand, some silt, saturated		322.00 321.00			
3.00 - 5.00	Test Pit terminated at 3.00 m		320.00 319.00			At drilling completion, test pit sidewalls unstable. Water level at 2.10 m upon completion. Water level at 1.60 m 2 hours after completion Test pit sidewalls caved at 1.80 m 2 hours after completion.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 10

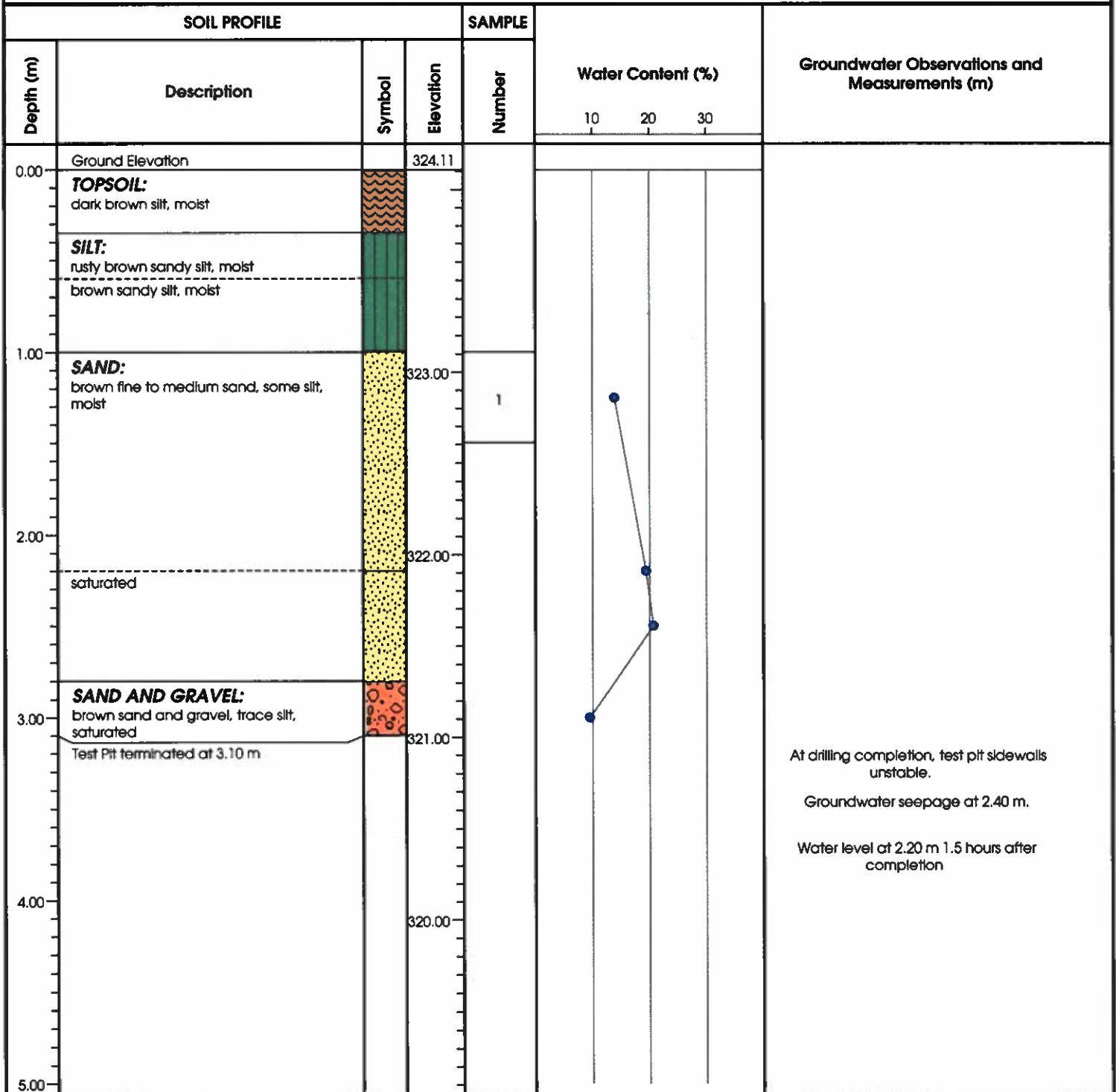
Ground Elevation: 324.11 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004



At drilling completion, test pit sidewalls unstable.
Groundwater seepage at 2.40 m.
Water level at 2.20 m 1.5 hours after completion

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 11

Ground Elevation: 323.27 m.

Project: Proposed Estate Residential Dev., George Good - Audrey Meadows

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE		Groundwater Observations and Measurements (m)		
Depth (m)	Description	Symbol	Elevation	Number	Water Content (%)			
					10		20	30
0.00	Ground Elevation		323.27					
0.00 - 1.00	TOPSOIL: dark brown silt, very moist		323.00					
1.00 - 2.10	SILT TILL: brown silt, some sand, clay and gravel, moist to very moist		322.00	1				
2.10 - 3.00	some fine silt layers, wet		321.00					
3.00	Test Pit terminated at 3.00 m		320.00					
4.00			319.00					
5.00								

At drilling completion, test pit sidewalls stable.
No groundwater encountered.
Water level at 2.10 m 1.5 hours after completion.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 12

Ground Elevation: 326.15 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		326.15			
	TOPSOIL: dark brown silt, moist					
	SAND: brown fine to medium sand, trace silt, damp			1		
1.00			325.00			
	brown fine to coarse sand, some fine gravel, damp			2		
2.00			324.00			
	SAND AND GRAVEL: brown sand and fine gravel, trace silt, damp			3		
3.00			323.00			
	Test Pit terminated at 3.00 m					
4.00			322.00			
5.00						

At drilling completion, test pit sidewalls unstable.
No groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 13

Ground Elevation: 327.82 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		327.82			
	TOPSOIL: dark brown silt, moist					
	SAND TILL: brown silty sand, some gravel and cobbles, moist			1		
1.00			327.00			
	SAND: brown fine to coarse sand, trace silt, moist			2		
2.00			326.00			
	SAND AND GRAVEL: brown sand and gravel, trace cobbles and silt, saturated			3		
3.00	Test Pit terminated at 3.30 m		325.00			
4.00			324.00			
5.00			323.00			

At drilling completion, test pit sidewalls unstable at 3.00 m.
Groundwater seepage at 3.00 m. Water level at 3.00 m at completion.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 14

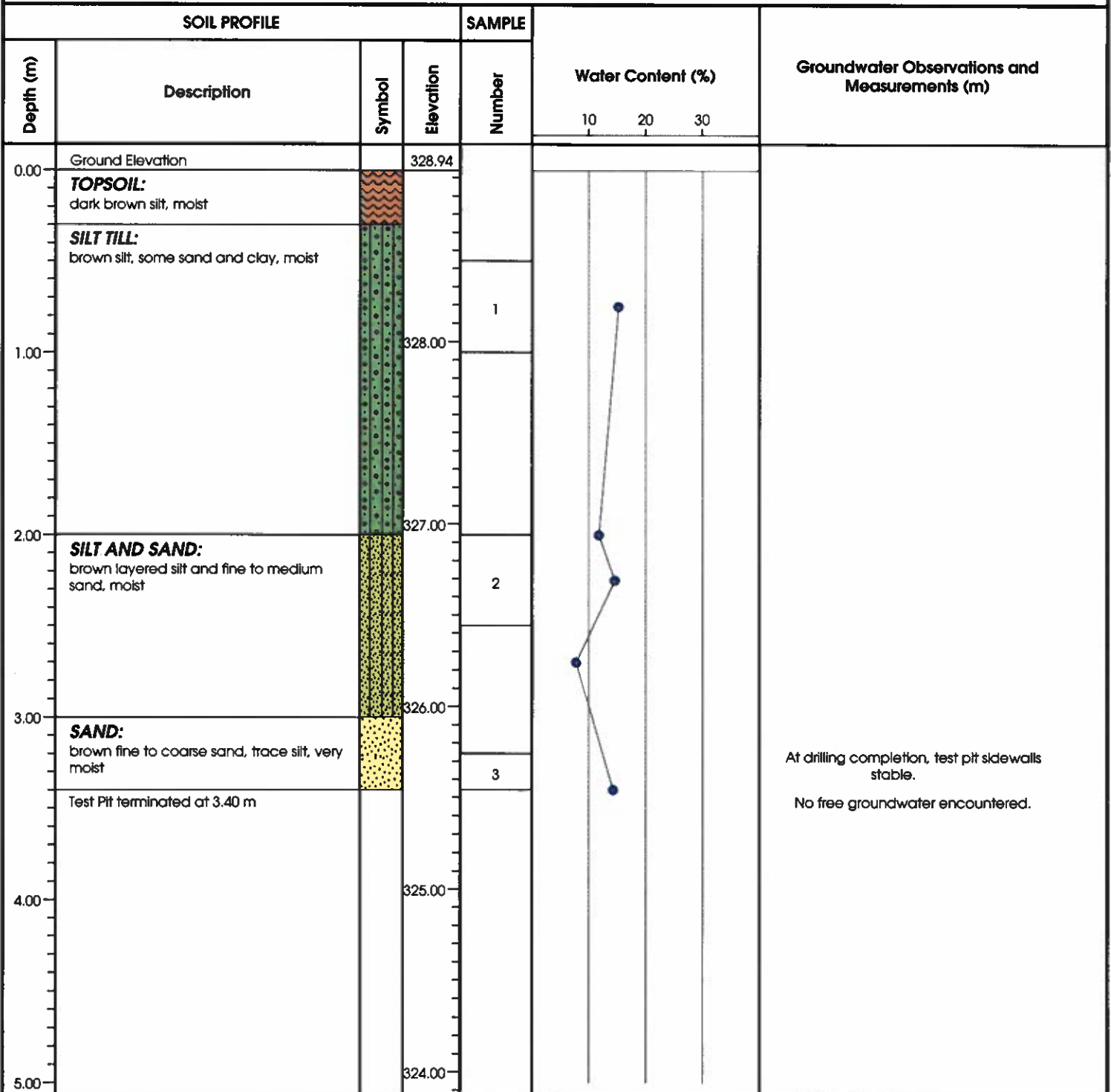
Ground Elevation: 328.94 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



SOIL PROFILE				SAMPLE	Water Content (%)			Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number	10	20	30	
0.00	Ground Elevation		324.09					<p>At drilling completion, test pit sidewalls stable.</p> <p>No free groundwater encountered.</p>
	TOPSOIL: dark brown silt, moist							
	SILT TILL: brown silt, some sand and clay, moist							
	Test Pit terminated at 0.70 m							
1.00			323.00					
2.00			322.00					
3.00			321.00					
4.00			320.00					
5.00								

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



SOIL PROFILE				SAMPLE		Groundwater Observations and Measurements (m)		
Depth (m)	Description	Symbol	Elevation	Number	Water Content (%)			
					10		20	30
0.00	Ground Elevation		329.19					
	TOPSOIL: dark brown silt, moist							
	SAND: brown fine to coarse sand, trace silt, damp							
1.00	SAND AND GRAVEL: brown fine to coarse sand and gravel, some cobbles, trace silt, damp		328.00					
2.00			327.00					
3.00	Test Pit terminated at 3.00 m		326.00					
4.00			325.00					
5.00								

At drilling completion, test pit sidewalls caving below 1.00 m.
No free groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 1.50 to 2.00 m.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 17

Ground Elevation: 326.96 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		326.96			
	TOPSOIL: dark brown silt, moist					
	SAND: light brown silty fine to medium sand, damp					
1.00			326.00	1		
	moist					
2.00			325.00			
	SAND AND GRAVEL: brown fine to coarse sand and gravel, trace silt, damp					
3.00			324.00	2		
	Test Pit terminated at 3.20 m					
4.00			323.00			
5.00			322.00			

At drilling completion, test pit sidewalls caving below 2.50 m.
No free groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 18

Ground Elevation: 329.43 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: August 31, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		329.43			
	TOPSOIL: dark brown silt, moist					
			329.00			
	SAND: light brown silty fine to medium sand, damp					
1.00						
			328.00	1		
	moist					
2.00						
			327.00			
	SAND AND GRAVEL: brown fine to coarse sand and gravel, trace silt, damp					
3.00				2		
	Test Pit terminated at 3.20 m					
			326.00			
4.00						
			325.00			
5.00						

At drilling completion, test pit sidewalls caving below 2.50 m.
No free groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes:

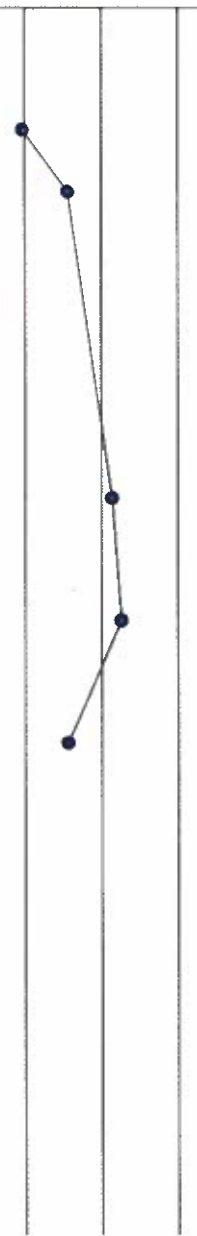
Sheet: 1 of 1

Drafted by: DC (04a)



SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		330.71			
	TOPSOIL: dark brown silt, moist					
	SILT TILL: brown silt, some sand and clay, trace gravel, moist		330.00	1		
1.00						
	some brown clayey silt layers, APL		329.00			
2.00						
	SAND: light brown silty fine sand, moist		328.00	2		
3.00						
	Test Pit terminated at 3.20 m					
4.00			327.00			
5.00			326.00			

10 20 30



At drilling completion, test pit sidewalls stable.
No free groundwater encountered.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 20

Ground Elevation: 329.51 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE		Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number			
0.00	Ground Elevation		329.51				
	TOPSOIL: dark brown silt, moist						
	SILT TILL: brown sandy silt, trace clay and fine gravel		329.00	1			
1.00	brown silt (till), some sand and clay, very moist						
			328.00	2			
2.00	some brown clayey silt layers, APL						
	very moist silt layers, wet		327.00				
3.00	grey clayey silt, APL						
	Test Pit terminated at 3.40 m		326.00				
4.00							
			325.00				
5.00							

At drilling completion, test pit sidewalls stable
Visible groundwater at 2.50 m after excavation.
No groundwater seepage 3.5 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 21

Ground Elevation: 329.72 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		329.72			
	TOPSOIL: dark brown silt, moist					
	SILT TILL: brown silt, some sand and clay, trace gravel, moist		329.00	1		
1.00						
	brown silt (fill), some clay, trace sand, moist		328.00			
2.00						
	grey, APL		327.00			
3.00						
	Test Pit terminated at 3.20 m					
			326.00			
4.00						
			325.00			
5.00						

At drilling completion, test pit sidewalls stable
No free groundwater encountered.
Minor groundwater seepage at 2.50 m, 3 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 22

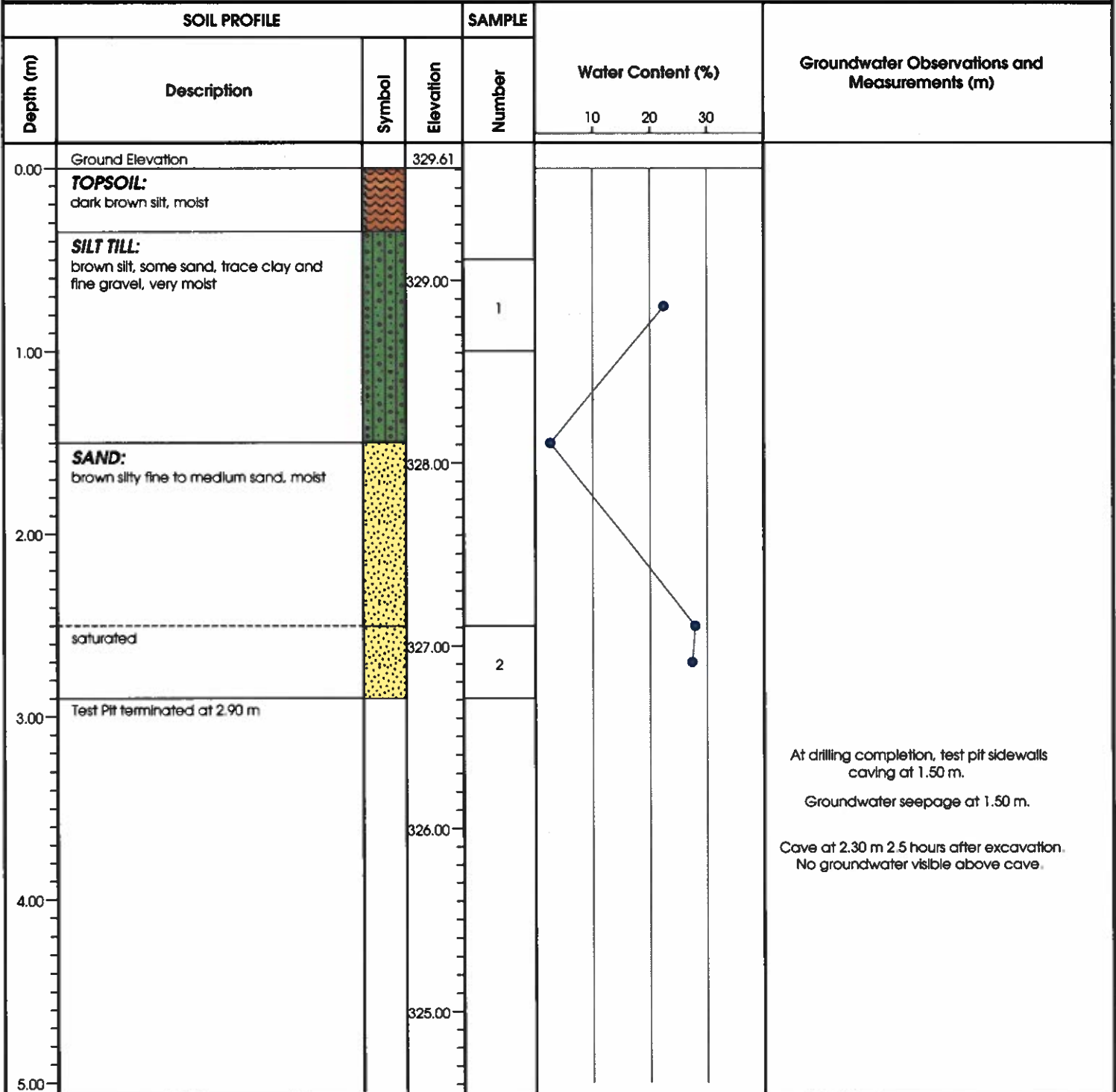
Ground Elevation: 329.61 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 23

Ground Elevation: 328.16 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		328.16			
	TOPSOIL: dark brown silt, moist					
	SAND TILL: brown silty sand, some gravel, moist			1		
1.00						
	SILT TILL: brown silt, some clay, trace sand, very moist		327.00			
2.00						
	trace clay, some sand layers, very moist		326.00			
3.00	Test Pit terminated at 3.00 m		325.00			
4.00						
			324.00			
5.00						

At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
No seepage 2.5 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 0.40 to 1.00 and 1.20 to 1.50 m.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 24

Ground Elevation: 328.42 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE		Water Content (%)	Groundwater Observations and Measurements (m)		
Depth (m)	Description	Symbol	Elevation	Number	10 20 30				
0.00	Ground Elevation		328.42						
	TOPSOIL: dark brown silt, moist								
	SILT TILL: brown silt, some sand, trace clay and gravel, very moist		328.00						
1.00				1					
	some clay, trace sand and gravel		327.00						
2.00				2					
	seepage, sand layer		326.00						
3.00	Test Pit terminated at 3.10 m		325.00						
4.00			324.00						
5.00									

At drilling completion, test pit sidewalls stable.
Groundwater seepage encountered at 2.60 m.
Water level at 2.50 m 2.5 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 25

Ground Elevation: 328.78 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE		Water Content (%)	Groundwater Observations and Measurements (m)		
Depth (m)	Description	Symbol	Elevation	Number					
					10			20	30
0.00	Ground Elevation		328.78						
	TOPSOIL: dark brown silt, moist								
	SILT TILL: brown sandy silt, some gravel, trace clay, moist								
1.00			328.00	1					
	brown silt, some sand, clay and gravel, trace cobbles, moist								
2.00			327.00	2					
3.00	Test Pit terminated at 3.00 m		326.00						
4.00			325.00						
5.00			324.00						

At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
No free groundwater encountered 2 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 26

Ground Elevation: 331.47 m.

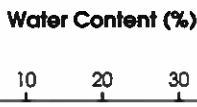
Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		331.47			
	TOPSOIL: dark brown silt, moist					
	SAND TILL: brown silty sand, some gravel, trace clay and cobbles, moist		331.00	1		
1.00						
	SILT TILL: brown sandy silt, some gravel, trace clay and cobbles, moist		330.00	2		
2.00						
	SAND: brown fine to medium sand, some silt, very moist		329.00	3		
3.00						
	Test Pit terminated at 3.30 m		328.00			
4.00						
			327.00			
5.00						



At drilling completion, test pit sidewalls stable.
No free groundwater encountered.
No groundwater encountered 1.5 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 27

Ground Elevation: 327.57 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		327.57			
	TOPSOIL: dark brown silt, very moist		327.00			
1.00	SILT TILL: brown silt, some sand, clay and gravel, moist		326.00	1		
2.00	some sand seams, moist					
	some brown clayey silt layers, APL		325.00			
3.00	Test Pit terminated at 3.00 m					
			324.00			
4.00						
			323.00			
5.00						

At drilling completion, test pit sidewalls stable.

No free groundwater encountered.

Water level at 2.70 m 1.5 hours after excavation.

Groundwater seepage encountered at 2.10 m 1.5 hours after excavation.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 28

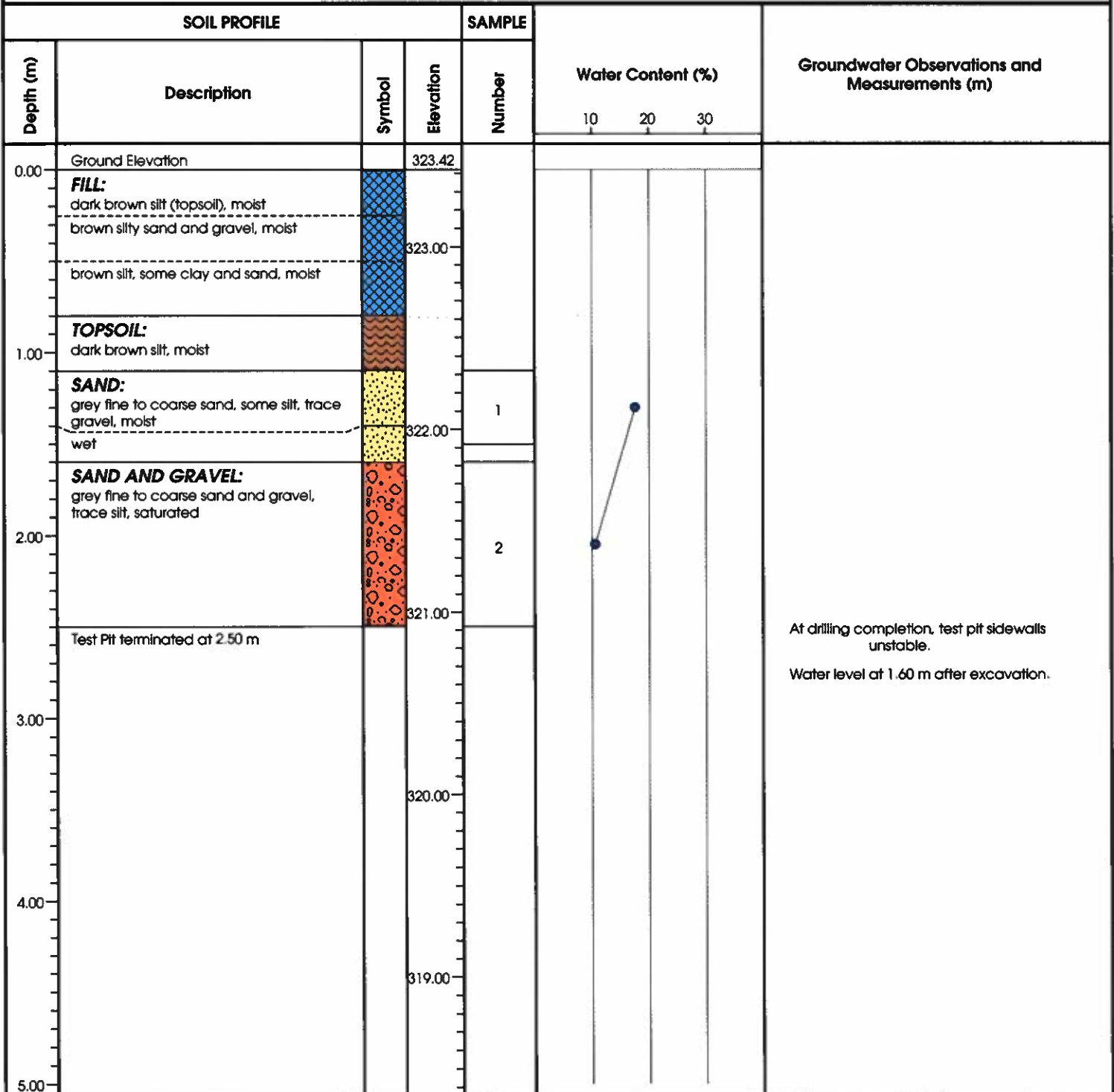
Ground Elevation: 323.42 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 29

Ground Elevation: 323.01 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		323.01			
	TOPSOIL: dark brown to black silt, moist					
	SILT: grey silty sand, very moist			1		
1.00	SAND: grey silty fine to coarse sand, some gravel, saturated		322.00	2		
	SAND AND GRAVEL: grey sand and gravel, trace silt, saturated			3		
2.00	Test Pit terminated at 2.20 m		321.00			
3.00			320.00			
4.00			319.00			
5.00			318.00			

At drilling completion, test pit sidewalls stable.
Groundwater seepage encountered at 1.00 m upon completion.
Water level at 1.50 m after excavation.

Reviewed by: CF

Field Tech: RM

Notes: Water ponded on ground surface near TP29.

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 30

Ground Elevation: 323.56 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation	Number		
0.00	Ground Elevation		323.56			
	TOPSOIL: dark brown to black silt, moist					
	SILT TILL: brown sandy silt, trace gravel, wet		323.00	1		
1.00	brown silt, some sand, trace clay and gravel, moist			2		
	grey, some sand layers, saturated		322.00			
2.00	grey silt, some sand, trace clay and gravel		321.00	3		
3.00	Test Pit terminated at 3.00 m					
			320.00			
4.00						
			319.00			
5.00						

At drilling completion, test pit sidewalls stable.
Groundwater seepage encountered at 1.70 m upon completion.

Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 31

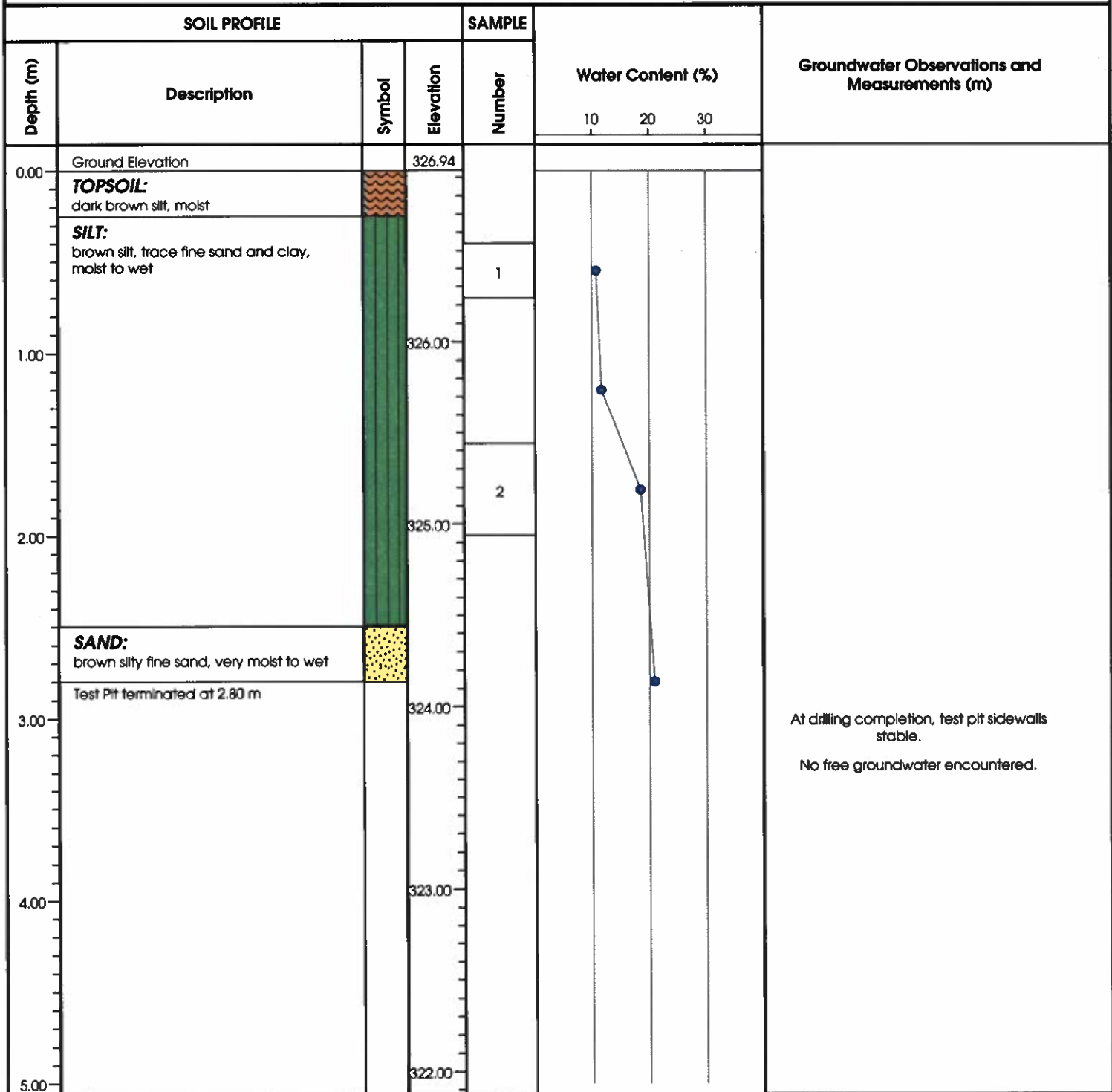
Ground Elevation: 326.94 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004



Reviewed by: CF

Field Tech: RM

Notes:

Sheet: 1 of 1

Drafted by: DC (04a)



Test Pit Number: 32

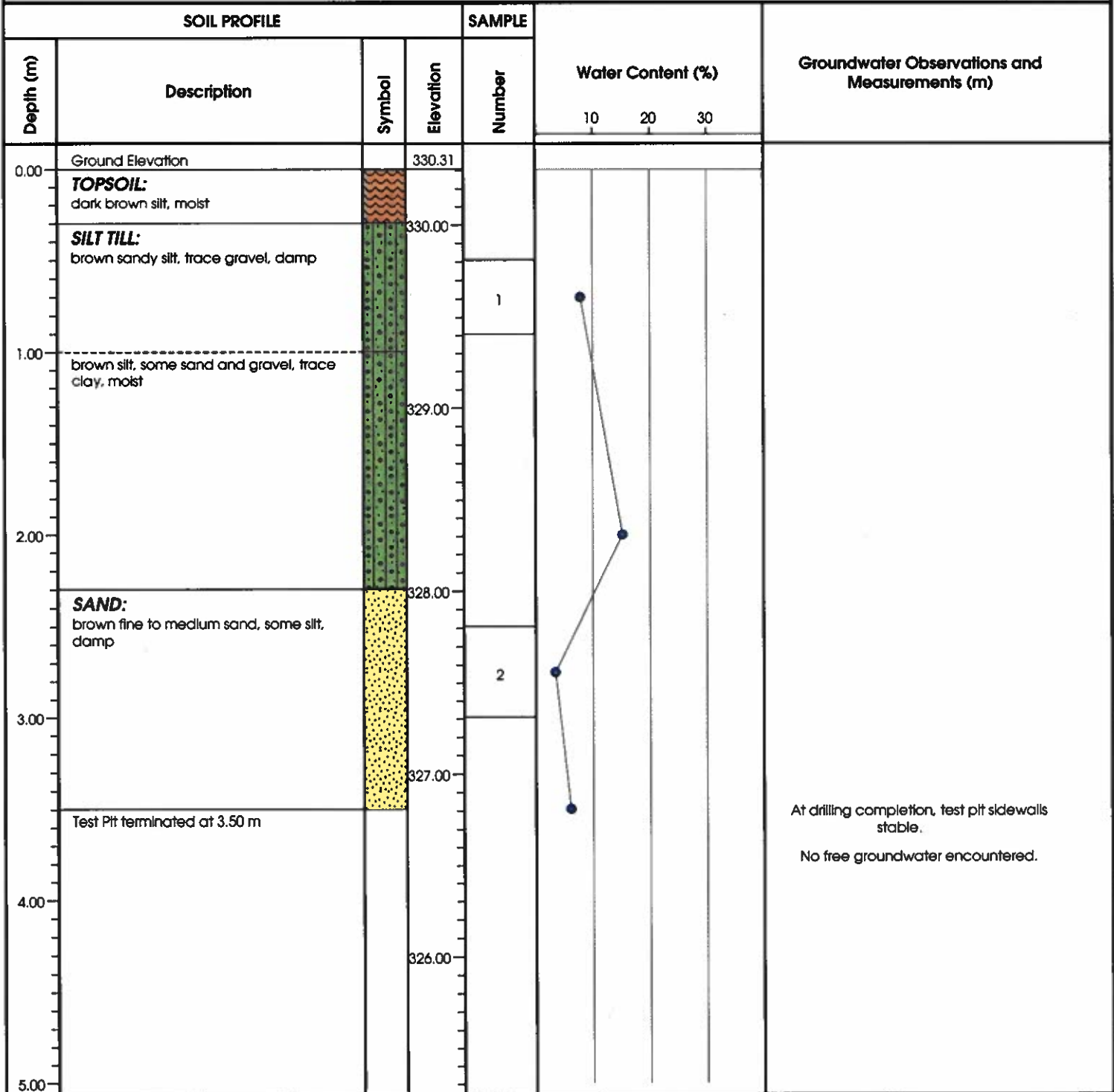
Ground Elevation: 330.31 m.

Project: Proposed Audrey Meadows Estate Subdivision

Job No.: 5360G01

Location: Part of Lots 18 and 19, Concession 8, Township of Puslinch, Ontario

Excavation Date: September 1, 2004



Reviewed by: CF

Field Tech: RM

Notes: Bulk sample taken from 1.50 to 2.50 m.

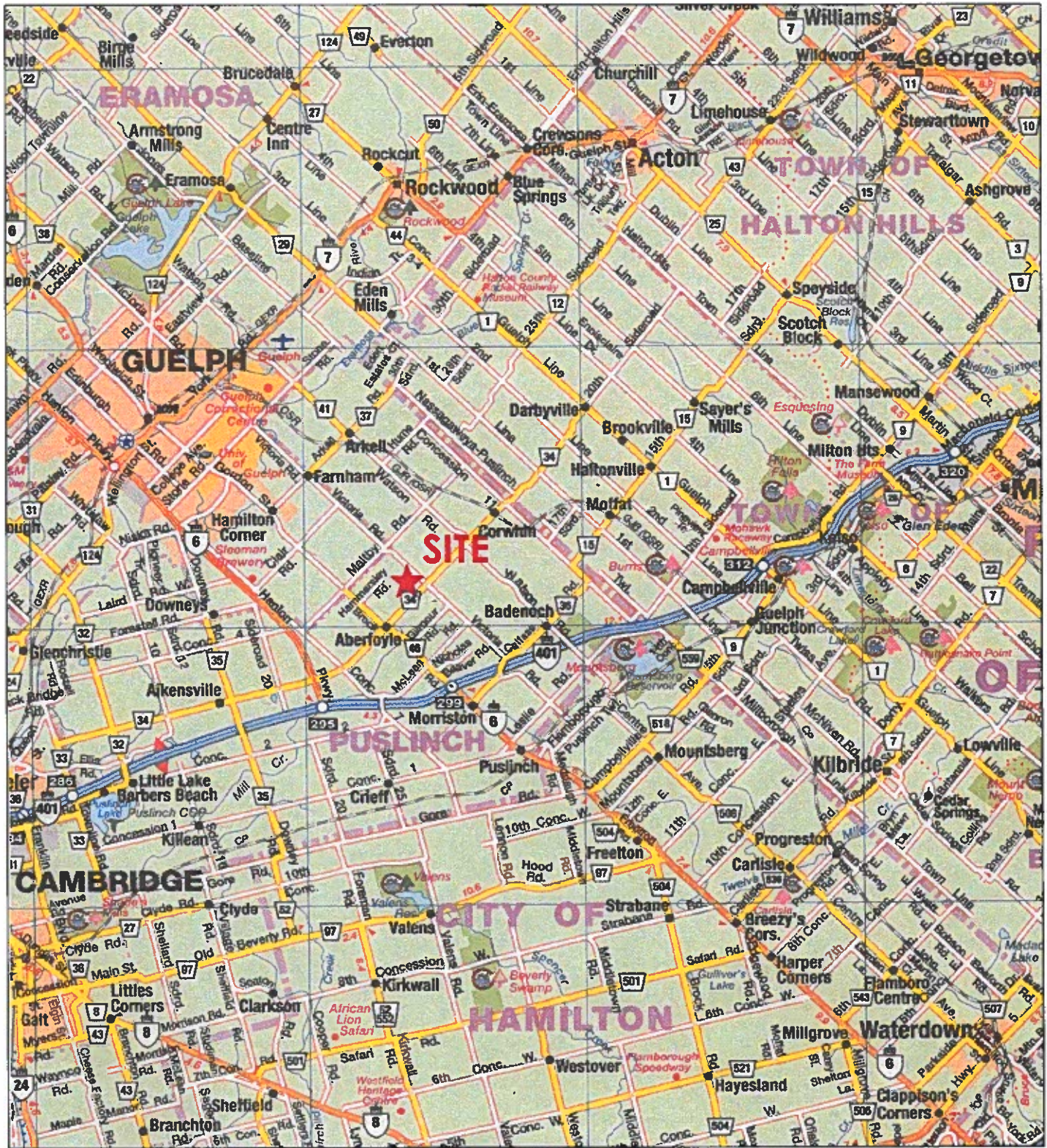
Sheet: 1 of 1

Drafted by: DC (04a)



NORTH

No.	Revisions	Date
0	Draft Report Issued	Oct. 2004
1	Final Report Issued	Nov. 2004
2		
3		



Drawing Reference: Base drawing from page 23 of Map Art's Ontario Road Atlas (2004).

F:\5063\506361\Final Report\506361_01.dwg
November 25, 2004 (GRL)

Geotechnical Investigation - Proposed
Audrey Meadows Estate Subdivision, Part of Lots
18 and 19, Concession 8, Puslinch Township, Ontario



Naylor
Engineering
Associates Ltd.
 CONSULTING ENGINEERS

LOCATION PLAN

Date	Scale	Job No.	Drawing No.
Nov. 2004	1:200000	5360G1	1



NORTH

No.
0
1
2
3

Revisions

Draft Report Issued
Final Report Issued

Date

Oct. 2004
Nov. 2004

LEGEND

CENOZOIC

PLEISTOCENE

RECENT

- 2a Stream deposits. Stratified gravel, some silt, and clay.
- Lake Ontario deposits. Stratified sand and gravel.**
- 11 Peat and muck

WISCONSINAN

- Alluvial fan gravel. Moderately rounded cobble gravel and minor sand and fine gravel.**
- 11 Beach gravel. Lake Iroquois, stratified, partly cemented heavy gravel. Lake Whittlesey well-sorted, angular, medium gravel.
- 10 Sand. Shallow-water lacustrine, kame, and outwash.
- 9 Lame deposits. Stratified to varved clay, silt, and some sand. Mainly deposits of lakes Whittlesey and Warren.
- 8 HALTON TILL. Purple clay or silt till. Gray near Dundas and East of Oakville.
- Outcrop complex. Bouldery till and bedrock ridges.
- 6 Outwash gravel.
- Kame gravel.
- WENTWORTH TILL. Sandy buff till.
- 3 PORT STANLEY DRIFT. Silt till.
- 2 CATFISH CREEK DRIFT. Stony silty sand till.

PALEOZOIC

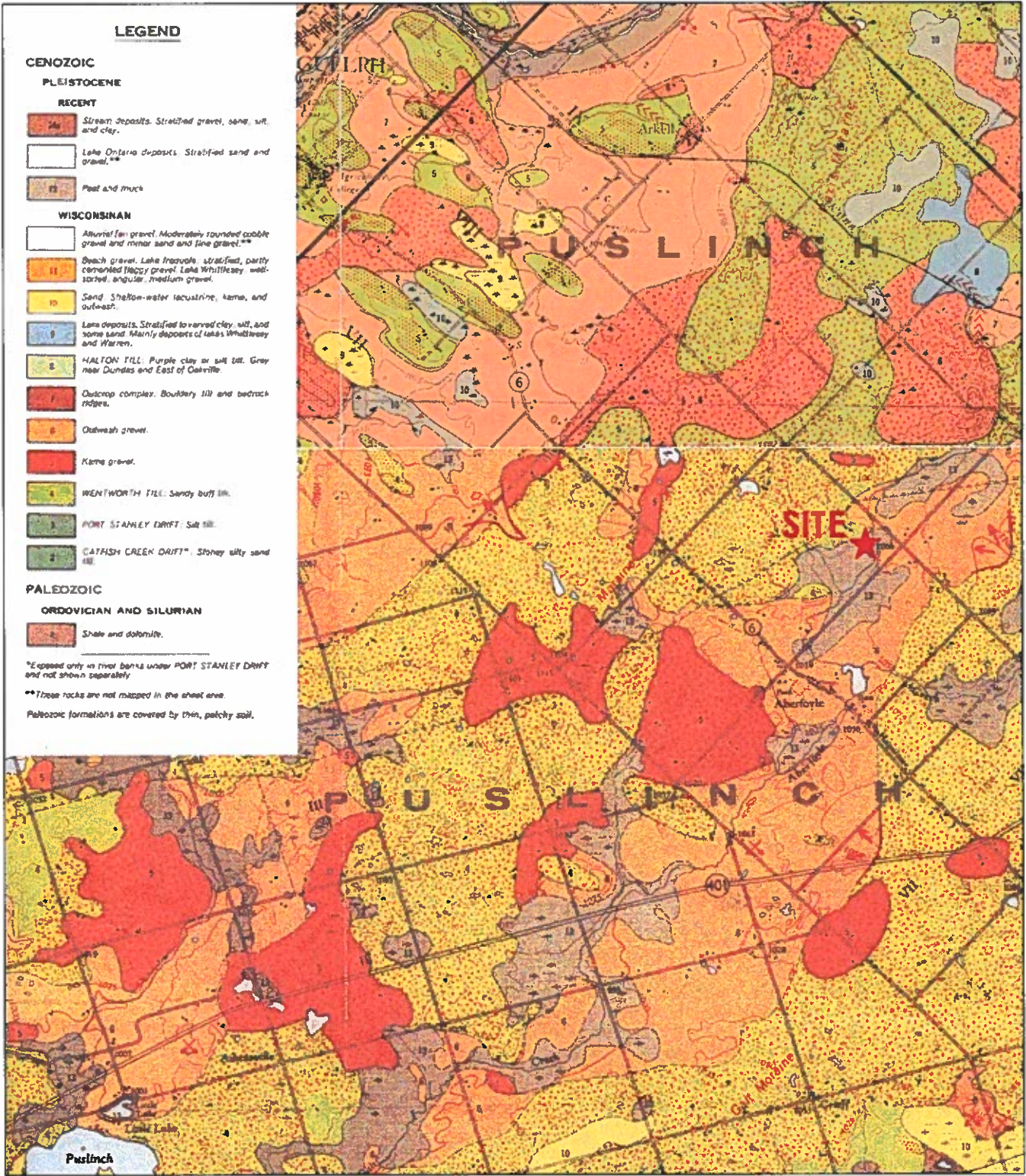
ORDOVICIAN AND SILURIAN

- Shale and dolomite.

*Exposed only in thin bands under PORT STANLEY DRIFT and not shown separately

**These rocks are not mapped in the sheet area.

Paleozoic formations are covered by thin, patchy soil.



Drawing Reference: Base drawing from Ontario Department of Mines Map 2029 and 2153.

Geotechnical Investigation - Proposed

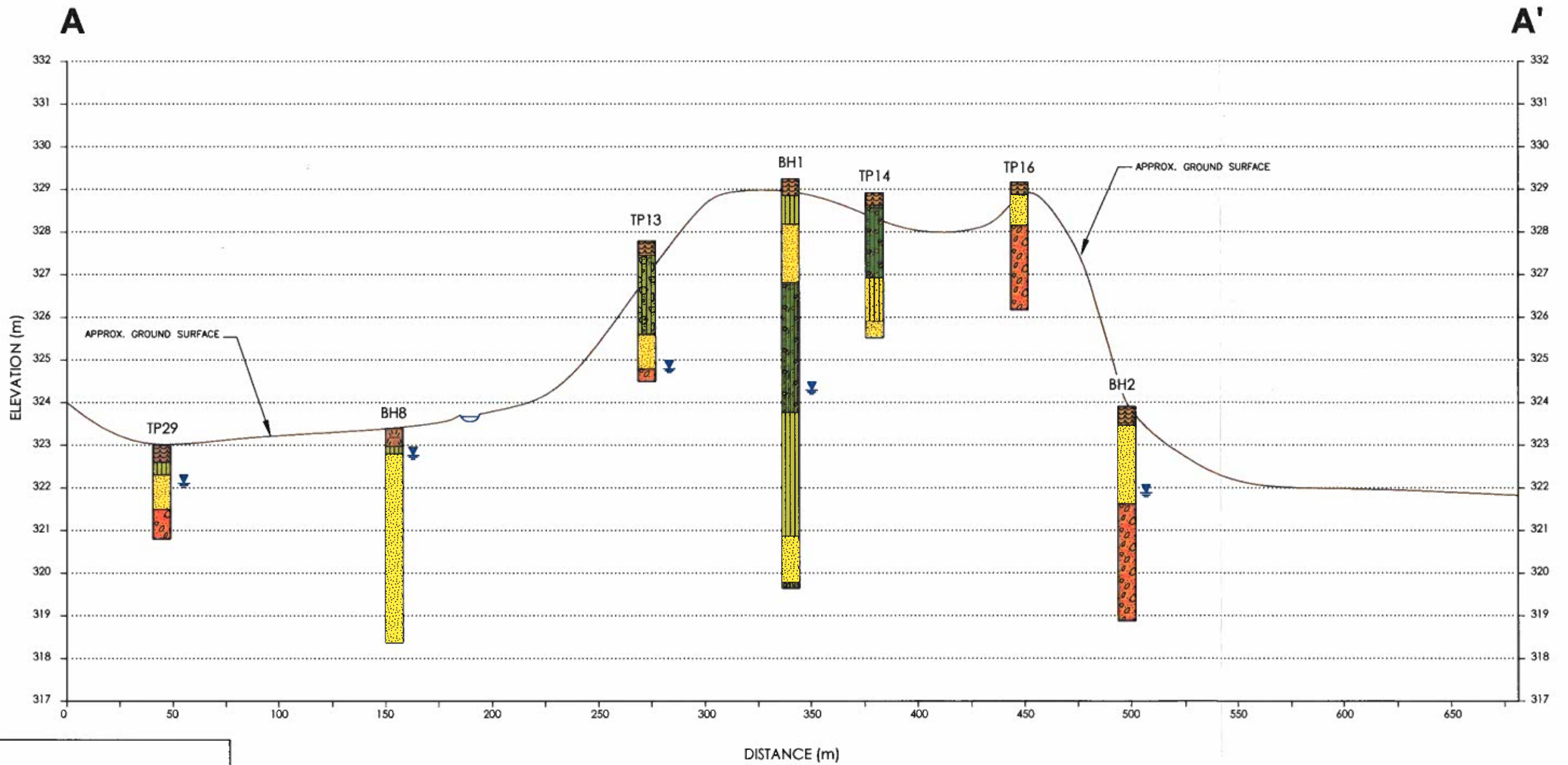
Audrey Meadows Estate Subdivision, Part of Lots

18 and 19, Concession 8, Puslinch Township, Ontario



QUATERNARY GEOLOGY

Date	Scale	Job No.	Drawing No.
Nov. 2004	1:75000	5360G1	3



LEGEND:

- | | | | |
|--|---------------|--|-----------|
| | Silt and Sand | | Topsoil |
| | Sand | | Silt |
| | Sand & Gravel | | Silt Till |
| | Peat | | Sand Till |

Groundwater Level, September 9, 2004

NOTE:

- The inferred stratigraphy shown on this cross-section is based on the subsurface stratigraphy contacted at the Boreholes and Test Pits. The subsurface conditions between the Boreholes and Test Pits will vary.
- The ground surface elevation shown is approximate based on available information. Exact existing ground elevations must be verified in the field.

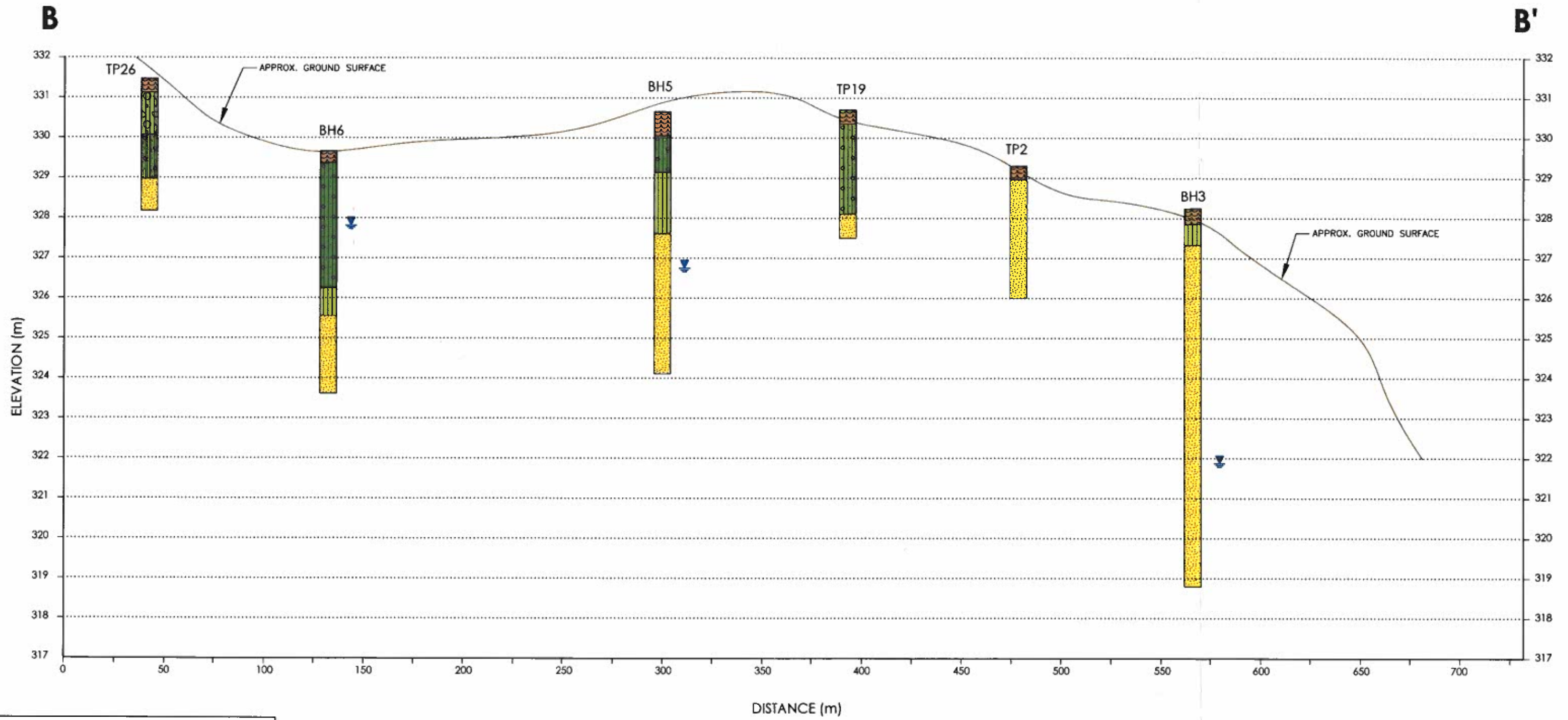
No.	Revisions	Date
0	Draft Report Issued	Oct. 2004
1	Final Report Issued	Nov. 2004
2		
3		



Geotechnical Investigation - Proposed
Audrey Meadows Estate Subdivision, Part of Lots
18 and 19, Concession 8, Puslinch Township, Ontario

CROSS-SECTION A - A'

Date	Scale	Job No.	Drawing No.
Nov. 2004	H = 1:2000 V = 1:100	5360G1	4



LEGEND:

- Sand
- Topsoil
- Silt
- Silt Till
- Sand Till
- Groundwater Level, September 9, 2004

NOTE:

1. The inferred stratigraphy shown on this cross-section is based on the subsurface stratigraphy contacted at the Boreholes and Test Pits. The subsurface conditions between the Boreholes and Test Pits will vary.
2. The ground surface elevation shown is approximate based on available information. Exact existing ground elevations must be verified in the field.

No.	Revisions	Date
0	Report Issued	Oct. 2004
1		
2		
3		

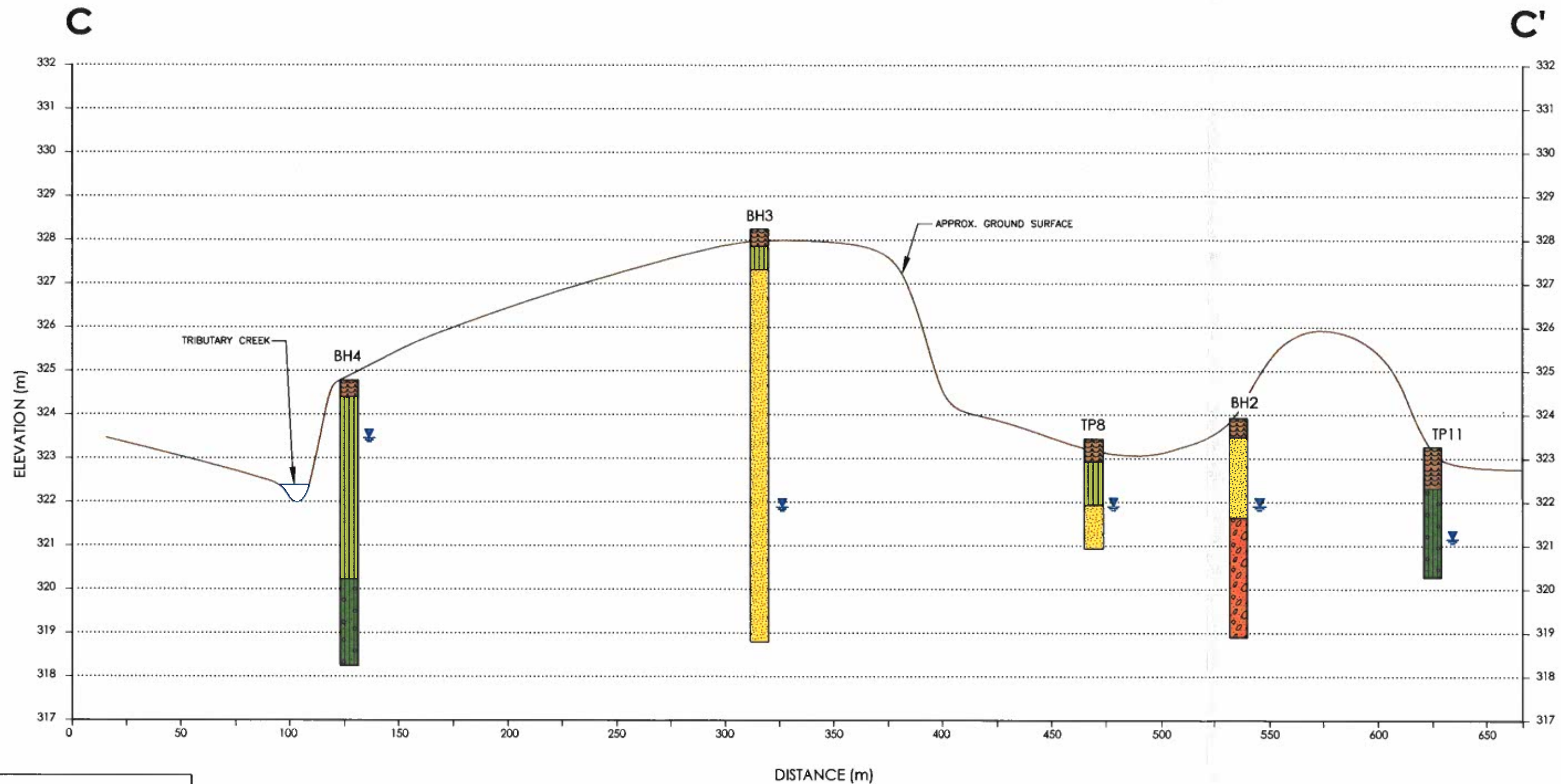


Geotechnical Investigation - Proposed
Audrey Meadows Estate Subdivision, Part of Lots
18 and 19, Concession 8, Puslinch Township, Ontario

CROSS-SECTION B - B'

Date	Scale	Job No.	Drawing No.
Oct. 2004	H = 1:2000 V = 1:100	5360G1	5

F:\5360\5360G1\5360G1_04.dwg
October 8, 2004 (GRL)



LEGEND:

- Sand
- Sand & Gravel
- Topsoil
- Silt
- Silt Till
- Groundwater Level, September 9, 2004

NOTE:

1. The inferred stratigraphy shown on this cross-section is based on the subsurface stratigraphy contacted at the Boreholes and Test Pits. The subsurface conditions between the Boreholes and Test Pits will vary.
2. The ground surface elevation shown is approximate based on available information. Exact existing ground elevations must be verified in the field.

No.	Revisions	Date
0	Draft Report Issued	Oct. 2004
1	Final Report Issued	Nov. 2004
2		
3		



Geotechnical Investigation - Proposed
Audrey Meadows Estate Subdivision, Part of Lots
18 and 19, Concession 8, Puslinch Township, Ontario

CROSS-SECTION C - C'

Date	Scale	Job No.	Drawing No.
Nov. 2004	H = 1:2000 V = 1:100	5360G1	6