PATERSON GROUP

Groundwater Impact Assessment

Proposed Residential Development

4386 Rideau Valley Drive
Ottawa, Ontario

Prepared for Uniform Developments

Report PH4624-1 dated August 23, 2022

Table of Contents

Appendices

1.0 INTRODUCTION

Paterson Group (Paterson) was commissioned by Uniform Developments to complete a Groundwater Impact Assessment (GIA) for the proposed residential development to be located at 4386 Rideau Valley Drive in the City of Ottawa, Ontario (Refer to Paterson Drawing PH4624-1 - Site Plan in Appendix 1)

The following report has been prepared specifically and solely for the aforementioned project described herein. It contains a hydrogeological review and assessments pertaining to the proposed development as it is understood by Paterson at the time of writing this report.

1.1 Proposed Development

Based on available design plans, it is understood that the proposed development will consist of townhomes and detached residential dwellings. The proposed residential development will also include driveways, roadways and landscaped areas. It is anticipated the proposed development will be municipally serviced.

2.0 Background Information

The field program for the geotechnical investigation (Report PG5828-1 by Paterson) was carried out on May 19 - 20, 2021. At that time, a total of nine (9) boreholes were advanced across the site to a maximum depth of 6.7 m below ground surface (bgs). BH7-21 encountered auger refusal at 4.4 m bgs. Dynamic Cone Penetration Tests (DCPT) were completed in select boreholes where practical DCPT refusal was encountered at 8.8 and 15.2 m bgs. The test hole locations were distributed in a manner to provide general coverage of the subject site. The approximate locations of the test holes are presented on drawing PG5828- 1 - Test Hole Location Plan included in Appendix 2.

3.0 SITE CONDITIONS

The subject site is approximately 12 ha in size and primarily consists of agricultural fields. There are some low-rise structures on the southeast side of the property. The subject site is bordered to the west by a tributary to the Rideau River and further by residential properties, to the north by a tributary to the Rideau River and further by a forested area, to the east by Rideau Valley Drive followed by the Rideau River and to the south by Bankfield Road and further by residential properties. The ground surface across the subject site slopes from the southeast to the northwest with an approximate grade differential of 7 to 10 m.

3.1 Geology

Generally, the soil profiles at the borehole locations consist of topsoil overlying a silty clay deposit which is underlain by a glacial till unit at select locations. Practical refusal to auguring was encountered at BH7-22 at a depth of 4.4 m bgs. DCPTs were conducted at select boreholes where practical DCPT refusal was encountered at 8.8 and 15.2 m bgs. Specific details of the soil profile at each test hole location are presented on the borehole logs included in Appendix 2.

According to surficial mapping prepared by the Ontario Geological Survey (OGS, MRD128-Revised) the subject site is in an area where the surficial geology is recorded to consist of a fine-textured glaciomarine deposits of silt and clay, with minor amounts of sand and gravel. This information is consistent with the results of Paterson's geotechnical field investigation. The surficial mapping is presented in Appendix 1 as PH4624-2 - Surficial Geology Plan.

Fill

Fill material was only encountered at one test hole location (BH8-21) and consisted of silty sand with some gravel and trace amounts of topsoil. It was encountered below the topsoil and extended to a maximum depth of 1.1 m bgs.

Silty Sand

At select test hole locations, a brown silty sand was encountered below the topsoil and extended to a maximum depth of 0.8 m bgs.

Silty Clay

A hard to very stiff brown silty clay was encountered underlying the topsoil or silty sand deposit depending on the test hole location. The clay deposit extended to a depth of 6.7 m bgs within the boreholes and inferred to extend up to a maximum depth of approximately 15 m based on DCPT testing.

Glacial Till

A dense to compact glacial till deposit was encountered underlying the silty clay at select test hole locations and underlying the fill at BH8-21. The glacial till unit consisted of silty sand with gravel cobbles and boulders.

Bedrock

Based on available geological mapping provided by the Ontario Geological Survey (OGS, MRD 219), the subject site is located in the Oxford Formation and consists of dolostone, minor shale and sandstone with an overburden thickness of 10 to 25 m bgs. The bedrock geology is presented in Appendix 1 as PH4624-3 - Bedrock Geology Plan.

Karst Features

The term “karst” refers to a geologic formation characterized by the dissolution of carbonate bedrock, such as limestone or dolostone. For karstification to occur, precipitation must be able to infiltrate the top of the bedrock and enlarge previously existing joints and bedding planes through the process of dissolution. Based on available mapping by the Ontario Geological Survey (OGS, GRS005), there is no inferred, potential or known karstification in the subject area.

3.2 Hydrogeology

Existing Aquifer Systems

Aquifer systems may be defined as a geological media, either overburden soils or fractured bedrock, which permit the movement of groundwater under hydraulic gradients. Although groundwater has been observed within the overburden material at the subject site, the shallow depth of the overburden aquifer makes it an unlikely source for water supply wells. Water supply wells in the vicinity are expected to be found only accessing the bedrock aquifer.

Bedrock aquifer mapping, provided by Natural Resources Canada Urban Geology of the National Capital Region mapping, was reviewed as part of this assessment. Using this tool, it was found that the subject site primarily accesses the March and Oxford formation aquifer systems.

Potable water supply wells completed within a 100 m radius of the subject site encountered water-bearing fractures at depths typically ranging from 12 to 47 m bgs.

Groundwater Levels

Groundwater levels were measured from piezometers and wells at the test hole locations on May 26, 2021 and were observed to range between 1.1 to 4.3 m bgs, while a select number of piezometers were dry. It should be noted that water can become trapped in backfilled boreholes completed in low permeability materials resulting in an artificially elevated water table, and that groundwater levels can fluctuate both seasonally and in conjunction with precipitation events. As such, water levels may vary at the time of construction.

Hydraulic Gradients

Vertical hydraulic gradients were not measured at the subject site as the previous studies completed did not warrant the installation of monitoring well nests.

Due to the limited number of monitoring well installations, horizontal hydraulic gradients were not measured. However, it is expected that shallow groundwater flow in the vicinity of the subject site will reflect local topography and regional groundwater flow is considered to be in an east to northeastern direction towards the nearby Rideau River.

Hydraulic Conductivity

The hydraulic conductivity values were conservatively estimated based upon previous experience at similar sites in the area and typical published values for similar stratigraphy. The hydraulic conductivity values are interpreted to range from approximately 1×10^{-7} to 1×10^{-9} m/sec for stiff silty clay and from 1×10^{-4} to 1×10^{-7} m/sec for silty sand. The soil properties are dependent on the moisture level and consistency of the deposit. The hydraulic conductivity values are interpreted to range from approximately 1×10^{-6} to 1×10^{-8} m/sec for glacial till with a silty sand matrix and is dependent on the ratios of the various materials in the deposit.

At the time of report preparation, it is our understanding that the maximum depth of housing excavations is expected to be approximately 3 m below proposed ground surface (bpgs) while the maximum depth of servicing excavations to be approximately 5 m bpgs. It is expected that the excavation footprints will be at or above the long-term groundwater table.

Groundwater Recharge and Discharge

In general, groundwater will follow the path of least resistance from areas of higher hydraulic head to areas of lower hydraulic head. While upward and downward hydraulic gradients may be indicative of discharge and recharge respectively, other factors must be considered.

Based on the hydraulic conductivity estimates obtained from published literature, the glacial till is considered to have a higher hydraulic conductivity than the silty clay soil, which is generally considered to act as a confining layer. It is expected that the majority of surface water will either flow down-gradient as perched water within the silty sand and fill material or as sheet drainage where silty clay is present. There is likely to be some vertical drainage in areas where the subsurface soils generally consist of glacial till and thus contribute to the volume of recharge in the events of significant precipitation. However, given the frequency of such events and the abundance of clay within the subject site, the volume of recharge within the site boundaries is expected to be minimal.

With regards to discharge zones, neither the topographical nor geological conditions are suitable for large scale discharge to occur at the subject site, with only limited discharge potential in the Rideau River tributaries that border the site to the north and west.

4.0 POTENTIAL IMPACTS

4.1 Adverse Effects on Adjacent Structures

The overburden in the area consists of topsoil overlying a silty clay deposit which is underlain by a glacial till unit at select locations. The potential dewatering volumes due to groundwater infiltration into the excavation footprints are anticipated to be low due to the excavation sizes and the low-hydraulic conductivity of the soils where groundwater infiltration may be encountered. The majority of water infiltration is likely to be from precipitation rather than groundwater sources. Additionally, given the nature of the development (residential dwellings), any de-watering activities are expected to be short term in nature. Furthermore, the radius of influence expected to develop as a result of dewatering during construction will be minimal. As such, any effects related to ground surface settlement due to the water taking activities during construction are expected to be negligible.

4.2 Adverse Effects on Neighbouring Water Wells

A search of the Ontario Water Well Records database indicates there are several wells within 100 m of the site as depicted on drawing PH4624-1 - MECP Water Well Location Plan included in Appendix 1. The wells that are currently in use were noted to be screened in the bedrock aquifer system with sufficient vertical and horizontal separation between the maximum potential depth of excavation and the depth of the wells. Furthermore, water takings at the subject site are expected to be short term in duration, given the nature of the proposed development. Due to the vertical/horizontal separation between the maximum potential depth of excavation, the short-term nature of the water takings and the limited radius of influence expected to develop as a result of dewatering activities, it is not expected that any of the water takings will negatively affect the water quantity and/or quality of nearby well users.

It is worth noting that specific construction methodologies were unknown at the time of report preparation. It is understood that bedrock removal is not anticipated to be required as part of the development.

A series of calculations were carried out on the theoretical radius of influence for a housing excavation of 3 m bgs and a servicing trench excavation of 5 m bgs while using a conservative 0.5 m thickness of aquifer drawdown (saturated thickness) for the underlying silty clay or glacial till. Note that the long-term groundwater table is expected to be at or below the proposed excavation depth; therefor, the following calculation is a conservative estimate. To estimate the equivalent radius of the excavations, a housing footprint of 17 m (length) by 10 m (width) and servicing trench footprint of 25 m (length) by 5 m (width) was used and converted to an equivalent radius. These calculations were completed based on Sichardt (1992) using the equation:

$R = r_e + 3000*\Delta h(k^{0.5})$

R = radius of influence (m)
r_e = equivalent radius of excavation (m)
Δh = thickness of drawdown within the aquifer (m)
k = hydraulic conductivity (m/sec)

For the purposes of completing the calculations, the following assumptions were made:

- r_e = 9 to 10 m
- k = 1 x 10^{-6} m/s for glacial till, 1 x 10^{-7} for silty clay
- Δh = 0.5 m

Using the above equation and assumptions, a radius of influence of approximately 0.5 to 1.5 m will develop as a steady state condition, extending from the edge of the excavation, in the area of the subject site.

Given the hydrogeological characteristics of the subject site, the theoretical radius of influence for the potential excavations related to the development and the depth of water supply wells within 100 m, no long-term groundwater monitoring program is required.

However, a baseline water quality sampling program has been recommended to be completed prior to commencing construction on site. The premise of the program is to obtain groundwater quality information from the water supply wells in the vicinity of the proposed development prior to the project commencing. This ensures that all parties involved (developer, homeowners, and City of Ottawa) are protected should a concern arise during or after construction.

Baseline Water Sampling Program

As noted above, the excavations for the proposed development are either expected to be at or above the long term groundwater table. However, using a conservative value of a 0.5 m saturated thickness, the theoretical radius of

influence for the proposed development is expected to be 0.5 to 1.5 m from the edge of the excavations at the time of construction. The domestic wells in the area are assumed to be screened within a bedrock aquifer and well outside the theoretical radius of influence. Furthermore, bedrock excavation is not anticipated as part of the proposed development.

Based on the water service mapping provided by the City of Ottawa, as well as all the available information, a total of thirty (30) potential privately serviced lots have been identified to be included in the Baseline Groundwater Monitoring Program.

The following municipal addresses are proposed to be included in the Baseline Groundwater Monitoring Program:

- ❑ 1166 Bankfield Road
- ❑ 1178 Bankfield Road
- ❑ 1184 Bankfield Road
- ❑ 1202 Bankfield Road
- ❑ 1220 Bankfield Road
- ❑ 5477 Colony Heights Road
- ❑ 5481 Colony Heights Road
- ❑ 5470 Colony Heights Road
- ❑ 5480 Colony Heights Road
- ❑ 5479 Fee Street
- ❑ 5482 Fee Street
- ❑ 5476 Fee Street
- ❑ 468 Lockmaster Crescent
- ❑ 466 Lockmaster Crescent
- ❑ 464 Lockmaster Crescent
- ❑ 462 Lockmaster Crescent
- ❑ 460 Lockmaster Crescent
- ❑ 458 Lockmaster Crescent
- ❑ 456 Lockmaster Crescent
- ❑ 454 Lockmaster Crescent
- ❑ 452 Lockmaster Crescent
- ❑ 450 Lockmaster Crescent
- ❑ 448 Lockmaster Crescent
- ❑ 446 Lockmaster Crescent
- ❑ 444 Lockmaster Crescent
- ❑ 5482 Manotick Main Street
- ❑ 5478 Manotick Main Street
- ❑ 4306 Rideau Valley Road
- ❑ 4314 Rideau Valley Road
- ❑ 4395 Rideau Valley Road

The homeowners of the aforementioned properties will be invited to participate in the baseline sampling program by providing a registered letter delivered by Canada Post followed by up to two visits. In instances where the homeowner does not respond to the registered letter, a daytime visit with a second contact letter outlining the proposed sampling program will be left at the property for future sampling. The following visit will be completed in the evening with a second contact letter if the homeowner is still not available. Interested homeowners will be interviewed for the purpose of obtaining baseline water quality information followed by the collection and submission of a raw water sample.

The parameters that are being analyzed as part of the sampling program consist of the "Subdivision Water Quality Package" offered by Eurofins Environmental Testing Canada Inc. This package includes; alkalinity, bacteria, colour, conductivity, pH, hardness, IC anions, NH_3, TKN, DOC, phenols, sulphide, metals, Tannin & Lignin, TDS and turbidity.

A draft copy of the registered letter has been appended to the report and will be submitted to the City of Ottawa for review prior to commencement of the baseline water quality sampling program outlined above.

4.3 Soil, Surface Water and Groundwater

A search of the MECP Brownfields Environmental Site Registry was conducted as part of this assessment. No recorded Brownfield sites were identified within 100 m of the subject site.

All excess soils, with the exception of engineered crushed stone fill, generated by construction activities that will be transported on-site or off-site should be handled as per Ontario Regulation 406/19: On-Site and Excess Soil Management.

With respect to surface water features, there are none located within the theoretical radius of influence of the proposed excavations. The nearest surface water features are two tributaries of the Rideau River which are located on the northern and western border of the subject site. The Rideau River itself is also located approximately 50 m east of the subject site. As previously stated, these surface water features are outside the theoretical radius of influence of the proposed development.

It is expected that a multi-barrier approach (such as hay bales, geosocks, silt fencing, etc.) to a non-frozen, well vegetated area will be utilized in order to promote re-infiltration of discharge water prior to reaching the adjacent surface water features noted above. In addition, the turbidity of the water shall not exceed 8 NTU above background levels when discharging within 30 m of a watercourse. Therefore, adverse effects to surface water features resulting from dewatering activities at the subject site are expected to be negligible.

The groundwater that is pumped from the excavations must be managed in an appropriate manner. The contractor may be required to implement a water management and treatment program to dispose of the pumped water. It is expected the groundwater will be discharged to overland. Further treatment may be required should the discharge not meet the required guidelines.

4.4 Adjacent Permits to Take Water

A search of the MECP Permit to Take Water (PTTW) database provided no active PTTW within 100 m of the subject site. A search of the MECP Environmental Activity and Sector Registry (EASR) database provided no water taking permits within 100 m of the subject site.

4.5 Existing Servicing

The site is currently serviced by a private well and septic system. The well will be required to be properly decommissioned by a licensed well contractor as per O.Reg. 903 prior to construction. The septic system should be decommissioned in accordance with Part 8 of the Ontario Building Code.

5.0 RECOMMENDATIONS

Further testing and site preparation is recommended for the detailed Groundwater Impact Assessment. The following aspects of the program should be performed prior to commencing construction for the proposed residential development:

- ❑ All existing wells within the proposed residential development should be properly decommissioned as per O.Reg. 903 prior to construction, if they are not intended to be maintained in accordance with the regulations.

- ❑ The septic system should be decommissioned in accordance with Part 8 of the OBC.

- ❑ In the interest of public perception, a baseline water sampling program is recommended prior to commencing construction on site consisting of the addresses noted in Section 4.2.

- ❑ Prior to and during site development, it is recommended that construction best management practices with respect to fuels and chemical handling, spill prevention, and erosion and sediment control be followed.

- ❑ For any water taking of volumes greater than 50,000 L/day, either an Environmental Activity and Sector Registration (EASR) or a Permit To Take Water (PTTW) is required from the MECP, dependant on dewatering requirements.

6.0 STATEMENT OF LIMITATIONS

The recommendations provided in this report are in accordance with our present understanding of the project.

A hydrogeological review of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Uniform Developments or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Oliver Blume, M.Sc., G.I.T.

Michael S. Killam, P.Eng.
Senior Hydrogeologist

APPENDIX 1

DRAWING PH4624-1 - SITE PLAN

DRAWING PH4624-2 - SURFICIAL GEOLOGY PLAN

DRAWING PH4624-3 - BEDROCK GEOLOGY PLAN

DRAWING PH4624-4 - MECP WATER WELL LOCATION PLAN

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

GROUNDWATER IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
4386 RIDEAU VALLEY DRIVE

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:3000	Date: 08/2022
Drawn by: GK	Report No.: PH4624-REP.01
Checked by: OB	Dwg. No.: PH4624-1
Approved by: MK	Revision No.:

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11x17

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

GROUNDWATER IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
4386 RIDEAU VALLEY DRIVE

OTTAWA, ONTARIO

Title:

SURFICIAL GEOLOGY PLAN

Scale: 1:3000	Date: 08/2022
Drawn by: GK	Report No.: PH4624-REP.01
Checked by: OB	Dwg. No.: PH4624-2
Approved by: MK	Revision No.:

11x17

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

GROUNDWATER IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
4386 RIDEAU VALLEY DRIVE

OTTAWA, ONTARIO

Title:

BEDROCK GEOLOGY PLAN

Scale: 1:3000	Date: 08/2022
Drawn by: GK	Report No.: PH4624-REP.01
Checked by: OB	Dwg. No.: PH4624-3
Approved by: MK	Revision No.:

11x17

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100 m BUFFER ZONE
FROM SUBJECT SITE

RIDEAU RIVER

RIDEAU VALLEY DRIVE

SITE

CROIS. LOCKMASTER CRES.

BANKFIELD ROAD

COLONY HEIGHTS ROAD

RUE FEE STREET

LEGEND:

MECP WELL LOCATIONS

SCALE: 1:5000

0 50 100 150 200 250 300m

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

GROUNDWATER IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
4386 RIDEAU VALLEY DRIVE

OTTAWA, ONTARIO

Title:

MECP WATER WELL LOCATION PLAN

Scale: 1:5000	Date: 08/2022
Drawn by: GK	Report No.: PH4624-REP.01
Checked by: OB	Dwg. No.: PH4624-4
Approved by: MK	Revision No.:

11x17

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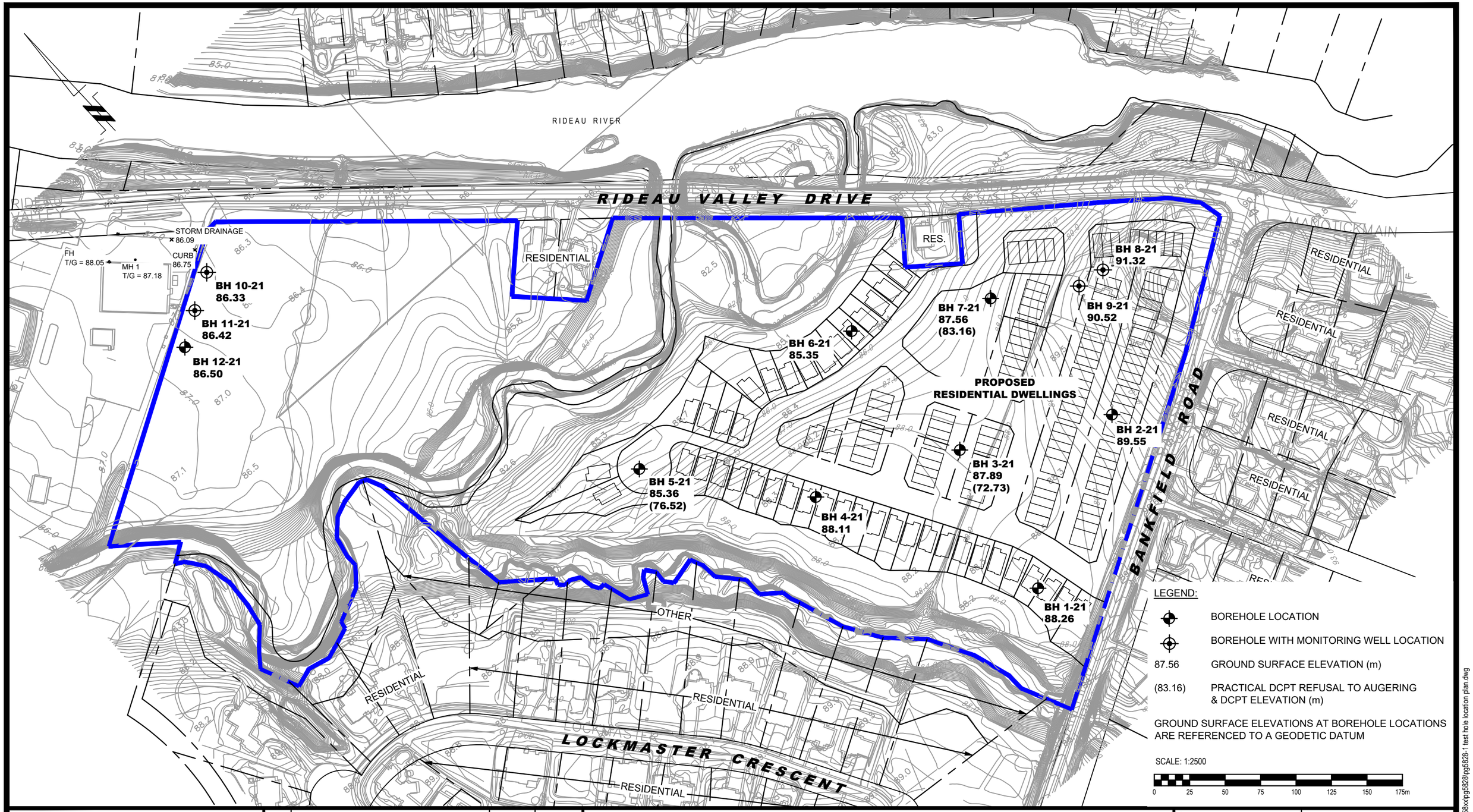
APPENDIX 2

PG5828-1 - TEST HOLE LOCATION PLAN

PATERSON - SOIL PROFILE AND TEST DATA SHEETS



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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

GEOTECHNICAL INVESTIGATION / SLOPE ANALYSIS
PROPOSED RESIDENTIAL DWELLINGS
4386 RIDEAU VALLEY DRIVE
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:2500	Date: 06/2021
Drawn by: JM	Report No.: PG5828-1
Checked by: MS	Dwg No.: PG5828-1
Approved by: DJG	Revision No.:

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

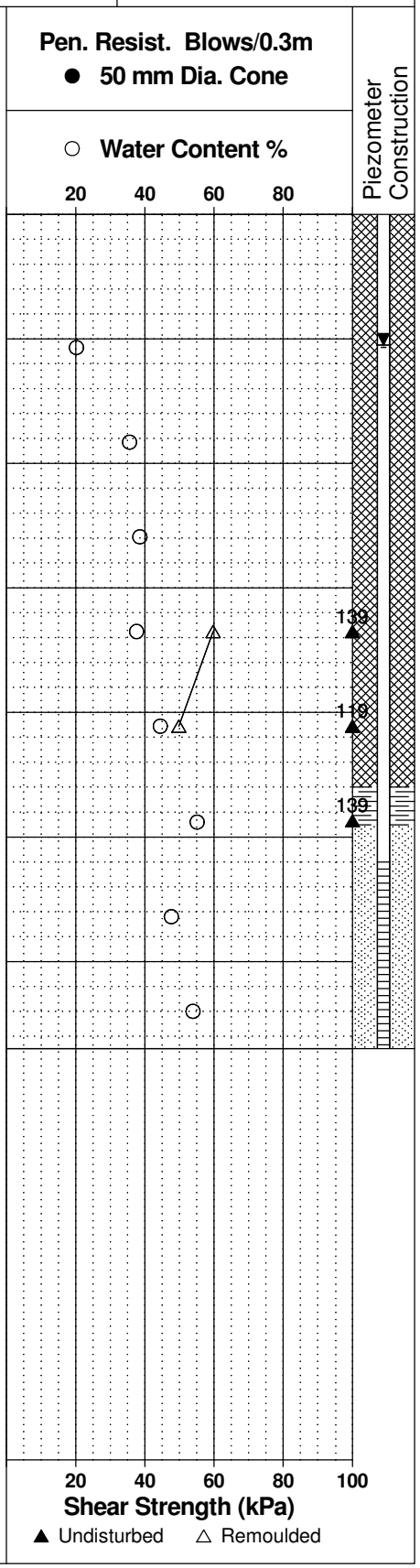
FILE NO. PG5828

REMARKS

HOLE NO. BH 1-21

BORINGS BY Track-Mount Power Auger **DATE** May 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.26
TOPSOIL 0.30		AU	1				
		SS	2	100	13	1	87.26
		SS	3	100	6	2	86.26
		SS	4	100	8		
Hard to very stiff, brown **SILTY CLAY,** trace sand		SS	5	100	7	3	85.26
		SS	6	100	5	4	84.26
		SS	7	83	P	5	83.26
- grey by 5.2m depth		SS	8	83	P		
		SS	9	83	P	6	82.26
6.70							
End of Borehole							
(GWL @ 1.05m - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

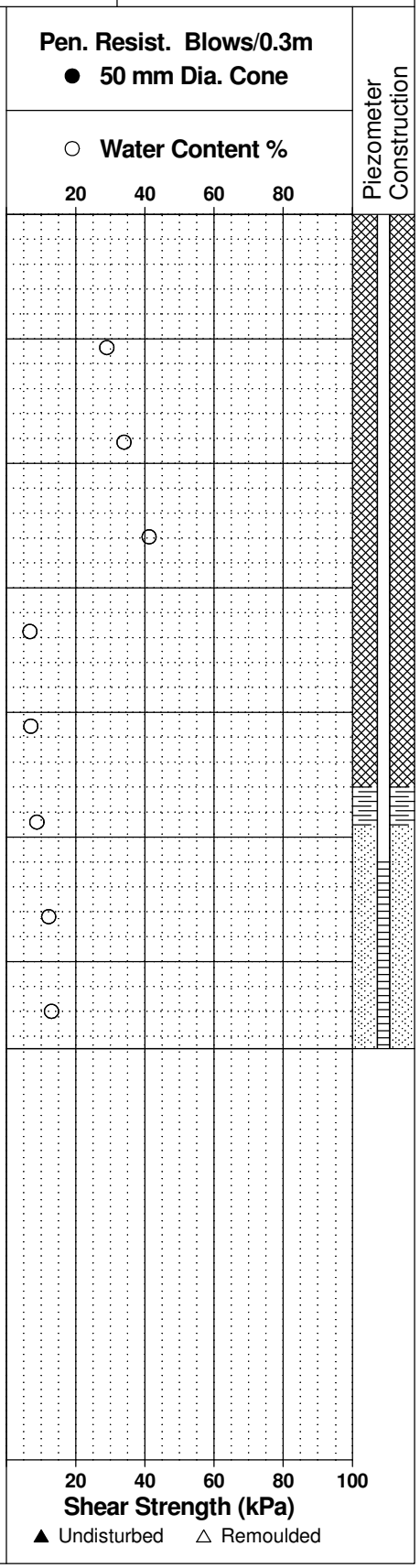
FILE NO. PG5828

REMARKS

HOLE NO. BH 2-21

BORINGS BY Track-Mount Power Auger **DATE** May 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	89.55
TOPSOIL 0.30		AU	1				
Hard to very stiff, brown **SILTY CLAY,** some to trace sand		SS	2	100	11	1	88.55
		SS	3	58	8	2	87.55
2.80		SS	4	60	8		
GLACIAL TILL: Dense to compact, brown silty sand with gravel, cobbles and boulders, trace clay		SS	5	67	46	3	86.55
		SS	6	62	27	4	85.55
		SS	7	60	21	5	84.55
		SS	8	58	15	6	83.55
6.70		SS	9	50	10		
End of Borehole							
(BH dry - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

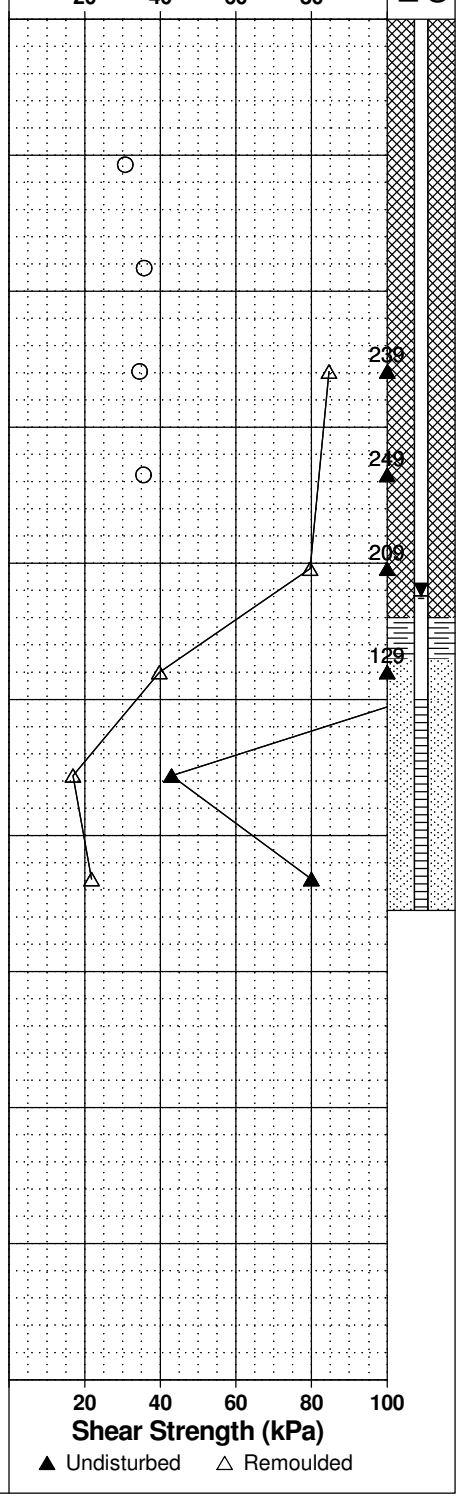
FILE NO. PG5828

REMARKS

HOLE NO. BH 3-21

BORINGS BY Track-Mount Power Auger **DATE** May 20, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	87.89
TOPSOIL 0.25		AU	1				
		SS	2	83	9	1	86.89
		SS	3	83	5	2	85.89
Hard to very stiff, brown **SILTY CLAY,** trace sand		SS	4	83	P	3	84.89
- sand content decreasing with depth		SS	5	83	P	4	83.89
						5	82.89
- stiff and grey by 5.2m depth						6	81.89
6.55							
Dynamic Cone Penetration Test commenced at 6.55m depth. Cone pushed to 11.0m depth						7	80.89
						8	79.89
						9	78.89
						10	77.89



Piezometer Construction

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

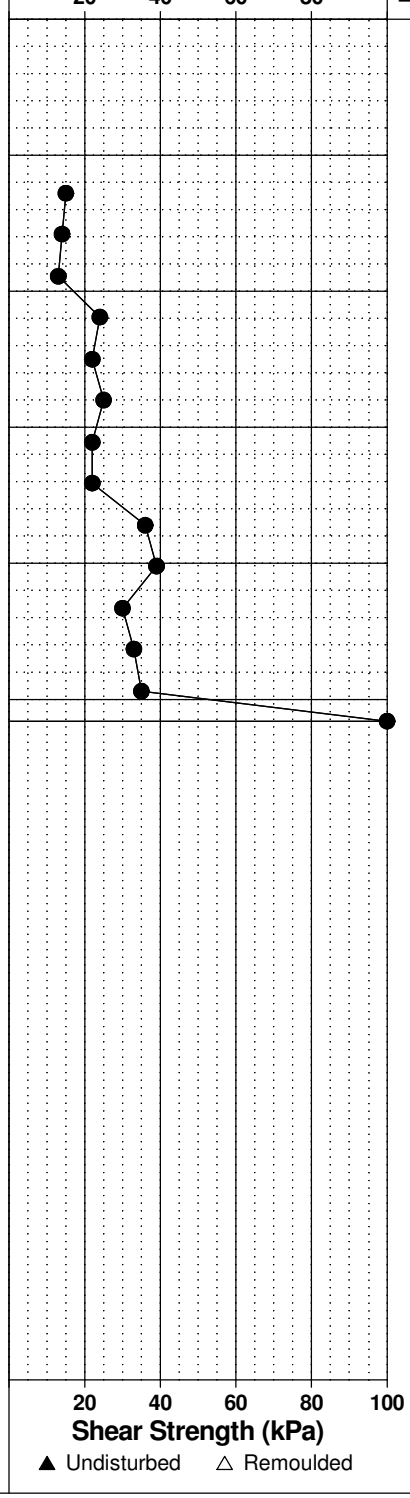
FILE NO. PG5828

REMARKS

HOLE NO. BH 3-21

BORINGS BY Track-Mount Power Auger **DATE** May 20, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone ○ Water Content %	Piezometer Construction
GROUND SURFACE									
						10	77.89		
						11	76.89		
						12	75.89		
						13	74.89		
						14	73.89		
						15	72.89		
15.16									
End of Borehole									
Practical refusal to DCPT at 15.16m depth									
(GWL @ 4.24m - May 26, 2021)									



patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

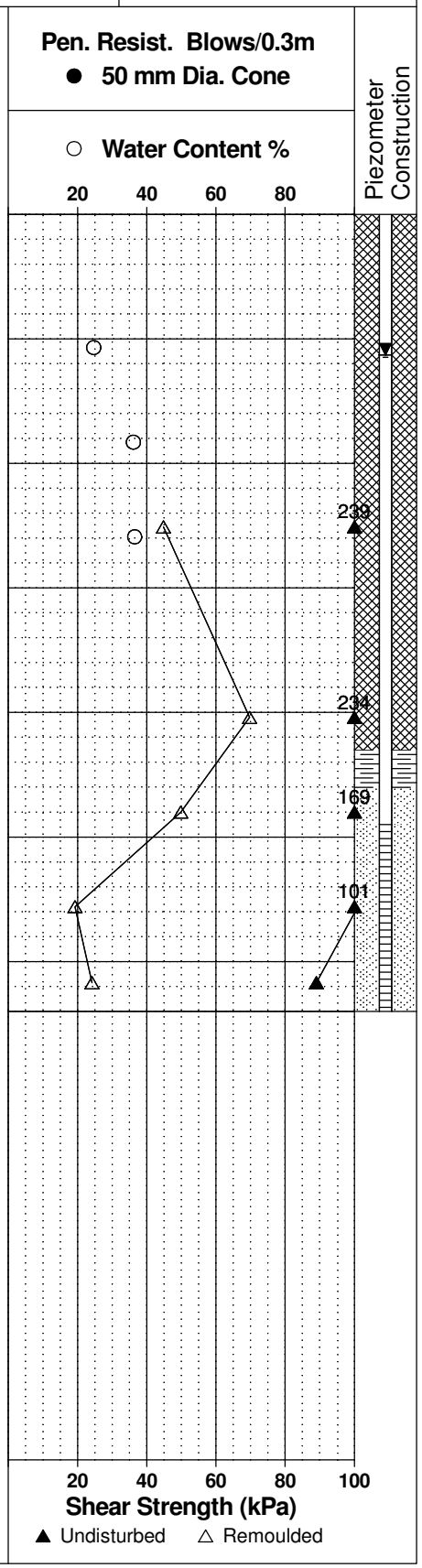
FILE NO. PG5828

REMARKS

HOLE NO. BH 4-21

BORINGS BY Track-Mount Power Auger **DATE** May 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.11
TOPSOIL 0.36		AU	1				
		SS	2	83	8	1	87.11
		SS	3	83	5	2	86.11
Hard to very stiff, brown **CLAY,** some silty sand - sand content decreasing with depth		SS	4	100	6	3	85.11
						4	84.11
5.18						5	83.11
Stiff, grey **SILTY CLAY**						6	82.11
6.40							
End of Borehole (GWL @ 1.13m - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

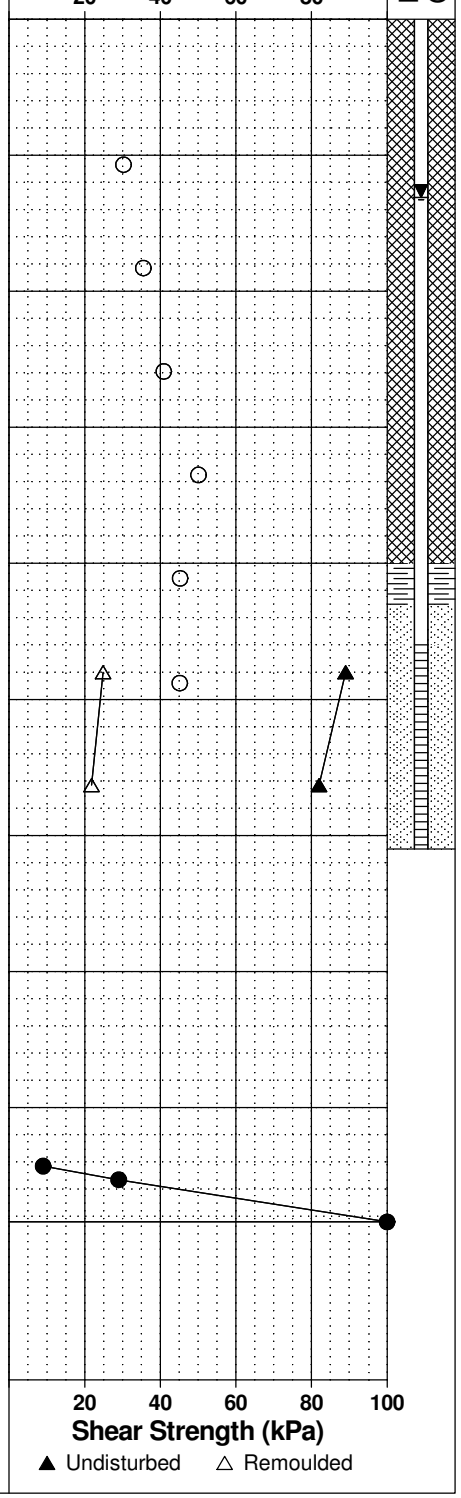
FILE NO. PG5828

REMARKS

HOLE NO. BH 5-21

BORINGS BY Track-Mount Power Auger **DATE** May 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.36
TOPSOIL 0.30							
Compact, brown **SILTY SAND** 0.60		AU	1				
		SS	2	50	10	1	84.36
		SS	3	58	11	2	83.36
Hard to very stiff, brown **SILTY CLAY**		SS	4	83	9	3	82.36
		SS	5	100	7		
		SS	6	100	5	4	81.36
- stiff and grey by 4.3m depth						5	80.36
		SS	7	100	P		
6.10						6	79.36
Dynamic Cone Penetration Test commenced at 6.10m depth. Cone pushed to 8.43m depth						7	78.36
						8	77.36
8.84							
End of Borehole Practical DCPT refusal at 8.84m depth. (GWL @ 1.31m - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

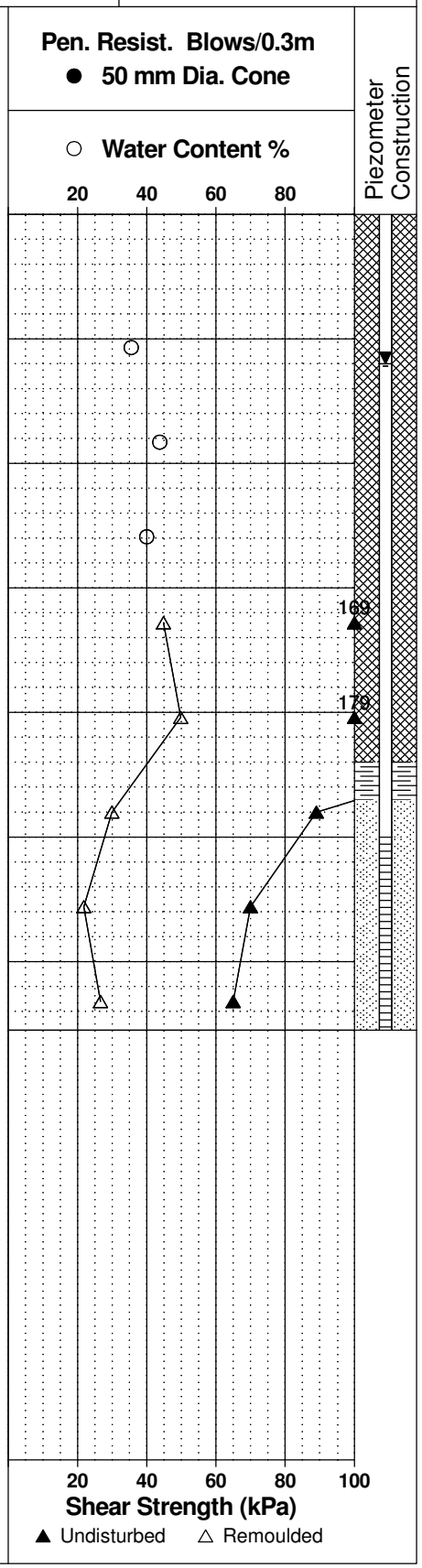
FILE NO. PG5828

REMARKS

HOLE NO. BH 6-21

BORINGS BY Track-Mount Power Auger **DATE** May 19, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	85.35
TOPSOIL 0.30							
Brown **SILTY SAND,** trace clay 0.60		AU	1				
		SS	2	83	6	1	84.35
		SS	3	83	6	2	83.35
		SS	4	83	5		
Very stiff to stiff, brown **SILTY CLAY,** trace sand						3	82.35
- sand content decreasing with depth						4	81.35
- grey by 4.6m depth						5	80.35
						6	79.35
6.55							
End of Borehole							
(GWL @ 1.20m - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

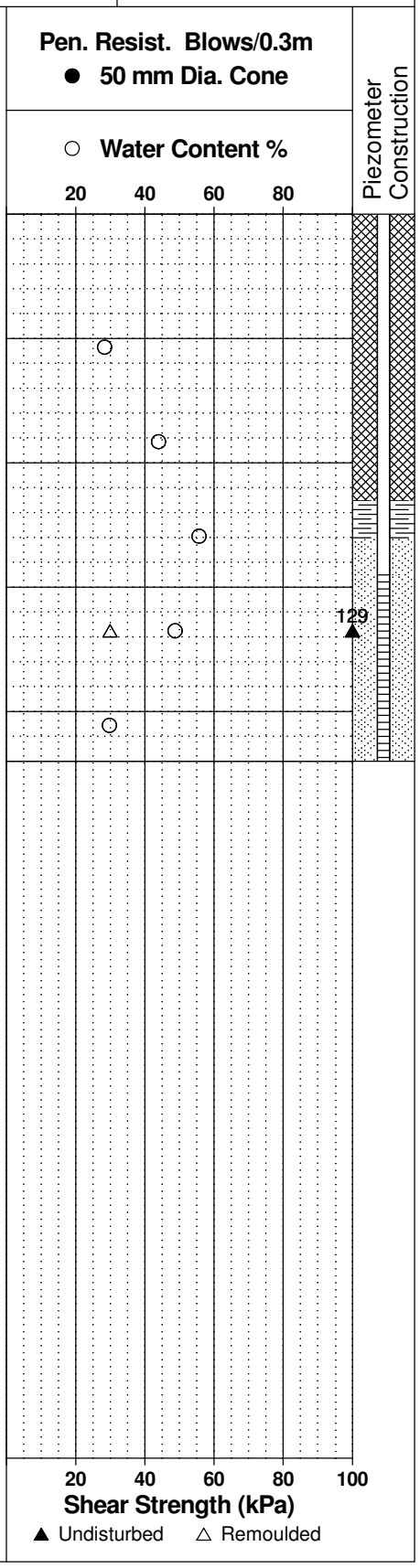
FILE NO. PG5828

REMARKS

HOLE NO. BH 7-21

BORINGS BY Track-Mount Power Auger **DATE** May 20, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	87.56
TOPSOIL 0.30							
Brown **SILTY SAND,** trace clay 0.76		AU	1				
		SS	2	75	7	1	86.56
Very stiff, brown **SILTY CLAY,** trace sand		SS	3	83	7	2	85.56
- sand content decreasing with depth		SS	4	83	3		
		SS	5	100	P	3	84.56
- some sand, trace gravel by 4.1m depth		SS	6	87	8	4	83.56
4.40							
End of Borehole							
Practical refusal to augering at 4.4m depth							
(BH dry - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

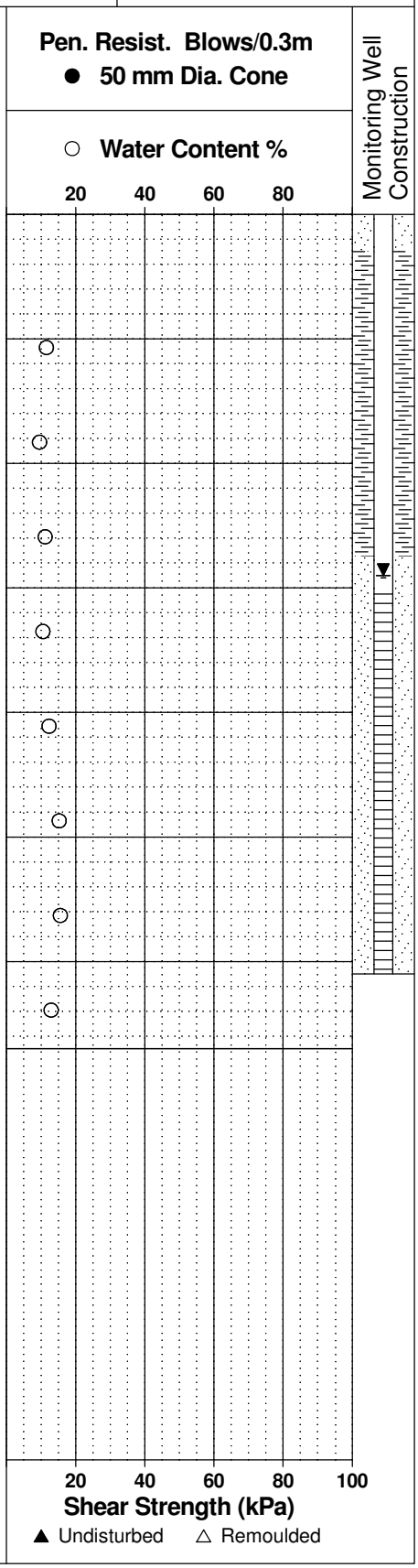
FILE NO. PG5828

REMARKS

HOLE NO. BH 8-21

BORINGS BY Track-Mount Power Auger **DATE** May 20, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	91.32
TOPSOIL 0.20							
FILL: Brown silty sand, some gravel, trace topsoil		AU	1				
1.07		SS	2	62	30	1	90.32
		SS	3	75	34	2	89.32
		SS	4	62	27	3	88.32
GLACIAL TILL: Dense to compact, brown silty sand with gravel, cobbles and boulders		SS	5	75	32		
		SS	6	62	39	4	87.32
		SS	7	50	27	5	86.32
		SS	8	42	26		
		SS	9	42	21	6	85.32
6.70 End of Borehole							
(GWL @ 2.90m - May 26, 2021)							



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development
4386 Rideau Valley Drive, Ottawa, Ontario

DATUM Geodetic

FILE NO. PG5828

REMARKS

HOLE NO. BH 9-21

BORINGS BY Track-Mount Power Auger **DATE** May 20, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	90.52
TOPSOIL 0.30		AU	1				
Stiff, brown **SILTY CLAY,** some to trace sand		SS	2	83	12	1	89.52
1.52						2	88.52
GLACIAL TILL: Compact to dense, brown silty sand with gravel, cobbles and boulders		SS	3	75	23	3	87.52
						4	86.52
						5	85.52
		SS	4	75	32	6	84.52
6.70 End of Borehole							
(GWL @ 3.09m - May 26, 2021)							

Pen. Resist. Blows/0.3m
● **50 mm Dia. Cone**
○ **Water Content %**

20 40 60 80

Monitoring Well Construction

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ Remoulded

APPENDIX 3

WATER SERVICE PLAN - CITY OF OTTAWA

HOMEOWNER LETTER

N

Legend

w_Pipe

SUBTYPE

- Service Pipe
- Water Pipe
- w_Service_Location

1:5,000

0 50 100 200 Meters

Date: 2022-Aug-18

PATERSON GROUP

Consulting Engineers
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
Tel: (613) 226-7381

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Retaining Wall Design
Noise and Vibration Studies

patersongroup.ca

August 23, 2022

File No.: PH4624

Attention: **Owner/Occupant**

Subject: **Baseline Water Well Testing**

Dear Owner/Occupant,

Paterson Group Inc. (Paterson), an Ottawa based Geotechnical, Environmental, and Hydrogeological Engineering Consulting Firm, is carrying out a baseline well water sampling program in your area, along with a short interview. This baseline well sampling program is being completed as a requirement by the City of Ottawa prior to starting construction works for the proposed development to be located at 4386 Rideau Valley Drive in Ottawa (Manotick). The sample results will be used as a baseline to provide a reference water quantity and quality in the unlikely event that construction works impact your well.

We are anticipating carrying out the well sampling program over a three-week period starting at the beginning of September. We would like to take this opportunity to schedule an appointment to sample your well when convenient.

As part of the baseline well sampling program, we are requesting access to your property to collect a raw water sample from an untreated tap/spigot. It is preferred to sample an untreated outdoor location to reduce potential for close contact and maintain social distance. Participants will be asked if they can provide a copy of the Well Record from when the well was installed, but water samples will be taken even if the record is not available. The program will consist of a brief interview with our field staff regarding the well history, determining the location of the well on the property and taking a water sample from an exterior tap/spigot should the water not be subject to any filtration or treatment measures. The entire process will take **15 to 20 minutes**. The interview can be done either in person at the time of sampling, or over the phone in order to limit social interaction.

The purpose of the sampling program is to protect homeowners against possible effects of construction on the adjacent properties, for which contingency plans will be in place. Well water testing includes several chemical parameters (not only bacteria) and the results will be provided to you **free of charge** (value of approximately $350).

Homeowner names, addresses with related analytical results, and contact information **will not** be released publicly by Paterson or the client. The information will be provided to the City where they have noted they will not share the report and that all personal information will remain private. If there are any questions as to how the parties will handle your information, please reach out to the appropriate person noted below.

Please contact Zavian Buchanan at Paterson Group (613-223-7368) or via email at (zbuchanan@patersongroup.ca) to schedule an appointment to sample your well. Please contact Tessa Di Iorio at the City of Ottawa (613-406-6465) or via email at (tessa.diiorio@ottawa.ca) should you require further information or if you have questions about the City's requirement for the well water sampling program.

We will continue to follow Public Health Ontario and Ottawa Public Health recommendations related to COVID-19 throughout these times. Please let us know if there are any health-related concerns you may have regarding the sampling.

Best Regards,

Paterson Group Inc.

Zavian Buchanan, B.Eng
Junior Hydrogeologist

APPENDIX 4

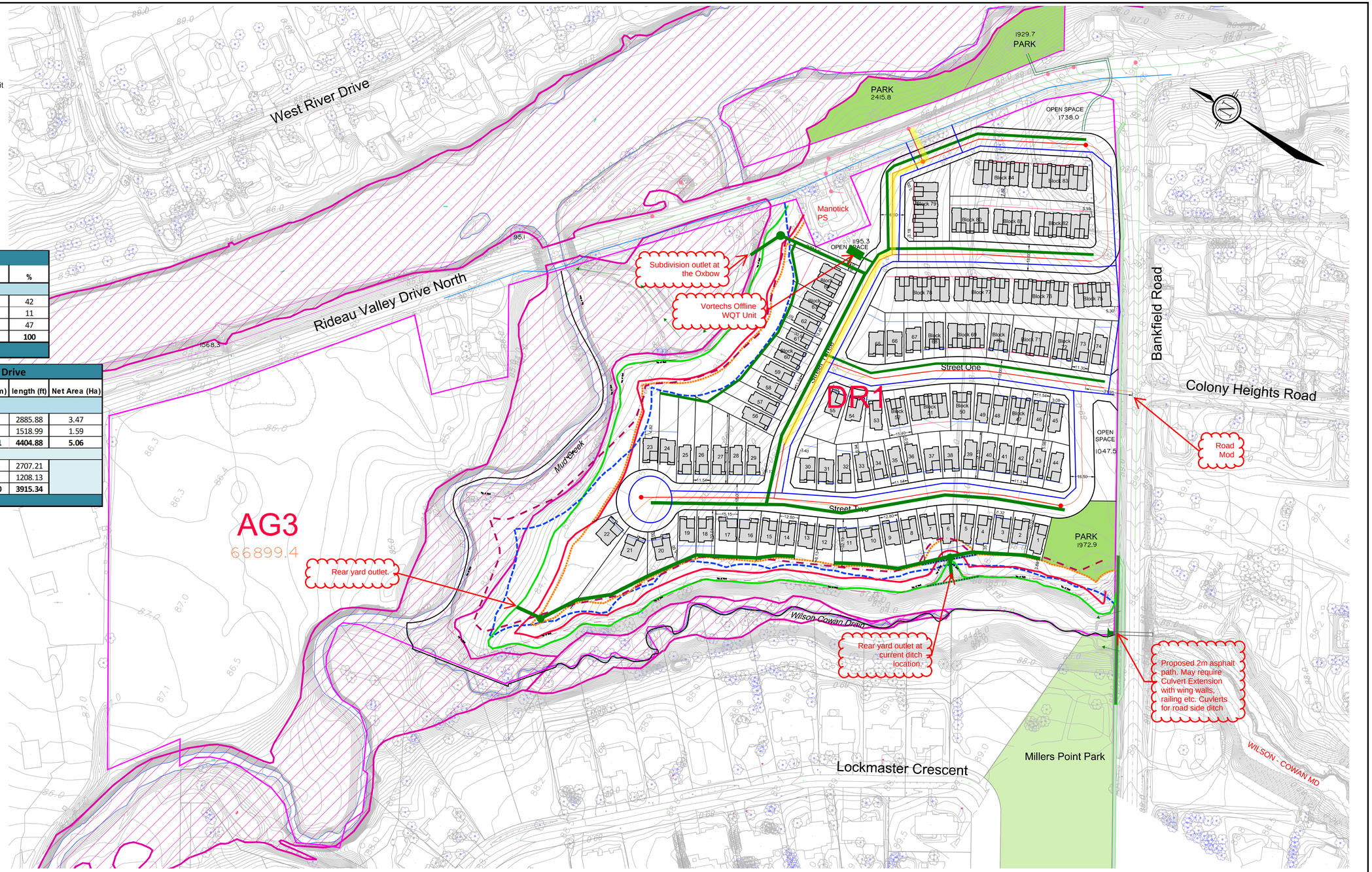
NOVATECH CONCEPT PLAN 18

LEGEND

- Site Boundary
- Drainage Line (River/Stream edge/centerline)
- 1:100 Floodplain Limit (RVCA GeoPortal)
- Geotechnical + Erosion Access Limit (Paterson)
- 30m from Water's Edge
- Assumed Top of Slope (Paterson)
- New Top of Slope
- Top of Bank (AOV)
- 15m from Top of Slope
- New 15m from Top of Slope
- 15m from Top of Bank
- Proposed 2.0m Pathway

4386 Rideau Valley Drive		
* Setback Assumptions: 6.0m FY, 6.0m RY, 3.0m Ext Side, 1.2m Int	Yield	%
Singles	62	42
Semis	16	11
Towns	69	47
Total	**147**	**100**

4386 Rideau Valley Drive			
* Setback Assumptions: 6.0m FY, 6.0m RY, 3.0m Ext Side, 1.2m Int	length (m)	length (ft)	Net Area (Ha)
Saleable Frontage			
Singles/Semis	879.62	2885.88	3.47
Towns	462.99	1518.99	1.59
Total Frontage	**1342.61**	**4404.88**	**5.06**
Road Lengths			
18m ROW	825.16	2707.21	
16.5m ROW	368.24	1208.13	
Total roads	**1193.40**	**3915.34**	



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	REVISED PER COMMENTS	FEB 04/22	GLW

SCALE: 1:1250 (A1) / 1:2500 (11x17)

1:1250 0 10 20 30 40 50

DESIGN: XXX
CHECKED: XXX
DRAWN: wls
CHECKED: XXX
APPROVED: XXX

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY of OTTAWA
4386 RIDEAU VALLEY DRIVE

DRAWING NAME
CONCEPT PLAN 18

PROJECT No. 121153-00
REV REV #1
DRAWING No. 121153-CP18

M:\2021\121153\CAD\Planning\Concept Plans\121153-CP18.dwg, Concept Plan - Dual Scale, Feb 07, 2022 - 4:14pm, wilsos