

Groundwater Impact Assessment

Proposed Mixed-Use Development

1000 Tawadina Road - Wateridge Village Block 12
Ottawa, Ontario

Prepared for Mattamy Homes

Report PH5272-REP.01

August 14, 2026



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1.0 Introduction

Paterson Group (Paterson) was commissioned by Mattamy Homes to complete a Groundwater Impact Assessment (GIA) for the proposed mixed-use development to be located at 1000 Tawadina Road (Wateridge Village Block 12) in the City of Ottawa, Ontario (Refer to Paterson Drawing PH5272-1 - 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

It is our understanding that the proposed development will consist of townhomes and a multi-storey mixed-use residential and commercial building with associated driveways, local roadways and landscaped areas. It is further expected that the development will be municipally serviced.

2.0 Background Information

A field program in support of the proposed development was carried out by Paterson in May 2023. During that time, a total of 11 boreholes were advanced across the subject site to a maximum depth of 6.0 m below ground surface (bgs). The test hole locations were distributed in a manner to provide general coverage of the subject site taking into consideration site features and underground utilities. Reference should be made to the Soil Profile and Test Data sheets included in Appendix 2 for the details of the soil profiles encountered at each test hole location. The locations of the test holes are presented on Paterson Drawing PG6688-1 - Test Hole Location Plan included in Appendix 2.

3.0 Site Conditions

At the time of the field investigation, the subject site was generally covered by grass and gravel. The site is bordered to the north by Tawadina Road, to the east by Bareille-Snow Street, to the west by a commercial development followed by Codd's Road, and to the south by vacant land followed by Hemlock road. The area surrounding the proposed development is part of other Wateridge Village blocks that are either already constructed or to be developed shortly. The ground surface at the subject site is generally flat and at grade with adjacent lands.

3.1 Geology

Generally, the subsurface profile encountered at the test hole locations consisted of fill underlain by a silty sand layer or glacial till deposit followed by bedrock. Practical refusal to augering was encountered at select test hole locations between 0.8 and 2.8 m bgs. Specific details of the soil profile at each test hole location within the subject site are presented on the Soil Profile and Test Data sheets included in Appendix 2.

According to surficial geology mapping prepared by the Ontario Geological Survey (OGS; MRD128-Revised) the subject site is in an area where the surficial geology consists primarily of fine-textured glaciomarine deposits. This information is consistent with the results of the field investigation. The surficial geology mapping is presented on Paterson Drawing PH5272-2 - Surficial Geology Plan included in Appendix 1.

Fill

Fill material was encountered at ground surface and extended to a maximum observed depth of 1.1 m bgs. The fill material was generally comprised of brown silty clay with sand gravel and crushed stone.

Silty Sand

At select test hole locations, a brown silty sand layer was encountered below the fill material and extended to a maximum observed depth of 2.2 m bgs. A thin silty clay deposit was encountered interbedded with the silty sand layer at select test hole locations.

Glacial Till

At select test hole locations, a brown glacial till deposit was encountered below the fill or silty sand layer and extended to a maximum observed depth of 2.8 m bgs. The glacial till deposit was generally comprised of brown silty clay with sand, gravel, cobbles and boulders

Bedrock

Based on the results from the field investigation, bedrock was encountered at select test hole locations between 1.3 and 2.7 m bgs and was cored to a maximum depth of 6.0 m bgs. Based on the coring results, the bedrock was generally of good to excellent quality with only select shallow cap rock samples identified as very

poor to poor quality. Practical refusal to auguring was encountered at select test hole locations between 0.8 and 2.8 m bgs.

Based on the available bedrock geological mapping provided by the Ontario Geological Survey (OGS; MRD 219), the subject site is located in an area where the bedrock consists of limestone and dolostone of the Gull River formation with an overburden drift thickness of 3 to 5 m. The bedrock geology is presented on drawing PH5272-3 - Bedrock Geology Plan included in Appendix 1.

Karst Features

The term “karst” refers to a geologic formation generally characterized by the dissolution of soluble bedrock, such as limestone or dolostone. Karstification generally occurs when groundwater or precipitation travels through existing joints and bedding planes causing dissolution. Based on available mapping by the Ontario Geological Survey (OGS, GRS005), the subject site is identified as an area with potential karstification. However, the bedrock cored during the field investigation did not show evidence of karst features within the subject site boundary.

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 only accessing the bedrock aquifer.

Based on the available geological mapping provided by the Ontario Geological survey (OGS, MRD 219), the bedrock aquifer system consists of limestone and dolostone of the Gull River Formation.

Based on the Ministry of the Environment, Conservation and Parks (MECP) online well mapping, no potable water supply wells were found to be within 500 m of the subject site due to the developed nature of the region.

Groundwater Levels and Flow Direction

Piezometers were installed at the test hole locations to allow for the collection of groundwater level readings. Groundwater levels were recorded on June 2, 2023 and were observed to range between 1.3 to 4.5 m bgs. It should be noted that groundwater levels can fluctuate both seasonally and in conjunction with precipitation events. As such, water levels may vary at the time of construction. The groundwater level measurements are shown on the Soil Profile and Data Sheets included in Appendix 2.

Groundwater flow in the vicinity of the subject site is generally expected to reflect local topography. Based on watershed mapping provided by the Ministry of the Environment Conservation and Parks (MECP; Source Protection Information Atlas), the subject site is located within the Grande Presqu'Île subwatershed of the Lower Ottawa River watershed with a local and regional flow direction expected to trend north towards the Ottawa River.

Hydraulic Conductivity

Hydraulic conductivity values for the subsurface materials encountered at the subject site were estimated based on published values and Paterson's experience at similar sites in the area. The hydraulic conductivity for the silty sand, glacial till and bedrock identified at the subject site is anticipated to range from 1×10^{-5} to 1×10^{-7} m/sec.

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.

The subsurface profile at the subject site consist primarily of fill underlain by a silty sand or glacial till deposit followed by bedrock. It is therefore anticipated that surface water will either flow down-gradient as sheet drainage or infiltrate the overburden materials before intercepting the underlying bedrock unit where it will flow laterally as interflow. As such, certain areas may allow for some volume of recharge to be occurring, but the overall volume of recharge occurring within the subject site boundary is expected to be minimal given the shallow overburden thickness. Furthermore, mapping provided by the MECP (Source Protection Information Atlas) has indicated the subject site is not considered a significant groundwater recharge area.

With regards to discharge zones, neither the topographical nor geological conditions are suitable for discharge to be occurring on a large scale at the subject

site. Furthermore, no indication of groundwater discharge zones was identified during Paterson's field investigation.

4.0 Potential Impacts

4.1 Adverse Effects on Neighbouring Water Wells

Based on the Site Servicing Plan prepared by Stantec included in Appendix 3, the majority of the proposed development is anticipated to be constructed at/near existing grade with excavation depths of ≤ 1 m bgs. Only select areas are anticipated to require deeper excavations with maximum excavation depths of approximately 2 and 4 m bgs for servicing installations at select locations. Given the observed groundwater levels and anticipated maximum excavation depths, it is estimated that up to 3 m of saturated material could be encountered at the excavation locations. If required, bedrock removal is anticipated to be limited to shallow isolated areas with small footprints for select servicing installations.

A search of the Ontario Water Well Records database indicates there are several monitoring well installations within 500 m of the site. However, no potable water supply wells were found to be within 500 m of the subject site due to the developed nature of the region. Additionally, the area within 500 m of the site is serviced by municipal water supplies. Dewatering activities and bedrock removal, if required, are therefore not expected to interfere with the water supply of surrounding properties. Surrounding water wells are depicted on Paterson Drawing PH5272-4 - MECP Water Well Location Plan included in Appendix 1.

In order to determine potential impacts to nearby well users, conservative theoretical radii of influence have been calculated based on the saturated material encountered on site.

These calculations were completed based on Sichardt (1992) using the equation:

$$R = 3000 \cdot \Delta h (k^{0.5})$$

- ☐ R = radius of influence (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:

- ☐ k = 1×10^{-5} to 1×10^{-7} m/sec
- ☐ Δh = 0.5 to 3 m

Using the above equation and assumptions, a radius of influence of approximately < 1 to 29 m will develop as a steady state condition, extending from the edge of the excavation.

As the potential to interfere with the water quality/quantity of existing well users in the area is negligible, a water well monitoring program is not recommended. If wells are found to remain in existence on the subject site, they should be decommissioned in accordance with Ontario Regulation (O.Reg.) 903.

4.2 Adverse Effects on Adjacent Structures

The subsurface profile at the subject site generally consisted of fill underlain by a silty sand layer or a glacial till deposit followed by bedrock. It is anticipated that the surrounding structures are either founded on overburden materials with minimal compressibility or bedrock. Additionally, given the nature of the proposed development, dewatering activities are anticipated to be short-term in duration. As a result, any effects related to ground surface settlement due to the water taking activities are anticipated to be negligible.

If the taking of water is shown to cause negative impacts to surrounding structures, the Party responsible for water taking activities shall take action to remedy the impacts, compensate persons for reasonable costs associated to do so or shall reduce water taking amounts to alleviate the negative impacts.

4.3 Soil, Surface Water and Groundwater

A search of the MECP Environmental Site Registry for Records of Site Condition (RSC) was conducted as part of the assessment of the site, neighbouring properties and the general area. A total of nine (9) Records of Site Condition sites were identified within 500 m of the subject site and are presented in Table 1 below. While groundwater remediation was required at several locations, no ongoing groundwater monitoring controls were noted in any of the files reviewed.

Table 1 - Summary of MECP Brownfield Sites

RSC #	Address	Distance from Site	Soil Remediation	GW Remediation	Monitoring Controls
223064	335 St. Laurent Blvd.	320 m SE	3,188 m ³ Removed	2 m ³ Removed	N/A
221266	335 St. Laurent Blvd.	490 m SW	3,350 m ³ Removed	37.46 m ³ Removed	N/A
223850	335 St. Laurent Blvd.	430 S	1,220 m ³ Removed	60 m ³ Removed	N/A
226318	715 Mikinak Road	180 m SE	4,931 m ³ Removed	5,314 m ³ Removed	N/A
226470	1076-1335 Hemlock Road	160 m E	2,250 m ³ Removed	5,500 m ³ Removed	N/A
230865	1076 Hemlock Private	400 m NE	N/A	N/A	N/A
236493	1076 Hemlock Private	200 m SW	4,630 m ³ Removed	N/A	N/A
237674	1076 Hemlock Private	435 m NE	490 m ³ Removed	N/A	N/A
B-403-53550813 04	0 Tawadina Road	180 m NW	9,570 m ³ Removed	1,333 m ³ Removed	N/A

It is anticipated that excess soil will be handled in accordance with O.Reg. 406-19 – On-site and Excess Soil Management.

With respect to surface water bodies, a stormwater management pond was identified within 410 m of the subject site. This surface water feature is located well beyond the anticipated theoretical radius of influence associated with potential dewatering activities for the proposed development. As such, adverse effects to surface water features resulting from dewatering activities at the subject site are expected to be negligible.

If the discharged water is to be directed to overland drainage within 30 m of a watercourse, the turbidity of the water shall not exceed 8 NTU above background levels of the nearest water body.

The contractor will be required to maintain appropriate Best Management Practices with respect to sediment and erosion control to ensure negative effects to the surrounding environment are minimized.

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 applicable guidelines/regulations.

4.4 Adjacent Permits to Take Water

A search of the MECP Permit to Take Water (PTTW) database provided no active PTTW within 500 m of the subject site.

A search of the MECP Environmental Activity and Sector Registry (EASR) database provided three (3) EASR water taking registrations within a 500 m radius of the subject site.

EASR R-009-2112511249 is registered to Mattamy (Jock River) Limited for construction dewatering at 681 Mikinak Road, approximately 80 m south of the subject site. The EASR contains one (1) source with a maximum potential taking of 400,000 L/day. Based on available EASR documentation and aerial mapping, it is anticipated that the dewatering associated with this EASR has been completed.

EASR R-009-9110607360 is registered to Ottawa Greenbelt Construction for construction dewatering approximately 240 m east of the subject site. The EASR contains one (1) source with a potential taking of 400,000 L/day. Based on available EASR documentation and aerial mapping, it is anticipated that the dewatering associated with this EASR has been completed.

EASR R-009-3469801096 is registered to Wateridge Lifestyles Ltd. for construction dewatering at 200 Codd's Road approximately 170 m north of the subject site. The EASR contains one (1) source with a maximum potential water taking of 86,600 L/day.

Based on the above, the risk of cumulative impacts resulting from multiple water taking permits in proximity to each other is considered negligible.

4.5 Existing Servicing

All existing wells within the subject site will be required to be properly decommissioned by a licensed well contractor as per O.Reg. 903 prior to construction.

5.0 Recommendations

The following aspects of the program should be performed prior to commencing construction for the proposed residential development:

- ☐ All existing wells within the proposed 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.
- ☐ Prior to and during site development, it is recommended that construction best management practices with respect to fuels and chemical handling, spill prevention, erosion and sediment control be followed.
- ☐ If water taking volumes are greater than 50,000 L/day, a MECP water taking Environmental Activity and Sector Registry (EASR) will be required.

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 Mattamy Homes 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, P.Geo.



APPENDIX 1

DRAWING PH5272-1 - SITE PLAN

DRAWING PH5272-2 - SURFICIAL GEOLOGY PLAN

DRAWING PH5272-3 - BEDROCK GEOLOGY PLAN

DRAWING PH5272-4 - MECP WATER WELL LOCATION PLAN



LEGEND:

— SITE BOUNDARY

SCALE: 1:500

 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					MATTAMY HOMES GROUNDWATER IMPACT ASSESSMENT PROPOSED MIXED-USE DEVELOPMENT WATERIDGE VILLAGE - BLOCK 12 OTTAWA, Title:	ONTARIO	Scale:	1:500	Date:	08/2026	
							Drawn by:	GK	Report No.:	PH5272-REP.01	
							Checked by:	OB	Dwg. No.:	PH5272-1	
							Approved by:	OB	Revision No.:		
NO.	REVISIONS	DATE	INITIAL								





9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

OTTAWA,
Title:

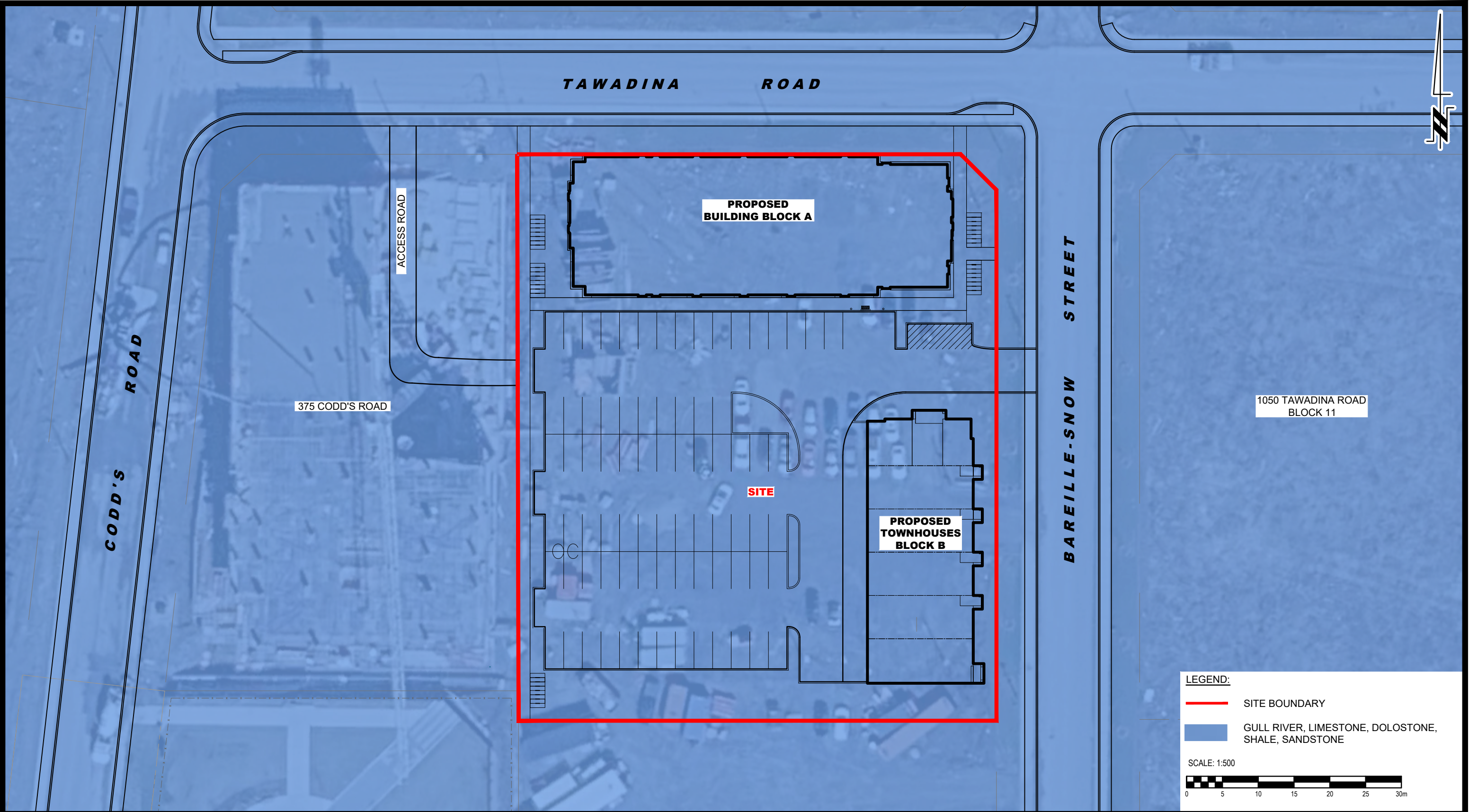
MATTAMY HOMES

GROUNDWATER IMPACT ASSESSMENT
PROPOSED MIXED-USE DEVELOPMENT
WATERIDGE VILLAGE - BLOCK 12

ONTARIO

SURFICIAL GEOLOGY PLAN

Scale:	1:500	Date:	08/2026
Drawn by:	GK	Report No.:	PH5272-REP.01
Checked by:	OB	Dwg. No.:	PH5272-2
Approved by:	OB	Revision No.:	





9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

OTTAWA,
Title:

MATTAMY HOMES
GROUNDWATER IMPACT ASSESSMENT
PROPOSED MIXED-USE DEVELOPMENT
WATERIDGE VILLAGE - BLOCK 12

BEDROCK GEOLOGY PLAN

ONTARIO

Scale:	1:500	Date:	08/2026
Drawn by:	GK	Report No.:	PH5272-REP.01
Checked by:	OB	Dwg. No.:	PH5272-3
Approved by:	OB	Revision No.:	



LEGEND:

- MECP WELL LOCATIONS
- SITE BOUNDARY
- WATER FEATURE

SCALE: 1:10000

0 100 200 300 400 500m 750m

 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					MATTAMY HOMES GROUNDWATER IMPACT ASSESSMENT PROPOSED MIXED-USE DEVELOPMENT WATERIDGE VILLAGE - BLOCK 12 ONTARIO MECP WATER WELL LOCATION PLAN	Scale:	1:10000	Date:	08/2026
						Drawn by:	GK	Report No.:	PH5272-REP.01
						Checked by:	OB	Dwg. No.:	PH5272-4
						Approved by:	OB	Revision No.:	
	NO.	REVISIONS	DATE	INITIAL					

APPENDIX 2

SOIL PROFILE AND TEST DATA SHEETS

PG6688-1 - TEST HOLE LOCATION PLAN

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372618.2 **NORTHING:** 5035288 **ELEVATION:** 89.00

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 1-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface	EL 89 m						0																
FILL: Brown silty clay with sand, gravel and crushed stone		SS1	▽	50	83	9	0																
		SS2	▽	50	21	30	1																
1.07 m EL 87.93 m			▽			9																	
Compact, brown SILTY SAND		RC1	○	75	33																		
1.42 m EL 87.58 m			○																				
BEDROCK: Poor to good quality, grey limestone		RC2	○	100	83		2																
- joint at 4' 10" and 8' 6"																							
		RC3	○	100	71		3																
							4																
							5																
4.55 m EL 84.45 m							6																
End of Borehole							7																
(GWL @ 1.64m - June 2, 2023)																							

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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 -Ottawa, On.

DATUM: Geodetic **EASTING:** 372638.8 **NORTHING:** 5035293 **ELEVATION:** 89.27

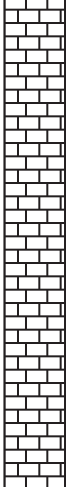
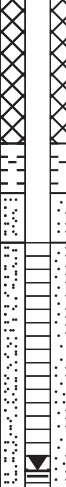
PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS: **DATE:** May 25, 2023

HOLE NO. BH 2-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface							0																
FILL: Brown silty clay with sand, gravel and crushed stone		SS1		42	14	11	0																
		SS2		6	50+	27	1																
1.07 m EL 88.2 m																							
Compact to dense, brown SILTY SAND																							
1.58 m EL 87.69 m																							
BEDROCK: Poor to good quality, grey limestone		RC1		100	86		2																
		RC2		100	75		3																
							4																
4.57 m EL 84.7 m							5																
End of Borehole							6																
(GWL @ 4.45m - June 2, 2023)							7																

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GROUP**

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372627.5 **NORTHING:** 5035282 **ELEVATION:** 88.84

PROJECT: Proposed Mixed Use Development

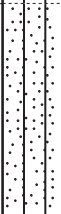
FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 2A-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction		
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100			
Ground Surface																					EL 88.84 m				
FILL: Brown silty clay with sand, gravel and crushed stone							0																		
							1																		
							2																		
							3																		
							4																		
1.07 m EL 87.77 m																									
Compact to dense, brown SILTY SAND							1																		
							2																		
							3																		
							4																		
							5																		
1.52 m EL 87.32 m																									
Glacial Till: Loose, brown SILTY SAND gravel, cobbles and boulders		SS1		42	7	10	2																		
							3																		
							4																		
							5																		
							6																		
2.8 m EL 86.04 m																									
End of Borehole							3																		
							4																		
							5																		
							6																		
							7																		
Practical refusal to augering at 2.80m depth																									
(BH dry - June 2, 2023)																									

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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372647.9 **NORTHING:** 5035255 **ELEVATION:** 89.14

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 3-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface																							
EL 89.14 m																							
FILL: Brown silty clay with sand, gravel and crushed stone		SS1	▽	75	23	18	0																
0.3 m EL 88.84 m			▽			18																	
Compact, brown SILTY SAND		SS2	▽	75	27	19	1																
1.07 m EL 88.07 m			▽			33																	
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders		RC1	○	88	88																		
1.4 m EL 87.74 m			○																				
BEDROCK: Good to excellent quality, grey limestone		RC2	○	100	95		2																
			○				3																
			○				4																
			○				5																
			○				6																
			○				7																
4.6 m EL 84.54 m			○																				
End of Borehole																							
(GWL @ 3.77m - June 2, 2023)																							

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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372651.8 **NORTHING:** 5035268 **ELEVATION:** 89.22

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 4-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface							0																
EL 89.22 m																							
FILL: Brown silty clay with sand, gravel and crushed stone		SS1		58	14	26	0																
0.69 m																							
EL 88.53 m																							
Loose, brown SILTY SAND		SS2		67	7	23	1																
1.62 m																							
EL 87.6 m																							
End of Borehole		SS3		33	50+	16	2																
Practical refusal to augering at 1.62m depth.																							
(BH dry - June 2, 2023)																							
							3																
							4																
							5																
							6																
							7																

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Wateridge Block 12 - Ottawa, On.

ELEVATION: 88.39

FILE NO. PG6688

HOLE NO. BH 5-23

DATE: May 25, 2023

Ground Surface		EL 88.39 m	
FILL: Brown silty clay with sand and gravel 0.69 m EL 87.7 m GLACIAL TILL: Brown silty clay with sand and gravel, cobbles and boulders 1.27 m EL 87.12 m End of Borehole Practical refusal to augering at 1.27m depth. (BH dry - June 2, 2023)	 SS1 	75 9 22	0 1 2 3 4 5 6 7
	 SS2 	73 10 24	1 2 3 4 5 6 7

RSLog / Geotechnical Borehole - Geodetic / paterson-group / admin / September 15, 2023 04:09 PM

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372606.3 **NORTHING:** 5035269 **ELEVATION:** 88.73

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

HOLE NO. BH 6-23

REMARKS: **DATE:** May 25, 2023

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface																							
FILL: Brown silty clay with sand and gravel 0.3 m EL 88.43 m		SS1		58	13	21	0																
Compact, brown SILTY SAND 0.69 m EL 88.04 m		SS2		50	50+	2	15																
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders 0.81 m EL 87.92 m							1																
End of Borehole																							
Practical refusal to augering at 0.81m depth.							2																
(BH dry - June 2, 2023)																							
							3																
							4																
							5																
							6																
							7																

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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372650.4 **NORTHING:** 5035238 **ELEVATION:** 88.79

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 7-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface	EL 88.79 m						0																
FILL: Crushed stone and gravel	0.08 m EL 88.71 m	SS1	▽	58	14	17	0																
FILL: Brown silty clay with sand and gravel	0.3 m EL 88.49 m		▽				25																
Compact, brown SILTY SAND, trace gravel	1.07 m EL 87.72 m	SS2	▽	67	13	19	1																
Hard, brown SILTY CLAY	1.45 m EL 87.34 m	SS3	▽		50+	13																	
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders							2																
	2.74 m EL 86.05 m	RC1	○	80	0		3																
BEDROCK: Very poor to excellent quality, grey limestone		RC2	○	100	100		4																
							5																
	6 m EL 82.79 m	RC3	○	100	97		6																
End of Borehole							7																

RSLog / Geotechnical Borehole - Geodetic / paterson-group / admin / September 15, 2023 04:09 PM

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SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372650.4 **NORTHING:** 5035238 **ELEVATION:** 88.79

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 26, 2023

HOLE NO. BH 7A-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface	EL 88.79 m						0																
FILL: Crushed stone and gravel	0.08 m EL 88.71 m																						
FILL: Brown silty clay with sand and gravel	0.3 m EL 88.49 m																						
Compact, brown SILTY SAND, trace gravel	1.07 m EL 87.72 m						1																
Hard, brown SILTY CLAY	1.52 m EL 87.27 m																						
Loose, brown SILTY SAND with gravel		SS1	▽	58	4	11	2																
GLACIAL TILL: Brown silty clay with sand, gravel, cobbles and boulders	2.21 m EL 86.58 m																						
	2.67 m EL 86.12 m	SS2	▽	56	50+	23																	
End of Borehole							3																
Practical refusal to augering at 2.67m depth.							4																
							5																
							6																
							7																

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**PATERSON
GROUP**

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372649.5 **NORTHING:** 5035290 **ELEVATION:** 89.36

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 8-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface							0																
EL 89.36 m																							
FILL: Brown silty clay with sand and gravel		SS1	▽	33	22	27	0																
0.69 m EL 88.67 m																							
Compact, brown SILTY SAND with gravel, trace clay		SS2	▽	75	28	17	1																
1.32 m EL 88.04 m																							
BEDROCK: Excellent to good quality, grey limestone		RC1	○	92	92		2																
		RC2	○	100	90		3																
		RC3	○	100	85		4																
4.62 m EL 84.74 m							5																
End of Borehole							6																
(GWL @ 3.26m - June 2, 2023)							7																

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**PATERSON
GROUP**

SOIL PROFILE AND TEST DATA

GEOTECHNICAL INVESTIGATION

Wateridge Block 12 - Ottawa, On.

DATUM: Geodetic **EASTING:** 372607.1 **NORTHING:** 5035290 **ELEVATION:** 89.01

PROJECT: Proposed Mixed Use Development

FILE NO. PG6688

BORINGS BY: CME-55 Low Clearance Drill

REMARKS:

DATE: May 25, 2023

HOLE NO. BH 9-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	WATER CONTENT %	DEPTH (m)	Remoulded Shear Strength (kPa)					Peak Shear Strength (kPa)					Pen. Resist. Blows/0.3m (50 mm Dia. Cone)					Piezometer Construction
		No.	Type					0	25	50	75	100	0	25	50	75	100	0	25	50	75	100	
Ground Surface																							
EL 89.01 m																							
FILL: Brown silty clay with sand and gravel		SS1	▽	33	19	15	0																
0.3 m EL 88.71 m			▽				11																
Dense, brown SILTY SAND		SS2	▽	80	50+	8	1																
1.3 m EL 87.71 m																							
BEDROCK: Good quality, grey limestone		RC1	○	100	87		2																
		RC2	○	100	76		3																
- mud seam at 3.9m depth, and at 9' 3" depth, 10' 5" depth.																							
		RC3	○	100	78		4																
4.67 m EL 84.34 m																							
End of Borehole							5																
(GWL @ 4.01m - June 2, 2023)																							
							6																
							7																

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SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t , is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$

Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

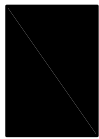
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.
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SYMBOLS AND TERMS (continued)

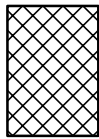
STRATA PLOT



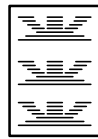
Topsoil



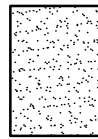
Asphalt



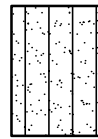
Fill



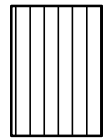
Peat



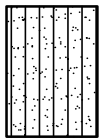
Sand



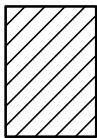
Silty Sand



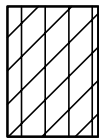
Silt



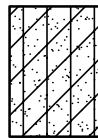
Sandy Silt



Clay



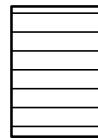
Silty Clay



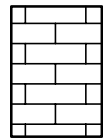
Clayey Silty Sand



Glacial Till



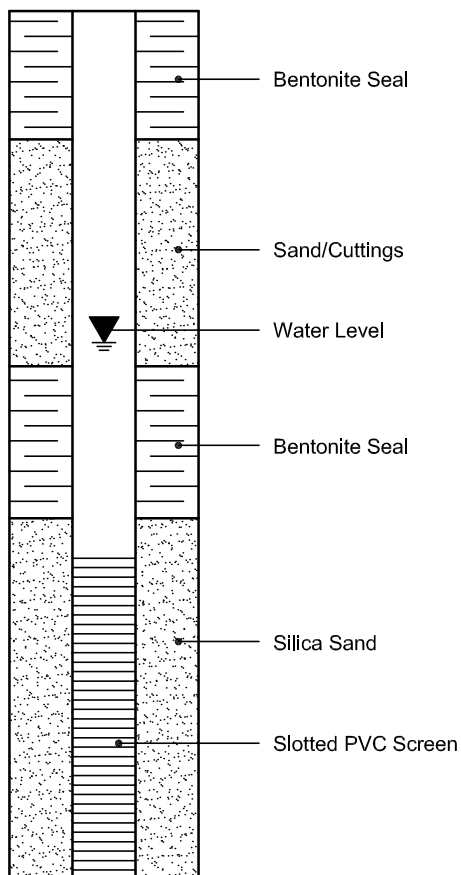
Shale



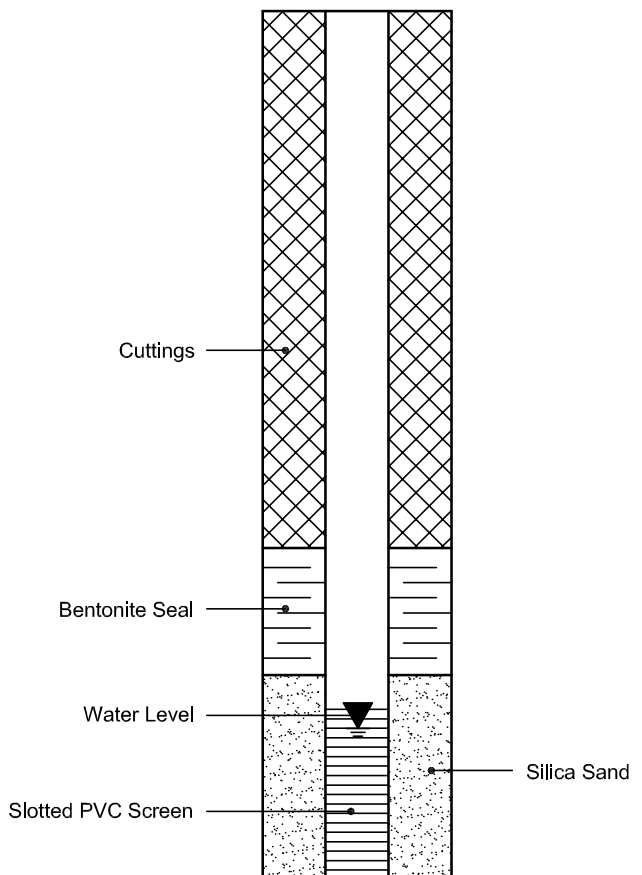
Bedrock

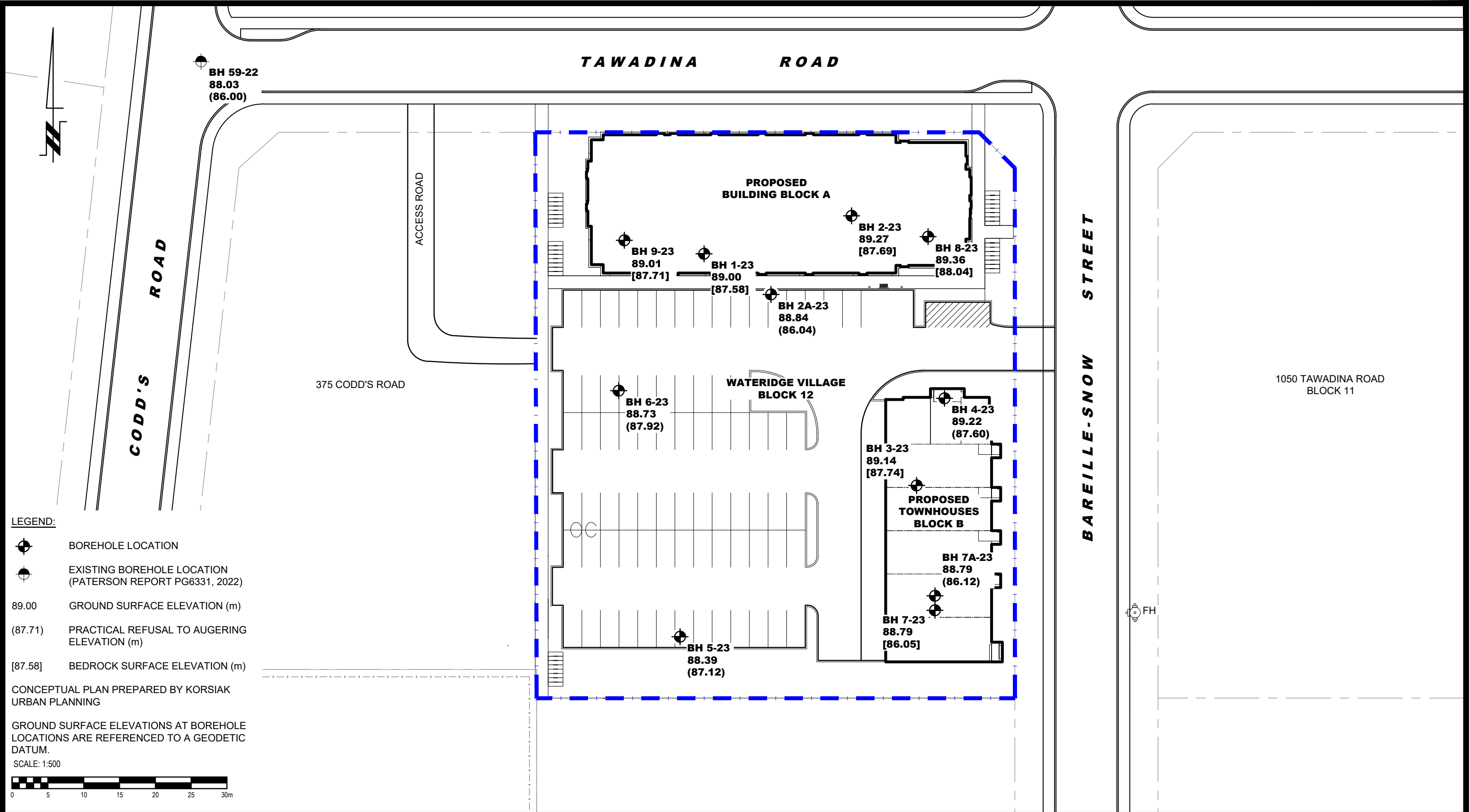
MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION





LEGEND:

 BOREHOLE LOCATION

 EXISTING BOREHOLE LOCATION
(PATERSON REPORT PG6331, 2022)

89.00 GROUND SURFACE ELEVATION (m)

(87.71) PRACTICAL REFUSAL TO AUGERING
ELEVATION (m)

[87.58] BEDROCK SURFACE ELEVATION (m)

CONCEPTUAL PLAN PREPARED BY KORSIK
URBAN PLANNING

GROUND SURFACE ELEVATIONS AT BOREHOLE
LOCATIONS ARE REFERENCED TO A GEODETIC
DATUM.

SCALE: 1:500





9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

MATTAMY HOMES

GEOTECHNICAL INVESTIGATION
PROPOSED MIXED-USE DEVELOPMENT
WATERIDGE VILLAGE - BLOCK 12

OTTAWA,
Title:

ONTARIO

TEST HOLE LOCATION PLAN

Scale:	1:500	Date:	08/2026
Drawn by:	GK	Report No.:	PG6688-1
Checked by:	NP	Dwg. No.:	PG6688-1
Approved by:	KP	Revision No.:	

APPENDIX 3

STANTEC - SITE SERVICING PLAN

