PATERSON GROUP

Groundwater Impact Assessment

Proposed Residential Development

Wateridge Block 105 – Mikinak Road & Vedette Way
Ottawa, Ontario

Prepared for Mattamy Homes

Report PH5061-REP.01
dated May 2, 2025

Table of Contents

Appendices

1.0 INTRODUCTION

Paterson Group (Paterson) was commissioned by Mattamy Homes to complete a groundwater impact assessment (GIA) for the proposed residential development to be located at Mikinak Road and Vedette Way in the City of Ottawa, Ontario (Refer to Paterson Drawing PH5061-1 - 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 drawings and information at the time of report preparation, the proposed development will consist back-to-back and stacked townhouses with basements or slab-on-grade construction. It is anticipated the proposed development will be municipally serviced.

2.0 BACKGROUND INFORMATION

The field investigations in support of the proposed development was carried out by Paterson and others between February 2014 and March 2025. During that time, a total of six (6) boreholes were advanced across the subject site to a maximum sampling depth of 7.5 m below ground surface (bgs). The borehole locations were distributed in a manner to provide general coverage of the subject site. Borehole information can be found in Appendix 2 of this report. The approximate locations of the boreholes are presented on drawing PG7353-1 - Test Hole Location Plan included in Appendix 2.

3.0 SITE CONDITIONS

The subject site is vacant and grassed covered. It is bordered to the north by Hemlock Road, to the east by a park block, to the south by Mikinak Road, and to the west by Vedette Way. The ground surface across the subject site gradually slopes downward towards the west with an approximate elevation difference of approximately 2 m.

The subject site was previously used as a military base known as CFB Rockcliffe. The majority of the subject site was previously occupied by single family dwellings, local roadways and car parking areas in addition to some landscaped areas. All structures within the subject site were demolished by 2013.

3.1 Geology

Generally, the soil profiles at the borehole locations consist of topsoil and fill material underlain by silty clay and/or glacial till. Specific details of the soil profile at each borehole location within the subject site 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 consists of fine-textured glaciomarine deposits. This information is generally consistent with the results of the field investigations. The surficial mapping is presented on drawing PH5061-2 - Surficial Geology Plan included in Appendix 1.

Fill Material

Fill material was encountered at all borehole locations. The fill generally consists of brown silty clay and/or silty sand with gravel, crushed stone, organics, and construction debris to a maximum depth of 2.7 m bgs.

Silty Clay

A hard to stiff brown silty clay crust was encountered below the fill and/or topsoil at the majority of borehole locations to a maximum depth of 4.9 m bgs. A firm grey silty clay deposit was encountered in BH2-25 to a maxim depth of 5.9 m bgs.

Glacial Till

A compact to dense glacial till deposit was encountered at all borehole locations underlying the fill material and/or silty clay. The glacial till deposit is comprised of brown silty sand, with varying amounts of clay, gravel, cobbles and boulders to a maximum sampling depth of 7.5 m bgs.

Bedrock

Available geological mapping provided by the Ontario Geological Survey (OGS, MRD 219) has noted the subject site to consist of interbedded limestone and dolostone of the Gull River formation with a drift thickness of 2 to 5 m bgs. The bedrock geology is presented on drawing PH5061-3 - Bedrock Geology Plan included in Appendix 1.

It is anticipated that minor bedrock removal may be required for building construction and servicing installations at select locations.

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), the subject site is located within an area with potential karstic landforms due to areas of carbonate rock units identified as being susceptible to karst processes. However, the impermeable silty clay layer identified throughout the majority of the site inhibits the infiltration of water necessary for the dissolution of the underlying carbonate rocks. Therefore, impacts related to karstification are considered to be negligible within the 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 hydrogeological characteristics of the overburden aquifer makes it an unlikely source for water supply wells. Based on the well records within the subject area, the water supply wells have been noted to be accessing the bedrock aquifer.

Based on the available geological mapping provided by the Ontario Geological Survey (OGS, MRD 219) and bedrock aquifer mapping, provided by Natural Resources Canada Urban Geology of the National Capital Region, the bedrock aquifer system consists of limestone and dolostone of the Gull River formation. The subject area primarily accesses the Gull River formation aquifer system or the bordering Rockcliffe and Bobcaygeon aquifer systems.

Existing potable water wells have been noted for domestic supply in the Fairhaven Community located approximately 330 m south (upgradient) of the subject site. Based on the well records, the wells have been noted to be accessing the bedrock aquifer, extending to depths ranging from 18 to 122 m bgs. Water bearing fractures were encountered at depths ranging from 17 to 119 m bgs. Bedrock was encountered between ground surface to 6 m bgs.

Groundwater Levels

Groundwater was observed in the monitoring wells and piezometers installed in the overburden at the borehole locations. Based on a review of the water well records, groundwater is also present in the bedrock at depth. Groundwater levels in the overburden at the subject site were measured between 82.31 m asl (4.11 m bgs) and 85.2 m asl (3.3 m bgs) following the completion of the geotechnical field investigations.

While groundwater infiltration from the silty clay deposit is expected to be negligible, the potential exists for a moderate amount of groundwater inflow through the glacial till and bedrock, depending on the compaction and composition of the deposit or bedrock quality at a given location. It is anticipated that pumping from open sumps will be sufficient to control groundwater influx through the sides of the excavations. It should be noted that groundwater levels can fluctuate seasonally and with precipitation events. Therefore, groundwater levels could vary at the time of construction.

Groundwater Flow Paths

Due to the nature of the water levels obtained from field work conducted at the subject site (groundwater monitoring wells and piezometers), the absolute direction and magnitude of horizontal hydraulic gradients in the vicinity of the subject site was not determined. However, using the available data, it was possible to approximate the horizontal hydraulic gradients in the overburden materials given that the horizontal hydraulic gradient between any 2 points is the slope of the hydraulic head between those points:

$$i=h_2-h_1/L$$

Where: i = horizontal gradient
h = water elevation (m asl)
L = horizontal distance between test hole locations

Using the above noted formula, the horizontal hydraulic gradients were observed to reflect local topography with a magnitude generally ranging between 0.008 to 0.040 m/m in the overburden materials. The approximate hydraulic gradients are presented in Table 2 in Appendix 3.

Groundwater flow in the vicinity of the subject site is generally expected to reflect local topography. The subject site is located within the Ottawa East of Core 2 subwatershed with a regional flow direction expected to trend north towards the Ottawa River.

Hydraulic Conductivity

The hydraulic conductivity values for the overburden and bedrock material were conservatively estimated based on experience at similar sites and published values. Hydraulic conductivity for glacial till generally ranges from 1 x 10^{-5} to 1 x 10^{-9} m/sec and is dependent on the compaction and composition of the deposit at a given location. Hydraulic conductivity for brown to grey silty clay generally ranges from 1 x 10^{-7} to 1 x 10^{-12} m/sec and is dependent on the moisture level and consistency of the material. The hydraulic conductivity for bedrock generally ranges from 1 x 10^{-5} to 1 x 10^{-9} m/sec, depending on the quality of the bedrock at a given location.

At the time of report preparation and for the purpose of this study, the maximum elevation depth of excavation for the buildings and servicing is expected to be approximately 84.5 m asl and 83 m asl, respectively. These depths are based on drawings prepared by Stantec that are included in Appendix 4. Given the observed groundwater infiltration levels in the test holes and proposed excavation depths, it is conservatively estimated that up to 2.5 m of saturated overburden and bedrock material could be encountered at the excavation locations.

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 Source Protection Information Atlas mapping provided by the MECP, the subject site is not considered a significant groundwater recharge area. Furthermore, the silty clay layer encountered throughout the majority of the site is generally considered to act as a confining layer. It is our interpretation that groundwater will generally flow laterally through the underlying glacial till material and bedrock, as opposed to vertically through the soils with lower hydraulic conductivity such as the silty clay. As such, the volume of recharge occurring 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. Furthermore, no indication of groundwater discharge zones was identified during Paterson's field investigations.

4.0 POTENTIAL IMPACTS

4.1 Adverse Effects on Neighbouring Water Wells

A search of the Ontario Water Well Records database indicates there are several monitoring well installations within 500 m of the site. While no potable water supply wells were identified in close proximity to the subject site, the Fairhaven Community located approximately 330 m south of the property (upgradient) is privately serviced. Additionally, the area within 500 m of the site is primarily serviced by municipal water supplies, with the exception of the Fairhaven Community. Surrounding water wells are depicted on Paterson Drawing PH5061-4 - MECP Water Well Location Plan included in Appendix 1.

As previously noted, the wells within the Fairhaven Community are accessing the bedrock aquifer, extending to depths ranging from 18 to 122 m bgs. Water bearing fractures were encountered at depths ranging from 17 to 119 m bgs. Bedrock was encountered between ground surface to 6 m bgs.

In order to determine potential impacts to well users for the purpose of this study, 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:

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

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 x 10^{-7} m/s for silty clay; 1 x 10^{-5} m/s for glacial till; 1 x 10^{-5} m/s for bedrock
- Δh = 2 m silty clay; 1.5 m glacial till; 1.5 m bedrock

Using the above equation and assumptions, the following radii of influence will develop as a steady state condition, extending from the edge of the excavation, in the area of the subject site. A factor of safety has been applied to the calculated radius of influence for the purpose of this review.

- R = 2 m (4 m factored) for silty clay
- R = 14 m (28 m) for glacial till
- R = 14 m (28 m) for bedrock

Based on the above noted calculations, the Fairhaven Community is located well outside the factored radii of influence that will develop during steady state conditions. Furthermore, the anticipated water taking activities at the subject site are located downgradient from the existing well users. Lastly, water takings are expected to be short term in duration, given the nature of the development.

As the potential to interfere with the water quality/quantity of the existing well users within the Fairhaven Community is negligible, a water well monitoring program is not recommended for the aforementioned water takings.

4.2 Adverse Effects on Adjacent Structures

Existing structures adjacent to the subject site include the residential dwellings located to the south and west. The distance from the building excavations where dewatering will take place to the existing residential dwellings have been noted to be approximately 25 m or greater.

While the adjacent structures are anticipated to be founded on either silty clay, glacial till or bedrock, the majority of the groundwater infiltration is expected to occur within the glacial till deposit or bedrock with minimal compressibility. Furthermore, adjacent structures founded on silty clay are located outside the factored theoretical radius of influence of 4 m, as per Section 4.1. As such, any effects related to ground surface settlement due to the water taking activities during construction are expected to be negligible.

4.3 Soil, Surface Water and Groundwater

A search of the MECP Environmental Site Registry for Records of Site Condition (RSCs) was conducted as part of the assessment of the site, neighbouring properties, and the general area. A total of seven (7) RSCs were identified within 500 m of the subject site and are presented in Table 1. None of the RSC sites have ongoing monitoring controls.

Table 1 - Summary of Adjacent RSC Sites

RSC #	Address	Distance to RSC from Site	Soil Remediation	GW Remediation	Monitoring Controls
236493	1076 Hemlock Rd.	25 m N	4,630 m^3 Removed	Not Required	Not Required
226470	1076-1335 Hemlock Rd.	150 m E	2,250 m^3 Removed	5,500 m^3 Removed	Not Required
226318	715 Mikinak Rd.	235 m E	4,931 m^3 Removed	5,314 m^3 Removed	Not Required
223064	335 St. Laurent Blvd	400 m E	3,188 m^3 Removed	2 m^3 Removed	Not Required
223850	335 St. Laurent Blvd.	250 m SE	1,220 m^3 Removed	60 m^3 Removed	Not Required
221266	335 St. Laurent Blvd.	25 m S	3,350 m^3 Removed	37.5 m^3 Removed	Not Required
229794	1076 Hemlock Rd.	25 m W	527 m^3 Removed	Not Required	Not Required

All excess soils 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 is an unidentified tributary to the Ottawa River located approximately 375 m west of the subject site and well outside the anticipated radii of influence that may develop due to dewatering activities at the subject site. 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 water 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 water 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 database provided one (1) PTTW within a 500 m radius of the subject site.

Permit number 0565-A5AMP8 has been registered to Canada Lands Company CLC Ltd. The PTTW contains three (3) sources within the subject area and is for construction dewatering related to municipal serving within the Wateridge development. The cumulative potential taking for these sources is 94,500 L/day. It is understood that municipal servicing has been completed under the current PTTW. Furthermore, the above noted PTTW will expire on December 31, 2025, prior to any water takings at the subject site. Therefore, cumulative impacts related to adjacent water taking permits are anticipated to be negligible.

A search of the Environmental Activity and Sector Registry (EASR) database provided one (1) EASR within a 500 m radius of the subject site. EASR R-009-2112511249 is registered to Mattamy (Jock River) Ltd. The EASR has a total potential taking of 400,000 L/day and is located approximately 90 m east of the site and well outside the theoretical radius of influence. Furthermore, it is understood that all water taking activities have been completed. Therefore, cumulative impacts related to water taking activities or ground surface settlement between the two sites are expected to be negligible.

4.5 Existing Servicing

It is understood there are no existing supply wells located within the subject site. Existing monitoring wells at the subject site should be properly decommissioned by a licensed well contractor as per O.Reg. 903 prior to construction.

5.0 RECOMMENDATIONS

Further testing and site preparation is recommended for the detailed hydrogeological 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 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 regulation.

- ❑ 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, an active 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 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.

Nicholas Zulinski, P.Geo., géo.

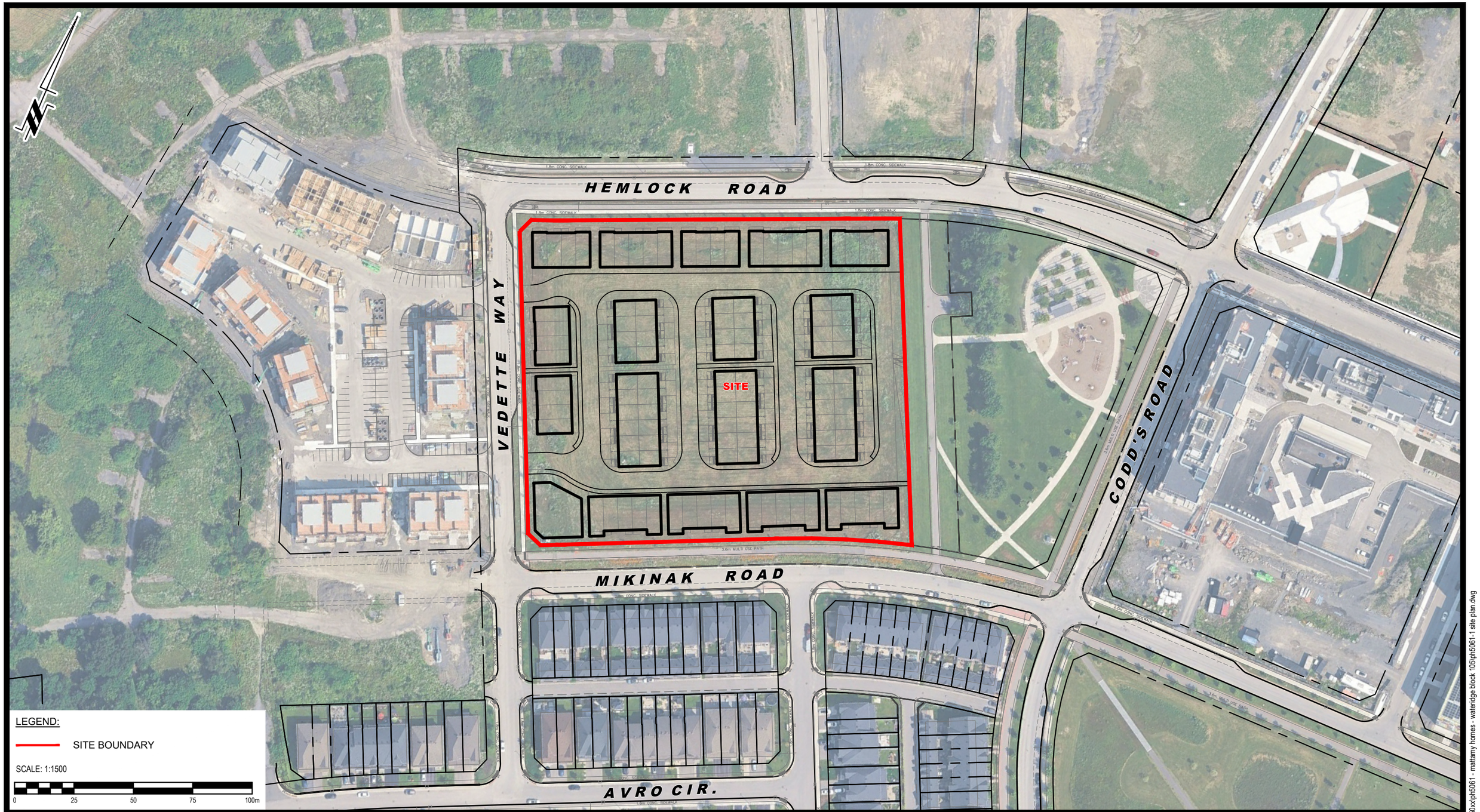
APPENDIX 1

DRAWING PH5061-1 - SITE PLAN

DRAWING PH5061-2 - SURFICIAL GEOLOGY PLAN

DRAWING PH5061-3 - BEDROCK GEOLOGY PLAN

DRAWING PH5061-4 - MECP WATER WELL LOCATION PLAN



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NO.	REVISIONS	DD/MM/YYYY	INITIAL

MATTAMY HOMES
GROUNDWATER IMPACT ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
WATERIDGE BLOCK 105 - MIKINAK ROAD & VEDETTE WAY
OTTAWA, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 04/2025
Drawn by: GK	Report No.: PH5061-1
Checked by: NZ	Dwg. No.: PH5061-1
Approved by: NZ	Revision No.:

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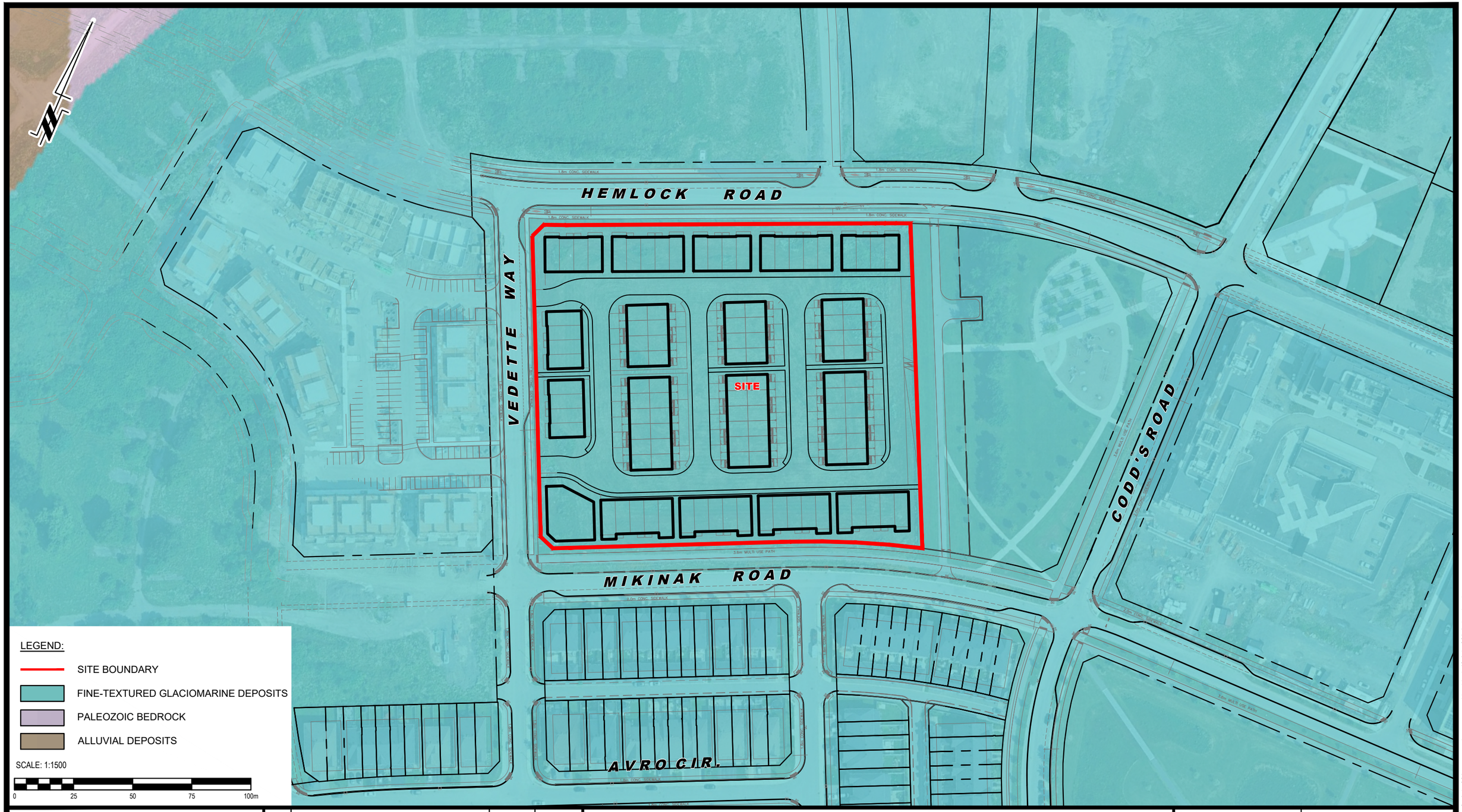

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PROPOSED RESIDENTIAL DEVELOPMENT
WATERIDGE BLOCK 105 - MIKINAK ROAD & VEDETTE WAY
OTTAWA, ONTARIO

Title:
SURFICIAL GEOLOGY PLAN

Scale: 1:1500	Date: 04/2025
Drawn by: GK	Report No.: PH5061-1
Checked by: NZ	Dwg. No.: PH5061-2
Approved by: NZ	Revision No.:

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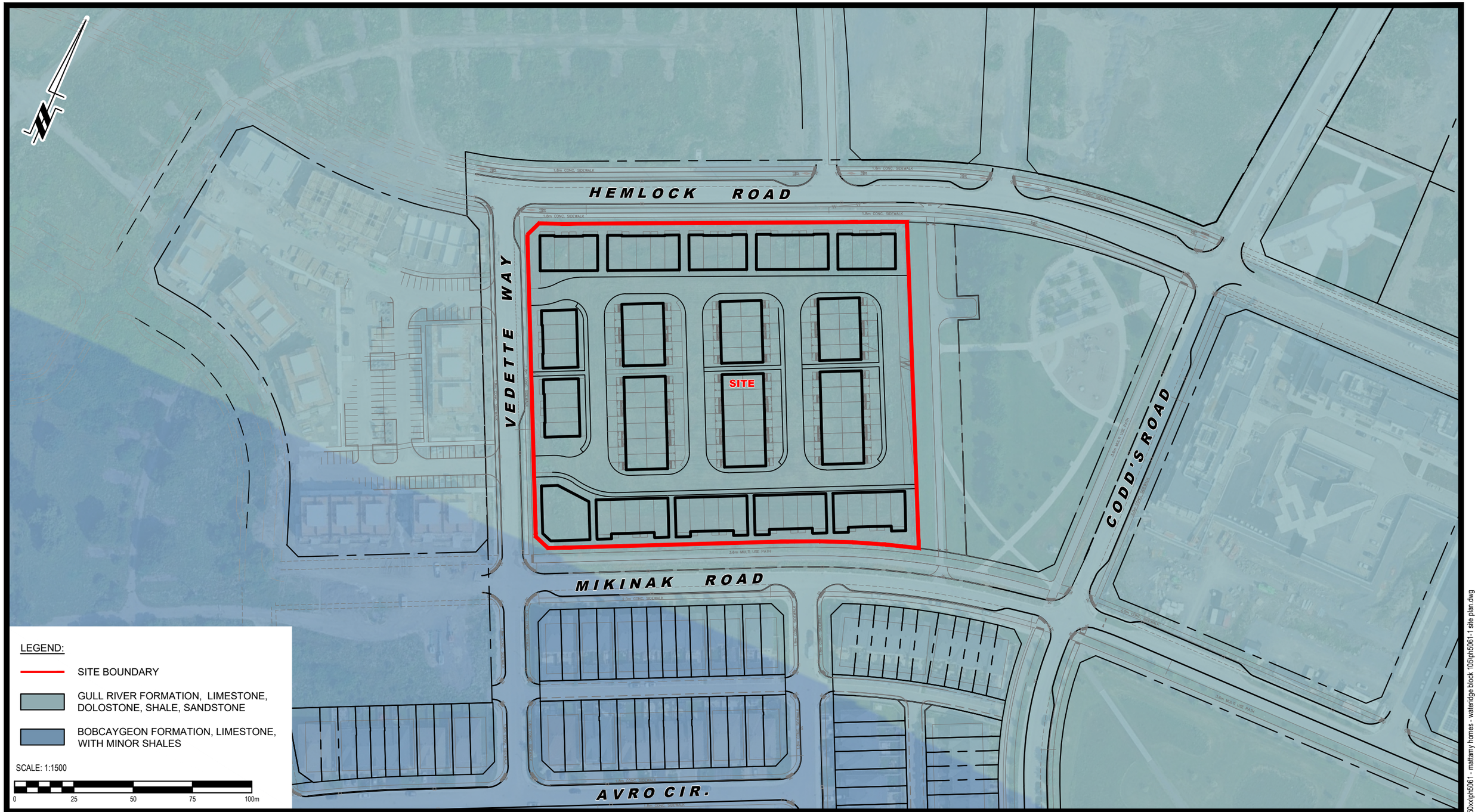

LEGEND:

- SITE BOUNDARY
- GULL RIVER FORMATION, LIMESTONE, DOLOSTONE, SHALE, SANDSTONE
- BOBCAYGEON FORMATION, LIMESTONE, WITH MINOR SHALES

SCALE: 1:1500

0 25 50 75 100m

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WATERIDGE BLOCK 105 - MIKINAK ROAD & VEDETTE WAY
OTTAWA, ONTARIO

Title:

BEDROCK GEOLOGY PLAN

Scale: 1:1500	Date: 04/2025
Drawn by: GK	Report No.: PH5061-1
Checked by: NZ	Dwg. No.: PH5061-2
Approved by: NZ	Revision No.:

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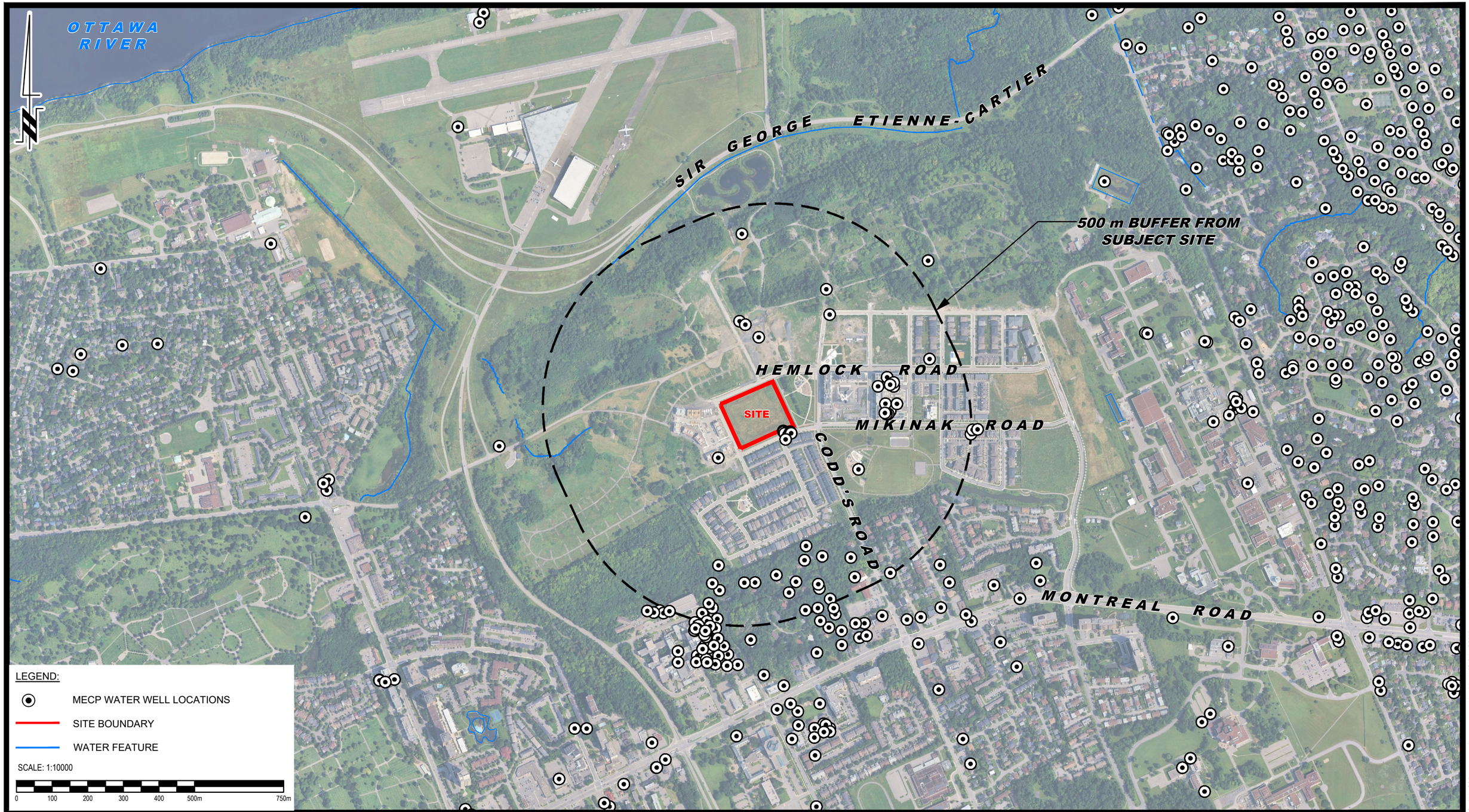

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NO.	REVISIONS	DD/MM/YYYY	INITIAL

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WATERIDGE BLOCK 105 - MIKINAK ROAD & VEDETTE WAY
OTTAWA, ONTARIO

Title:
MECP WATER WELL LOCATION PLAN

Scale: 1:10000	Date: 04/2025
Drawn by: GK	Report No.: PH5061-1
Checked by: NZ	Dwg. No.: PH5061-4
Approved by: NZ	Revision No.:

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APPENDIX 2

PG7353 - SOIL PROFILE AND TEST DATA SHEETS

PG7353-1 - TEST HOLE LOCATION PLAN

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Wateridge Block 15 - Mikinak Road & Vedette Way, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 372289.43 **NORTHING:** 5035042.12 **ELEVATION:** 86.69

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 10, 2025

FILE NO. : PG7353

HOLE NO. : BH 1-25

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH (kPa) / UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL 0.25m [86.44m]									
FILL: Brown silty clay, with topsoil, crushed stone and gravel			AU 1			23			
		1	SS 2	46	2-3-6-4 9	20			86
1.98m [84.71m]									
Very stiff, brown **SILTY CLAY**		2	SS 3	71	2-2-6-7 8	22			85
			SS 4	46	P	27		121	
		3	SS 5	96	P	39		121	84
			SS 6	92	P	50	△29	111	83
4.72m [81.97m]		4							
GLACIAL TILL: Very stiff, brown silty clay, with gravel and sand, occasional cobbles and boulders			SS 7	46	4-8-20-17 28	13			82
- Grey by 5.18 m depth		5							
			SS 8	46	8-8-12-8 20	55			81
6.22m [80.47m]		6							
Dynamic cone penetration test commenced at 6.22 m depth 6.27m [80.42m]			SS 9	63	50-/-/-/ 50/0.13	12		100	
End of Borehole		7							80
Practical refusal to DCPT at 6.27 m depth									
(Dry - March 21, 2025)		8							79

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Wateridge Block 15 - Mikinak Road & Vedette Way, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 372313.90 **NORTHING:** 5034952.10 **ELEVATION:** 86.42

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 10, 2025

FILE NO. : PG7353

HOLE NO. : BH 2-25

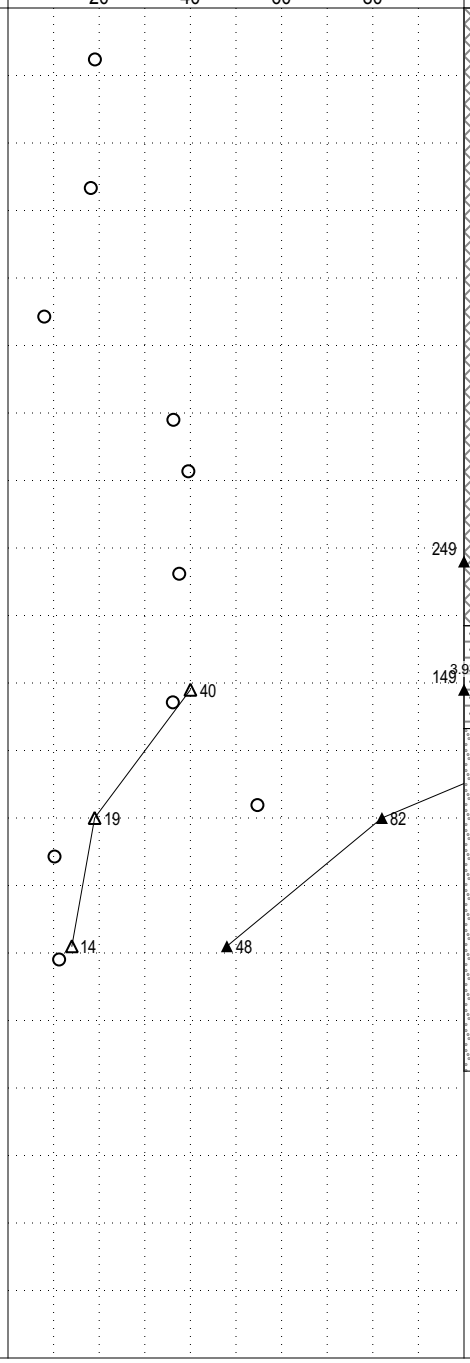
SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N OR RQD	WATER CONTENT (%)	ELEVATION (m)
GROUND SURFACE							86.42
TOPSOIL 0.18m [86.24m]		0	AU 1			19	
FILL: Brown silty clay, trace gravel, topsoil and sand		1	SS 2	29	2-3-2-3 5	18	
1.45m [84.97m]							85
FILL: Brown silty sand, some organics, trace gravel, some bricks		2	SS 3	83	7-12-11-12 23	8	
2.29m [84.13m]							
FILL: Brown silty clay, some sand and topsoil			SS 4	58	1-2-3-3 5	36 40	84
2.74m [83.68m]		3					
Hard to very stiff, brown **SILTY CLAY**			SS 5	96	P	38	83
		4	SS 6	96	P	36	82
4.88m [81.54m]			SS 7	83	P	55 10	
Firm, grey **SILTY CLAY**		5					81
5.94m [80.48m]						11	
GLACIAL TILL: Compact, grey silty sand, some gravel, trace clay, occasional cobbles and boulders		6	SS 8	25	7-14-12-10 26		80
6.71m [79.71m]							
End of Borehole		7					79
(GWL at 3.94 m depth - March 21, 2025)		8					

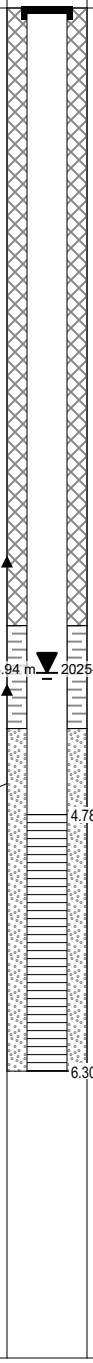
PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80

REMOULDED SHEAR STRENGTH (kPa)

UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80

PL (%) WATER CONTENT (%) LL (%) 20 40 60 80





SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Wateridge Block 15 - Mikinak Road & Vedette Way, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 372399.54 **NORTHING:** 5035001.50 **ELEVATION:** 87.36

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 10, 2025

FILE NO. : PG7353

HOLE NO. : BH 3-25

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80	REMOULDED SHEAR STRENGTH (kPa) / UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80	PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE											
TOPSOIL 0.20m [87.16m]											87
FILL: Brown silty clay, with sand, some topsoil, trace gravel		1	AU 1			26					
1.45m [85.91m]			SS 2	29	2-3-3-2 6	20					86
Hard to very stiff, brown **SILTY CLAY**		2	SS 3	71	2-6-8-9 14	37					
2.97m [84.39m]			SS 4	100	3-7-8-8 15	37					85
GLACIAL TILL: Compact to dense, brown silty sand, some gravel, occasional cobbles and boulders		3	SS 5	83	6-8-3-11 11	10					84
		4	SS 6	87	8-22-20-23 42	9					83
5.21m [82.15m]		5	SS 7		10-17-37-50 54	8					
End of Borehole											82
Practical refusal to augering at 5.21 m depth		6									
(Dry - March 21, 2025)		7									81
		8									80

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Wateridge Block 15 - Mikinak Road & Vedette Way, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 372379.42 **NORTHING:** 5035089.00 **ELEVATION:** 88.46

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 10, 2025

FILE NO. : PG7353

HOLE NO. : BH 4-25

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N OR RQD	WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH (kPa) / UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
TOPSOIL 0.20m [88.26m]									
FILL: Brown silty clay, some sand, trace gravel		1	AU 1			27			88
			SS 2	71	2-3-4-2 7	29 22			87
1.98m [86.48m]		2	SS 3	71	1-2-6-27 8	43 8			
GLACIAL TILL: Dense to compact, brown silty sand, trace clay, occasional cobbles and boulders			SS 4	83	13-19-13-12 32	10			86
3.81m [84.65m]		3	SS 5	67	11-11-14-17 25	10			85
End of Borehole		4							84
Practical refusal to augering at 3.81 m depth		5							83
(Dry - March 21, 2025)		6							82
		7							81
		8							

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

Wateridge Block 15 - Mikinak Road & Vedette Way, Ottawa, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 372335.12 **NORTHING:** 5035084.75 **ELEVATION:** 87.58

PROJECT: Proposed Residential Development

ADVANCED BY: CME-55 Low Clearance Drill

REMARKS:

DATE: March 10, 2025

FILE NO. : PG7353

HOLE NO. : BH 5-25

SAMPLE DESCRIPTION	STRATA PLOT	DEPTH (m)	SAMPLE TYPE AND NO.	SAMPLE RECOVERY (%)	SAMPLE N OR RQD	SAMPLE WATER CONTENT (%)	PEN. RESIST. (BLOWS/0.3m) DCPT (50mm DIA. CONE) 20 40 60 80 / REMOULDED SHEAR STRENGTH (kPa) / UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 / PL (%) WATER CONTENT (%) LL (%) 20 40 60 80	PIEZOMETER CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
Overburden		0							87
		1							86
		2							85
		3							84
		4						4.54 m — 2025-03-21	83
5.05m [82.53m]		5							
Inferred Glacial Till									82
5.38m [82.20m]		6							
End of Borehole									81
Practical refusal to augerings at 5.38 m depth		7							
(GWL at 4.54 m depth - March 21, 2025)		8							80

LOG OF BOREHOLE BH14-30

DST REF. No.: **OE-OT-015358**
CLIENT: **Canada Lands Company**
PROJECT: **Former CFB Rockcliffe**
LOCATION: **Ottawa, Ontario**
SURFACE ELEV.: **85.85 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
DIAMETER: **80 mm ID**
DATE: **February 24, 2014**
COORDINATES: **5033327.89** m N, **450239.28** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l) 20 40 60 80	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) ✖ 20 40 60 80; SPT (N) □ Blows/0.3m DCPT ◆ 20 40 60 80	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	85.85				TOPSOIL - with grass and roots	AS1				Water level at 3.13 mbgs
0.6	85.25				SAND - with clay, trace gravel and roots, compact	SS2		10		
1.0	85									
1.5	84.35				CLAY - Silty, grey, very stiff, medium plasticity	ST1				
2.0	84								>>✖	115 kPa
2.5	83.35					SS3		6		
3.0	83	▼							>>✖	115 kPa
3.8	82.05				SAND - some gravel, trace silt, occasional cobbles, compact to dense	SS4		12		11 84 (5)
4.0	82									
4.6	81.25					SS5		35		
5.0	81					SS6		18		
6.0	80					SS7		19		
7.0	79				- fractured rock, loose	SS8		6		14 84 (2)
7.5	78.35				End of Borehole at 7.5 m Auger Refusal					
8.0	78									
9.0	77									
10.0	76									
11.0	75									
12.0	74									
13.0	73									
14.0	72									
15.0	71									
16.0	70									
17.0	69									
18.0	68									
19.0	67									
	66									

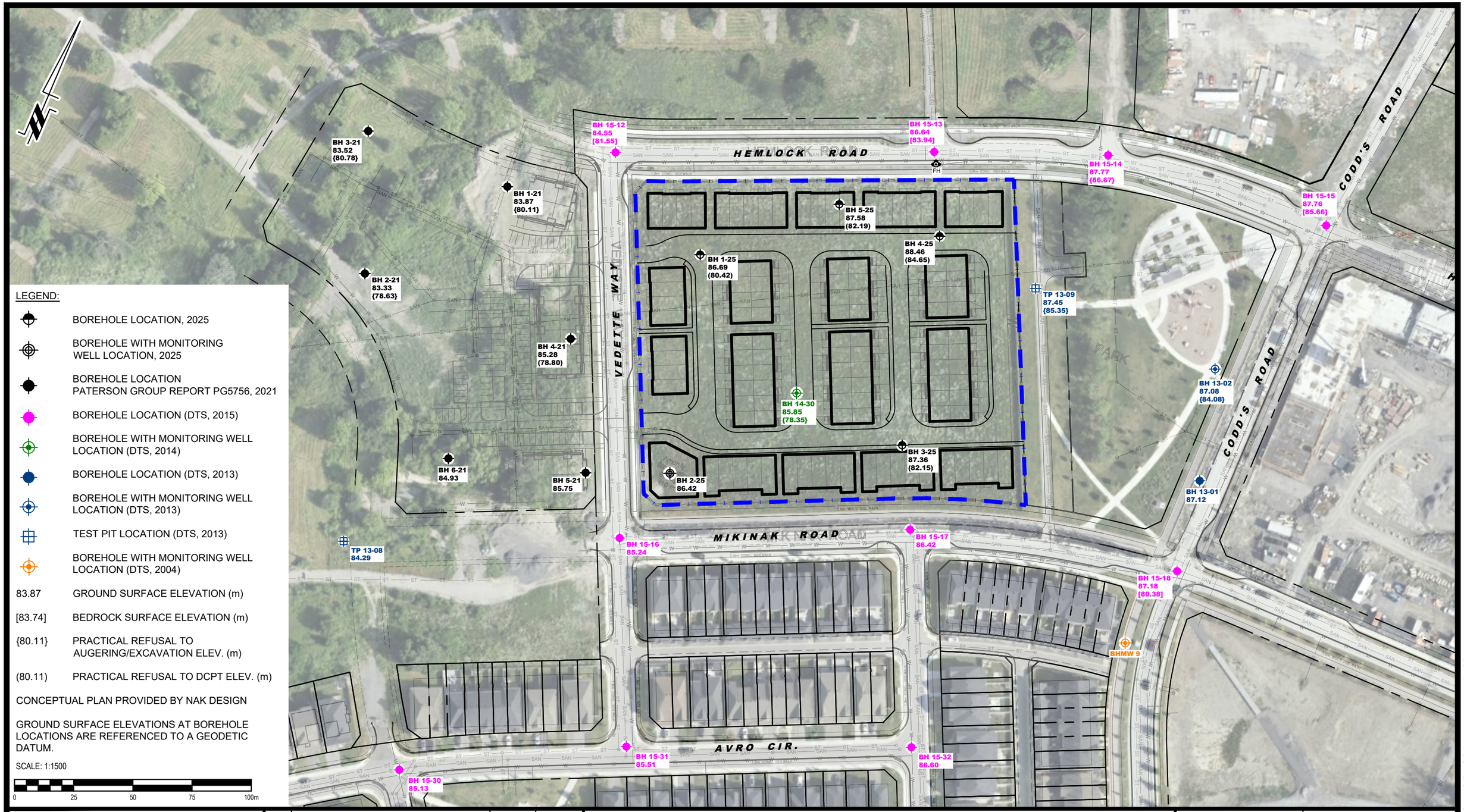
BOREHOLE (STANDARD) - OTTAWA GS-OT-015358 ROCKCLIFFE PHASE I.GPJ DST_MIN.GDT 4/11/14

DST consulting engineers
DST Consulting Engineers Inc.
203 - 2150 THURSTON DRIVE
OTTAWA, ONTARIO, K1G 5T9
PH: (613)748-1415
FX: (613)748-1356
Email: ottawa@dstgroup.com
Web: www.dstgroup.com

SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- 70mm Thin Wall Tube
- Bentonite
- Sand

ENCLOSURE 5



LEGEND:

- BOREHOLE LOCATION, 2025
- BOREHOLE WITH MONITORING WELL LOCATION, 2025
- BOREHOLE LOCATION PATERSON GROUP REPORT PG5756, 2021
- BOREHOLE LOCATION (DTS, 2015)
- BOREHOLE WITH MONITORING WELL LOCATION (DTS, 2014)
- BOREHOLE LOCATION (DTS, 2013)
- BOREHOLE WITH MONITORING WELL LOCATION (DTS, 2013)
- TEST PIT LOCATION (DTS, 2013)
- BOREHOLE WITH MONITORING WELL LOCATION (DTS, 2004)

83.87 GROUND SURFACE ELEVATION (m)

[83.74] BEDROCK SURFACE ELEVATION (m)

{80.11} PRACTICAL REFUSAL TO AUGERING/EXCAVATION ELEV. (m)

(80.11) PRACTICAL REFUSAL TO DCPT ELEV. (m)

CONCEPTUAL PLAN PROVIDED BY NAK DESIGN

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

SCALE: 1:1500

0 25 50 75 100m

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

NO.	REVISIONS	DD/MM/YYYY	INITIAL
1	2025 BOREHOLES ADDED TO PLAN UPDATED TO NEW CONCEPTUAL PLAN	25/03/2025	KP

MATTAMY HOMES
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
WATERIDGE BLOCK 15 - MIKINAK ROAD & VEDETTE WAY
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 11/2024
Drawn by: GK	Report No.: PG7353-1
Checked by: MA	Dwg. No.: PG7353-1
Approved by: KP	Revision No.: 1

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11x17

APPENDIX 3

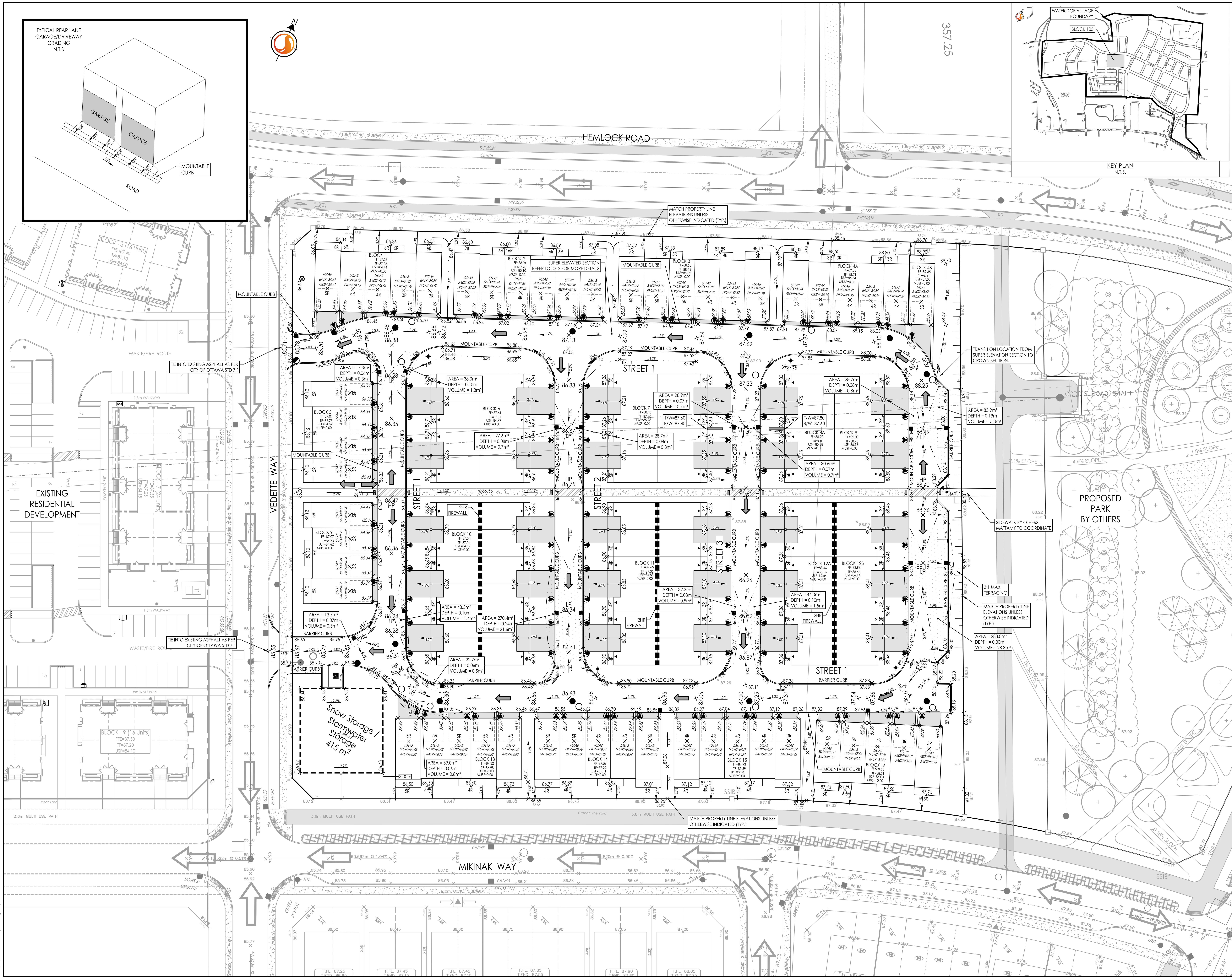
TABLE 2 – HORIZONTAL HYDRAULIC GRADIENT SUMMARY

Table 2 - Horizontal Hydraulic Gradient Summary						
Well 'A'		Well 'B'				
Well ID	GW Elevation (m asl)	Well ID	GW Elevation (m asl)	Distance (m)	Hydraulic Gradient (m/m)*	Date
BH2-25	82.3	BH3-25	82.5	100	-0.0020	2025-05-02
BH3-25	82.5	BH4-25	85.2	90	-0.0300	2025-05-02
BH4-25	85.2	BH5-25	83.4	45	0.0400	2025-05-02
BH5-25	83.4	BH2-25	82.3	135	0.0081	2025-05-02

*Hydraulic Gradient = (GW Elevation Well 'A' - GW Elevation Well 'B') / Distance

APPENDIX 4

STANTEC – GRADING AND SERVICING PLAN



Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

Symbol	Description
× 99.99	ORIGINAL GROUND ELEVATION
99.99 ×	PROPOSED ELEVATION
× 99.99 / 98.88	PROPOSED LOT CORNER ELEVATION EXISTING ELEVATION AT LOT CORNER
2.0% ←	FLOW DIRECTION AND GRADE
FFE=100.00	FINISHED FIRST FLOOR ELEVATION
USF=97.00	UNDERSIDE OF FOOTING ELEVATION
(E.F.)	ENGINEERED FILL REQUIRED
3:1	TERRACING 3:1 SLOPE MAXIMUM (UNLESS OTHERWISE SHOWN)
	DIRECTION OF OVERLAND FLOW
	DIRECTION OF EMERGENCY OVERLAND FLOW
	PROPOSED VALVE BOX
	PROPOSED VALVE CHAMBER
	PROPOSED FIRE HYDRANT
	PROPOSED SANITARY SEWER MANHOLE
	PROPOSED STORM SEWER MANHOLE
	PROPOSED CATCHBASIN MANHOLE
	PROPOSED CATCHBASIN
D.C.	PROPOSED DEPRESSED CURB LOCATION
	PROPOSED BARRIER CURB
	HEAVY DUTY ASPHALT.
	OVERLAND SPILL LOCATION
	TWSI LOCATION AS PER CITY STD
*	FFE TO EXTERIOR GRADE LESS THAN 1.4m
	EXISTING LOT SIDE OVERLAND FLOW ROUTE
	EXISTING ROADSIDE OVERLAND FLOW ROUTE
BARRIER CURB / MOUNTABLE CURB	PROPOSED MOUNTABLE/BARRIER CURB TRANSITIONS

Notes

1. GRADING INFORMATION ALONG PROPERTY LINES AND ADJACENT ROADS NETWORK RETRIEVED FROM IBI GROUP: WATERIDGE VILLAGE AT ROCKLIFFE PHASE 1A, DATED OCT 25, 2026

2. ACCESS LANES AND LOCAL ROADWAYS
   40mm HL3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE
   50mm HL8 OR SUPERPAVE 19.0 ASPHALTIC CONCRETE
   150mm OPSS GRANULAR A BASE
   400mm OPSS GRANULAR B TYPE I OR II

   CAR ONLY PARKING AREAS
   50mm HL3 OR SUPERPAVE 12.5 ASPHALTIC CONCRETE
   150 OPSS GRANULAR 'A' BASE
   300 OPSS GRANULAR 'B' TYPE I OR II

3. GRADING RELATIONSHIPS

   B2B TOWNS
   FFE - TFW = 0.34m
   FFE - USF = 2.82m

   REAR LANE TOWNS
   FFE - TFW = 0.34m
   FFE - USF = VARIES

Revision		By	Appd.	YY.MM.DD
1	ISSUED FOR CITY REVIEW	JP	PM	25.04.04

File Name: 160402127-DB	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	JP	PM	JP	25.03.24

Permit-Seal

Client/Project
MATTAMY HOMES

WATERIDGE VILLAGE
BLOCK 105
OTTAWA, ON, CANADA

Title
GRADING PLAN

Project No.	Scale
160402127	1:400

Drawing No.	Sheet	Revision
GP-1	4 of 10	1

PLAN # XXXXX

D07-XX-XX-XXXX

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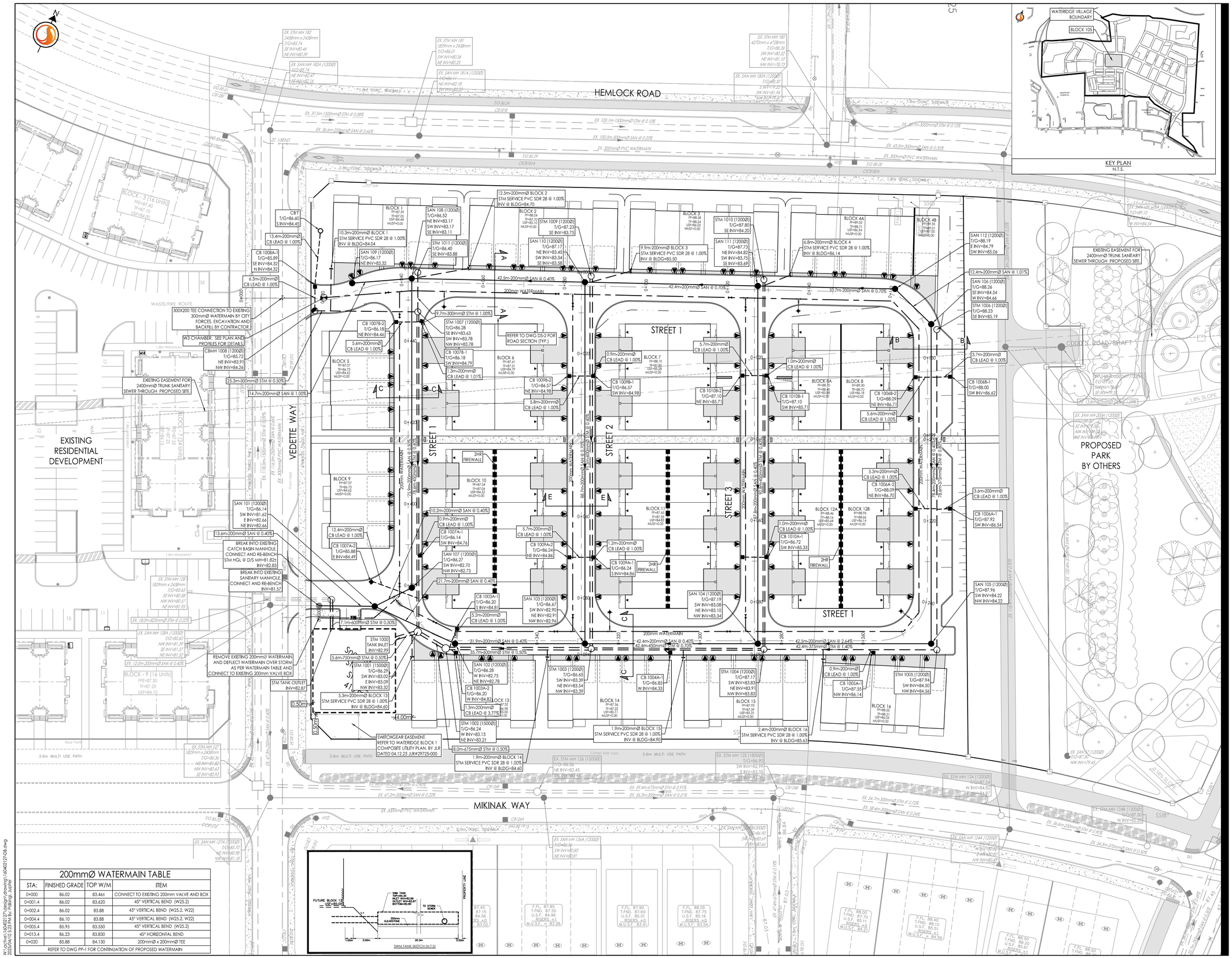
ORIGINAL SHEET - ARCH D



KEY PLAN
N.T.S.

200mmØ WATERMAIN TABLE			
STA:	FINISHED GRADE	TOP W/M	ITEM
0+000	86.02	83.46±	CONNECT TO EXISTING 200mm VALVE AND BOX
0+001.4	86.02	83.620	45° VERTICAL BEND (W25.2)
0+002.4	86.02	83.88	45° VERTICAL BEND (W25.2, W22)
0+004.4	86.10	83.88	45° VERTICAL BEND (W25.2, W22)
0+005.4	85.95	83.550	45° VERTICAL BEND (W25.2)
0+013.4	86.23	83.830	45° HORIZONTAL BEND
0+020	85.88	84.130	200mmØ x 200mmØ TEE
REFER TO DWG PP-1 FOR CONTINUATION OF PROPOSED WATERMAIN			

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- PROPOSED WATERMAIN
- PROPOSED VALVE AND VALVE BOX
- PROPOSED VALVE CHAMBER
- PROPOSED REDUCER
- PROPOSED FIRE HYDRANT
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER AND ETOBICOKE SYSTEM
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- EXISTING WATERMAIN
- EXISTING VALVE AND VALVE BOX
- EXISTING VALVE CHAMBER
- EXISTING REDUCER
- EXISTING FIRE HYDRANT
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING CATCHBASIN MANHOLE
- EXISTING CATCHBASIN
- PROPOSED DEPRESSED CURB LOCATIONS
- PROPOSED BARRIER CURB
- THERMAL INSULATION ON STORM SEWER WHERE COVER IS LESS THAN 1.5m. THERMAL INSULATION ON WATERMAIN WHERE COVER IS LESS THAN 2.4m AS PER W22.
- PROPOSED 2Hr RATED FIRE WALL LOCATION

PROPOSED HOUSE SERVICES
- 200mm STORM SERVICE PVC SDR 28 @ 1% MIN
- 150mm SANITARY SERVICE PVC SDR 28 @ 1% MIN
- 19mm PEX TUBING WATER SERVICE C/W CURB STOP AND SERVICE POST
- SCUPPER LOCATIONS

Notes

1. SERVICING INFORMATION WITHIN PROPERTY LIMITS AND ADJACENT ROADS NETWORK RETRIEVED FROM IBI GROUP: WATERIDGE VILLAGE AT ROCKLIFFE PHASE 1A, DATED OCT 25, 2026

1	ISSUED FOR CITY REVIEW	JP	PM	25.04.04
Revision		By	Appd.	YY.MM.DD

File Name: 160402127-D8	JP	PM	JP	25.03.24
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
MATTAMY HOMES

WATERIDGE VILLAGE
BLOCK 105
OTTAWA, ON, CANADA

Title
SITE SERVICING PLAN

Project No.	Scale	Revision
160402127	1:400 (0 4 12 20m)	
Drawing No.	Sheet	
SSP-1	3 of 10	1

PLAN # XXXXX

D07-XX-XX-XXXX

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ORIGINAL SHEET - ARCH D