Robinson
Land Development

Servicing & Stormwater Management Report

Proposed Site Plan
391 Hilversum Lane
Carp, ON

Prepared For:

Inverness Homes

Prepared By:

Robinson Land Development

Project No. 25094
Version 3.0
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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLE OF CONTENTS CONTINUED

LIST OF APPENDICES

TABLE OF CONTENTS CONTINUED

LEGAL NOTIFICATION

This report was prepared by Robinson Land Development for the account of **Inverness Homes.**

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1.0 INTRODUCTION

Robinson Land Development have been retained by Inverness Homes to prepare detailed servicing and stormwater management designs in support of a proposed residential site plan development located at 391 Hilversum Lane in the Village of Carp (refer to **Figure 1.0 – Key Plan** following page 1).

This report will detail the proposed means of servicing the site and will provide details on how the stormwater management requirements will be achieved in accordance with overarching reports and current City of Ottawa guidelines.

2.0 GUIDELINES, STUDIES AND REPORTS

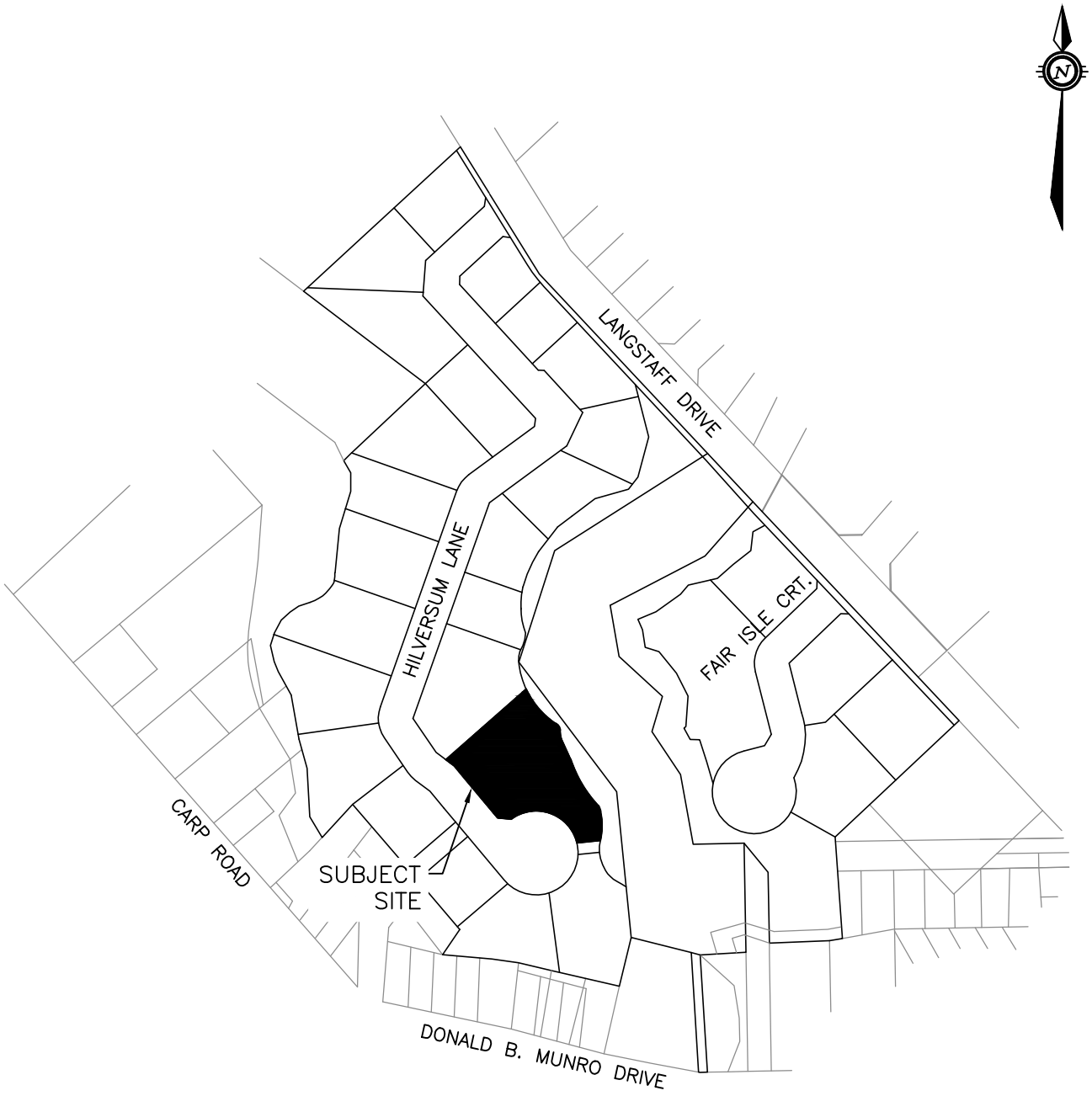
The servicing and stormwater management designs for the subject site have been prepared in keeping with the following documents:

- **Sewer Design Guidelines**, City of Ottawa, December 2025 (herein referred to as OSDG).
- **Water Distribution Design Guidelines**, City of Ottawa, December 2025 (herein referred to as OWDG).
- **Design Guidelines for Sewage Works**, Ministry of the Environment, 2008 (herein referred to as MECP Design Guidelines).
- **Design Guidelines for Drinking-Water Systems**, Ministry of the Environment, 2008 (herein referred to as MECP Water Design Guidelines).
- **Stormwater Planning and Design Manual,** Ministry of the Environment, March 2003 (herein referred to as MECP SWM Design Guidelines).
- **Water Supply for Public Fire Protection**, Fire Underwriters Survey, 2020 (herein referred to as FUS Guidelines).
- **Ontario Building Code Compendium**, Ministry of Municipal Affairs and Housing Building Development Branch, June 27, 2025 (herein referred to as OBC).
- **147 Langstaff Drive, Village of Carp, ON, Proposed Residential Development, Servicing and Stormwater Management Report**, Robinson Land Development, May 2024 (herein referred to as the Robinson Report).
- **Geotechnical Investigation, Proposed Residential Development – Phase 1 Apartment Building (Block 27), 391 Hilversum Lane, Ottawa, Ontario,** Paterson Group, Report PG4918-2, February 11, 2026 (herein referred to as the Paterson Report)

A pre-consultation meeting was held with the City of Ottawa on April 30, 2025 to discuss requirements for the proposed development. Refer to pre-consultation notes provided under **Appendix A** for more details.

3.0 EXISTING CONDITIONS

The subject site is contained within a 0.31-hectare block which is zoned Village Residential Third Density Zone (V3I[932r]-h). The site is located within Phase 1 of the Huntley Hollow



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scale N.T.S.	391 HILVSERUM LANE, CARP	project no. 25094
date 13/11/25		
drawn by BLM	KEY PLAN	FIG 1.0

Subdivision, formerly known as 147 Langstaff Drive. The current Plan of Subdivision has identified the subject site as Block 12, however, the block was formerly known as Block 27 at time of the subdivision approval and is referenced as such in the overarching Robinson Report). The block is bound by Hilversum Lane to the west, a future park block to the north, and open space (i.e. ravine and watercourse) to the east. Refer to the superseded and current Plan of Subdivisions, prepared by Fairhall Moffatt & Woodland Limited, under **Appendix A** for more details. Phase 1 of the Huntley Hollow Subdivision is currently under construction. Municipal infrastructure has been installed within the Hilversum Lane right-of-way. Refer to **Figure 2.0** below for an aerial view of the site (defined by "red" boundary) under its pre-development state.

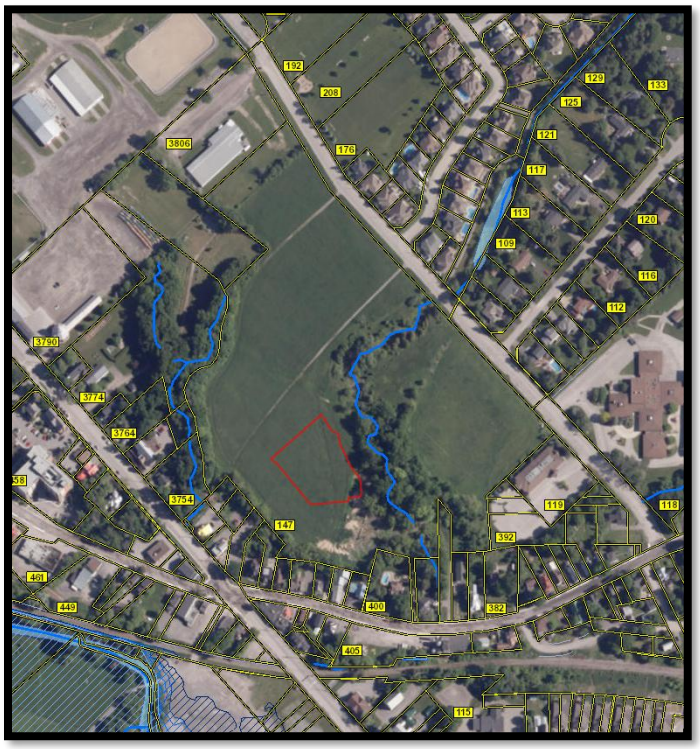


Figure 2.0: Existing Conditions

4.0 DEVELOPMENT PROPOSAL

The Owner is proposing to construct a 3-storey 39-unit residential apartment building with a footprint of approximately 1257 square metres. The site plan will also include an underground parking garage and a slab-on-grade club house building. Refer to the site plan, prepared by Peter Mansfield Architect, under **Appendix B** for more details.

The site is constrained by a limit of hazard lands and a 15.0m top of slope setback established through geotechnical investigations completed for the adjacent ravine and watercourse. The site is also constrained by a Blanding's turtle habitat setback established through on-site environmental investigations. The setbacks associated with the subject site are shown on the civil plans provided under **Appendix B**.

The subject site will be provided with new water, sanitary and storm infrastructure via connections to the existing municipal systems as detailed in the sections below.

5.0 WATER SERVICING

5.1 Existing System

Existing municipal watermains are available in proximity to the subject site as follows:

- A 203mm diameter PVC watermain within the Hilversum Lane right-of-way.

In addition, a 203mm diameter watermain stub was installed off the 203mm diameter municipal watermain to service the subject site as part of the construction works for Phase 1 of the Huntley Hollow Subdivision. The municipal watermain distribution system is looped between Langstaff Drive and Carp Road via Hilversum Lane, Block 14 (i.e. pathway block), and the unopened John Street road allowance. Refer to the General Plan of Services, prepared by Robinson Land Development for the Huntley Hollow Subdivision under **Appendix A**.

There are known capacity constraints with the Village water treatment and pumping station on Salisbury Street. There is a significant level of service (low pressure) risk in the existing system during Max. Day and Peak Hour demand scenarios. The station requires short-term upgrades to mitigate the known capacity constraints. The City has indicated that the detailed design for the short-term upgrades is anticipated to be completed in Q4 2026 with construction being completed in Q4 2028. Refer to the Carp Short Term Upgrades presentation prepared by the City's Water Resources Planning and Engineering Branch under **Appendix A** for more details.

Through recent communications with City staff, the Infrastructure and Planning group have advised that sufficient capacity is available for the subject site. Refer to correspondence with the City under **Appendix A**.

5.2 Proposed System

The proposed apartment building will be serviced for domestic water supply and fire protection via an extension of the 203mm diameter watermain stub. The proposed club house will be serviced for domestic water supply via a 19mm diameter water service fed from the apartment building's mechanical room. The proposed watermain network is shown on the Servicing Plan (DWG. 25094-S1) provided under **Appendix B**.

5.3 Design Criteria

The design of the municipal watermain distribution system for the Huntley Hollow Subdivision is detailed in the overarching Robinson Report. In keeping with Robinson Report and current Ottawa Water Design Guidelines (OWDG), the following design criteria will be utilized for the design of the subject site (i.e. Block 12, formerly Block 27):

• Basic Day (BSDY) Demand	280 L/person/day	(OWDG; ISTB-2021-03)
• Maximum Day (MXDY) Demand	BSDY x 2.9	(MECP; Table 3-3)
• Peak Hour (PKHR) Demand	MXDY x 4.3	(MECP; Table 3-3)
• Apartment Population Densities		(OWDG; Table 4.1)
• Bachelor	1.4 persons/unit	
• 1-Bedroom	1.4 persons/unit	
• 2-Bedroom	2.1 persons/unit	
• Club House		
• Water Closet	150 L/fixture/hour of use	(Appendix 4-A)
• Wash Basin	375 L/fixture/day	(Appendix 4-A)
• Roughness Coefficient		(OWDG; Table 4.4)
• 19mm diameter pipe	100	

• 200mm diameter pipe	110	
• Minimum Pressure	40 psi	(OWDG; S4.2.2)
• Maximum Pressure	80 psi	(OWDG; S4.2.2)
• Available Fire Flow	6,750 L/min	

The City of Ottawa has indicated that the available fire flow in the municipal watermain distribution system is only 6,750 L/min (112.5 L/s) which corresponds to the capacity of a single high lift pump at the Carp Drinking Water Facility. Refer to excerpts from the Robinson Report under **Appendix C**.

5.4 Water Demands

Domestic water demands have been calculated for the subject site in accordance with the OWDG and in keeping with the overarching Robinson Report. Demands for the proposed club house have been calculated based on water use estimates for miscellaneous fixtures as per *Appendix 4-A* of the OSDG. Peaking factors for maximum day and peak hour demands are in keeping with the peaking factors established in the overarching Robinson Report (which accounted for the subject site). The calculated water demands have been summarized in the table below:

Table 5.1: Domestic Water Demands

Dwelling	Basic Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Apartments	0.22	0.62	0.93
Club House	0.016	0.045	0.067
Total	**0.23**	**0.67**	**0.99**

Notes:
1. BSDY = 280 L/person/day
2. MXDY = BSDY x 2.9
3. PKHR = BSDY x 4.3

Refer to the water demand calculations provided under **Appendix C** for more details.

5.5 Fire Flow

The total required fire flow for the subject site has been calculated in accordance with the current OWDG *Appendix J* (formerly IWSTB-2024-05). Since the apartment building is significantly larger than the club house, the required fire flow for the apartment building will be greater and will govern for the site design. The required fire flow shall first be calculated based on OBC *Appendix A-3.2.5.7* as follows:

• Water Supply Coefficient (K)	OBC Table 1
• Total Building Volume (V)	A x H
• Total of Spatial Coefficient (S_{TOT})	OBC Figure 1
• Minimum Supply of Water (Q)	K x V x S_{TOT}
• Type of Construction	Combustible (with fire resistance ratings)
• Group Classification	Group C
• Building Area (A)	1257 m^2
• Building Height (H)	9.1 m

The water supply coefficient (K) is derived from OBC Table 1. Through correspondence with the Architect, is has been confirmed that the proposed building will be classified as Group C,

non-combustible with fire resistance ratings in accordance with *Subsection 3.2.2* of the OBC, which returns a K value of 10.

The total building volume has been calculated to be 11,438.70 m^3 based on dimensions provided by the Architect.

The total of spatial coefficient (S_{TOT}) is interpolated from OBC *Figure 1* based on exposure distances measured from the proposed building. Where a building has exposures on more than one side, the percentage increase in the fire protection water supply should be totaled to reflect all exposure protection requirements. Note that the total of spatial coefficient need not exceed a value of 2.0. The spatial coefficients for each side of the building are summarized below:

$S_{side\ 1}$ = 0.50 (exposure distance of 4.5m measured to the north property line)
$S_{side\ 2}$ = 0.00 (exposure distance of 15.1m measured to centreline of Hilversum Lane)
$S_{side\ 3}$ = 0.40 (exposure distance of 6.1m measured to the east property line)
$S_{side\ 4}$ = 0.50 (exposure distance of 4.25m measured to midpoint of club house)
S_{TOT} = 1.0 + (0.50 + 0.40 + 0.50) = 2.4

S_{TOT} = 2.0

Minimum Supply of Water (Q) = K x V x S_{TOT}

Q = (10) x (11,438.70 m^2) x (2.0) = 228,774 L

The required minimum water supply flow rate can be derived from OBC *Table 2*. For a minimum supply of water of 228,774 L, the required minimum water supply flow rate is 6,300 L/min. In accordance with the OWDG *Appendix J*, since the site has a pressurized hydrant available and the required minimum water supply flow rate is less than 9,000 L/min, further calculations using FUS or NFPA guidelines are not warranted.

The City of Ottawa has indicated that the available fire flow in the municipal watermain distribution system is only 6,750 L/min (112.5 L/s) which corresponds to the capacity of a single high lift pump at the Carp Drinking Water Facility. Since the required fire flow of 6,300 L/min is less than the available fire flow of 6,750 L/min it has been demonstrated that there is sufficient fire flow available for the proposed development. Refer to **Section 5.8** for further discussion on hydrant coverage.

5.6 Hydraulic Model

A water distribution hydraulic model has been created for the subject site using EPANET2 software. The hydraulic model has incorporated the proposed watermain layout, proposed hydrant locations, boundary conditions (provided by the City of Ottawa), and appropriate roughness coefficients. To provide a cohesive model between the provided boundary condition on Hilversum Lane and the club house, a dummy watermain alignment has been assigned for the segment of the system located internal to the building. Refer to **Figure 3.0: Hydraulic Water Model** and the boundary conditions provided by the City under **Appendix C** for more details.

5.7 Hydraulic Model Outputs

The developed hydraulic model was used to assess the anticipated pressures within the proposed system under the peak hour and maximum day scenarios. The model outputs at the building junctions are summarized in the table below:

Table 5.2: System Pressures at Building Junctions

Building	Model Junction	Peak Hour (psi)	Max. Day (psi)
Apartment[*2]	J7	70.43	84.29
Club House[*3]	J11	72.20	86.20

Notes:
1. Outputs modelled using EPANET2 software.
2. Pressures have been assessed at model junction J7 which has an assigned elevation equal to the building ground floor elevation (105.10m).
3. Pressures have been assessed at model junction J11 which has an assigned elevation equal to the building ground floor elevation (103.66m).

As shown in the table above, the minimum pressures modelled (peak hour scenario) at the building junctions exceed the minimum operating pressure of 40 psi and therefore are in accordance with the current OWDG. The maximum pressures modelled (max. day scenario) at the building junctions exceed the maximum pressure of 80 psi and therefore pressure reducing valves (PRVs) will be required. Refer to the complete hydraulic model outputs (**Table C1** & **C2**) for the peak hour and maximum day scenarios and the pipe report (**Table C3**) under **Appendix C** for more details.

5.8 Hydrant Coverage

In accordance with the current OWDG *Appendix H* (formerly Technical Bulletin ISTB-2018-02), the aggregate fire flow capacity of all contributing fire hydrants within 150 m of a building shall not be less than the required fire flow. The contribution to the required fire flow is dependent on the distance from the hydrant to building being considered. A flow of 5,700 L/min should be assigned to all hydrants with a distance of less than or equal to 75 m from the building being considered and 3,800 L/min to all hydrants with a distance between 75 m and 150 m from the building being considered (as per *Table 1* from *Appendix H* for AA rated hydrants). Coverage for the apartment building and club house will be provided by the proposed private hydrant and by the existing hydrant on Hilversum Lane. Since the apartment building will be sprinklered, a hydrant must also be located within 45 m of the building's siamese connection in accordance with the OBC. The contributing fire flows have been summarized in the table below based on a maximum available fire flow of 6,750 L/min within the existing watermain distribution system:

Table 5.3: Hydrant Coverage

Building	Distance Proposed Hydrant (m)	Hydrant Contrib. (L/min)	Distance Existing Hydrant (m)	Hydrant Contrib. (L/min)	Total Fire Flow Contrib.[*1] (L/min)
Apartment	19	5,700	54	1,050	6,750
Club House	39	5,700	46	1,050	6,750

Notes:
1. Total fire flow contribution cannot exceed the maximum available fire flow within the existing watermain distribution system.

As shown in the table above, the contributing fire flows from the proposed private hydrant in combination with the existing hydrant, exceeds the total required fire flow (refer to **Section**

5.5) and therefore adequate fire protection coverage has been demonstrated. Refer to **Figure 4.0: Hydrant Coverage Plan** provided under **Appendix C**.

6.0 SANITARY SERVICING

6.1 Existing System

Existing municipal sanitary sewers are available in proximity to the subject site as follows:

- A 200mm diameter PVC sanitary sewer within the Hilversum Lane right-of-way.

In addition, a 200mm diameter sanitary sewer stub was installed to the east of the existing sanitary maintenance hole (denoted as MH 110) to service the subject site. The existing municipal sanitary sewer system conveys wastewater in a southwest direction, through Block 14 (i.e. pathway block) and the unopened John Street road allowance before discharging to the existing system on Carp Road and ultimately to the wastewater pumping station on Salisbury Street. Refer to the General Plan of Services, prepared by Robinson Land Development for the Huntley Hollow Subdivision under **Appendix A**.

There are known capacity constraints with the Village wastewater pumping station (WWPS) on Salisbury Street. There is a significant flood risk at the station itself and for existing basements in the low-lying area of the Village. The WWPS requires short-term upgrades to increase the maximum flow rate to 75 L/s and the incorporation of a proper system overflow (i.e. to an adjacent storm sewer system) to mitigate the known capacity constraints. The City has indicated that the detailed design for the short-term upgrades is anticipated to be completed in Q4 2026 with construction being completed in Q4 2028. Refer to the Carp Short Term Upgrades presentation prepared by the City's Water Resources Planning and Engineering Branch under **Appendix A**.

6.2 Existing System Allocation

The design of the municipal sanitary sewer system for Phase 1 of the Huntley Hollow Subdivision is detailed in the overarching Robinson Report (refer to excerpts provided under **Appendix D**). The sanitary sewer system design allocated capacity for the subject site (i.e. Block 12, formerly Block 27) based on the following:

- Apartment Units 32
- Population 67.2 people (2.1 persons/unit)
- Site Area 0.30 ha
- Extraneous Flow 0.10 L/s
- Peak Design Flow 0.89 L/s

A peak sanitary design flow of 0.89 L/s was allocated for the subject site within the municipal sanitary sewer system on Hilversum Lane (downstream of MH 110). Refer to the *sanitary sewer design sheet* and *Sanitary Drainage Area Plan (DWG. 19008-SAN1)* prepared by Robinson Land Development for the Huntley Hollow Subdivision under **Appendix D** for more details.

Through recent communications with City staff, the Infrastructure and Planning group have advised that sufficient capacity is available for the subject site. Refer to correspondence with the City under **Appendix A**.

6.3 Proposed System

The proposed apartment building will be serviced via an extension of the 200mm diameter sanitary sewer stub installed as part of the Phase 1 construction for the Huntley Hollow Subdivision. The proposed club house will be serviced via a 135mm diameter sanitary service. The 135mm diameter club house service will be directed to the apartment building mechanical room and will ultimately be discharged via the 200mm diameter sanitary sewer outlet for the site. The proposed sanitary sewer/service have been designed with adequate capacity to convey the peak sanitary design flow and to meet the allowable full flow velocities for self-cleansing in accordance with the current OSDG. The proposed sanitary sewer network is shown on the Servicing Plan (DWG. 25094-S1) provided under **Appendix B**.

6.4 Design Criteria

The proposed sanitary sewer system for the subject site has been designed in accordance with the current OSDG and in keeping with the overarching Robinson Report using the following design criteria:

- Residential Flow — 280 L/person/day — (ISTB-2018-01)
- Residential Peaking Factor — Harmon Formula
- Harmon Correction Factor — 0.80 — (ISTB-2018-01)
- Extraneous Flow — 0.33 L/s/ha — (ISTB-2018-01)
- Minimum Full Flow Velocity — 0.60 m/s — (OSDG S6.1.2.2)
- Maximum Full Flow Velocity — 3.0 m/s — (OSDG S6.1.2.2)
- Manning's 'n' Value — 0.013 — (OSDG S6.1.8.2)
- Apartment Population Densities — (OSDG; Table 4.1)
  - Bachelor — 1.4 persons/unit
  - 1-Bedroom — 1.4 persons/unit
  - 2-Bedroom — 2.1 persons/unit
- Water Closets — 550 L/fixture/day — (Appendix 4-A)
- Wash Basins — 350 L/fixture/day — (Appendix 4-A)
- Club House Peaking Factor — 3.68

Peak sanitary design flows generated from the proposed club house have been estimated using fixture daily flow values from *Appendix 4-A* of the OSDG (provided under **Appendix D** for reference). The peaking factor for the club house has been interpolated using the Harmon Formula for an assumed population of 30 people.

6.5 Sanitary Design Flows

Using the design criteria above, the peak sanitary design flow for the subject site has been calculated and summarized in the table below.

Table 6.1: Peak Sanitary Design Flows

Design	Pop.	Peak Residential Flow (L/s)	Peak Club House Flow (L/s)	Extraneous Flow (L/s)	Peak Design Flow (L/s)
Robinson Report[*1]	67.2	0.79	-	0.10	0.89
Current	66.5	0.78	0.08	0.10	0.96

Notes:
1. Approved Robinson Report (May 2024) for Huntley Hollow Subdivision.

As shown in the table above, the calculated population is marginally below the population value assumed in the Robinson Report. With the addition of the club house, the calculated peak design flow of 0.96 L/s is greater than the allocated value in the Robinson Report (7.9% increase). As demonstrated in the Huntley Hollow sanitary sewer design sheet, the sewers downstream of the site outlet have adequate capacity to accommodate a 0.07 L/s increase in peak flows. For reference, a flow rate of 0.07 L/s represents approximately 0.37% of the total pipe capacity of a 200mm diameter sewer installed at minimum slope (0.33%). Refer to the sanitary sewer design sheet provided under **Appendix D** for more details.

7.0 STORM SERVICING

7.1 Existing System

Existing municipal storm sewers are available in proximity to the subject site as follows:

- A 525mm-750mm diameter conc. storm sewers within the Hilversum Lane right-of-way.

In addition, a 375mm diameter storm sewer stub was installed to the east of the existing storm maintenance hole (denoted as MH 210) to service the subject site. The existing municipal storm sewer system conveys stormwater in an easterly direction before discharging to the existing ravine and watercourse bisecting the Huntley Hollow Subdivision. The ravine has existing inline control structures which provide stormwater detention for the Huntley Hollow Subdivision and upstream drainage areas as detailed in the overarching Robinson Report. Refer to the General Plan of Services, prepared by Robinson Land Development for the Huntley Hollow Subdivision under **Appendix A**.

7.2 Existing System Allocation

The design of the municipal storm sewer (minor) system for Phase 1 of the Huntley Hollow Subdivision is detailed in the overarching Robinson Report. The storm sewer system design allocated capacity for the subject site (i.e. Block 12, formerly Block 27) based on the following:

- Site Area 0.31 ha
- Weighted Runoff Coefficient 0.69
- Time of Concentration 10 minutes
- 2-Year Peak Design Flow 46.26 L/s

An unrestricted 2-year peak design flow of 46.26 L/s was allocated for the subject site within the municipal storm sewer (minor) system on Hilversum Lane (downstream of MH 210). Refer to the *storm sewer design sheet* and *Storm Drainage Area Plan (DWG. 19008-STM1)* prepared by Robinson Land Development for the Huntley Hollow Subdivision under **Appendix E** for more details.

7.3 Proposed System

The subject site will be serviced for stormwater via a connection to the 375mm diameter storm sewer stub installed as part of the Phase 1 construction for the Huntley Hollow Subdivision. The proposed 250mm diameter storm service to the apartment building will provide an outlet for the foundation drainage system and for the roof drainage system. As noted in the Geotechnical Investigation, a perimeter foundation drainage system is recommended for the proposed apartment building. The system should consist of a 100mm diameter, geotextile-wrapped, perforated pipe surrounded on all sides by 150mm of 19mm clear stone. The perforated pipe should be placed at the footing level around the exterior perimeter of the

structure with a positive outlet, such as a gravity connection to the storm sewer. For the underground parking garage level, sub-slab drainage will also be required to control water infiltration. For preliminary design purposes, it is recommended that 100mm diameter perforated pipes be placed at approximate 6.0m centres underlying the slab, with a positive outlet, such as a gravity connection to the storm sewer. The spacing of the sub-slab drainage system should be confirmed at the time of building excavation when water infiltration can be better assessed. It should be noted that sub-slab drainage is not required for the proposed clubhouse, as it will not have below-grade space. The mechanical design will need to incorporate a backflow prevention device to protect the foundation drainage and sub-slab systems against surcharging in the minor system. The roof system will need to outlet downstream of the backflow prevention device on the foundation drainage and sub-slab systems.

Stormwater runoff from the underground parking garage ramp will be captured by a trench drain and/or internal floor drain system (to be designed by the Mechanical Consultant) and conveyed via the internal building plumbing to the building's storm service.

The proposed club house will be slab-on-grade construction with a pitched roof and will therefore not require a storm service.

Stormwater runoff from the majority of the site frontage will be captured by surface inlets and conveyed to the on-site minor system. The proposed storm sewer network is shown on the Servicing Plan (DWG. 25094-S1) provided under **Appendix B**

7.4 Design Criteria

The proposed storm sewer (minor) system for the subject site has been designed in accordance with the current OSDG and in keeping with the overarching Robinson Report using the following design criteria:

• Peak Flow (Q)	2.78CiA (Rational Method)	
• Rainfall Intensity (i)	City of Ottawa IDF Curve Equations	
• Runoff Coefficient (C)		
▪ Pervious Areas	0.20	
▪ Impervious Areas	0.90	
▪ 100-Year C	C + 25% (Max. 1.0)	
• Inlet Time	10 minutes	(OSDG S5.1.4)
• Minimum Full Flow Velocity	0.80 m/s	(OSDG S6.1.2.1)
• Maximum Full Flow Velocity	3.0 m/s	(OSDG S6.1.2.1)
• Minimum Sewer Diameter	250 mm	(OSDG S6.1.1.2)
• Minimum Catch Basin Lead	200 mm	(OSDG S5.6.7)
• Manning's 'n' Value	0.013	(OSDG S6.1.8.1)
• Design Level of Service	2-Year Event	(PIEDTB-2016-01)

7.5 Minor System Peak Design Flow

Using the design criteria above, the unrestricted 2-year peak design flow to the minor system has been calculated and summarized in the table below.

Table 7.1: 2-Year Unrestricted Peak Minor System Flow

Design	Area (ha)	Runoff Coeff.	2-Year Peak Minor System Flow (L/s)
Robinson Report*[1]	0.31	0.69	46.26
Current	0.16	0.74	25.06

Notes:
1. Approved Robinson Report (May 2024) for Huntley Hollow Subdivision.

As shown in the table above, the unrestricted 2-year peak flow to the on-site minor system has been reduced from the peak flow rate allocated for in the overarching Robinson Report. At the time of the subdivision design, the entire area of Block 27 was conservatively assumed to discharge to the minor storm sewer system via the provided storm sewer stub. Due to the topography of the property, a portion of the site will be uncontrolled, bypassing the on-site minor storm system. The reduced peak flow to the minor system can be attributed to the reduction in the tributary drainage area. Since the 2-year minor system flow has been reduced from the allocated rate, the existing storm sewers downstream of the site outlet will have adequate capacity to convey the peak flows from the subject site.

The proposed storm sewers have been designed with adequate capacity to convey the unrestricted 2-year peak design flow and to meet the allowable full flow velocities for self-cleansing in accordance with the current OSDG. The proposed storm sewers also have adequate capacity to convey the restricted 100-year peak flow without surcharging of the system. Refer to the runoff coefficient calculations, storm sewer design sheet and Storm Drainage Area Plan (DWG. 25094-STM1) provided under **Appendix E** for more details.

8.0 STORMWATER MANAGEMENT

8.1 Design Criteria

In accordance with the overarching Robinson Report and pre-consultation with the City of Ottawa, the following stormwater management design criteria have been implemented into the on-site design:

- Control post-development peak flows to the allowable release rates established in the overarching Robinson Report.
- Provide on-site storage (in excess of the allowable release rates) for all storm events up to and including the 100-year event.
- No surface ponding during the 2-year design event.
- Maximum surface ponding depth of 350mm.
- Minimum 300mm of freeboard between 100-year spill elevation and any building openings.
- No spill from stress test (100-year + 20%) onto permanent structures.
- Minimum 150mm of freeboard between spill elevations and ground elevation at building envelope (in proximity to flow route or ponding area).
- Provide a major overland flow route to the adjacent municipal right-of-way.
- Provide enhanced level (80% TSS removal) quality control of stormwater runoff.
- Implement low impact development (LID) measures where feasible.

8.2 Allowable Release Rates

Post-development peak flows for the subject site will need to be controlled to the allowable release rates allocated in the overarching Robinson Report for Block 27. The allocated minor and major system flows have been summarized in the table below.

Table 8.1: Allowable Release Rates

Minor System Flow (L/s)	Major System Flows (L/s)		
	2-Year	5-Year	100-Year
47	0	22	87

Notes:
1. Flows as per *Table 8.11* from the approved Robinson Report (May 2024) prepared for the Huntley Hollow Subdivision.

Stormwater peak flows from the subject site must be controlled to the rates noted in the table above in accordance with the overarching Robinson Report.

8.3 Quantity Control

In order to restrict stormwater peak flows to the established allowable release rates, quantity controls will be required.

Drainage areas STM1 and STM2 comprise the majority of the site frontage along Hilversum Lane and consist of both impervious and pervious surface covers. Since the peak flows generated from these drainage areas are low, no quantity controls (i.e. ICDs) will be required. For stormwater management purposes, the drainage areas are assumed to be uncontrolled.

Drainage area R1 is comprised of the flat portion of the apartment building roof and will be restricted by roof drain controls. A roof drain release rate of 40 L/s/ha has been assigned, which equates to a peak flow rate of 3.9 L/s over the total roof area. The total number of roof drains required will need to be confirmed by the Mechanical Consultant.

Drainage area FF1 is comprised of the underground parking garage ramp which will be captured by a trench drain (and/or internal building floor drains) and conveyed to the building plumbing system. For stormwater management purposes, area FF1 has been assumed to be uncontrolled and will ultimately discharge to the building storm service via the internal building plumbing system.

Drainage area FF2 is comprised of the remaining site frontage along Hilversum Lane and will be conveyed uncontrolled to the Hilversum Lane right-of-way where it will be captured by an existing surface inlet and conveyed to the municipal storm sewer system.

Drainage area FF3 is comprised of the remaining site area along the northern and eastern perimeters of the property which will be conveyed uncontrolled to the existing ravine.

Stormwater peak flows for the 2-year through 100-year design events have been summarized in the table below.

Table 8.2: Stormwater Peak Flows

Drainage Area	2-Year Peak Flow (L/s)	5-Year Peak Flow (L/s)	100-Year Peak Flow (L/s)	Flow Control
STM1[*1]	1.8	2.4	5.2	Uncontrolled
STM2[*1]	2.6	3.6	7.6	Uncontrolled
R1[*2]	3.9	3.9	3.9	Roof Drain
FF1[*3]	1.9	2.5	4.8	Uncontrolled
FF2[*3]	5.5	7.4	15.9	Uncontrolled
FF3[*3]	9.9	13.4	28.8	Uncontrolled
Total	**25.6**	**33.3**	**66.3**	
Total (Minor Only)[*4]	**10.2**	**12.5**	**21.6**	
Total (Major Only)[*5]	**15.4**	**20.9**	**44.7**	
Allowable (Minor)[*6]	**47.0**	**47.0**	**47.0**	
Allowable (Major)[*6]	**0.0**	**22.0**	**87.0**	

Notes:
1. Peak flow calculated using the Rational Method at a time of concentration of 10 minutes.
2. Peak flows for roof area (R1) are based on roof drain release rate of 40 L/s/ha.
3. Peak flows for free flow areas (FF1-FF3) are calculated using the Rational Method at a time of concentration of 10 minutes.
4. Excludes peak flow from free flow areas (FF2 & FF3) which bypasses the on-site minor system.
5. Includes free flow area conveyed to Hilversum Lane right-of-way (FF2) and free flow area conveyed directly to the ravine (FF3).
6. Allowable release rates as per approved Robinson Report for Huntley Hollow Subdivision.

As shown in the table above, the total peak flows from the subject site tributary to the minor storm sewer system for the 2-year through 100-year design events, do not exceed the allowable release rates established in the overarching Robinson Report.

The Robinson Report assumed that during the 2-year design event, stormwater runoff from the subject site (i.e. Block 27) would be fully captured by the on-site minor system such that no major system flows would be conveyed to the Hilversum Lane right-of-way. However, based on grading constraints, some major system flow from the uncontrolled free flow drainage area (i.e. FF2) will be conveyed to the Hilversum Lane right-of-way where it will be captured by an existing surface inlet and conveyed to the municipal minor storm sewer system (i.e. pipe run 211-OGS1). In review of the storm sewer design sheet prepared for the Huntley Hollow Subdivision, pipe run 211-OGS1 has a full flow capacity of 687.79 L/s and is only 49% full during the 2-year design event. The additional peak flow of 5.5 L/s generated from the subject site (i.e. from FF2) will only account for 0.80% of the total pipe capacity and therefore is considered a negligible increase.

Overall, the peak flows from the subject site during the 2-year through 100-year design events are less than the allowable release rates and therefore have been designed in keeping with the overarching Robinson Report. Refer to the supporting free flow calculations provided under **Appendix F** for more details.

8.4 Quantity Storage

In order to restrict stormwater peak flows to the rates provided in **Table 8.2**, on-site storage will be required. On-site storage (in excess of the allowable release rates) will be required for all storm events up to and including the 100-year event. In accordance with the current OSDG,

there shall be no surface ponding during the 2-year design event and the maximum ponding depth shall not exceed 350mm. Required storage volumes have been calculated using the Modified Rational Method and the allowable release rates provided in **Table 8.2**. Storage volume and ponding depths for the on-site catchment areas during the 100-year design event have been summarized in the table below.

Table 8.3: 100-Year Surface Storage Volumes & Ponding Depths

Drainage Area	100-Year		
	Required Storage Volume (m^3)	Available Storage Volume[*1] (m^3)	Max. Static Ponding Depth[*3,4] (m)
STM1	0.0	1.1	0.20
STM2	0.0	0.60	0.20
R1	41.0	49.3[*2]	0.15

Notes:
1. Available storage volumes are calculated using AutoCAD Civil3D by Autodesk (surface storage only).
2. Available storage volume on roof estimated by assuming conical shaped ponding area (V=bh/3) taken over flat roof area at maximum ponding depth of 150mm.
3. Ponding depths are measured from the maximum static ponding elevation to the top of grate elevation.
4. Static ponding depth before overtopping occurs.

As shown in the table above, no on-site storage will be required for drainage areas STM1 & STM2 since the peak flows are less than the downstream pipe capacities (i.e. there will be no flow restrictions). Roof storage will be required for drainage area R1. The available storage volume on the roof has been estimated assuming a conical shaped ponding area and a maximum ponding depth of 150mm. The available storage volume on the roof will need to be verified once detailed roof plans are available. The allocated flow rate for the roof drains can be increased if the required storage volume needs to be reduced (to be determined when roof plans are available).

The table above has demonstrated that adequate on-site storage has been provided to detain the 100-year event to the allowable release rates established in the overarching Robinson Report. Refer to the storage volume tables provided under **Appendix F** for more details.

8.5 Stress Test (100-YR + 20%) and Freeboard

The stress test (100-year + 20%) event must be assessed to ensure that ponding limits do not encroach onto adjacent permanent structures. For drainage areas STM1 and STM2, no surface ponding will occur during the street test event. For building floodproofing, a minimum freeboard of 0.30m must also be provided between the maximum static ponding elevation and any building openings adjacent to the ponding area. The table below demonstrates the provided freeboard for the subject site:

Table 8.4: Freeboard

Drainage Area	Max. Static Ponding Elev.[*1] (m)	Building Opening Elevation (m)	Freeboard (m)	Stress Test Ponding Elev. (m)	Ground Surface Elev.[*2] (m)	Freeboard (m)
STM1	104.39	105.10	0.71	104.19[*4]	104.85	0.66
STM2	103.77	105.10	1.33	103.57[*4]	105.07	1.50
Cul-de-sac	103.36[*3]	103.66	0.30	103.42[*3]	103.51	0.09

Notes:
1. Maximum static ponding elevation before spilling occurs.
2. Ground surface elevation at perimeter of closest permanent structure adjacent to ponding area.
3. Ponding elevations as per approved Robinson Report for Huntley Hollow Subdivision.
4. Where no surface ponding is expected to occur, ponding elevations are set to the T/G elevation.

As demonstrated in the table above, adequate freeboard has been provided in accordance with the current OSDG. Static and stress test ponding elevations from the Robinson Report have been used to assess the freeboard for the club house which is adjacent to the ponding area for the Hilversum Lane cul-de-sac. Supporting flow and storage volume calculations for the stress test event are shown on the storage volume tables provided under **Appendix F**.

A freeboard of 0.30m has also been provided between the overtopping spill elevation for the Hilversum Lane cul-de-sac (103.36m) and the high point for the proposed parking garage ramp (103.66m).

8.6 Major System

Major system flows within the municipal right-of-way are conveyed via the dedicated overland flow block to the existing ravine. In the event that the minor system becomes blocked or over capacity, the major system for the subject site has been designed to cascade overland flow from the individual catchment areas to the adjacent Hilversum Lane right-of-way, except for free flow area (FF3) which is conveyed directly to the ravine. As demonstrated under **Section 8.5**, adequate freeboard has been provided between the major system spill elevations and any adjacent building openings.

8.7 Swale Flow Velocities

At the request of the City, the proposed drainage swales which discharge towards the existing ravine have been assessed to determine if permanent erosion control measures are warranted. The swale on the north side of the apartment building captures runoff from a tributary drainage area of 0.03 hectares (denoted as area SWALE-1). The swale located between the apartment building and the club house captures runoff from a tributary drainage area of 0.02 hectares (denoted as area SWALE-2). Using the Rational Method, peak flows for the 100-year design event have been calculated for each drainage area based on a time of concentration of 10 minutes. A hydraulic assessment was then completed to determine the maximum flow velocity in the swale. The results of the assessment are summarized in the table below.

Table 8.5: Swale Velocities

Drainage Area ID	100-Year Peak Flow[*1] (L/s)	100-Year Velocity[*2] (m/s)	Permissible Velocity[*3] (m/s)
SWALE-1	10.2	0.58	1.50
SWALE-2	4.4	0.72	1.20

Notes:
1. Peak flow calculated using the Rational Method at time of concentration of 10 minutes.
2. Flow velocity assessed using the maximum slope along the drainage swale.
3. Permissible velocity for grass mixture cover as per OSDG *Appendix 6-C*.

As shown in the table above, the flow velocities in the swales will be 0.58 m/s and 0.72 m/s during the 100-year design event for SWALE-1 and SWALE-2 respectively. *Appendix 6-C* of the current OSDG (provided under **Appendix F** for reference) provides permissible velocities

for channels lined with grass. Assuming a typical grass mixture cover, the calculated velocities are below the permissible values and therefore permanent erosion controls are not warranted. Refer to the supporting swale flow velocity calculations and **Figure 5.0: Swale Drainage Area Plan** under **Appendix F** for more details. To minimize the potential impacts of converged flows, the swale side slopes shall taper off upstream of the property line to promote sheet flow prior to discharging off-site.

8.8 Quality Control

Stormwater runoff captured by the on-site storm sewer system is conveyed to the existing municipal storm sewer system on Hilversum Lane. Minor system flows are then conveyed through an inline oil grit separator (OGS) unit located at the end of the municipal cul-de-sac before discharging to the existing ravine. As detailed in the Robinson Report, the OGS unit was sized to provide enhanced level (80% TSS removal) quality control for Phase 1 of the Huntley Hollow Subdivision (inclusive of the subject site; Block 27). The sizing of the OGS unit assumed a tributary drainage area and weighted runoff coefficient for the subject site. Refer to *Figure 5: OGS Unit Drainage Area Plan* from the Robinson Report, provided under **Appendix F**, which demonstrates the drainage area used to size the OGS unit. The parameters used in sizing the OGS unit have been compared to the current parameters in the table below.

Table 8.6: OGS Unit Sizing Parameters

Design	Tributary Area (ha)	Runoff Coeff.
Robinson Report*1	0.31	0.69
Current	0.20	0.73

Notes:
1. Approved Robinson Report (May 2024) for Huntley Hollow Subdivision.

As shown in the table above, the tributary area to the OGS unit has been reduced by approximately 36% while the weighted runoff coefficient has increased by approximately 5.8%. As demonstrated in **Table 7.1**, the revised site parameters have reduced the peak flow rate to the minor system and therefore the treatment efficiency of the unit should not be negatively impacted. The OGS unit is a Stormceptor EFO8 model with a sediment storage capacity of 8780 litres and a maximum treatment rate of 1700 L/s. The OGS unit forms part of the amended Environmental Compliance Approval (ECA) issued by the Ministry of the Environment, Conservation and Parks for the Huntley Hollow Subdivision and associated stormwater management controls in the ravine. A copy of the issued ECA is provided under **Appendix F** for reference.

Although stormwater runoff from the subject site which is captured by the minor system will receive quality control via the municipal OGS unit, the proposed surface treatments of the site plan do not warrant extensive quality control measures to protect the downstream watercourse against TSS. Approximately 44% of the site is comprised of building roof which is considered to generate ‘clean’ runoff. Approximately 40% of the site is comprised of landscaped area which is also considered to generate ‘clean’ runoff. The remaining 16% of the site is comprised of hard surface area, however, much of this area consists of terraces and pedestrian sidewalks/pathways. The implementation of an underground garage and elimination of surface parking areas reduces the level of TSS and hydrocarbons that could potentially be borne in stormwater runoff from the site. Surface vegetation will provide added quality control as discussed further under **Section 8.8** below.

8.9 Low Impact Development (LID)

Low Impact Development (LID) is a stormwater management strategy that seeks to mitigate the impacts of increased runoff and stormwater pollution by managing runoff as close to its source as possible. LID comprises a set of site design strategies that minimize runoff through distributed, small scale structural practices that mimic natural or predevelopment hydrology through the processes of infiltration, evapotranspiration, harvesting, filtration and detention of stormwater. These practices can effectively remove nutrients, pathogens and metals from runoff, and they reduce the volume and intensity of stormwater flows. [Low Impact Development Technical Guidance Report, Aquafor Beech, February 2021].

Appendix 10 of the OSDG (formerly Technical Bulletin IWSTB-2024-04), notes that infiltration/exfiltration systems will not be permitted on sites with clay/silt soils due to their poor hydraulic properties. Based on the Geotechnical Investigation completed by Paterson, silty clay is anticipated to be encountered throughout the subject site (refer to geotechnical excerpts provided under **Appendix F**). Therefore, in accordance with the current OSDG infiltration/exfiltration LID practices are not suitable for the subject site.

Much of site's stormwater runoff will be conveyed via grassed drainage swales and/or surface sheet flow over vegetated areas. A vegetative buffer of approximately 6.0m is provided between the developed portion of the site and the eastern property boundary adjacent to the existing ravine and watercourse. Surface vegetation will provide a degree of quality cleansing by reducing flow velocities, promoting infiltration and evapotranspiration during low intensity events, and filtration. The City of Ottawa does not have any guidelines to quantify the level of quality control achieved from such measures; however, surface vegetation will provide an overall benefit from a stormwater quality perspective.

9.0 UNDERGROUND PARKING GARAGE RAMP DESIGN

The proposed site plan for the subject site has incorporated an underground parking garage which will be accessed by a new entrance connection to the Hilversum Lane cul-de-sac. A detailed design of the parking garage ramp has been completed to ensure vehicle movements can be accommodated without conflicts.

An alignment has been created along the inside edge of the proposed ramp which represents the steepest longitudinal slopes which will be experienced by vehicles. The alignment has been offset from the inside edge by a distance of 0.60 m to represent the approximate path of travel of the vehicle tires. The proposed profile for the ramp has incorporated two vertical curves to ensure a smooth transition between varying longitudinal slopes.

Using AutoTURN Pro software, a vertical simulation of the ramp has been completed to assess any conflicts with vehicular movements. The vertical simulation has been completed based on the following parameters:

- Vehicle template for passenger vehicle (TAC-2017).
- Vehicle ground clearance reduced to 0.12 m.
- Set bottom of body clearance of 0.02 m.

The completed simulation has verified that there will be no conflicts with the proposed ramp profile using the parameters above. In other words, a vehicle with a ground clearance of 0.10 m or greater can utilize the ramp without a risk of bottoming out. Refer to the Parking Garage

Ramp Plan & Profile (DWG. 25094-P1) and **Figure 6.0: AutoTurn Simulation** provided under **Appendix B**.

10.0 EROSION AND SEDIMENT CONTROL

Prior to construction and until vegetation has been re-established in disturbed areas, temporary erosion and sediment control measures must be implemented to mitigate the impact of construction on receiving watercourses and existing infrastructure. The following erosion and sediment control (ESC) measures have been proposed for the subject site:

- Limiting the extent of exposed soils at any given time.
- Erosion and sediment control measures shall be maintained until vegetation has been re-established in all disturbed areas. Re-vegetate disturbed areas in accordance with approved Landscape Plan as soon as possible.
- Stockpile soil away (15 metres or greater) from watercourses, drainage features and top of steep slopes.
- Installation of silt sacks between frame and cover on all proposed and existing catch basins and open cover storm manholes until construction is completed.
- Silt fence barriers to be installed and maintained along property boundaries and where indicated on the erosion and sediment control plans.
- Installation of straw bale flow check dams where indicated on the erosion and sediment control plans.
- Installation of mud mats at all construction entrances.
- For dry weather periods (active and/or inactive construction phases) inspections of ESC measures shall be undertaken on a weekly basis.
- Inspection of ESC measures shall be undertaken immediately after major storm events (>25mm of rain in 24 hour period), significant snowmelt events (melting of snow at a rate which adversely affects the performance and function of the system), and extreme weather events.
- Visual inspections shall also be undertaken in anticipation of large storm events (or a series of rainfall and/or snowmelt days) that could potentially yield significant runoff volumes.
- Identify and rectify any deficiencies and undertake necessary maintenance measures as soon as possible.
- Inspections and maintenance of temporary ESC measures shall continue until they are no longer required.
- The Contractor shall ensure that records of inspection are taken, including at a minimum:
  - the inspector's name;
  - date of inspection;
  - visual observations;
  - any necessary remedial measures taken to maintain the interim ESC measures.
- Care shall be taken to prevent damage to ESC during construction operations.
- In some cases, barriers may be removed temporarily to accommodate construction operations. The affected barriers shall be reinstated immediately after construction operations are completed.
- ESC should be adjusted during construction to adapt to site features as the site becomes developed.
- ESC shall be cleaned of accumulated sedimentation as required and replaced as necessary.
- During the course of construction, if the Engineer believes that additional prevention methods are required to control erosion and sedimentation, the Contractor shall implement additional measures, as required, to the satisfaction of the Engineer.

- Construction and maintenance requirements for erosion and sediment controls are to comply with Ontario Provincial Standard Specification (OPSS) 805.

Refer to the Erosion and Sediment Control Plan (DWG. 25094-ESC1) provided under **Appendix B** for more details.

11.0 CONCLUSIONS

It has been demonstrated that the proposed site plan development located at 391 Hilversum Lane can be adequately serviced and stormwater management requirements can be achieved in accordance with current City of Ottawa guidelines and overarching reports. Specifically, the development of the site will include the following key servicing and stormwater management design features:

- Water supply will be provided by an extension of the existing 203mm diameter watermain stub off Hilversum Lane.
- Fire protection will be provided by a new on-site hydrant and by the existing hydrant located on Hilversum Lane.
- Sanitary flows will be conveyed to the existing sanitary sewer system on Hilversum Lane via a connection to the existing 200mm diameter sanitary sewer stub.
- Stormwater runoff (minor system) will be conveyed to the existing storm sewer system on Hilversum Lane via a connection to the existing 375mm diameter storm sewer stub.
- Stormwater peak flows will be restricted to the allowable release rates established in the overarching Robinson Report prepared for the Huntley Hollow Subdivision.
- Adequate on-site storage will be provided for all events up to and including the 100-year design event.
- The major system design will convey overland flow to the adjacent municipal right-of-way.
- Quality control of stormwater runoff will be provided by the existing inline OGS unit, grassed swales, and vegetative buffer.
- Erosion and sediment control measures will be implemented prior to construction and maintained until vegetation has been re-established in disturbed areas.

Report Prepared By:

Brandon MacKechnie, P.Eng.
Project Engineer

Appendix A

Pre-Consultation Notes

Superseded Plan of Subdivision
(prepared by FMW)

Plan of Subdivision (prepared by FMW)

Huntley Hollow General Plan of
Services (DWG. 19008-S2)

Huntley Hollow Grading Plan
(DWG. 19008-GR2)

Carp Short Term Upgrades
Presentation

Correspondence with City

File No.: PC2025-0124

May 5, 2025

Robin Daigle
Inverness Homes Inc.
Via email: robin@invernesshomes.ca

Subject: **Pre-Consultation: Meeting Feedback**
Proposed Site Plan Control Application – 391 Hilversum Lane

Please find below information regarding next steps as well as consolidated comments from the above-noted pre-consultation meeting held on April 30, 2025.

Pre-Consultation Preliminary Assessment

1 ☐	**2** ☒	**3** ☐	**4** ☐	**5** ☐

One (1) indicates that considerable major revisions are required while five (5) suggests that the proposal appears to meet the City's key land use policies and guidelines. This assessment is purely advisory and does not consider technical aspects of the proposal or in any way guarantee application approval.

Next Steps

1. A review of the proposal and materials submitted for the above-noted pre-consultation has been undertaken. For your next submission, please submit the required Application Form, together with the necessary studies and/or plans to planningcirculations@ottawa.ca, copy (cc:) to the file lead and planning support.

2. In your subsequent pre-consultation or application submission, please ensure that all comments or issues detailed herein are addressed. A detailed cover letter stating how each issue has been addressed is requested with the submission materials. Please coordinate the numbering of your responses within the cover letter with the comment number(s) herein.

3. Please note, if your development proposal changes significantly in scope, design, or density it is recommended that a subsequent pre-consultation application be submitted.

Supporting Information and Material Requirements

1. The attached **Study and Plan Identification List** outlines the information and material that has been identified, during this phase of pre-consultation, as either required (R) or advised (A) as part of a future complete application submission.

a. The required plans and studies must meet the City's Terms of Reference (ToR) and/or Guidelines, as available on Ottawa.ca. These ToR and Guidelines outline the specific requirements that must be met for each plan or study to be deemed adequate.

Consultation with Technical Agencies

1. You are encouraged to consult with technical agencies early in the development process and throughout the development of your project concept. A list of technical agencies and their contact information is enclosed.

Planning

Comments:

1. The site is within the Rural Transect of the City of Ottawa's Official Plan (2022) and is designated Village. Under the Village of Carp Secondary Plan, the site is designated Village Residential 3. The property is zoned Village Residential Third Density Subzone I Rural Exception Nine-Hundred and Thirty-Two with a Holding Zone (V3I[932r]-h) under the City's Zoning By-law.

    a. A major challenge in the Village of Carp identified by the Secondary Plan is the lack of affordable housing, particularly for seniors and young people. The applicant should consider the provision of affordable units within the proposed apartment building. Details are provided below on the City's Affordable Housing Community Improvement Plan, and supports exist at other levels of government to support affordable housing development within the private sector.

2. The subject site is within a draft approved subdivision (City files D07-16-19-0034 and D07-16-21-0012). The conditions of the subdivision must be fulfilled and the subdivision registered prior to the registration of a site plan agreement for this site.

3. There is a Holding Zone affecting this property. The hold associated with this rural exception can only be lifted once it has been demonstrated, to the satisfaction of the City, that there is sufficient servicing capacity for the development. An application for Lifting the Holding By-law will need to be submitted once sufficient servicing capacity is available prior to the site plan application.

4. The following plans and reports are required for the planning portion of a formal application for Site Plan Control:

    a. A Site Place that conforms to the City's Site Plan Terms of Reference. The Site Plan shall be consistent with other plans and reports submitted in support of this application.

i. Setbacks for environmental constraints must be clearly marked and will assist with any future discussions on design concepts.

b. A Zoning Confirmation Report that shows the proposed development's conformity with the City of Ottawa's Zoning By-law (ZBL).

c. Building elevations that demonstrate the visual of proposed development to understand facing of building including direction of sunlight, height, doors, and windows.

d. A Plan of Survey outling the boundary of the subject property and any other relevant information including utility lines, registered easements, etc.

e. A Landscape Plan that identifies any existing natural features and shows any tree plantings or soft landscaping proposed to support the development.

Site-Specific Comments on the Proposed Design

5. The proposed site plan lists 46 vehicular parking spaces being provided (40 underground spaces and six spaces at grade). However, 47 parking spaces are required: 39 residence parking spaces (1 per dwelling unit x 39 units) as well as eight visitor parking spaces (0.2 per dwelling unit x 39 units, rounded to the nearest whole number).

6. No bicycle parking is shown on the plan. The plan must include 20 bicycle parking spaces (0.5 per dwelling unit). Staff encourage the applicant to consider an interior secured bike room for residents in addition to an exterior secure and covered bike rack for visitors.

7. Ensure that the site's design meets the City's accessibility design standards and features.

    a. It appears that one Type A parking space is provided within the center of the roundabout; however, two accessible parking spaces are required (one Type A and one Type B) as per the City's Traffic and Parking By-law. There is also no appropriate access aisle provided adjacent to the accessible parking space.

    b. Staff would recommend that the applicant explores designs that place the accessible parking spaces closer to the front entrance, without the need to cross the drive aisle.

    c. Tactile Walking Surface Indicators (TWSIs) should be considered at walkways entering the drive aisle/parking area.

d. Staff appreciate the overhang over the front entrance, and recommend benches to be located nearby.

8. The common amenity areas provided on the concept plan do not appear to meet the Zoning By-law requirements. Section 137 requires that 6m^2 per dwelling unit be provided (234m^2 for 39 units) and 50% of this total must be provided as communal amenity area (117m^2). The yoga, exercise and activity room appear to only be 86m^2. If feasible, in addition to the internal amenities, outdoor amenity space should be considered. 54m^2 of the communal amenity space must be aggregated.

9. Snow storage must be shown or noted on the plan.

10. Staff are not supportive of the auto-centric focus of the front entrance, especially considering that the site is located at the end of a cul-de-sac. If the front entrance was located closer to the street, drop off and pick up functions as well as access by fire services could occur in the street.

11. As the application is over six residential units, the City's Solid Waste Collection Design Guidelines for Multi-Unit Residential Development will apply. If the development cannot meet the guidelines due to site design, a Waste Management Brief may be required in coordination with Solid Waste Services to find an acceptable strategy.

12. The City is working on a new Zoning By-law. The applicant asked for details regarding possible reductions in parking minimums for Villages. Policy staff have recommended different options for parking in Villages to Council, and there are concerns by Council to remove parking minimums in the Villages entirely. It could be the case that the parking minimums for multi-unit developments could change with the new Zoning By-law, but it is not clear at this time what direction Council will choose after being presented the options for parking minimums in villages. The minimum visitor parking requirement is proposed to be lowered to 0.1 spaces per dwelling unit from 0.2 spaces per dwelling unit.

Please contact Jerrica Gilbert, Planner II, for follow-up questions.

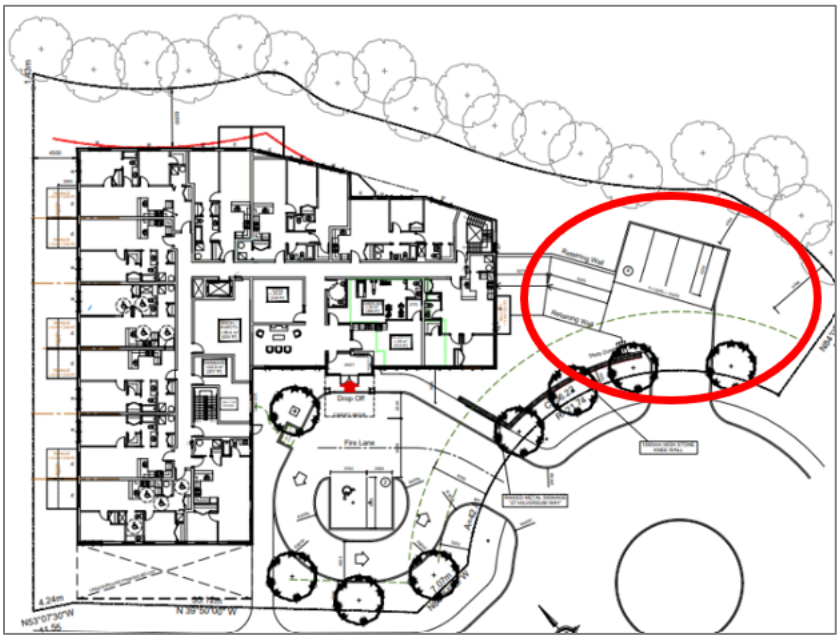
Urban Design
Comments:

13. The following plans and reports will be required as part of a complete submission for site plan:

    a. Urban Design Brief (Terms of Reference attached)
    b. Site Plan
    c. Building Elevations
    d. Landscape Plan
    e. Floor Plans (Optional)

14. Staff recognize that the site has three critical frontages: Hilversum Lane, the proposed park, and the environmental area.

15. Staff do not support the amount of auto-oriented functions at the front of the building along Hilversum Lane. Consolidation is needed so that the building can engage with the public realm and its surroundings. With the current scheme, staff believe that the following area (Figure 1 below) could be optimized if the parking ramp was internal to the building.



16. Staff are looking to understand the ground floor interface with Hilversum Lane, the proposed park, and the environmental area. Ground floor units with individual entrances and amenity areas are recommended.

17. The public realm should be bolstered with tree planting and other softscape.

18. If possible, Urban Design staff would like to review the alternate site plan options that were discussed at the meeting.

Please contact Nader Kadri, Planner III – Urban Design, for follow-up questions.

Engineering

Comments:

19. A servicing report is required.

20. The Stormwater Management Criteria, for the subject site, is to be based on the following:

a. Application of the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.

b. A calculated time of concentration (cannot be less than 10 minutes).

c. The quantity control criteria is c = 0.65 (to be up-rated for infrequent storms). Designs showing a runoff coefficient higher shall retain the delta on site.

d. The stormwater quality control criteria is that of 80 % TSS removal.

e. Low Impact Development techniques (LID) are required.

21. Water

a. There is limited capacity.

b. Water data card (future requirement).

c. Water Boundary condition requests must include the location of the service (map or plan with connection location(s) indicated) and the expected loads required by the proposed development, including calculations. Please provide the following information:

i. Location of service

ii. Type of development

iii. The amount of fire flow required (per Tech Bulletin IWSTB-2024-05)- limited capacity in the Village of Carp may control the size of development and/or may require costly additional fire control techniques (to be provided at the cost of the owner).

iv. Average daily demand: ___ l/s.

v. Maximum daily demand: ___l/s.

vi. Maximum hourly daily demand: ___ l/s.

d. Fire route to be designated with By-law, copying the engineering reviewer, at fireroutes@ottawa.ca. The fire route appears tight for a firetruck.

22. Sewer (sanitary and storm)

a. Capacity in the subdivision is, presently, limited to 264.3 persons, as stated in the Servicing and Stormwater Management Report, prepared by Robinson Land Development, project no. 19008, revised May 2024, for

the foreseeable future. A holding provision, or some other mechanism will be required to limit development amongst proposals.

23. A grading plan is required. The grading plan shall include the datums used to establish horizontal and vertical co-ordination for the site. Grading is required for each and every TWSI.

24. A geotechnical report is required (including, a detailed sensitive marine clay investigation including, but not limited to Atterberg Limits, consolidation testing, sensitivity values, shrinkage testing and Nilcon vane shear test results). A seasonal high groundwater estimate is required, over spring estimates will not be accepted.

25. A slope stability report is required by the Morgenstern-Price method.

26. A fluvial geomorphological report is required.

27. The construction constraints on the project are that of the surrounding subdivision still being constructed. The drop off spot seems hard to turn in and out of.

28. There are no Capital Works Projects scheduled that affect this project, at April 25, 2025, but this may change.

29. Development cannot obtain Site Plan Control approval until after the subdivision is registered and the holding provision is either cleared or revised.

30. The Building Code does not address ramp grades. Underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. Ramp grades steeper than 15% can be psychological barriers to some drivers. The winter weather in Ottawa can be troublesome for steeper grades, even those with melting devices. Please note that curves can see the grade steepen in the inside of the bend. When the underground parking ramp's break over slope exceeds 8%, a vertical-curve transition should be used, which will need detailed grading to carry the transition. Without the transition, "bottoming out" of vehicles may occur.

Please contact Damien Whittaker, Senior Engineer - Infrastructure Applications, for follow-up questions.

Noise

Comments:

31. A Surface Transportation Noise study is not required.

Please contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Transportation

Comments:

32. Follow Transportation Impact Assessment Guidelines:

    a. Submit a Screening Form applicable to the Site Plan application at your earliest convenience to josiane.gervais@ottawa.ca.

    b. If a Transportation Impact Assessment is required. Please submit the Scoping/Forecasting report to josiane.gervais@ottawa.ca at your earliest convenience. The applicant is responsible to submit the Scoping Report prior to application and must allow for a 14 day circulation period. The Strategy Report (including Synchro files) must be submitted with the formal submission to deem complete. The applicant is strongly encouraged to submit the Strategy Report to the TPM prior to formal submission and allow for a 14 day circulation period. Note that the TIA Guidelines have been updated, the changes are available on the City's website.

    c. If a TIA is not required, complete and submit the Transportation Demand Management Measures Checklist and the Transportation Demand Management Supportive Development Design and Infrastructure Checklist in support of the application.

33. Ensure that the development proposal complies with the Right-of-Way protection requirements of the Official Plan's Schedule C16.

34. The site is within proximity of the following arterials/collectors, as per the OP:

    a. Carp Road (2-lane arterial)

    b. Langstaff Drive (2-lane collector)

    c. Donald B. Munro (2-lane collector)

35. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.). Provide a 1.5m wide access aisle next to the accessible parking stall.

36. On site plan:

    a. Ensure site access meets the City's Private Approach Bylaw.

    b. Show all details of the roads abutting the site; include such items as pavement markings, signage, accesses, on-street parking, and/or sidewalks.

c. Clearly distinguish between where the curbs are depressed and where they are full height.

d. Turning movement diagrams required for all accesses showing the largest vehicle to access/egress the site.

e. Turning movement diagrams required for internal movements (loading areas, garbage).

f. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible and fall within TAC guidelines (Figure 8.5.1).

g. Show dimensions for site elements (i.e. lane/aisle widths, access width and throat length, parking stalls, sidewalks, pedestrian pathways, etc.)

h. Sidewalk is to be continuous across access as per City Specification 7.1.

i. Show slope of garage ramp on site plan. Note that underground ramps should be limited to a 12% grade and must contain a subsurface melting device when exceeding 6%. Ramp grades greater than 15% can be psychological barriers to some drivers. When the underground parking ramp's break over slope exceeds 8%, a vertical-curve transition or a transition slope of half the ramp slope should be used. Without this transition, bottoming out of vehicles may occur.

Please contact Josiane Gervais, Transportation Project Manager, for follow-up questions.

Environment

Comments:

37. Please provide an up-to-date Environmental Impact Statement (EIS) and Tree Conservation Report (TCR) for the project. The submission must include a new Information Gathering Form (IGF) for the proposed development area. This information will help determine an appropriate and detailed site plan layout, and incorporate Ministry of the Environment, Conservation and Parks (MECP) direction as per the requirements under the Planning Act and Species at Risk (SAR).

38. If the proposed buildings are four storeys in height or under, a discussion on Bird Safe Design Guidelines will not be a requirement within the EIS. Although not a requirement, the proponent is still encouraged to reference the guidelines and incorporate any design features they deem beneficial to the project.

39. Please ensure the plans and drawings clearly delineate the top of bank, the top of slope, natural heritage/habitat setbacks, and natural hazard setbacks, etc., as per the requirements of the Official Plan (Section 4.9.3), Secondary Plan, Carp

River Watershed/Subwatershed Study, and/or applicable agency legislation and stipulations. This may include, but is not limited to, the local Conservation Authority, the Department of Fisheries and Oceans, the Ministry of the Environment, Conservation and Parks (MECP), etc. For example, any Blanding's Turtle habitat should be up-to-date and clearly delineated.

40. The integrated and updated EIS/TCR with associated drawings specifically delineated important setbacks and/or vegetative buffers must be made available on site throughout the various phases of development (i.e., site preparation, site alterations, grading, development and until the site has been reestablished to pre-conditions or better). In addition, this information, along with any applicable training material must be provided to all the onsite supervisors. The intent is to ensure due diligence due to the sensitive nature of the subject area, habitat, and/or species at risk.

41. Sweeps of the work area should be completed prior to each workday, and any Species at Risk (SAR) occurrences must be submitted to the Natural Heritage Information Centre (NHIC), the Ministry of the Environment, Conservation and Parks (MECP), and the proponents project biologist as soon as possible. Work that may impact the species must be halted until further direction is obtained from the Ministry.

42. The integrated EIS/TCR report must include a discussion on temporary exclusion fencing (Species at Risk Branch Best Practices Technical Note, Reptile and Amphibian Exclusion Fencing - Version 1.1, dated July 2013) that will be used during site alterations and development, such as in the vicinity of the ravine corridor. The intent is to ensure that turtles or other sensitive wildlife species cannot access the construction area. Any permanent exclusionary fencing and locations should also be detailed within the report. For example, please detail the temporary exclusion fencing measures along the outer edge of the Category 2 Blanding's turtle habitat, as well as the permanent fencing measures that should be located inside of any proposed pathway alignment.

43. Please provide a Landscape Plan to support the application. The submitted information will help ensure no adverse impacts to the existing tree cover on the property and on the adjacent lands. The plan may also help with achieving the City's long-term tree canopy targets. In addition, any endangered species, such as Butternut trees, must be identified on the plan and appropriately addressed prior to site alterations and development. Low Impact Development (LID) strategies are also encouraged, where feasible. Although LID strategies help with stormwater management, they also help achieve additional greenspace and locally appropriate native tree species and tree cover.

44. Please provide a Lot Grading and Drainage Plan and ensure any proposed site alterations, grading and development are outside of any natural heritage or hazard areas, including Blanding's turtle habitat.

Please contact Kim MacDonald, Environmental Planner, for follow-up questions.

Forestry

Comments:

Tree Protection

45. A Tree Conservation Report is required, in accordance with Schedule E of the Tree Protection By-law. Ownership of all trees on the subject site and with Critical Root Zones extending onto the subject site must be determined, and plans must show how they will be protected from proposed works. This may be combined with the Landscape Plan, but must show the locations of tree protection fencing and note any required mitigation measures.

    a. Given that the only trees near the site are within the ravine area, they are a very high priority to retain. The TCR should, however, identify any trees within the ravine area which may present undue risk to the subject site, and provide mitigation or management recommendations.

46. A permit is required prior to removal of any protected trees on site. The tree permit will be released upon site plan approval. Monetary compensation for City trees must be paid before the permit is issued. Please contact the planner associated with the file or the Planning Forester, Nancy Young (Nancy.young@ottawa.ca) for information on obtaining the tree permit.

47. To ensure that no harm is caused to breeding birds, tree removal and vegetation clearing should be avoided during the migratory bird season (April 15 – August 15) as specified by The City of Ottawa's Environmental Impact Study Guidelines.

Landscaping

48. A Landscape Plan is required with this application and must address all requirements within the Landscape Plan Terms of Reference https://documents.ottawa.ca/sites/documents/files/landscape_tor_en.pdf , including the projection of canopy cover toward the target of 40%, and confirmation of adequate soil volumes to support any proposed trees.

49. The Landscape Plan must show the setback distances between proposed and existing trees to buildings and underground structures to ensure that both the above and below-ground space proposed is sufficient for tree planting in the Right of Way (across the full frontage) and other landscaped areas.

50. Site Plan applications should provide areas for tree planting on site to increase the canopy cover and shade for residents and visitors to the site.

51. Planting of large-growing native trees must be prioritized where sufficient soil volume and conditions allow (including geotechnical restrictions), particularly within the City-owned ROW.

52. Please provide the approved Geotechnical Report and map to confirm any tree planting restrictions.

    a. The Landscape Plan must show restricted planting areas as recommended in the approved Geotechnical Report and confirm that all required conditions for planting at reduced setbacks are met. This should be provided in the notes block for clarity.

    b. Confirm with the Geotechnical Engineer if tree planting restrictions apply where underground parking is proposed [e.g. deep foundations]. If yes, the section of underground parking close to the road frontage must be reduced to provide sufficient setbacks to plant trees in the ROW.

53. Confirm what is proposed within the constrained area between the building and the treed edge of the ravine. If this is to be open space, it would be a good candidate for tree planting opportunities to increase the canopy cover of the site.

54. Consider aligning the underground parking with above-ground parking/hard surface, to limit impacts to softscape elsewhere.

55. The Official Plan section 4.8.2, sub 3 provides the following direction related to tree planting related to site plans:

    a) Preserve and provide space for mature, healthy trees on private and public property, including the provision of adequate volumes of high-quality soil as recommended by a Landscape Architect;

    b) On urban properties subject to site plan control or community planning permits, development shall create tree planting areas within the site and in the adjacent boulevard, as applicable, that meet the soil volume requirements in any applicable City standards or best management practices or in accordance with the recommendation of a Landscape Architect;

Please contact Nancy Young, Forester, for follow-up questions.

Parkland

Comments:

56. Parkland Dedication

    a. Parkland Dedication is required for the developemnt as per By-law No. 2022-280.

b. The lot was accounted for in the parkland dedication requirements for the related subdivision application. No further parkland dedication is required.

57. Park Adjacency

    a. The subject sites abuts the future park block with the site plan showing the building at 4.5 meters from the park property line and the terraces within 1 meter of the park fence line. Parks staff will be looking at the elevation drawings for this side of the building. Would encourage landscaping on this side of the building.

Please contact Anissa McAlpine, Parks Planner, for follow-up questions.

Mississippi Valley Conservation Authority

Comments:

58. MVCA mapping sources identify a watercourse adjacent to the subject property. MVCA regulates activities including straightening, changing, diverting or interfering in any way with the existing channel or the shoreline of a watercourse under Ontario Regulation 41/24. Under Ontario Regulation 41/24, written permission is required from the MVCA prior to the initiation of any works.

59. Please note that MVCA does not have flooding or erosion hazard mapping completed for this watercourse.

    a. MVCA understands that the Limit of Hazard Lands were established through the subdivision process for 147 Langstaff. The Limit of Hazard Lands should be shown on the plans, and all grading and development is to be located outside on this limit.

60. MVCA may review the stormwater management plan with a focus on quantity management with respect to natural hazards from the receiving watercourse perspective.

Please contact Mercedes Liedtke, Environmental Planner, for follow-up questions.

Other

61. The High Performance Development Standard (HPDS) is a collection of voluntary and required standards that raise the performance of new building projects to achieve sustainable and resilient design and will be applicable to Site Plan Control and Plan of Subdivision applications.

    a. The HPDS was passed by Council on April 13, 2022, but is not in effect at this time, as Council has referred the 2023 HPDS Update Report back to staff with the direction to bring forward an updated report to Committee at

a later date. The timing of an updated report to Committee is unknown at this time, and updates will be shared when they are available.

b. Please refer to the HPDS information at ottawa.ca/HPDS for more information.

62. Under the Affordable Housing Community Improvement Plan, a Tax Increment Equivalent Grant (TIEG) program was created to incentivize the development of affordable rental units. It provides a yearly fixed grant for 20 years. The grant helps offset the revenue loss housing providers experience when incorporating affordable units in their developments.

    a. To be eligible for the TIEG program you must meet the following criteria:

        i. the greater of five units OR 15 per cent of the total number of units within the development must be made affordable

        ii. provide a minimum of 15 per cent of each unit type in the development as affordable

        iii. enter into an agreement with the city to ensure the units maintain affordable for a minimum period of 20 years at or below the city-wide average market rent for the entire housing stock based on building form and unit type, as defined by the Canada Mortgage and Housing Corporation

        iv. must apply after a formal Site Plan Control submission, or Building Permit submission for projects not requiring Site Plan Control, and prior to Occupancy Permit issuance

    b. Please refer to the TIEG information *at Affordable housing community improvement plan / Plan d'améliorations communautaires pour le logement abordable for more details or contact the TIEG coordinator via email at affordablehousingcip@ottawa.ca.*

Concluding Remarks

Should there be any questions, please do not hesitate to contact myself or the contact identified for the above areas / disciplines.

Yours Truly,
Jerrica Gilbert
Planner II, Development Review – Rural

Encl. Supplementary Development Information, List of Technical Agencies to Consult, Study and Plan Identification List, Urban Design Brief Terms of Reference, High Performance Development Standards Pre-consultation Handout and Checklist, City of Ottawa Accessibility Checklist, MVCA Regulation Map

c.c. Damien Whittaker, Senior Engineer - Infrastructure Applications
Josiane Gervais, Transportation Project Manager
Kim MacDonald, Environmental Planner
Nancy Young, Planning Forester
Anissa McAlpine, Parks Planner
Nader Kadri, Planner III – Urban Design
Sarah McCormick, Planner III – Rural
Cass Sclauzero, Planner II – Rural

SUPPLEMENTARY DEVELOPMENT INFORMATION

The following details have been compiled to provide additional information on matters for consideration throughout the application approval and development process. Please note, this document is updated from time to time and should be reviewed for each project proposed to be undertaken.

General

- Refer to Planning application submission information and materials and fees for further information on preparing for application submission. Be aware that other fees and permits may be required, outside of the development review process.
- Additional information is available related to building permits, development charges, and the Accessibility Design Standards.
- You may obtain background drawings by contacting geoinformation@ottawa.ca.
- Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).
- All PDF submitted documents are to be unlocked, flattened and not saved as a portfolio file.
- Where private roads are proposed:
    - Submit a Private Roadway Street Naming application to Building Code Services Branch for any internal private road network.
    - Applications are available at all Client Service Centres and the private roadway approval process takes three months.

Servicing and Site Works

Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines (October 2012)
- Ottawa Design Guidelines – Water Distribution (2010)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)

Exterior Site Lighting

Where proposed, requires certification by an acceptable professional engineer, licensed in the Province of Ontario, which states that the exterior site lighting has been designed to meet the following criteria:

- It uses only fixtures that meet the criteria for Full Cut-Off (Sharp cut-off) classification, as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and
- It results in minimal light spillage onto adjacent properties. As a guideline, 0.5 foot-candle is normally the maximum allowable spillage.

The location of the fixtures, fixture type (make, model, part number and the mounting height) must be shown on one of the approved plans.

City Surveyor Direction

- The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.
- Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

Questions regarding the above requirements can be directed to the City's Surveyor, Andre Roy, at Andre.Roy1@ottawa.ca.

Waste Management

- New multi-unit residential development, defined as containing six (6) or more units, intending to receive City waste collection services will be required, as of June 1, 2022, to participate in the City's Green Bin program in accordance with Council's approval of the multi-residential waste diversion strategy. The development must include adequate facilities for the proper storage of allocated garbage, recycling, and green bin containers and such facilities built in accordance with the approved site design. Questions regarding this change and requirements can be directed to Andre.Laplante@ottawa.ca.

- For sites containing:
  - One or more buildings with a total GFA greater than 2000 square metres;
  - Retail shopping complexes with a total GFA greater than 10,000 square metres;
  - Sites containing office buildings with total GFA greater than 10,000 square metres;
  - Hotels and motels with more than 75 units;
  - Hospitals (human);
  - Educational institutions with more than 350 students; or
  - Manufacturing establishments working more than 16,000 person-hours in a month

A Waste Reduction Workplan Summary is required for the construction project as required by O.Reg. 102/94, being "Waste Audits and Waste Reduction Work Plans" made under the Environmental Protection Act, RSO 1990, c E.19, as amended.

Fire Routes

- Fire routes are required to be designated by By-law for Fire Services to establish them as a legal fire route. Where a development proposes to establish a fire route, an Application for Fire Route Designation is to be made. Questions regarding the designation of fire routes and required process can be directed to fireroutes@ottawa.ca.

Dewatering Activities

- Project contractors and/or your engineers are required to contact the Sewer Use Program to arrange for the proper agreements or approvals to allow for the discharge of water from construction dewatering activities to the City's sanitary or storm sewer system. Please contact the Sewer Use Duty Officer at 613-580-2424 ext. 23326 and/or suppue@ottawa.ca.

Backflow Prevention Devices for Premise Isolation

- Buildings or facilities installing a backflow preventer for premise isolation of the drinking water system must register with the City's Backflow Prevention Program where a moderate or severe hazard may be caused in accordance with CSA B64.10 "Selection and Installation of Backflow Preventers". Please contact the Backflow Prevention Program at 613-580-2424 ext. 22299 or backflow@ottawa.ca to submit a Premise Isolation Survey.

Energy Considerations

- Are you considering harvesting thermal energy from the wastewater infrastructure or harvesting geothermal energy?
    - Additional information can be found on the City website or by contacting Melissa Jort-Conway.

Flood Plain Mapping and Climate Change

- An interactive map, for informational purposes only, showing the results of on-going flood plain mapping work completed by the Conservation Authorities in partnership with the City is now available. This mapping may be used to identify known riverine flood hazards for a property or area. The map and additional related information can be found on Ottawa.ca.

Blasting

- Where blasting may take place:
    - Blasting activities will be required to conform to the City's Standard S.P. No. F-1201 entitled Use of Explosives, as amended.
    - To avoid future delays in process, including the Municipal Consent process for shoring, ensure communication with necessary entities, including utilities, is undertaken early.
- Blasting and pile driving activities in the vicinity of Enbridge Gas Distribution and Storage (GDS) facilities require prior approval by GDS. The Blasting and Pile Driving Form, referenced in Enbridge's Third Party Requirements in the Vicinity of Natural Gas Facilities Standard, must be provided to mark-ups@enbridge.com by the Owner of the proposed work for all blasting and pile driving operations. In addition, a licensed blasting consultant's stamped validation report must be submitted to GDS for review if blasting is to occur within thirty (30) metres of GDS facilities. The request must be submitted a minimum of four weeks prior to the beginning of work to allow sufficient time for review.

Archaeological

- Archaeological Resources
  - Should potential archaeological resources be encountered during excavation activities, all Work in the area must stop immediately and the Owner shall contact a provincially licensed archaeologist.
  - If during the process of development deeply buried/undetected archaeological remains are uncovered, the Owner shall immediately notify the Archaeology Section of the Ontario Ministry of Tourism, Culture and Sport.
  - In the event that human remains are encountered during construction, the Owner shall immediately contact the police, the Ministry of Tourism, Culture and Sport and the Registrar of Cemeteries, Cemeteries Regulation Unit, Ministry of Consumer and Business Services, Consumer Protection Branch.

Trees

- The City's Tree Protection Bylaw, being By-Law No. 2020-340, as amended, requires that any trees to be removed shall be removed in accordance with an approved Tree Permit and Tree Conservation Report and that all retained trees will be protected in accordance with an approved Tree Conservation Report.

Limiting Distance and Parks

- A Limiting Distance Agreement may be required by Building Code Services before building permit(s) can be issued with respect to the proximity of the building to a park block. The City will consider entering into a Limiting Distance Agreement with the Owner with such Agreement to be confirmed through the City's Reality Initiatives & Development Branch. A Limiting Distance Agreement is at the expense of the Owner.

Development Constructability

How a development is constructed, its constructability, is being looked at earlier in the development review process to raise awareness of potential impacts to the City's right of way and facilitate earlier issue resolution with stakeholders. Where a construction management plan is required as part of the site plan or subdivision application approval, conditions will be included that set out the specific parameters to be addressed for the specific project. However, please note the following construction and traffic management requirements and considerations in the development of your project.

- **Open Lane (includes all vehicular lanes, transit lanes and cycling lanes) Requirements**
  - Unless specified in the site-specific conditions to be provided by City of Ottawa Traffic Management at the time of approval, the following requirements must be adhered to and accommodated as part of any proposed encroachments and construction management plan. The standard requirements outlined in this section shall further apply to cycling facilities and Transit.
    - All lanes are to function uninterrupted at all times.
    - No interruption or blockage of traffic is permitted.
    - No loading or unloading from an open lane is permitted.
    - All vehicular travel lanes are to be a minimum of 3.5 metres in width.

        - All cycling lanes are to be a minimum of 1.5 metres.
- **Pedestrian Requirements**
    - Unless specified in the site-specific conditions provided by City of Ottawa Traffic Management at the time of approval, the contractor is required to maintain a minimum width of 1.5 metres for a pedestrian facility on one side of the corridor at all times; even in instances where a pedestrian facility was not present prior to construction.
    - The facility shall include a free and unobstructed hard surface acceptable for the use of all pedestrians including those with accessibility challenges and shall maintain access to all buildings and street crossings.
    - The facility must always be maintained in a clean condition and in a good state of repair to the satisfaction of the City.
    - Any change of level which is over 13 millimetres in height is to be provided with a smooth non-tripping transition.
    - Any temporary barriers or fencing shall include a cane detectable boundary protection with edge or barrier at least 75 millimetres high above the ground surface.
    - If works overhead are required, a 2.1 metre minimum clear headroom must be provided.
    - If overhead protection is required above the pedestrian facility, it is to be offset a minimum of 600 millimetres from any travel lane.
- **Transit Requirements**
    - Travel lanes accommodating OC Transpo must be a minimum of 3.5 metres in width and have a minimum 4.5 metre vertical clearance at all times.
    - Should access to a bus stop be impacted, the developer will be required to email TOPConstructionandDetours@ottawa.ca a minimum of 20 working days prior to work commencing to coordinate any site-specific conditions as part of the work. This includes temporary relocation of transit stops, removal of bus shelters or stops and transit detour routes.
    - The contractor may be required to relocate and provide a suitable alternative to OC Transpo's bus stop to the satisfaction of OC Transpo
    - The Contractor shall provide OC Transpo with a minimum of ten (10) working days' notice to coordinate temporary relocation of bus stops. When a bus stop and/or shelter must be temporarily relocated, the contractor may be required to provide stop infrastructure (i.e. bench, bus and/or shelter pads), to the satisfaction of OC Transpo.
    - All temporary stop locations including infrastructure are to be fully accessible in accordance with City of Ottawa Accessibility Design Standards and to the satisfaction of the OC Transpo.
    - Temporary bus stops are to be constructed and ready for use prior to the start of any works that would impact the regular bus stop location(s).
- **Public Consultation**
    - May include, but not be limited to, proponent lead public meeting(s), letter notification(s) and information dissemination via print, electronic means or social media, to impacted properties above and beyond the notification requirements specified in the Road Activity By-law.
- **General Considerations for all Applications**
    - A comprehensive construction management plan should include and consider the following:
        - The proposed stages of construction and the anticipated durations of each stage and any impact to existing travel lanes, pedestrian

facilities, cycling facilities and/or transit facilities. Any proposed encroachment should be identified and dimensioned on the site plan for review of feasibility.

- The proposed constructability methods being used as part of the proposed development (ie: fly forming, Peri forming etc.) and any additional traffic impacts/interruptions anticipated with proposed methods. If a crane is being placed on site, the location should be identified, and show the overhead impacts of the crane.
- Consideration that any tie-backs and/or shoring within the City of Ottawa Right of Way are subject to Municipal Consent in advance of commencement of the project. Approval for encroachments is not guaranteed if impacts to transportation facilities cannot be addressed to the City's satisfaction.
- Identify any truck hauling routes to and from the proposed development site and any proposed accesses. Designated heavy truck routes are to be followed at all times, however, if a deviation is required from the existing heavy truck route network, then a structural review may be required as part of an Over-dimensional Vehicle Project Permit.
- Identify the location of any site trailers and the location. Note, if placing a site trailer above any walk-through scaffolding or on the second floor (or above), an engineering drawing must be submitted to building code services for review. More information can be found on the Building Permit Approval process.
- Identify equipment and/or materials storage locations as required. Storage is not permitted on the road or the roadway shoulders or boulevards, unless the storage areas are identified in the traffic control plan and appropriate traffic control devices protect the equipment or materials.

- Any work as part of the development that requires a road cut, road closure or encroachment will be subject to the Road Activity By-law and potential site-specific conditions identified at site plan or subdivision approval which will be noted on the subsequent Permit(s). Information about construction in the right-of-way including applying for permits and associated fees can be found on the City's website.

List of Technical Agencies to Consult

Proposed Site Plan Control Application – 319 Hilversum– PC2025-0124

☐	Zayo	Utility.Circulations@Zayo.com
☐	Bell Canada	circulations@bell.ca
☐	Telus Communications	Engineering.Requests@telus.com / jovica.stojanovski@telus.com
☐	Rogers Communications	OPE.Ottawa@rci.rogers.com
☐	Enbridge Gas Distribution	municipalplanning@enbridge.com
☐	O.C. District School Board	planningcirculations@ocdsb.ca
☐	O.C. Catholic School Board	planningcirculations@ocsb.ca
☐	Conseil des écoles publiques	planification@cepeo.on.ca
☐	Conseil des écoles catholiques du Centre-Est	planification@ecolecatholique.ca
☐	Hydro One Networks (Local Distribution)	Ottawa.circulations@HydroOne.com
☐	Conservation Authority	MVCA – info@mvc.on.ca

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA
THIS _ _ _ _ DAY OF _ _ _ _ 2023.

_____,
GENERAL MANAGER
PLANNING AND GROWTH MANAGEMENT DEPARTMENT
PLANNING AND INFRASTRUCTURE PORTFOLIO
CITY OF OTTAWA

PLAN 4M–

I certify that this Plan is registered in the Land Registry Office for the Land Titles Division of Ottawa-Carleton N° 4 at _ _ _ o'clock on the _ _ _ _ day of _ _ _ _ and entered in the register for Property Identifier _ _ _ _ and required consents are registered as Plan Document N° _ _ _ _ _ _ _

_____
Land Registrar

THE SUBDIVISION REPRESENTED BY THIS PLAN AFFECTS

PLAN OF SUBDIVISION OF
PART OF NELSON STREET IN FRONT OF LOTS 49 TO 54, (BOTH INCLUSIVE)
(CLOSED BY BY-LAW NO. 2007-295, INST. OC751815)
AND
PART OF BLOCKS "A", "B" & "C"
AND
ALL OF LOTS 6 TO 21 (BOTH INCLUSIVE)
PART OF LOT 49,
ALL OF LOTS 50, 51, 52 & 53
PART OF LOTS 54, 55 & 56
PART OF JOHN STREET (NOT OPEN)
REGISTERED PLAN No. 148
AND
PART OF LOT 18, CONCESSION 2
GEOGRAPHIC TOWNSHIP OF HUNTLEY
CITY OF OTTAWA

SCALE 1 : 500
0 10 20 50 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

NOTES

1. BEARINGS ARE GRID AND ARE REFERRED TO THE SOUTHWESTERLY LIMIT OF LANGSTAFF DRIVE SHOWN ON PLAN 4R-24903 AS HAVING A BEARING OF N 43°10'30" W AND ARE REFERRED TO THE CENTRAL MERIDIAN, 76°30'W LONGITUDE MTM ZONE 9, NAD83 ORIGINAL.
2. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.999905.
3. LIMIT OF HAZARD LANDS DERIVED FROM DRAWING No. PG4918-1(REV.3) BY PATERSON GROUP, CONSULTING ENGINEERS DATED AUGUST, 2019.
4. ALL FOUND SURVEY MONUMENTS ARE STAMPED (857) UNLESS NOTED OTHERWISE.

LEGEND

- □ – SURVEY MONUMENT SET
- ■ – SURVEY MONUMENT FOUND
- SIB – STANDARD IRON BAR
- SSIB – SHORT STANDARD IRON BAR
- ø – ROUND
- IB – IRON BAR
- (P) – PLAN 4R-XXXX
- (S) – SET
- (M) – MEASURED
- (857) – FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S.
- (SU) – SOURCE UNKNOWN
- (WIT) – WITNESS
- PIN – PROPERTY IDENTIFIER NUMBER
- (647) – H. R. FARLEY, O.L.S.
- (1287) – FARLEY, SMITH & DENIS SURVEYING LTD., O.L.S
- (BF) – BOARD FENCE
- (CLF) – CHAIN LINK FENCE
- UP – UTILITY POLE
- GP – GATE POST

COORDINATES WERE DERIVED FROM PLAN 4R-32761 AND ARE MTM ZONE 9, NAD83 ORIGINAL.		
COORDINATES HAVE BEEN DETERMINED TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14(2) OF O.REG. 216/10.		
POINT ID	EASTING	NORTHING
71	341285.762	5023205.124
74	341400.980	5023082.320
75	341459.319	5023020.297
01919791113	340278.632	5023845.905
01919770765	341631.95	5021238.914

COORDINATES CANNOT IN THEMSELVES BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT:

1. BLOCKS 1 TO 34, BOTH INCLUSIVE THE STREETS, NAMELY STREET 1 & STREET 2, AND THE STREET WIDENING, NAMELY BLOCK 35, HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS AND THE STREET WIDENING ARE HEREBY DEDICATED TO THE CORPORATION OF THE CITY OF OTTAWA AS PUBLIC HIGHWAYS. DATED THIS _ _ _ _ DAY OF _ _ _ _ _ _ _ 2023.

_____
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON

_____ _____
DATE JOHN H. GUTRI
ONTARIO LAND SURVEYOR

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
Surveying and Land Information Services
100-600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591-2580 FAX: (613) 591-1495
www.fmw.on.ca

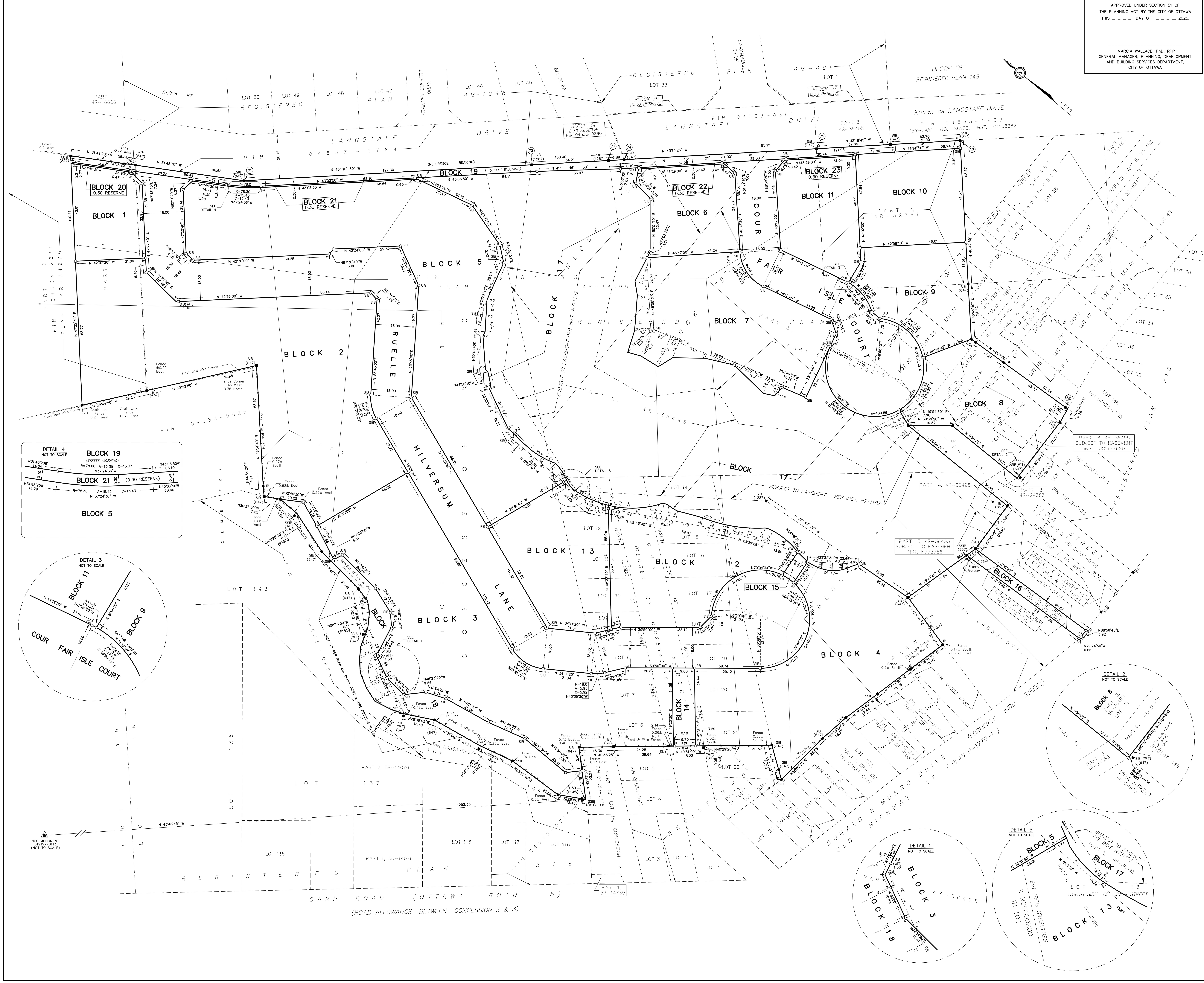
JOB No. 222000
E 341276, N 5023039
REFERENCE No. 12 HUNTLEY 26 – 148 HUNTLEY
S:\plan\222000\mplan-fin-can\
mplan-june_13_2024(use).dwg

June 13, 2024

METRIC
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

APPROVED UNDER SECTION 51 OF
THE PLANNING ACT BY THE CITY OF OTTAWA
THIS _ _ _ _ DAY OF _ _ _ _, 2025.

____
MARCIA WALLACE, PhD, RPP
GENERAL MANAGER, PLANNING, DEVELOPMENT
AND BUILDING SERVICES DEPARTMENT,
CITY OF OTTAWA



PLAN 4M–

I certify that this Plan is registered in the Land Registry Office for the Land Titles Division of Ottawa–Carleton N° 4 at _ _ _ o'clock on the _ _ _ _ day of _ _ _ 2025 and entered in the parcel register for Property Identifier 04533–2351 and required consents are registered as Plan Document N° _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _
Representative for Land Registrar

THIS PLAN COMPRISES ALL OF PIN 04533–2351.
ALL OF BLOCK 16 – SUBJECT TO EASEMENT OC2715125.
PART OF BLOCK 8 – SUBJECT TO EASEMENT OC1177620.
PART OF BLOCK 17 – SUBJECT TO EASEMENT N773756.
PART OF BLOCK 17 & 19 – SUBJECT TO EASEMENT N771192.

PLAN OF SUBDIVISION OF

LOTS 6 TO 13 (INCLUSIVE) NORTH SIDE OF JOHN STREET, LOTS 14 TO 21 (INCLUSIVE) SOUTH SIDE OF JOHN STREET, LOTS 52 & 53 PART OF LOTS 54, 55 & 56 NORTH SIDE OF NELSON STREET, LOTS 50 & 51, PART OF LOT 49 SOUTH SIDE OF NELSON STREET

AND

PART OF BLOCKS "A", "B" & "C"

AND

PART OF NELSON STREET (CLOSED BY BY–LAW NO. 2007–295, INST. OC751815), PART OF JOHN STREET (CLOSED BY OC2554675), REGISTERED PLAN 148

AND

PART OF LOT 18, CONCESSION 2 GEOGRAPHIC TOWNSHIP OF HUNTLEY CITY OF OTTAWA

SCALE 1 : 500
0 10 20 50 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED
ONTARIO LAND SURVEYORS

COORDINATES WERE DERIVED FROM PLAN 4R–32761 AND ARE MTM ZONE 9, NAD83 ORIGINAL.

COORDINATES HAVE BEEN DETERMINED TO AN URBAN ACCURACY IN ACCORDANCE WITH SECTION 14(2) OF O.REG. 216/10.

POINT ID	EASTING	NORTHING
71	341285.762	5023205.124
74	341400.980	5023082.320
75	341459.319	5023020.297
01919791113	340278.632	5023845.905
01919770765	341631.95	5021238.914

COORDINATES CANNOT IN THEMSELVES BE USED TO RE–ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

NOTES

1. BEARINGS ARE GRID AND ARE REFERRED TO THE SOUTHWESTERLY LIMIT OF LANGSTAFF DRIVE SHOWN ON PLAN 4R–24903 AS HAVING A BEARING OF N 43°10'30" W AND ARE REFERRED TO THE CENTRAL MERIDIAN, 76°30'W LONGITUDE MTM ZONE 9, NAD83 ORIGINAL.
2. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.999905.
3. ALL FOUND SURVEY MONUMENTS ARE STAMPED (857) UNLESS NOTED OTHERWISE.
4. ALL BARS SET ARE SSIB's & PB (ALTERNATE AND REDUCED LENGTH MONUMENTS SET DUE TO UNDERGROUND UTILITY HAZARD) UNLESS NOTED OTHERWISE.

LEGEND

□	– SURVEY MONUMENT SET
■	– SURVEY MONUMENT FOUND
SIB	– STANDARD IRON BAR
SSIB	– SHORT STANDARD IRON BAR
PB	– PLASTIC BAR
ø	– ROUND
IB	– IRON BAR
(P)	– PLAN 4R–36495
(P1)	– PLAN 4R–32761
(S)	– SET
(M)	– MEASURED
(857)	– FAIRHALL, MOFFATT & WOODLAND LIMITED, O.L.S.
(SU)	– SOURCE UNKNOWN
(WIT)	– WITNESS
PIN	– PROPERTY IDENTIFIER NUMBER
(647)	– H. R. FARLEY, O.L.S.
(1287)	– FARLEY, SMITH & DENIS SURVEYING LTD., O.L.S
(BF)	– BOARD FENCE
(CLF)	– CHAIN LINK FENCE
UP	– UTILITY POLE
GP	– GATE POST
PWF	– POST & WIRE FENCE

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT:

1. BLOCKS 1 TO 18, BOTH INCLUSIVE THE STREETS, NAMELY RUELLE HILVERSUM LANE & COUR FAIR ISLE COURT, THE STREET WIDENING NAMELY BLOCK 19 AND THE RESERVES NAMELY BLOCKS 20, 21, 22 & 23 HAVE BEEN LAID OUT IN ACCORDANCE WITH OUR INSTRUCTIONS.
2. THE STREETS AND THE STREET WIDENING ARE HEREBY DEDICATED TO CITY OF OTTAWA AS PUBLIC HIGHWAYS.

DATED THIS _ _ _ _

DAY OF _ _ _ _ _ _ _ _ 2025.

HUNTLEY HOLLOW INC.

____
KYLE MacHUTCHON
PRESIDENT
I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON SEPTEMBER 04, 2025.

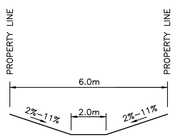
SEPTEMBER 04, 2025

_ _ _ _ _ _ _
JOHN H. GUTRI
ONTARIO LAND SURVEYOR

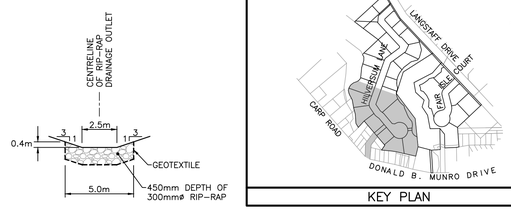
THIS PLAN RELATES TO AOLS PLAN SUBMISSION FORM NUMBER V–69760.

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
100–600 TERRY FOX DRIVE, KANATA, ONTARIO K2L 4B6
TEL: (613) 591–2580 FAX: (613) 591–1495
www.fmw.on.ca

JOB No. Z 2 2 0 0 0
E 341276, N 5023039
REFERENCE No.
144 – 2 HUNTLEY
26 – 148 HUNTLEY
S:\jobs\z22000\mplan–to–use\dwg–2025
mplan–30july2025.dwg (rr)



BLOCK 31 OVERLAND FLOW SECTION B–B



STREET 1 & 2 RIP RAP OUTLET SECTION A–A

TRENCH BOX DETAIL AT CARP ROAD SEWER CONNECTION SECTION C–C

TEMPORARY ICD TABLE				
STRUCTURE	PIPE DIA. (mm)	ALLOWABLE OUTFLOW (L/s)	ORIFICE DIA. (mm)	ORIFICE TYPE
115	200	4.57	39.0	CIRCULAR PLUG
117	200	3.10	32.1	CIRCULAR PLUG

LEGEND

- SINGLE SERVICE: 135mmø SANITARY, 150mmø STORM, 19mmø WATER
- DOUBLE SERVICE: 2–135mmø SANITARY, 2–150mmø STORM, 2–19mmø WATER
- PROPERTY BOUNDARY
- PHASE LIMIT
- LIMIT OF HAZARD LANDS
- SANITARY SEWER AND MANHOLE
- STORM SEWER AND MANHOLE
- CONCRETE HEADWALL
- WATERMAIN
- VALVE AND VALVE BOX
- HYDRANT WITH VALVE AND VALVE BOX
- ROADSIDE CATCH BASIN
- ROADSIDE DOUBLE CATCH BASIN
- LANDSCAPE CATCH BASIN ELBOW
- LANDSCAPE CATCH BASIN TEE
- SWALE WITH 250mmø SUBDRAIN
- EXISTING SANITARY SEWER AND MANHOLE
- EXISTING STORM SEWER AND MANHOLE
- EXISTING WATERMAIN
- EXISTING CATCH BASIN
- EXISTING HYDRANT
- EXISTING DITCH
- EXISTING OVERHEAD UTILITIES

NOTE: ALL SERVICES REQUIRE PRESSURE REDUCING VALVES (PRVs)

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP–STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP. TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83–9)

NO.	REVISION DESCRIPTION	DATE	BY
7	ISSUED FOR MECP ECA	23/09/24	BLM
6	ISSUED FOR PHASE 1 TENDER	06/09/24	BLM
5	REVISED PER CITY COMMENTS	12/07/24	BLM
4	REVISED PER CITY COMMENTS	28/05/24	BLM
3	REVISED PER CITY COMMENTS	22/03/24	BLM
2	REVISED PER CITY COMMENTS	09/11/23	BLM
1	ISSUED FOR REVIEW	24/05/23	BLM

SCALE
0 5m 10m 20m
HORIZONTAL 1:500

LICENSED PROFESSIONAL ENGINEER B. L. MACKECHNIE 100199554 Sept. 23/24 PROVINCE OF ONTARIO

Robinson Land Development

CONSULTING ENGINEERS
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	BLM
DRAWN	JHB
CHECKED	BLM
APPROVED	BLM

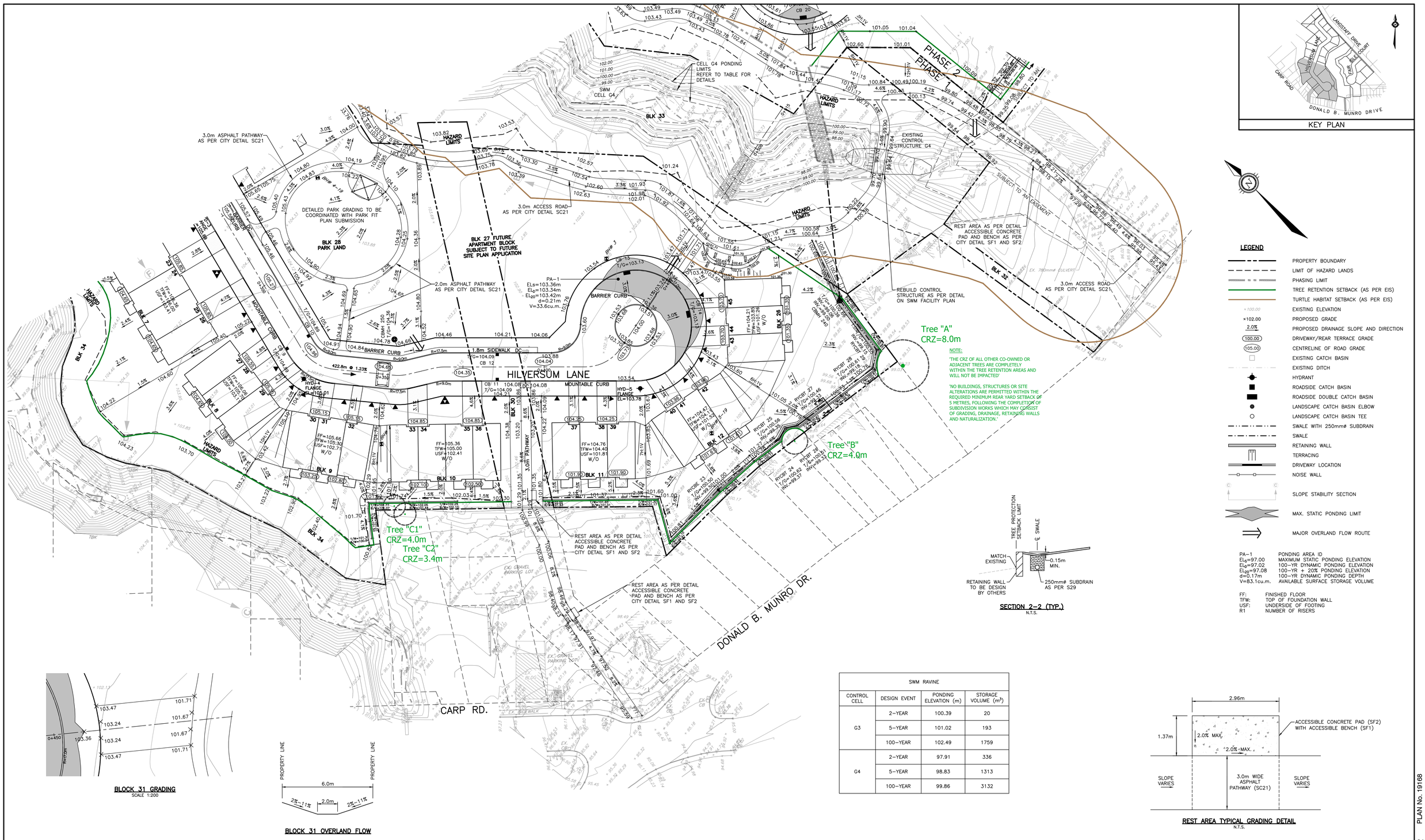
INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

147 LANGSTAFF DRIVE
CARP, ON

GENERAL PLAN OF SERVICES

PROJECT No.	19008
SURVEY	RLD
DATED	SEPTEMBER 2024
DWG. No:	19008-S2

FILE No. D07-16-21-0012 PLAN No. 19168



KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- PHASING LIMIT
- TREE RETENTION SETBACK (AS PER EIS)
- TURTLE HABITAT SETBACK (AS PER EIS)
- ×100.00 EXISTING ELEVATION
- ×102.00 PROPOSED GRADE
- 2.0% PROPOSED DRAINAGE SLOPE AND DIRECTION
- (100.00) DRIVEWAY/REAR TERRACE GRADE
- (105.00) CENTRELINE OF ROAD GRADE
- EXISTING CATCH BASIN
- EXISTING DITCH
- HYDRANT
- ROADSIDE CATCH BASIN
- ROADSIDE DOUBLE CATCH BASIN
- LANDSCAPE CATCH BASIN ELBOW
- LANDSCAPE CATCH BASIN TEE
- SWALE WITH 250mmø SUBDRAIN
- SWALE
- RETAINING WALL
- TERRACING
- DRIVEWAY LOCATION
- NOISE WALL
- SLOPE STABILITY SECTION
- MAX. STATIC PONDING LIMIT
- MAJOR OVERLAND FLOW ROUTE

PA-1 PONDING AREA ID
EL_5=97.00 MAXIMUM STATIC PONDING ELEVATION
EL_6=97.02 100-YR DYNAMIC PONDING ELEVATION
EL_{20}=97.08 100-YR + 20% PONDING ELEVATION
d=0.17m 100-YR DYNAMIC PONDING DEPTH
V=83.1cu.m. AVAILABLE SURFACE STORAGE VOLUME

FF: FINISHED FLOOR
TFW: TOP OF FOUNDATION WALL
USF: UNDERSIDE OF FOOTING
R1 NUMBER OF RISERS

NOTE:

'THE CRZ OF ALL OTHER CO-OWNED OR ADJACENT TREES ARE COMPLETELY WITHIN THE TREE RETENTION AREAS AND WILL NOT BE IMPACTED'

'NO BUILDINGS, STRUCTURES OR SITE ALTERATIONS ARE PERMITTED WITHIN THE REQUIRED MINIMUM REAR YARD SETBACK OF 5 METRES, FOLLOWING THE COMPLETION OF SUBDIVISION WORKS WHICH MAY CONSIST OF GRADING, DRAINAGE, RETAINING WALLS AND NATURALIZATION.'

SECTION 2–2 (TYP.)
N.T.S.

BLOCK 31 GRADING
SCALE 1:200

BLOCK 31 OVERLAND FLOW

SWM RAVINE			
CONTROL CELL	DESIGN EVENT	PONDING ELEVATION (m)	STORAGE VOLUME (m^3)
G3	2-YEAR	100.39	20
	5-YEAR	101.02	193
	100-YEAR	102.49	1759
G4	2-YEAR	97.91	336
	5-YEAR	98.83	1313
	100-YEAR	99.86	3132

REST AREA TYPICAL GRADING DETAIL
N.T.S.

NOTES

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GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP-STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83-9)

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SCALE
0 5m 10m 20m
HORIZONTAL 1:500

LICENSED PROFESSIONAL ENGINEER
B. L. MACKECHNIE
100199554
Sept. 23/24
PROVINCE OF ONTARIO

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CONSULTING ENGINEERS
350 PALLADIUM DRIVE
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TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	BLM
DRAWN	JHB
CHECKED	BLM
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

147 LANGSTAFF DRIVE
CARP, ON

GRADING PLAN

PROJECT No.	19008
SURVEY	RLD
DATED	SEPTEMBER 2024
DWG. No:	19008-GR2

PLAN No. 19168

FILE No. D07-16-21-0012

Brandon Mackechnie

Subject: FW: 147 Langstaff Drive - updates

From: McCormick, Sarah <sarah.mccormick@ottawa.ca>
Sent: October 21, 2025 9:00 AM
To: Robin Daigle <robin@invernesshomes.ca>; Joshua Laginski <joshua@invernesshomes.ca>
Cc: Brown, Adam <Adam.Brown@ottawa.ca>; Jack Stirling <jack@tsgdi.ca>; Alison Stirling <alison@tsgdi.ca>; Kyle MacHutchon <kyle@invernesshomes.ca>; michael.polowin <michael.polowin@gowlingwlg.com>
Subject: 147 Langstaff Drive - updates

Good morning,

We have been advised by our Infrastructure and Planning group, that after reviewing the residual capacity of both the sanitary and water services within the Village of Carp that sufficient capacity is available for the 39-unit apartment dwelling on Block 12 of the draft 4M Plan. Boundary conditions for this block will be made available to you shortly, under separate cover.

Further, please see below the new and revised conditions proposed for the subdivision agreement, for your review and concurrence. I note that Block 12 has been left out of the Phase 2 lands given the above servicing capacity update.

New Conditions

a) Phasing: The Owner acknowledges and agrees that while the subdivision is being registered in whole, that development will occur in phases as follows: (a) Phase 1 is to include Street 1 (Hilversum Lane), Blocks 1-5, 12-23; and (b) Phase 2 is to include Street 2 (Fair Isle Court) and Blocks 6 to 11. The Owner further acknowledges and agrees that Phase 2 of development can only occur once it has been demonstrated that sufficient water and sanitary capacity is available for the Phase 2 lands.
b) Inhibiting order: The Owners acknowledges and agrees that an inhibiting order will be left on lands within Phase 2 of the development until: (a) it is demonstrated that sufficient sanitary and water capacity is available to service the Blocks; and (b) that securities, fees and insurance documents for Phase 2, have been provided to the City.
c) Lifting of hold: The Owner acknowledges and agrees that the holding zone on Blocks 6-11, can only be lifted once the following occurs: (a) it is demonstrated that sufficient sanitary and water capacity is available to service the Blocks; and (b) that securities, fees and insurance documents for Phase 2, have been provided to the City.
d) Block 16: The Owner acknowledges and agrees that Block 16 is of insufficient size in terms of lot area and lot frontage to be considered a buildable lot.

Revise Condition

e) Block 8: Condition 11 of the draft approval will be updated in the subdivision agreement as follows: The Owner(s) of Block 9 is responsible, in perpetuity, for the ownership and maintenance the open area identified as Block 8.

Upon your concurrence of these conditions, I will ask the legal clerk to update the subdivision agreement with these conditions and the other outstanding comments Inverness provided in Robin's email dated September 17th.

If you have any questions or comments related to the above, please do not hesitate to contact me.

Regards,
Sarah

Sarah McCormick **MCIP, RPP**
Planner III / Urbaniste III
Development Review, Rural Services / Examen des projets d'aménagement, Service ruraux
Planning, Development, and Building Services Department
Direction générale des services de la planification, de l'aménagement et du bâtiment

City of Ottawa / Ville d'Ottawa
110 av Laurier Avenue West/ouest - 4th Floor/4e étage
Ottawa, ON, K1P 1J1
613.580.2424 ext./poste 24487

'

Carp Short Term Upgrades: Brief History and Status

Water Resources Planning and Engineering Branch

October 6, 2025

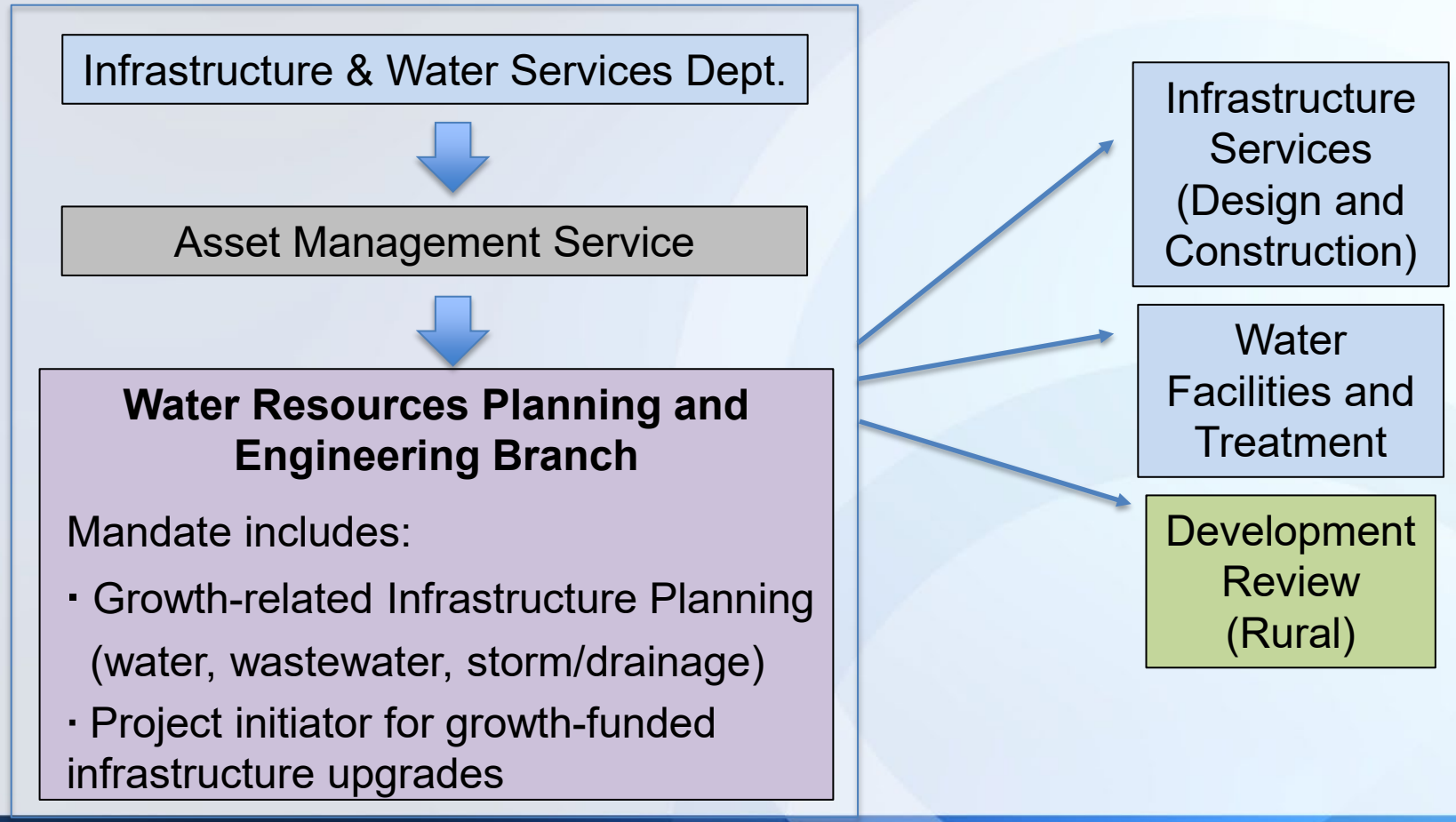
Meeting requested by:
Inverness Homes

Prepared by:
Stan Mathew, P.Eng, Program Manager, Intensification Servicing
Hiran Sandanayake, P.Eng, Manager, Water Resources Planning and Engineering

Meeting Agenda

- Introductions
- Servicing Context for the Village of Carp
- Consequences of Inadequate Capacity
- Scope of Carp Short Term Capacity Upgrades
  - Current Key Project Complexities
  - Project Next Steps

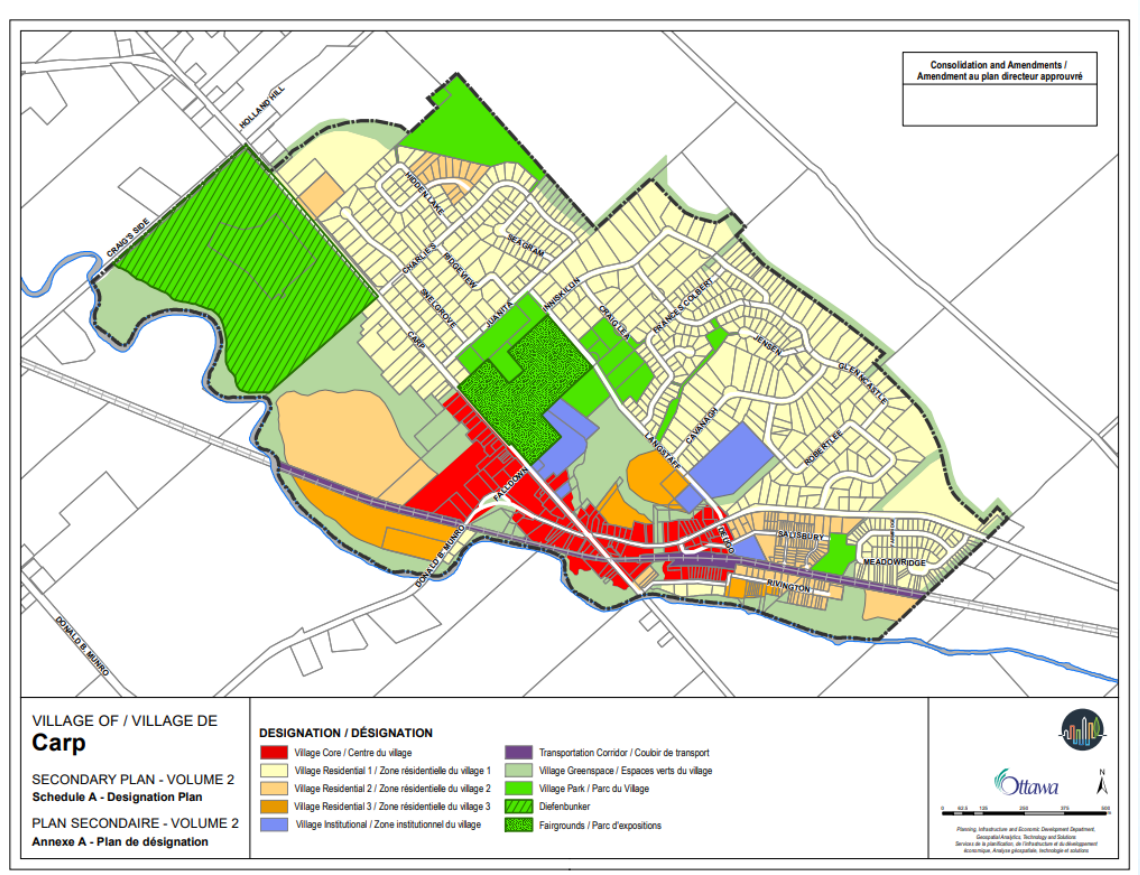
Introductions



Servicing Context for the Village of Carp

Key Milestones

- CDP in 2004
- EA in 2009 (Stantec)
- Short-term Functional Design in 2022
- Short-term Detailed Design in 2024
  - Includes capacity for 147 Langstaff
- Long-term Functional Design in 2025



Consequences of Inadequate Capacity

- **Wastewater**
  - Significant flood risk at the station and existing basements without upgrades (including station overflow)
    - Need upgrade from 51 lps to 75 lps max flow rates, overflow installation
- **Water**
  - Significant level of service (low pressure) risk in the existing system during Max Day and Peak Hour demand scenarios
    - Pumping considerations for maintaining water quality treatment through GAC system
    - Need station upgrade from 14 lps to 27 lps in the Max Day scenario

Scope of Carp Short-term Capacity Upgrades

Creating Capacity for Growth

- **Wastewater (Pumping Station)**
  - Replace pumps (based on existing forcemain constraints)
  - New gravity overflow connection from the station to existing sewer
  - New electrical service, generator; general upgrades to current standards
- **Water (Treatment Plant and Pumping Station)**
  - New pumps: well pumps and station pumps
  - Upgrades to Granulated Activated Carbon process – pumping scheme
  - Addition of provisions for on-site backwash of upgraded GAC system
  - Replacement of electrical services and motor control center

Current Key Project Complexities

Major Design Challenges

- **Wastewater (little to no schedule impacts)**
  - Confirmation of overflow configuration (completed)
  - Other pump station components are generally OK

Current Key Project Complexities

Major Design Challenges

- **Water (moderate schedule risk)**
  - Pumping scheme (managing low flows and much higher peak flows)
    - Critical for existing residents and future growth
  - 2024 well condition assessment
    - Strategy developed to maintain existing well capacity
    - Critical for existing residents and future growth
  - Various operational concerns with changes to GAC filtration and backwash
    - Important for City's ability to maintain delivery of clean, safe drinking water

Project Next Steps

Current Estimated Schedule – Short-term Capacity Upgrades

Milestone	Estimated Date
Complete Detailed Design	Q4 2026
Complete Tendering/Award	Q1 2027
Commence Construction	Q2 2027
Complete Construction	Q4 2028

Appendix B

Site Plan
(prepared by Peter Mansfield Architect)

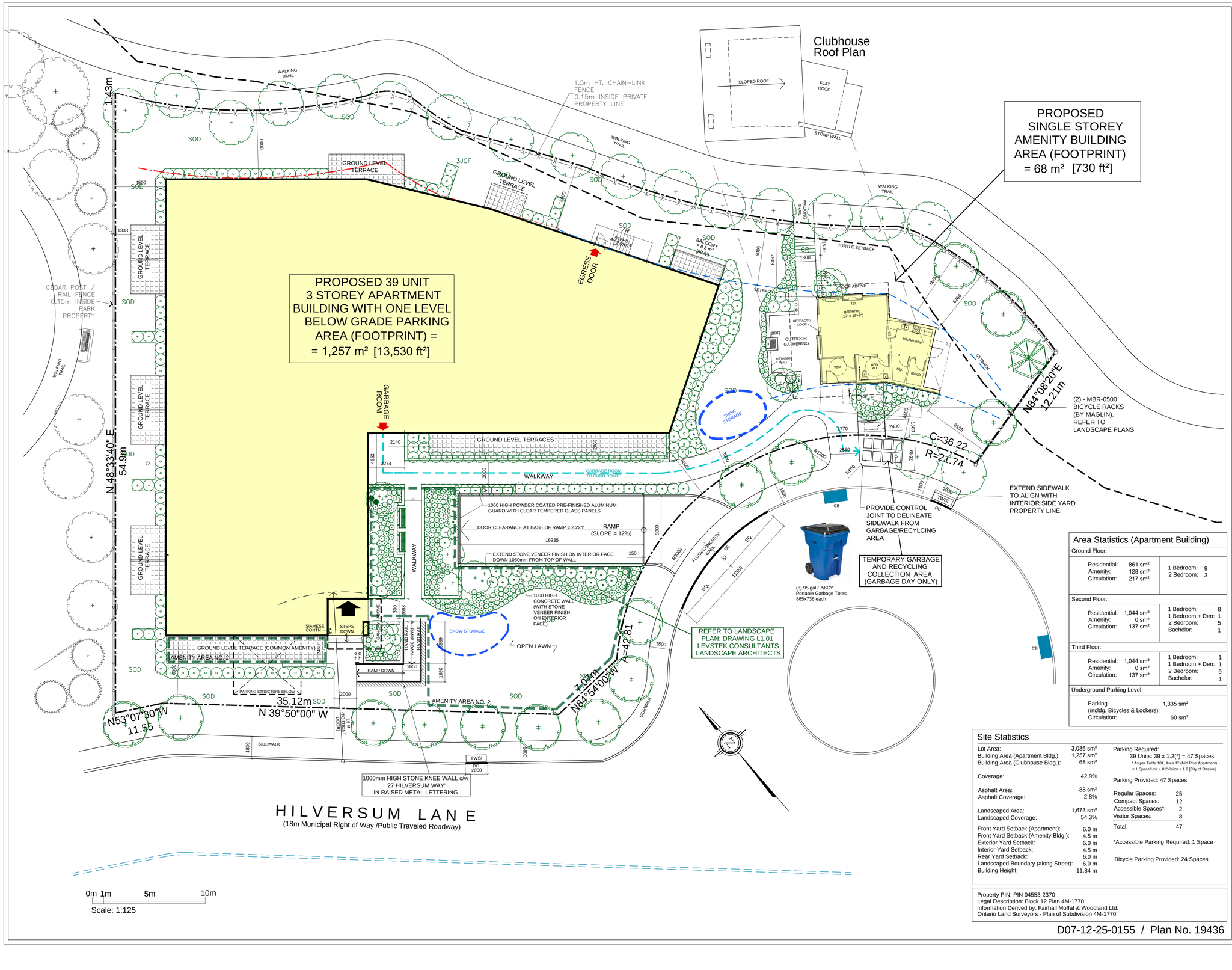
Servicing Plan (DWG. 25094-S1)

Grading and Drainage Plan
(DWG. 25094-GR1)

Notes & Details
(DWG. 25094-N1)

Erosion and Sediment Control Plan
(DWG. 25094-ESC1)

Parking Garage Ramp Plan & Plan
(DWG. 25094-P1)



No.:	Issued For:	Date:
1	For SPA	Nov 03-2025
2	For SPA (WITH LANDSCAPE)	Nov 20-2025
3	For SPA	Nov 24-2025
4	For SPA	Jan 12-2026
5	For SPA	Jan 14-2026
6	For SPA	Jan 21-2026
7	For SPA	Jan 22-2026
8	For SPA	Feb 03-2026
9	SPA Review Comments	Mar 19-2026
10	For SPA	Apr 07-2026
11	For SPA (With Plan No.)	Apr 07-2026

Area Statistics (Apartment Building)

Ground Floor:			
Residential:	861 sm²	1 Bedroom:	9
Amenity:	128 sm²	2 Bedroom:	3
Circulation:	217 sm²		
Second Floor:			
Residential:	1,044 sm²	1 Bedroom:	8
Amenity:	0 sm²	1 Bedroom + Den:	1
Circulation:	137 sm²	2 Bedroom:	5
		Bachelor:	1
Third Floor:			
Residential:	1,044 sm²	1 Bedroom:	1
Amenity:	0 sm²	1 Bedroom + Den:	1
Circulation:	137 sm²	2 Bedroom:	9
		Bachelor:	1
Underground Parking Level:			
Parking (incldg. Bicycles & Lockers):	1,335 sm²		
Circulation:	60 sm²		

Site Statistics

Lot Area:	3,086 sm²
Building Area (Apartment Bldg.):	1,257 sm²
Building Area (Clubhouse Bldg.):	68 sm²
Coverage:	42.9%
Asphalt Area:	88 sm²
Asphalt Coverage:	2.8%
Landscaped Area:	1,673 sm²
Landscaped Coverage:	54.3%
Front Yard Setback (Apartment):	6.0 m
Front Yard Setback (Amenity Bldg.):	4.5 m
Exterior Yard Setback:	6.0 m
Interior Yard Setback:	4.5 m
Rear Yard Setback:	6.0 m
Landscaped Boundary (along Street):	6.0 m
Building Height:	11.84 m

Parking Required:
39 Units: 39 x 1.2(*) = 47 Spaces
* As per Table 101, Area 'D' (Mid Rise Apartment)
= 1 Space/Unit + 0.2/Visitor = 1.2 [City of Ottawa]

Parking Provided: 47 Spaces

Regular Spaces:	25
Compact Spaces:	12
Accessible Spaces*:	2
Visitor Spaces:	8
Total:	47

*Accessible Parking Required: 1 Space

Bicycle Parking Provided: 24 Spaces

Property PIN: PIN 04553-2370
Legal Description: Block 12 Plan 4M-1770
Information Derived by: Fairhall Moffat & Woodland Ltd.
Ontario Land Surveyors - Plan of Subdivision 4M-1770

D07-12-25-0155 / Plan No. 19436

INVERNESS HOMES

Developer:
Inverness Homes
Carp, ON, 613 831-9111
Invernesshomes.ca

Planning:
Brigette Alchawa, MCIP, RPP
Keeper Co.
130 Kings Creek Road, Ashton, ON
bridgette@keeperco.ca

Civil Engineering:
Brandon Mackechnie, P. Eng.
RCI Land Development
2936 Baseline Road, Ottawa, ON
www.rci.com

Landscape Design:
Rudy Levstek, Landscape Architect
Levstek Consultants
5871 Hugh Cresent, Ottawa, ON
rlevstek@larocquelevstek.com

Surveyor:
John H. Cutri OLS, President
Fairhall Moffatt & Woodland Limited
Ontario Land Surveyors
100-600 Terry Fox Drive, Kanata, ON
(613) 591-2580 / john@fmw.ca

Project North Arrow:

Actual North Arrow:

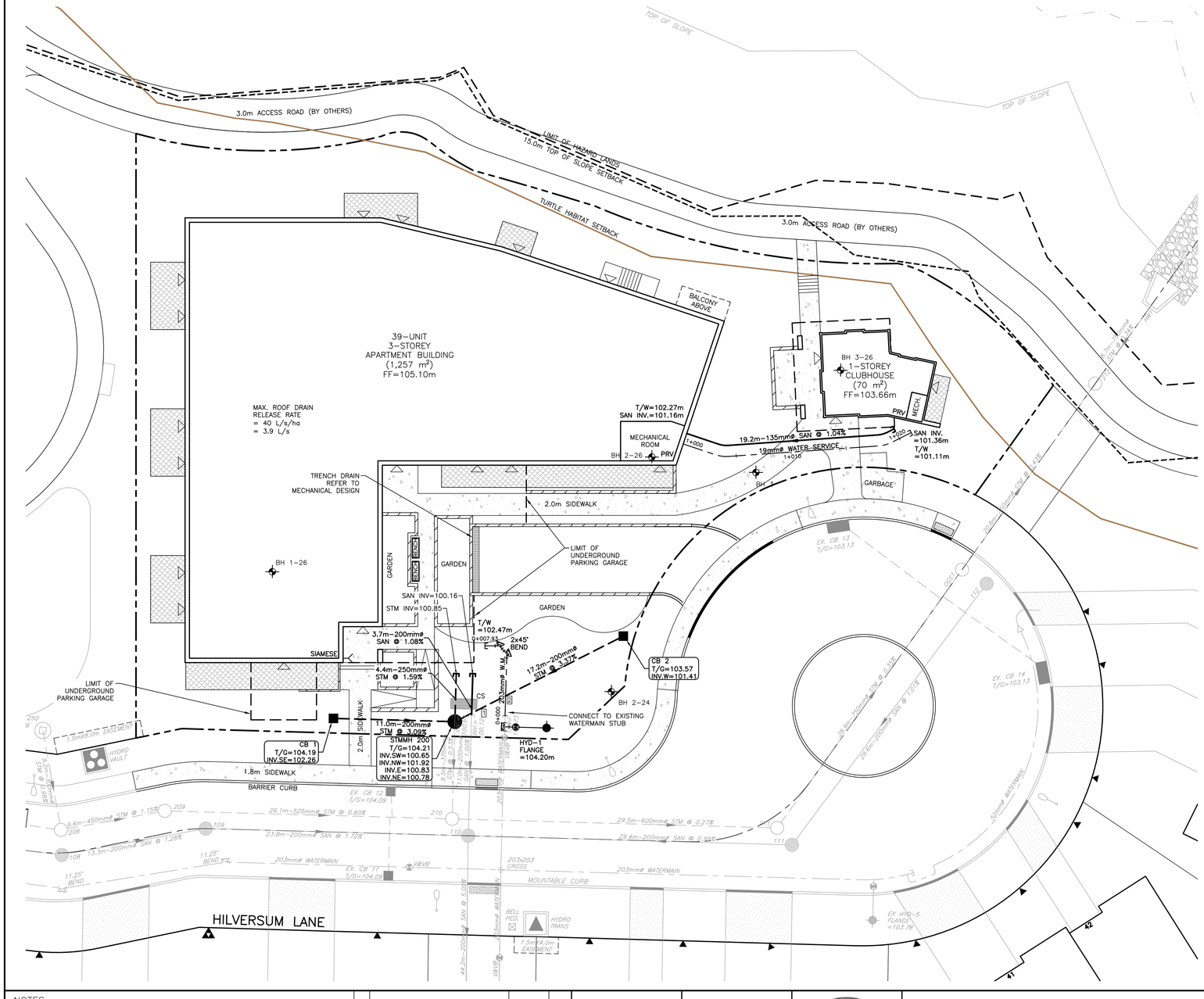
ONTARIO ASSOCIATION OF ARCHITECTS
PETER MANSFIELD
LICENCE
5450

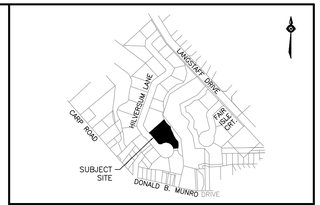
Architect:
Peter Mansfield, Architect
B. Tech., M. Arch., O.A.A.
122 Bridge Street, Almonte, ON
613-256-5213

Project Title:
Proposed 39 Unit Apartment Building
391 Hilversum Lane, Carp, ON

Drawing List:
Site Plan

Job No.:	2404	Drawing No.:	A0.0
Scale:	As Noted		
Date:	Nov 03-2025		
Drawn By:	PM	Reviewed By:	PM





KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- 15.0m TOP OF SLOPE SETBACK
- TURTLE HABITAT SETBACK (AS PER EIS)
- EXISTING HYDRANT
- EXISTING CATCH BASIN
- EXISTING WATERMAIN
- EXISTING VALVE & VALVE BOX
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- EXISTING LIGHT STANDARD
- PROPOSED HYDRANT
- WATERMAIN
- V&VB — VALVE & VALVE BOX
- PRV — PRESSURE REDUCING VALVE
- SIAMESE CONNECTION
- CATCH BASIN
- SANITARY SEWER & MANHOLE
- STORM SEWER & MANHOLE
- CS — CLAY SEAL (CITY STD. S8)
- SC — ROOF SCUPPER
- BUILDING ENTRANCE
- CROSSING NUMBER
- INSULATION (AS PER CITY STD. W22/S35)
- BOREHOLE (REFER TO GEOTECHNICAL REPORT)

CROSSING TABLE

CROSSING No.	SERVICE	TOP/BOTTOM OF PIPE (m)	SEPARATION (m)
1	STORM	101.05	0.73
	SANITARY	100.32	
2	WATER	101.72	0.50
	STORM	101.22	

NOTES:
1. SEPARATIONS ARE MEASURED TO OUTSIDE OF PIPE DIMENSIONS.

203mmø WATERMAIN GRADE TABLE – BUILDING SERVICE

STATION	FINISHED GRADE (m)	TOP OF WATER (m)	COVER DEPTH (m)	COMMENTS
0+000	104.10	101.73	2.37	CONNECT TO EXISTING STUB
0+001.8	104.35	101.95	2.40	STORM CROSSING
0+005.6	104.63	102.23	2.40	45° HORZ. BEND
0+006.6	104.73	102.33	2.40	45° HORZ. BEND
0+007.9	104.87	102.47	2.40	CAP

19mmø WATERMAIN GRADE TABLE – CLUB HOUSE SERVICE

STATION	FINISHED GRADE (m)	TOP OF WATER (m)	COVER DEPTH (m)	COMMENTS
1+000	104.67	102.27	2.40	MECHANICAL ROOM
1+010	103.62	101.22	2.40	TOP OF WATERMAIN
1+020	103.44	101.04	2.40	TOP OF WATERMAIN
1+021.2	103.51	101.11	2.40	CAP

NOTES:
1. CONNECTIONS TO LIVE WATERMAINS TO BE COMPLETED BY CITY FORCES. CONTRACTOR TO PROVIDE EXCAVATION, MATERIAL, BACKFILL AND ASSISTANCE AS REQUIRED.

NOT FOR CONSTRUCTION

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP–STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83–9)

NO.	REVISION DESCRIPTION	DATE	BY
3	REVISED PER CITY/MVCA COMMENTS	08/04/26	BLM
2	REVISED PER CITY COMMENTS	12/02/26	BLM
1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE
0 2m 4m 8m
HORIZONTAL 1:200

LICENSED PROFESSIONAL ENGINEER
B.L. MACKECHNIE
100199554
APR. 26
PROVINCE OF ONTARIO

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
CHECKED	SG
APPROVED	BLM

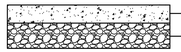
INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

391 HILVERSUM LANE
CARP, ON

SERVICING PLAN

PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-S1

FILE No. D07-12-25-0155 PLAN No. 19436

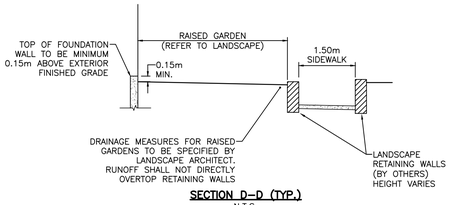


150mm THICKNESS
EXPOSURE CLASS C2
32 MPa CONCRETE (5 TO 8% AIR ENTRAINMENT)

300mm THICKNESS
OPSS GRANULAR A CRUSHED STONE

NOTES:
1. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, DATED FEBRUARY 11, 2026.
2. GEOTECHNICAL CONSULTANT TO REVIEW SUBGRADE PRIOR TO PLACEMENT OF GRANULARS.

PARKING GARAGE RAMP STRUCTURE DETAIL
N.T.S.



SECTION D–D (TYP.)
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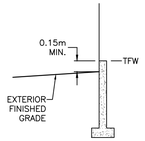
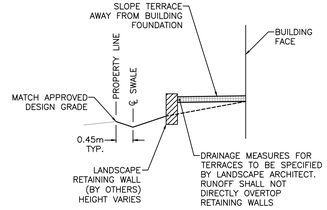


TYPICAL FOUNDATION DETAIL
N.T.S.



SECTION A–A (TYP.)
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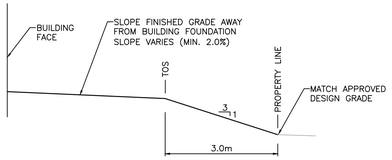
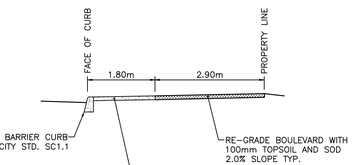
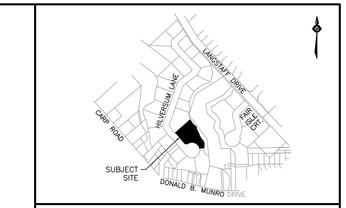


SECTION B–B (TYP.)
N.T.S.



SECTION C–C (TYP.)
N.T.S.

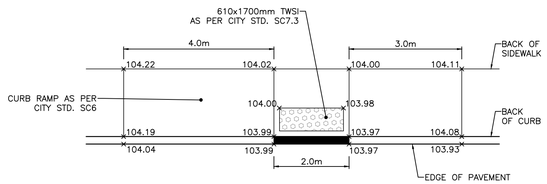


KEY PLAN

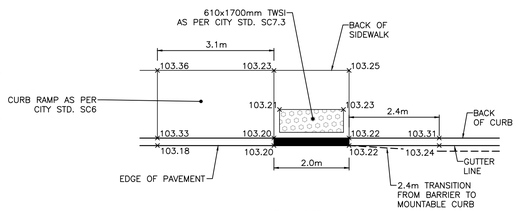
LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- 15.0m TOP OF SLOPE SETBACK
- TURTLE HABITAT SETBACK (AS PER EIS)
- ×103.00 EXISTING ELEVATION
- ×104.00 PROPOSED GRADE
- ×104.00 APPROVED DESIGN GRADE
- 2.0% PROPOSED DRAINAGE SLOPE & DIRECTION
- 3R PROPOSED NUMBER OF RISERS
- EXISTING HYDRANT
- EXISTING CATCH BASIN
- EXISTING SANITARY MANHOLE
- EXISTING STORM MANHOLE
- EXISTING LIGHT STANDARD
- PROPOSED HYDRANT
- CATCH BASIN
- STORM MANHOLE
- BUILDING ENTRANCE
- BOREHOLE (REFER TO GEOTECHNICAL REPORT)
- TERRACING (3H:1V MAX.)
- SWALE
- RETAINING WALL
- H.P. HIGH POINT
- DC DEPRESSED CURB WITH TWSI
- MAJOR OVERLAND FLOW ROUTE
- MAX. STATIC PONDING LIMIT
  - PA–1 PONDING AREA ID
  - El_{MAX} MAXIMUM STATIC PONDING ELEVATION
  - V_{MAX} MAXIMUM AVAILABLE SURFACE STORAGE
  - d_{MAX} MAXIMUM STATIC PONDING DEPTH
- SNOW STORAGE (REFER TO SITE PLAN)

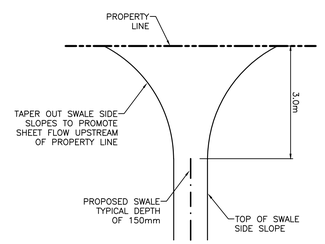
NOTE: NO SURFACE PONDING OCCURS DURING THE 2–YEAR THROUGH 100–YEAR DESIGN EVENTS.



TWSI DETAIL 1
N.T.S.



TWSI DETAIL 2
N.T.S.



REAR SWALE TERMINATION (TYP.)
N.T.S.

NOT FOR CONSTRUCTION

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1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE
0 2m 4m 8m
HORIZONTAL 1:200

B.L. MACKECHNIE 100199554 PROVINCE OF ONTARIO

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
CHECKED	SG
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

391 HILVERSUM LANE
CARP, ON

GRADING AND DRAINAGE PLAN

PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-GR1

FILE No. D07-12-25-0155 PLAN No. 19436

GENERAL NOTES:

1. ALL WORKS AND MATERIALS SHALL CONFORM TO THE LATEST REVISIONS OF THE STANDARDS AND SPECIFICATIONS OF THE CITY OF OTTAWA AND ONTARIO PROVINCIAL STANDARD DRAWINGS (OPSD) AND SPECIFICATIONS (OPSS), AS AMENDED BY THE CITY OF OTTAWA.
2. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING UTILITIES WITHIN THE SITE AND ADJACENT WORK AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY SERVICES OR UTILITIES DISTURBED DURING CONSTRUCTION, TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION.
3. ALL DIMENSIONS AND ELEVATIONS SHALL BE CHECKED AND VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER.
4. DESIGN ELEVATIONS GIVEN ARE TO BE ADHERED TO WITH NO CHANGES WITHOUT PRIOR WRITTEN APPROVAL BY ROBINSON LAND DEVELOPMENT.
5. ANY AREAS BEYOND THE LIMIT OF THE SITE DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE AUTHORITY HAVING JURISDICTION AT THE CONTRACTOR'S EXPENSE.
6. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
7. ALL CONSTRUCTION SIGNAGE MUST CONFORM TO THE M.T.O. MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (LATEST AMENDMENT).
8. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
9. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL BEDDING OR ADDITIONAL STRENGTH PIPE IF THE MAXIMUM TRENCH WIDTH, AS SPECIFIED BY OPSD, IS EXCEEDED.
10. ALL NECESSARY CLEARING AND GRUBBING SHALL BE COMPLETED BY THE CONTRACTOR. REVIEW WITH THE CITY OF OTTAWA PRIOR TO AND TREE CUTTING.
11. REFER TO GEOTECHNICAL INVESTIGATION PREPARED BY PATERSON GROUP, DATED FEBRUARY 11, 2026.
12. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL PROVIDE FOR DEWATERING, SUPPORT AND PROTECTION OF EXCAVATIONS AND TRENCHING AS WELL AS RELEASE OF ANY PUMPED GROUNDWATER IN A CONTROLLED AND APPROVED MANNER.
13. DO NOT CONSTRUCT USING DRAWINGS THAT ARE NOT MARKED "ISSUED FOR CONSTRUCTION".
14. CONTRACTOR IS RESPONSIBLE FOR ALL LAYOUT FOR CONSTRUCTION PURPOSES.
15. CLAY SEALS SHALL BE INSTALLED WITHIN SEWER TRENCHES THAT ARE 4.0m OR GREATER BELOW FINISHED GRADE. CLAY SEALS SHALL BE INSTALLED IN ACCORDANCE WITH OTT STANDARD S8.
16. MOVEMENT OF MATERIAL ON AND/OR OFF SITE SHALL BE IN ACCORDANCE WITH ONTARIO EXCESS SOIL REGULATION O.REG. 406/19.
17. THE CONTRACTOR SHALL COMPLETE A CCTV INSPECTION OF ALL NEW SANITARY AND STORM SEWERS. A COPY OF THE VIDEO INSPECTION SHALL BE PROVIDED TO THE ENGINEER FOR REVIEW.

STORM SEWERS:

1. ALL REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.2 (LATEST AMENDMENT). ALL NON-REINFORCED CONCRETE STORM SEWER PIPE SHALL BE IN ACCORDANCE WITH CSA A257.1 (LATEST AMENDMENT). PIPE SHALL BE JOINTED WITH STD. RUBBER GASKETS AS PER CSA A257.3 (LATEST AMENDMENT).
2. ALL STORM SEWER TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. S6 AND S7 CLASS 'B' UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC STORM SEWERS ARE TO BE SDR 35 APPROVED PER C.S.A. B182.2 OR LATEST AMENDMENT, UNLESS OTHERWISE SPECIFIED.
4. STORM MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.1.
5. CATCH BASIN MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S28.1.
6. STORM SEWER MANHOLES SERVING SEWERS LESS THAN 900mm SHALL BE CONSTRUCTED WITH A 300mm SUMP. FOR STORM SEWERS 900mm AND OVER USE BENCHING IN ACCORDANCE WITH OPSD 701.021.
7. THE STORM SEWER DESIGN CLASSES HAVE BEEN DESIGNED BASED ON BEDDING CONDITIONS SPECIFIED ABOVE. WHERE THE SPECIFIED TRENCH WIDTH IS EXCEEDED, THE CONTRACTOR SHALL BE REQUIRED TO PROVIDE ADDITIONAL BEDDING, A DIFFERENT TYPE OF BEDDING OR A HIGHER PIPE STRENGTH AT THEIR OWN EXPENSE AND SHALL ALSO BE RESPONSIBLE FOR EXTRA TEMPORARY AND/OR PERMANENT REPAIRS MADE NECESSARY BY THE WIDENED TRENCH.
8. ALL STORM MANHOLES SHALL BE 1200mm DIAMETER AS PER OPSD 701.010 UNLESS OTHERWISE NOTED.
9. ALL CATCH BASINS SHALL BE 600mm X 600mm AS PER OPSD 705.010 UNLESS OTHERWISE NOTED.

SANITARY SEWERS:

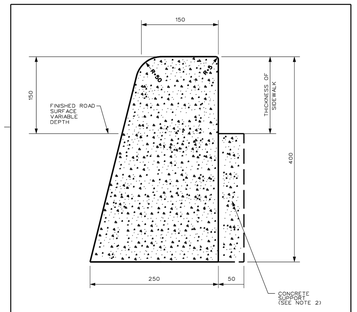
1. ALL SANITARY SEWERS 200mm IN DIAMETER (OR GREATER) SHALL BE PVC SDR 35, IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
2. ALL SANITARY SERVICES 135mm IN DIAMETER SHALL BE PVC SDR 38, IN ACCORDANCE WITH CITY OF OTTAWA STANDARDS.
3. ALL SANITARY SEWERS/SERVICES WITH LESS THAN 2.5m HORIZONTAL SEPARATION TO WATERMAINS SHALL BE CONSTRUCTED USING SEWER PIPE IN ACCORDANCE WITH OPSS 1841, WITH JOINTS CAPABLE OF 345 kPa MINIMUM, CONFORMING TO PSM PVC, CSA B182.2/CSA 182.7 OR CSA B137.3 OR AWWA 302.
4. SANITARY SEWER TRENCH AND BEDDING SHALL BE AS PER CITY OF OTTAWA STD. S6 AND S7, CLASS 'B' BEDDING UNLESS OTHERWISE NOTED.
5. ALL SANITARY SERVICES ARE TO BE EQUIPPED WITH APPROVED BACKWATER VALVES.
6. SANITARY MANHOLE FRAME AND COVERS SHALL BE AS PER CITY OF OTTAWA STD. S24.
7. SANITARY SEWER MANHOLES SHALL BE BENCHED AS PER OPSD 701.021.
8. FOR SANITARY MANHOLES, DEPENDING ON THE ELEVATION OF THE GROUNDWATER TABLE, AND BASED ON THE RECOMMENDATION OF THE PROJECT GEOTECHNICAL CONSULTANT, CRETEX SEALS, OR A SIMILAR PRODUCT, SHALL BE INSTALLED IN THE PRE-CAST MANHOLE SECTION TO JUST BELOW THE MANHOLE FRAME TO PREVENT INFILTRATION.
9. CONTRACTOR SHALL PERFORM EXFILTRATION TESTING, IN THE PRESENCE OF THE CONSULTANT, FOR ALL SANITARY SEWERS IN ACCORDANCE WITH OPSS 410.

WATER SUPPLY:

1. ALL PVC WATERMAINS SHALL BE EQUAL TO AWWA C-900 CLASS 150, SDR 18, OR APPROVED EQUAL.
2. WATERMAIN TRENCH AND BEDDING SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STANDARD W17, UNLESS OTHERWISE SPECIFIED. BEDDING AND COVER MATERIAL SHALL BE SPECIFIED BY PROJECT GEOTECHNICAL ENGINEER.
3. ALL PVC WATERMAINS SHALL BE INSTALLED WITH A 10 GAUGE STRANDED COPPER TWU OR RWU TRACER WIRE IN ACCORDANCE WITH CITY OF OTTAWA STD. W36.
4. CATHODIC PROTECTION IS REQUIRED ON ALL METALLIC FITTINGS AS PER CITY OF OTTAWA STD. W40 AND W42.
5. CONTRACTOR TO SUPPLY HYDRANT EXTENSION TO ADJUST THE LENGTH OF HYDRANT BARREL IF REQUIRED.
6. FIRE HYDRANTS SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W19, AND LOCATED AS PER CITY STD. W18.
7. VALVE IN BOXES SHALL BE INSTALLED AS PER CITY OF OTTAWA STD. W24.
8. WATERMAIN IN FILL AREAS TO BE INSTALLED WITH RESTRAINED JOINTS AS PER CITY OF OTTAWA STD. W25.5 AND W25.6.
9. THRUST BLOCKING OF WATERMAIN TO BE INSTALLED AS PER CITY OF OTTAWA STD. W25.3 AND W25.4.
10. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY CAPS, PLUGS AND BLOW-OFFS AND NOZZLES REQUIRED FOR TESTING AND DISINFECTION OF THE WATERMAIN.
11. WATERMAINS CROSSING OVER SEWERS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25.2. BARREL TO BARREL SEPARATION SHALL BE 500mm MINIMUM.
12. WATERMAINS CROSSING BELOW SEWERS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. W25. BARREL TO BARREL SEPARATION SHALL BE 500mm MINIMUM.
13. WATERMAINS SHALL HAVE A MINIMUM COVER DEPTH OF 2.4m MEASURED FROM FINISHED GRADE. WHERE SUFFICIENT COVER CANNOT BE ACHIEVED, PROVIDE THERMAL INSULATION IN ACCORDANCE WITH CITY OF OTTAWA STD. W22.
14. CONNECTION TO EXISTING WATERMAIN TO BE PERFORMED BY CITY FORCES. CONTRACTOR TO PROVIDE EXCAVATION, MATERIAL, BACKFILL AND ASSISTANCE AS REQUIRED.
15. SWABBING, DISINFECTION, AND HYDROSTATIC TESTING TO BE CONDUCTED AS PER CITY OF OTTAWA STANDARDS IN THE PRESENCE OF A CITY INSPECTOR AND/OR CONSULTANT.

ROADWORK SPECIFICATIONS:

1. CONCRETE BARRIER CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.1.
2. CONCRETE MOUNTABLE CURB SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC1.3.
3. ALL BARRIER CURB TO BE 150mm ABOVE FINISHED ASPHALT GRADE UNLESS OTHERWISE NOTED.
4. CONCRETE SIDEWALK SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. SC3.
5. TWSIs SHALL BE INSTALLED IN ACCORDANCE WITH CITY OF OTTAWA STD. SC7.3.
6. ANY PAVEMENT REINSTATEMENT FOR SERVICE AND UTILITY CUTS SHALL BE IN ACCORDANCE WITH CITY OF OTTAWA STD. R10.
7. GRANULAR "A" SHALL BE PLACED TO A MINIMUM THICKNESS OF 300mm AROUND ALL STRUCTURES WITHIN PAVEMENT AREA.
8. ALL GRANULAR FOR ROADS SHALL BE COMPACTED TO A MINIMUM OF 98% STANDARD PROCTOR DENSITY.
9. SUB-EXCAVATE SOFT AREAS AND FILL WITH GRANULAR 'B' COMPACTED IN MAXIMUM 300mm LIFTS.
10. ALL EDGES OF DISTURBED PAVEMENT SHALL BE SAW-CUT TO FORM A NEAT AND STRAIGHT LINE PRIOR TO PLACING NEW ASPHALT.
11. REFER TO GEOTECHNICAL INVESTIGATION FOR PARKING GARAGE RAMP STRUCTURE DETAIL.



CONCRETE BARRIER CURB

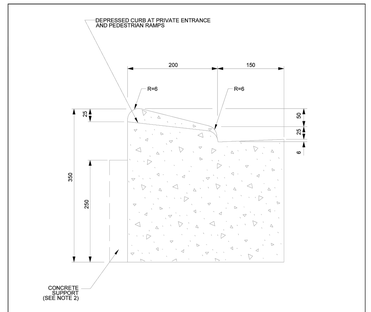
NOTES:

1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSED ACCESS CROSSING.
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK.
3. IF AN EXTRUSION CURBING MACHINE IS USED, THE EXPANSION BITUMINOUS MATERIAL AND THE #15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION.
4. EXPANSION AND CONTRACTION JOINTS AS PER SCS.
5. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 13mm

(DIMENSIONS mm)

NTS

Ottawa	CONCRETE BARRIER CURB FOR GRANULAR BASE PAVEMENT (MODIFIED OPSD 600.110)	DATE: JAN 2003 REV: JANUARY 2026 DWG No.: SC1.1

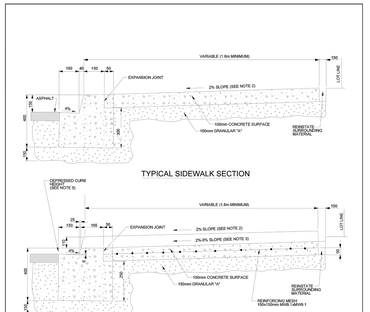


MOUNTABLE CURB WITH GUTTER

NOTES:

1. THE FULL CURB DEPTH SHALL BE CARRIED THROUGH THE DEPRESSED ACCESS CROSSING
2. A CONCRETE SUPPORT IS REQUIRED WHEN BUILT ADJACENT TO THE SIDEWALK
3. IF AN EXTRUSION CURBING MACHINE IS USED, THE EXPANSION BITUMINOUS MATERIAL AND THE #15 DOWELS ARE TO BE PLACED AT THE END OF THE EXTRUSION
4. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED
5. EXPANSION AND DUMMY JOINTS AS PER SCS
6. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 13mm

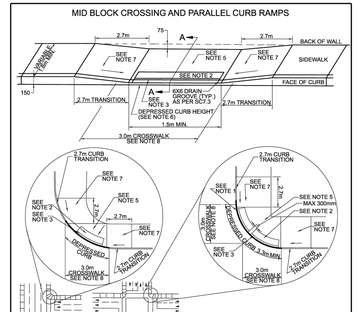
Ottawa	TITLE: CONCRETE MOUNTABLE CURB WITH GUTTER FOR GRANULAR BASE PAVEMENT	DATE: MAR 2003 REV: FEB 2025 DWG No: SC1.3



NOTES:

1. ALL MEASUREMENTS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED
2. THE MAXIMUM SLOPE IS NOT TO EXCEED 2%
3. THE MAXIMUM SLOPE IS NOT TO EXCEED 6% MINIMUM 8%
4. EXPANSION AND DUMMY JOINTS AS PER SCS
5. DEPRESSED CURB HEIGHT - FOR PEDESTRIAN CURB RAMPS 0 TO 6 mm AND FOR PRIVATE ENTRANCES 0 TO 13mm

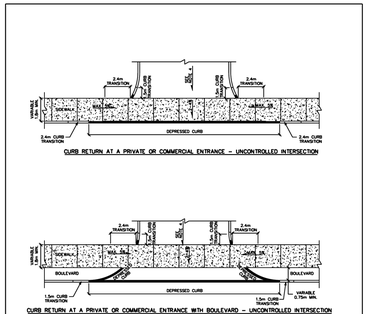
Ottawa	TITLE: CONCRETE CURB AND GUTTER WITH SIDEWALK	DATE: MAY 2001 REV: JULY 2025 DWG No: SC3



NOTES:

1. DOUBLE RAMP WIDTH SHOULD MATCH SIDEWALK WIDTH, BE A MINIMUM OF 3.3m WIDE AND PERMIT WHEELCHAIRS TO ENTER CROSSING AT RIGHT ANGLES
2. PROVIDE 1.5m MINIMUM LANDING AREA (1500 MIN.)
3. TACTILE WALKING SURFACE INDICATOR, RADIUS TO MATCH CURB.
4. 150 TO 200 GAP
5. ALL DIMENSIONS ARE IN MILLIMETRES
6. FOR TRANSITIONARE, MAXIMUM SLOPE OF 2%.
7. DEPRESSED CURB HEIGHT SHALL BE 0 TO 6mm FOR PEDESTRIAN CURB RAMPS AND 0 TO 25mm FOR PRIVATE ENTRANCES, OR EQUAL
8. FOR CURB RAMPS SLOPE OF 2% TO 6% MAXIMUM 8%.
9. REFER TO R15 AND R15.1 FOR RAISED CROSSWALK AND R15.2 FOR AT - GRADE CONCRETE CROSSWALK SUBJECT TO AVOIDANCE OF MISSING CROSSWALK
10. FOR RETROFIT APPLICATIONS ONLY
11. FOR MONOLITHIC SIDEWALK, TWSI SHALL BE 300 TO 350mm BACK FROM CURB FACE.

Ottawa	PEDESTRIAN CURB RAMP WITHOUT BOULEVARD	DATE: MAY 2001 REV: MARCH 2022 DWG. No.: SC6

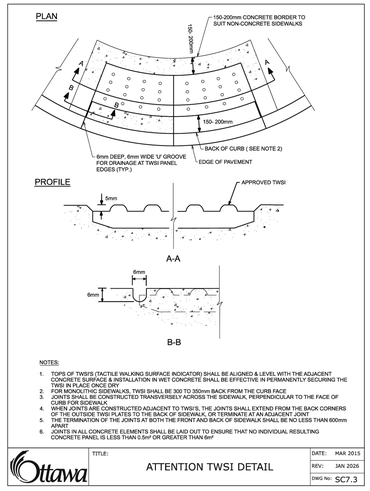


CURB RETURN AT A PRIVATE OR COMMERCIAL ENTRANCE WITH BOULEVARD - UNCONTROLLED INTERSECTION

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
2. CURB DETAILS SEE SC1.1, SC1.2 AND SC1.3.
3. SIDEWALK DETAILS SEE SC2 AND SC3.
4. MAXIMUM SLOPE VARIES, SEE PRIVATE APPROACH BYLAW.
5. UNCONTROLLED INTERSECTION MEANS AN ENTRANCE NOT LOCATED AT A TRAFFIC SIGNAL OR ALL-WAY STOP CONTROL

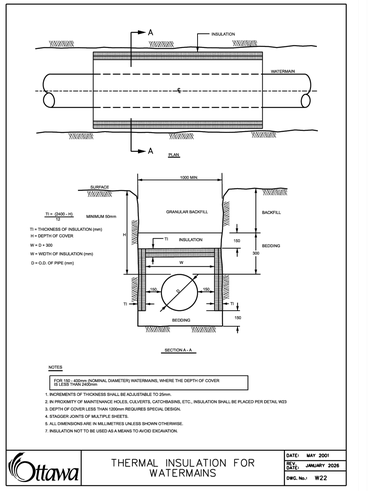
Ottawa	CURB RETURN ENTRANCES - UNCONTROLLED INTERSECTIONS	DATE: MARCH 2007 REVISED DATE: MARCH 2021 DWG. No.: SC7.1



NOTES:

1. TOPS OF TWSI'S (TACTILE WALKING SURFACE INDICATOR) SHALL BE ALIGNED & LEVEL WITH THE ADJACENT CONCRETE SURFACE & INSTALLATION IN WET CONCRETE SHALL BE EFFECTIVE IN PERMANENTLY SECURING THE TWSI IN PLACE ONCE DRY
2. FOR MONOLITHIC SIDEWALKS, TWSI SHALL BE 300 TO 350mm BACK FROM THE CURB FACE
3. JOINTS SHALL BE CONSTRUCTED TRANSVERSELY ACROSS THE SIDEWALK, PERPENDICULAR TO THE FACE OF CURB FOR SIDEWALK
4. WHEN JOINTS ARE CONSTRUCTED ADJACENT TO TWSI'S, THE JOINTS SHALL EXTEND FROM THE BACK CORNERS OF THE OUTSIDE TWSI PLATES TO THE BACK OF SIDEWALK, OR TERMINATE AT AN ADJACENT JOINT
5. THE TERMINATION OF THE JOINTS AT BOTH THE FRONT AND BACK OF SIDEWALK SHALL BE NO LESS THAN 600mm APART.
6. JOINTS IN ALL CONCRETE ELEMENTS SHALL BE LAID OUT TO ENSURE THAT NO INDIVIDUAL RESULTING CONCRETE PANEL IS LESS THAN 0.6m² OR GREATER THAN 6m²

Ottawa	TITLE: ATTENTION TWSI DETAIL	DATE: MAR 2015 REV: JAN 2026 DWG No: SC7.3

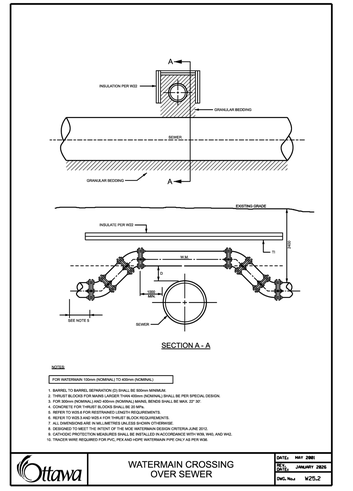


NOTES

FOR 150 - 400mm (NOMINAL DIAMETER) WATERMAINS, WHERE THE DEPTH OF COVER IS LESS THAN 2400mm

1. INCREMENTS OF THICKNESS SHALL BE ADJUSTABLE TO 25mm.
2. IN PROXIMITY OF MAINTENANCE HOLES, CULVERTS, CATCHBASINS, ETC., INSULATION SHALL BE PLACED PER DETAIL W23
3. DEPTH OF COVER LESS THAN 1200mm REQUIRES SPECIAL DESIGN.
4. A STAGGER JOINTS OF MULTIPLE SHEETS.
5. REFER TO W25.3 AND W25.4 FOR THRUST BLOCK REQUIREMENTS.
6. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
7. DESIGNED TO MEET THE INTENT OF THE MOE WATERMAIN DESIGN CRITERIA JUNE 2012.
8. CATHODIC PROTECTION MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH W36, W40, AND W42.
9. INSULATION IS NOT TO BE USED AS A MEANS TO AVOID EXCAVATION.

Ottawa	THERMAL INSULATION FOR WATERMAINS	DATE: MAY 2001 REV: JANUARY 2026 DWG No: W22

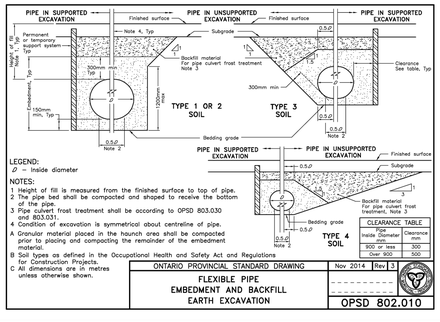


NOTES

FOR WATERMAIN 150mm (NOMINAL) TO 400mm (NOMINAL)

1. BARREL TO BARREL SEPARATION (D) SHALL BE 500mm MINIMUM.
2. FOR WATERMAIN CROSSING ABOVE SEWER, INSULATION SHALL BE PER SPECIAL DESIGN.
3. FOR 300mm (NOMINAL) AND 400mm (NOMINAL) MAINS, BENDS SHALL BE MAX. 22° 30'.
4. CONCRETE FOR THRUST BLOCKS SHALL BE 20 MPa.
5. REFER TO W25.4 FOR RESTRAINED LENGTH REQUIREMENTS.
6. REFER TO W25.3 AND W25.4 FOR THRUST BLOCK REQUIREMENTS.
7. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS SHOWN OTHERWISE.
8. DESIGNED TO MEET THE INTENT OF THE MOE WATERMAIN DESIGN CRITERIA JUNE 2012.
9. CATHODIC PROTECTION MEASURES SHALL BE INSTALLED IN ACCORDANCE WITH W36, W40, AND W42.
10. TRACER WIRE REQUIRED FOR PVC, PEX AND HDPE WATERMAIN TYPE ONLY AS PER W36.

Ottawa	WATERMAIN CROSSING OVER SEWER	DATE: MAY 2001 REV: JANUARY 2026 DWG No.: W25.2



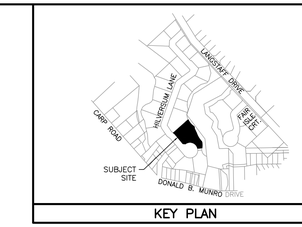
LEGEND:
D = Inside diameter

NOTES:
1 Height of fill is measured from the finished surface to top of pipe.
2 The pipe bed shall be compacted and shaped to receive the bottom of the pipe.
3 Pipe culvert frost treatment shall be according to OPSD 803.030 and 803.031.
4 Condition of excavation is symmetrical about centreline of pipe.
A Granular material placed in the haunch area shall be compacted prior to placing and compacting the remainder of the embedment material.
B Soil types as defined in the Occupational Health and Safety Act and Regulations for Construction Projects.
C All dimensions are in metres unless otherwise shown.

CLEARANCE TABLE

Pipe Inside diameter	Clearance mm
900 or less	300
Over 900	500

ONTARIO PROVINCIAL STANDARD DRAWING		Nov 2014 Rev 3
FLEXIBLE PIPE EMBEDMENT AND BACKFILL EARTH EXCAVATION		OPSD 802.010



KEY PLAN

NOT FOR CONSTRUCTION

NOTES

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GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP-STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83-9)

NO.	REVISION DESCRIPTION	DATE	BY
3	REVISED PER CITY/MVCA COMMENTS	08/04/26	BLM
2	REVISED PER CITY COMMENTS	12/02/26	BLM
1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE

B.L. MACKECHNIE 100199554 — APR. '26 — LICENSED PROFESSIONAL ENGINEER — PROVINCE OF ONTARIO

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
CHECKED	SG
APPROVED	BLM

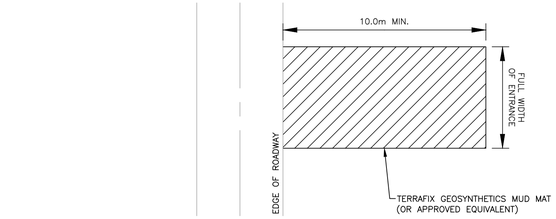
INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

391 HILVERSUM LANE
CARP, ON

NOTES & DETAILS

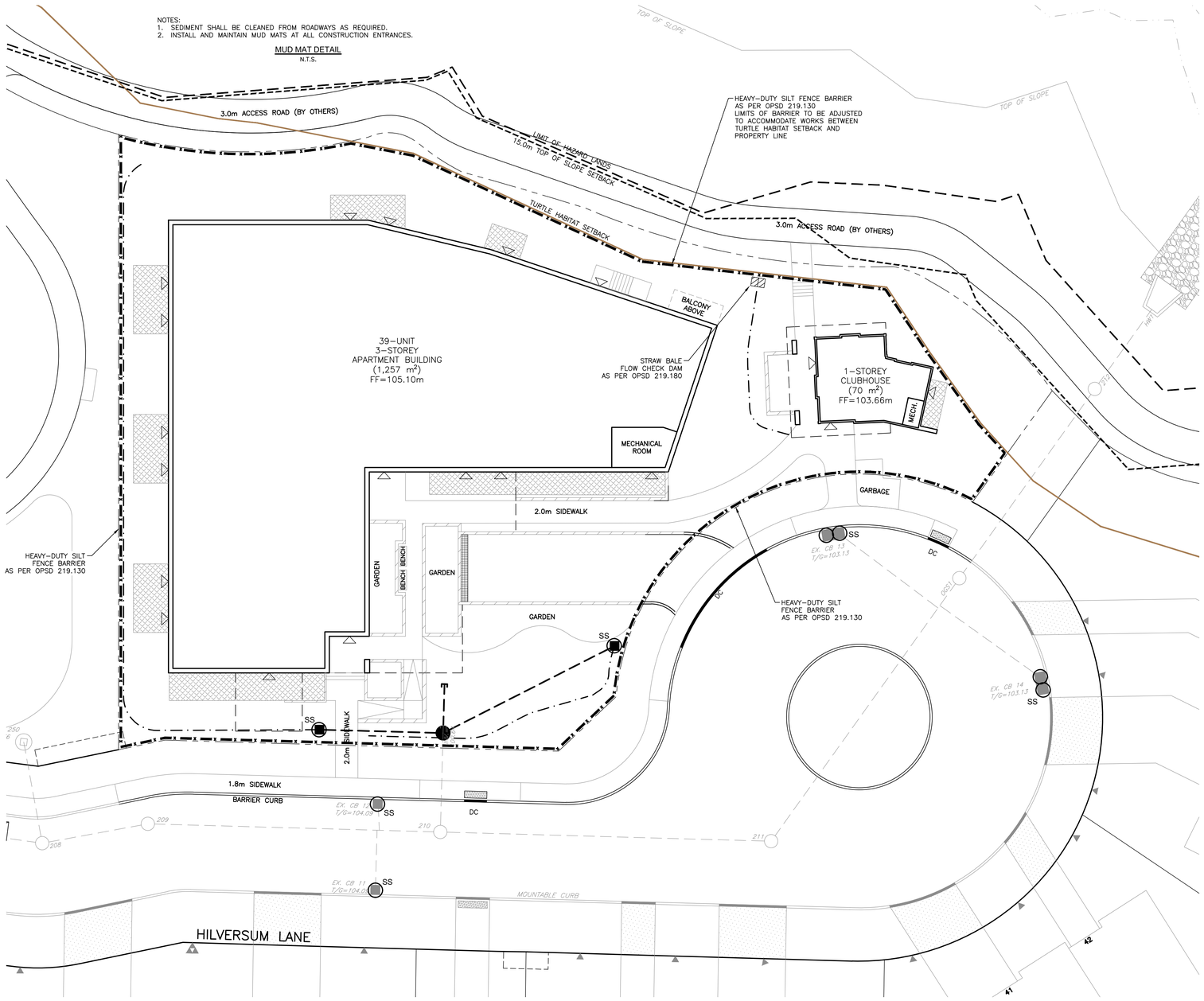
PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-N1

FILE No. D07-12-25-0155 PLAN No. 19436

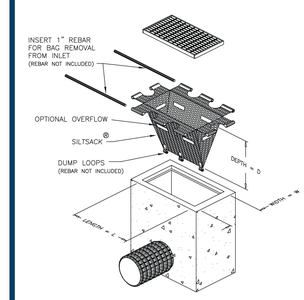


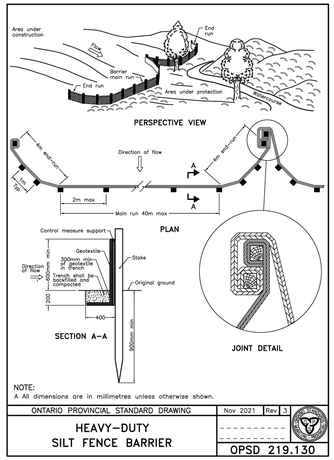
NOTES:
1. SEDIMENT SHALL BE CLEANED FROM ROADWAYS AS REQUIRED.
2. INSTALL AND MAINTAIN MUD MATS AT ALL CONSTRUCTION ENTRANCES.

MUD MAT DETAIL
N.T.S.



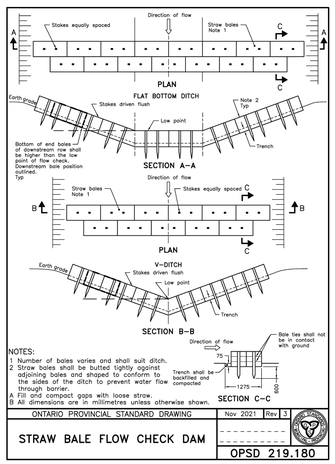
Typical Siltsack® Construction - Type B





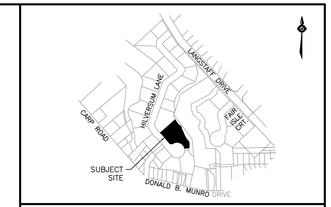
NOTE:
A All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
HEAVY-DUTY SILT FENCE BARRIER		OPSD 219.130



NOTES:
1 Number of bales varies and shall suit ditch.
2 Straw bales shall be butted tightly against adjoining bales and shaped to conform to the sides of the ditch to prevent water flow through barrier.
A Fill and compact gaps with loose straw.
B All dimensions are in millimetres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2021	Rev 3
STRAW BALE FLOW CHECK DAM		OPSD 219.180



KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- 15.0m TOP OF SLOPE SETBACK
- TURTLE HABITAT SETBACK (AS PER EIS)
- EXISTING CATCH BASIN
- EXISTING STORM SEWER & MANHOLE
- CATCH BASIN
- STORM SEWER & MANHOLE
- SWALE
- HEAVY-DUTY SILT FENCE BARRIER
- SILT SACK (OR APPROVED EQUIVALENT) — SS
- STRAW BALE FLOW CHECK DAM

NOTES:

1. THE CONTRACTOR SHALL IMPLEMENT EROSION AND SEDIMENT CONTROL MEASURES TO PROVIDE FOR PROTECTION OF THE AREA DRAINAGE SYSTEM AND THE ULTIMATE RECEIVING WATERCOURSE DURING CONSTRUCTION ACTIVITIES. THE CONTRACTOR ACKNOWLEDGES THAT FAILURE TO IMPLEMENT APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MAY BE SUBJECT TO PENALTIES IMPOSED BY ANY APPLICABLE REGULATORY AGENCY.
2. LIMIT THE EXTENT OF EXPOSED SOILS AT ANY GIVEN TIME.
3. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED UNTIL VEGETATION HAS BEEN RE-ESTABLISHED IN ALL DISTURBED AREAS. RE-VEGETATE DISTURBED AREAS AS SOON AS POSSIBLE.
4. CONTRACTOR SHALL MINIMIZE THE AMOUNT OF STOCKPILED MATERIAL. ALL STOCKPILE SOIL SHALL BE AWAY (15 METRES OR GREATER) FROM WATERCOURSES, DRAINAGE FEATURES AND TOP OF STEEP SLOPES. THE DOWNSTREAM SIDE OF ALL STOCKPILES SHALL BE PROTECTED WITH SILT FENCE, FIBRE ROLLS OR EQUIVALENT MEASURES PRIOR TO A RAINFALL EVENT.
5. SILT SACKS ARE TO BE PLACED UNDERNEATH THE FRAME AND COVER OF ALL PROPOSED AND EXISTING CATCH BASIN AND OPEN COVER STORM MANHOLES UNTIL CONSTRUCTION IS COMPLETED.
6. HEAVY-DUTY SILT FENCE BARRIERS SHALL BE INSTALLED AS PER OPSD 219.130 WHERE INDICATED AND MAINTAINED AS REQUIRED.
7. DURING ACTIVE CONSTRUCTION PERIODS, VISUAL INSPECTIONS SHALL BE UNDERTAKEN ON A WEEKLY BASIS AND AFTER MAJOR STORM EVENTS (>25mm RAIN IN 24 HOUR PERIOD) ON SEDIMENT CONTROL BARRIERS AND ANY DAMAGE REPAIRED IMMEDIATELY.
8. EROSION AND SEDIMENT CONTROL BARRIERS SHALL ALSO BE ASSESSED (AND REPAIRED AS REQUIRED) FOLLOWING SIGNIFICANT SNOWMELT EVENTS.
9. VISUAL INSPECTIONS SHALL ALSO BE UNDERTAKEN IN ANTICIPATION OF LARGE STORM EVENTS (OR A SERIES OF RAINFALL AND/OR SNOWMELT DAYS) THAT COULD POTENTIALLY YIELD SIGNIFICANT RUNOFF VOLUMES.
10. CARE SHALL BE TAKEN TO PREVENT DAMAGE TO EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION OPERATIONS.
11. IN SOME CASES, BARRIERS MAY BE REMOVED TEMPORARILY TO ACCOMMODATE THE CONSTRUCTION OPERATIONS. THE AFFECTED BARRIERS SHALL BE REINSTATED IMMEDIATELY AFTER CONSTRUCTION OPERATIONS ARE COMPLETED.
12. SEDIMENT CONTROL DEVICES SHALL BE CLEANED OF ACCUMULATED SEDIMENTATION AS REQUIRED AND REPLACED AS NECESSARY.
13. DURING THE COURSE OF CONSTRUCTION, IF THE ENGINEER BELIEVES THAT ADDITIONAL PREVENTION METHODS ARE REQUIRED TO CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR SHALL IMPLEMENT ADDITIONAL MEASURES, AS REQUIRED, TO THE SATISFACTION OF THE ENGINEER.
14. CONSTRUCTION AND MAINTENANCE REQUIREMENTS FOR EROSION AND SEDIMENT CONTROLS ARE TO COMPLY WITH OPSS 805.
15. MUD MATS SHALL BE INSTALLED AT ALL CONSTRUCTION ENTRANCES.
16. INSPECTION AND MAINTENANCE OF TEMPORARY ESC MEASURES SHALL CONTINUE UNTIL THEY ARE NO LONGER REQUIRED.
17. THE CONTRACTOR SHALL ENSURE THAT RECORDS OF INSPECTION ARE TAKEN, INCLUDING INSPECTOR'S NAME, DATE OF INSPECTION, VISUAL OBSERVATIONS, AND ANY NECESSARY REMEDIAL MEASURES TAKEN TO MAINTAIN INTERIM ESC MEASURES.

NOT FOR CONSTRUCTION

NOTES

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2	REVISED PER CITY COMMENTS	12/02/26	BLM
1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE
0 2m 4m 8m
HORIZONTAL 1:200

LICENSED PROFESSIONAL ENGINEER
B.L. MACKECHNIE
100199554
PROVINCE OF ONTARIO

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
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APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

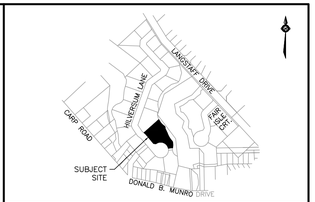
391 HILVERSUM LANE
CARP, ON

EROSION AND SEDIMENT CONTROL PLAN

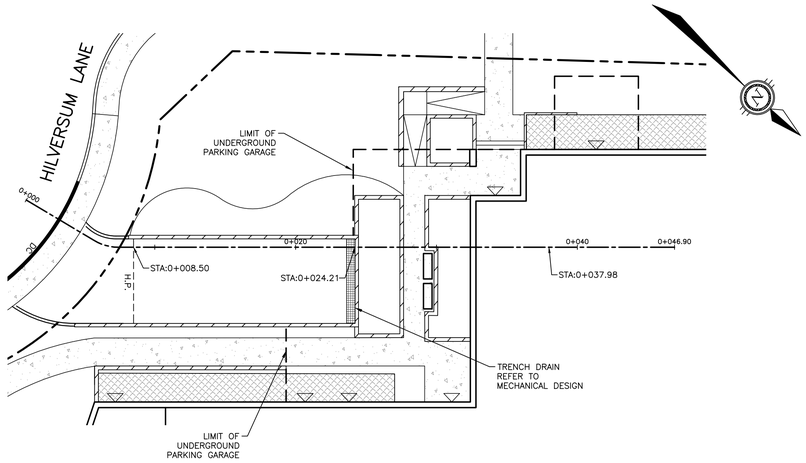
PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-ESC1

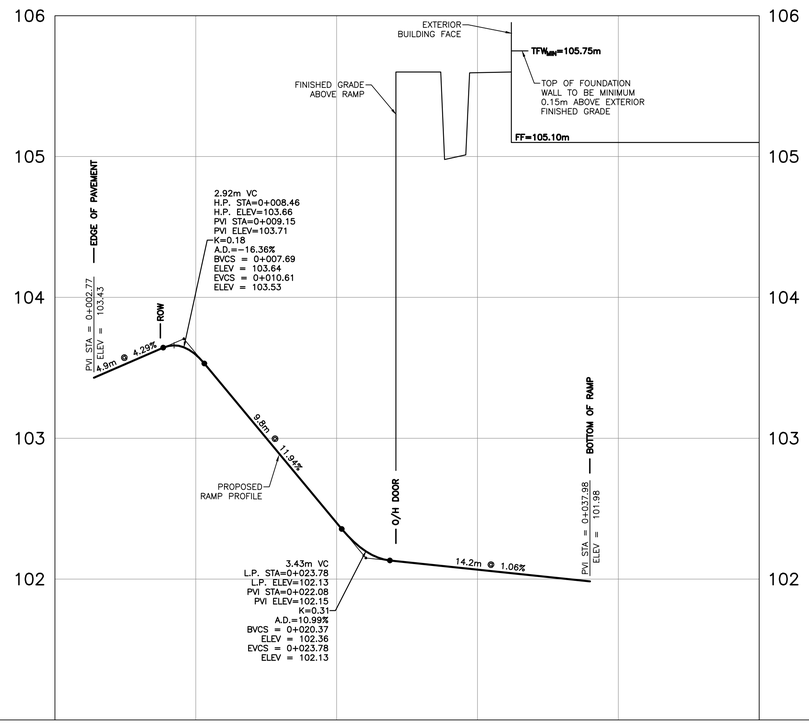
FILE No. D07-12-25-0155 PLAN No. 19438

NOT FOR CONSTRUCTION



KEY PLAN





PROPOSED RAMP ELEVATION											PROPOSED RAMP ELEVATION
	103.43	103.66	103.65	103.59	102.40	102.20	102.07	101.98			
CHAINAGE	0+000		0+010		0+020		0+030		0+040	0+050	CHAINAGE

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP–STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83–9)

NO.	REVISION DESCRIPTION	DATE	BY
3	REVISED PER CITY/MVCA COMMENTS	08/04/26	BLM
2	REVISED PER CITY COMMENTS	12/02/26	BLM
1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE

HORIZONTAL 1:200 (0, 2m, 4m, 8m)

VERTICAL 1:20 (0, 0.2m, 0.4m, 0.8m)

LICENSED PROFESSIONAL ENGINEER — B.L. MACKECHNIE — 100199554 — PROVINCE OF ONTARIO — Apr. '26

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
CHECKED	SG
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

391 HILVERSUM LANE
CARP, ON

PARKING GARAGE RAMP
PLAN & PROFILE

PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-P1

FILE No. D07-12-25-0155 PLAN No. 19436

Appendix C

Robinson Report Excerpts

Water Demand Calculations

Fire Flow Calculations (OBC)

Boundary Conditions

Figure 3.0: Hydraulic Water Model

Table C1: Peak Hour Model Outputs

Table C2: Max. Day Model Outputs

Table C3: Pipe Report

Figure 4.0: Hydrant Coverage Plan

Given the large difference in flow requirements between the peak hourly flow and fire flow, the City may consider assuming the firm capacity consists of the sum of the pump capacities with the largest unit out of service. The degree of fire protection to be provided for a municipality is to the discretion of the municipality. The plant is originally designed with one standby pump and it would be reasonable to continue with one standby pump in the future.

Functional Design Report (prepared by RVA, dated July 2022)

With regards to the water treatment facility, the proposed upgrades include replacement of the well pumps, MCC, standby generator (which provides standby power to both the water treatment facility and wastewater pumping station), and additional piping and site improvements to allow for the use of frac tanks for GAC backwashing.

The proposed improvements are intended to provide a short term upgrade to the water treatment facility and wastewater pumping station, to improve the reliability of both facilities, provide additional capacity to allow for development within the catchment area of the facilities, and ensure compliance with NFPA 820 requirements. It is understood that the long term plan for the water treatment facility and the pumping station involves significant capacity expansion, including twinning the sewage forcemain and potentially connecting the village of Carp to the City's main water distribution system, all of which will be examined as part of a separate assignment and are not included in the scope of work for this assignment. [source: RVA Report]

Through recent consultations, the City of Ottawa has indicated that the available fire flow for the proposed development is 6,750 L/min (112.5 L/s; capacity of a single high lift pump) based on the findings of the RVA Report. This is a reduction from the available fire flow of 9,300 L/min (155 L/s) provided by the City in 2019. Refer to correspondence with the City in **Appendix B**.

5.2 Proposed System

A new municipal watermain system with connections to the existing village system will be required to service the proposed development for domestic use and fire protection. The watermain system for the proposed development will provide a total of three connections to the existing watermain systems as follows:

- A connection to the existing 203 mm diameter watermain on Langstaff Drive via Street 1 (to be completed as part of Phase 1).
- A connection to the existing 305 mm diameter watermain on Carp Road via the unopened John Street road allowance (to be completed as part of Phase 1).
- A connection to the existing 203 mm diameter watermain on Langstaff Drive via Street 2 (to be completed as part of Phase 2).

The proposed municipal watermains have been designed to be 203 mm in diameter in keeping with current City standards. Each townhouse unit will be serviced with individual 19 mm water services. The apartment blocks (to be developed under separate site plan applications) will be provided with 203 mm diameter watermain stubs. New fire hydrants will be provided within the municipal right-of-ways with maximum spacing of 110 metres in accordance with the current Ottawa Water Design Guidelines (OWDG).

5.3 Water Distribution Hydraulic Model

A water distribution hydraulic model was created using H2OMap Water software for the proposed development. The hydraulic model incorporated the proposed watermain layout,

proposed hydrant locations and hydrant elevations, boundary conditions, and typical "C" factors in accordance with the current OWDG. Refer to the developed hydraulic model and boundary conditions provided in **Appendix B**.

5.4 Domestic Water Demands

Since the total population for the development is less than 500 persons, maximum day and maximum hour peaking factors shall follow Table 3-3 of the MECP Water Design Guidelines as per Section 4.2.8 of the OWDG. Domestic water demands have been calculated for each phase of the development in accordance with the current OWDG as follows:

• Average Day Demand	280 L/person/day	(OWDG; ISTB-2021-03)
• Max. Daily Demand	2.9 x Avg. Day	(MECP; Table 3-3)
• Max. Hourly Demand	4.3 x Avg. Day	(MECP; Table 3-3)
• Townhouses	2.7 persons/unit	(OWDG; Table 4.1)
• Apartments	2.1 persons/unit	(OWDG; Table 4.1)

Phase 1

Population = (73 TH units x 2.7 cap/unit) + (32 apt. units x 2.1 cap/unit) = **264.3 persons**

Average Day Demand = (264.3 persons) x (280 L/person/day) / 86400 s/day = **0.86 L/s**

Maximum Daily Demand = (2.9) x (0.86 L/s) = **2.48 L/s**

Maximum Hour Demand = (4.3) x (0.86 L/s) = **3.68 L/s**

Phase 2

Population = (8 TH units x 2.7 cap/unit) + (96 apt. units x 2.1 cap/unit) = **223.2 persons**

Average Day Demand = (223.2 persons) x (280 L/person/day) / 86400 s/day = **0.72 L/s**

Maximum Daily Demand = (2.9) x (0.72 L/s) = **2.10 L/s**

Maximum Hour Demand = (4.3) x (0.72 L/s) = **3.11 L/s**

Total

Population = **487.5 persons**

Average Day Demand = (487.5 persons) x (280 L/person/day) / 86400 s/day = **1.58 L/s**

Maximum Daily Demand = (2.9) x (1.58 L/s) = **4.58 L/s**

Maximum Hour Demand = (4.3) x (1.58 L/s) = **6.79 L/s**

Refer to the watermain design sheet provided in **Appendix B** for more details.

Water demands for park blocks can vary significantly depending on the proposed park design. Once a conceptual park design is provided by the City, the hydraulic model can be updated accordingly to accommodate the anticipated demands from the park, if required. The private park lands (Block 22) located in Phase 2 is not proposed to have a water service and therefore will not generate any water demands.

WATER DEMAND CALCULATIONS

391 Hilversum Lane, Carp, ON
Project No. 25094

Robinson
Land Development

JUNCTION NODE	RESIDENTIAL POPULATION				COMMERCIAL AREA (ha)	INSTITUTIONAL AREA (ha)	CLUB HOUSE		BASIC DAY DEMAND (L/s)					MAX. DAY DEMAND (L/s)					PEAK HOUR DEMAND (L/s)					AVG. DAY DEMAND
	APARTMENT UNIT COUNT			TOTAL POPULATION			WATER CLOSET[*5] (L/s)	WASH BASIN (L/s)	RES.	COMM.	INST.	CH	TOTAL	RES.	COMM.	INST.	CH	TOTAL	RES.	COMM.	INST.	CH	TOTAL	(m^3/day)
	BACHELOR	1-BEDROOM	2-BEDROOM																					
CONNECTION 1	2	20	17	66.5			0.007	0.009	0.22			0.016	0.23	0.62			0.045	0.67	0.93			0.067	0.99	20.0
Total	**2**	**20**	**17**	**66.5**					**0.22**			**0.016**	**0.23**	**0.62**			**0.045**	**0.67**	**0.93**			**0.067**	**0.99**	**20.0**

Notes:
1. Per unit populations as per OWDG Table 4.1.
2. For populations less than 500 persons, peaking factors as per MOE Table 3-3 (OWDG; Section 4.2.8)
3. Peaking factor for use with basic day demand as per MOE Table 3-3.
4. Peaking factors established in overarching Robinson Report (May 2024) prepared for Huntley Hollow Subdivision.
5. Water closet demand assumes 12 hours of use per day.

No. of Fixtures:		Demand:		
Water Closet	2	Water Closet	150	L/ per fixture / per hour of use
Wash Basin	2	Wash Basin	375	L / per fixture / per day

Per Unit Populations

Bachelor =	1.4	persons/unit
1-Bedroom =	1.4	persons/unit
2-Bedroom =	2.1	persons/unit

Basic Day Demand:

Residential	280	L/person/day
Commercial	28000	L/ha/day
Institutional	28000	L/ha/day

Max. Day Demand:

Residential	2.9	x Avg. Day[*4]
Commercial	1.5	x Avg. Day
Institutional	1.5	x Avg. Day

Peak Hour Demand:

Residential	4.3	x Avg. Day[*3,4]
Commercial	1.8	x Max. Day
Institutional	1.8	x Max. Day

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

DWELLING UNITS SERVICED	EQUIVALENT POPULATION	NIGHT MINIMUM HOUR FACTOR	MAXIMUM DAY FACTOR	PEAK HOUR FACTOR
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3

(Source: MOE Design Guidelines for Drinking-Water Systems)

Calculation of Required Fire Flow

$$Q = KVS_{Tot}$$

where

Q = minimum supply of water in litres (L)
K = water supply coefficient from Table 1
V = total building volume in cubic metres
S_{Tot} = total of spatial coefficient values from property line exposures on all sides, as obtained from the formula:

Ref: OBC Appendix A-3.2.5.7

Water Supply Coefficient:

Classification:

K = 10 (Table 1)

Total Building Volume:

BLDG Area = 1,257.00 m^2
Height = 9.1 m

V = 11,438.70 m^3

Total Spatial Coefficient:

S_{TOT} = 2.0 (Figure 1)

Minimum Water Supply:

Q_{MIN} = 228,774 L

Required Water Supply Flow Rate:

Q_{REQ} = 6300 L/min (Table 2)

Table 1: Water Supply Coefficient - K					
TYPE OF CONSTRUCTION	**Classification by Group or Division in Accordance with Table 3.1.2.1 of the Ontario Building Code**				
	A-2 B-1 B-2 B-3 C D	**A-4 F-3**	**A-1 A-3<**	**E F-2**	**F-1**
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches.	10	12	14	17	23
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. of the OBC. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	16	19	22	27	37
Building is of combustible construction with fire separations and fire-resistance ratings provided in accordance with Subsection 3.2.2. of the OBC, including loadbearing walls, columns and arches. Noncombustible construction may be used in lieu of fire-resistance rating where permitted in Subsection 3.2.2. of the OBC.	18	22	25	31	41
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls, columns and arches do not have a fire-resistance rating.	23	28	32	39	53
Column 1	2	3	4	5	6

Table 2: **Minimum Water Supply Flow Rates**	
Building Code, **Part 3 Buildings**	**Required Minimum Water Supply Flow Rate (L/min.)**
One-storey building with building area not exceeding 600m² (excluding F-1 occupancies)	1800
All other buildings	2700 (If **Q** ≤ 108,000L)[1] 3600 (If **Q** > 108,000L **and** ≤ 135,000L)[1] 4500 (If **Q** > 135,000L **and** ≤ 162,000L)[1] 5400 (If **Q** > 162,000L **and** ≤ 190,000L)[1] 6300 (If **Q** > 190,000L **and** ≤ 270,000L)[1] 9000 (If **Q** > 270,000L)[1]

Note: [1] $\mathbf{Q=KVS_{Tot}}$ as referenced in Section 3(a)

$$S_{Tot} = 1.0 + [(S_{Side1}) + (S_{Side2}) + (S_{Side3}) + \text{... etc.}]$$

where

> S_{Side} values are obtained from Figure 1, as modified by Sections 6.3 (e) and 6.3 (f) of this guideline, and
> S_{Tot} need not exceed 2.0
> (see also Section 7.0 of this guideline)

(e) Where a masonry wall with a minimum fire-resistance rating of 2 hours and no unprotected openings is provided as an exterior wall, the spatial coefficient "S_{Side}" for this side of the new building may be considered equal to 0. This exterior masonry wall shall be provided with a minimum 150 mm parapet. Firewalls that divide a structure into two or more buildings may be given similar consideration when evaluating the exposure of the buildings to each other.

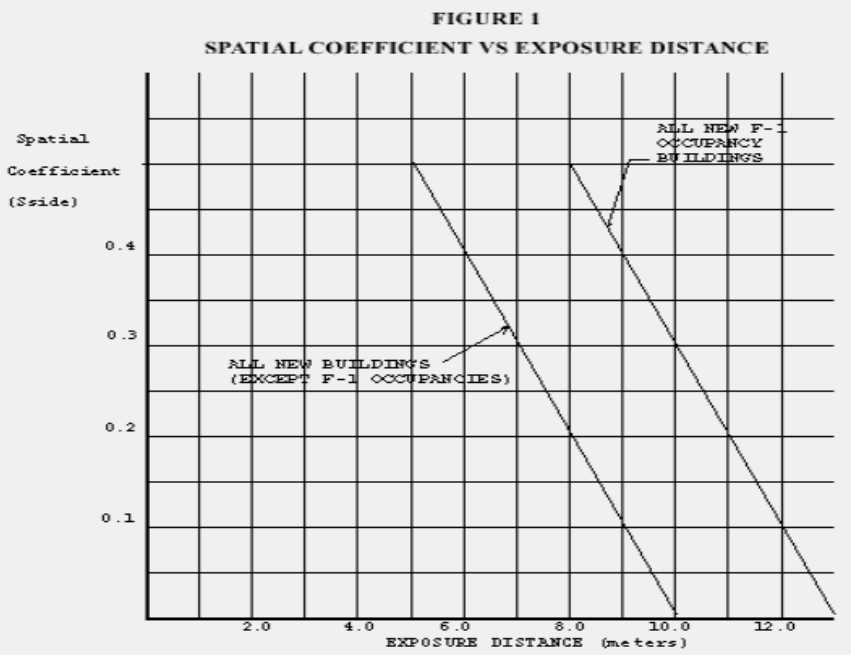
Section (e) is not applicable.

(f) The spatial coefficient "S_{Side}" may be considered equal to 0 when the exposed building is on the same property and is less than 10 m² in building area.

Section (f) is not applicable.

	S_{side}	Exposure Distance	
S_{side1} =	0.5	4.5	(north side; north PL)
S_{side2} =	0.0	15.1	(west side; CL of Hilversum Lane)
S_{side3} =	0.4	6.1	(east side; east PL)
S_{side4} =	0.5	4.25	(south side; midpoint to club house)

S_{TOT} = 2.0



Boundary Conditions
391 Hilversum Lane (Carp Village)

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	14	0.23
Maximum Daily Demand	109	1.82
Peak Hour	164	2.73
Fire Flow Demand #1	6,000	100.00

Location

Results

Connection 1 – Hilversum Lane

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	164.1	87.0
Peak Hour	154.4	73.2
Max Day plus Fire Flow #1	154.9	74.0

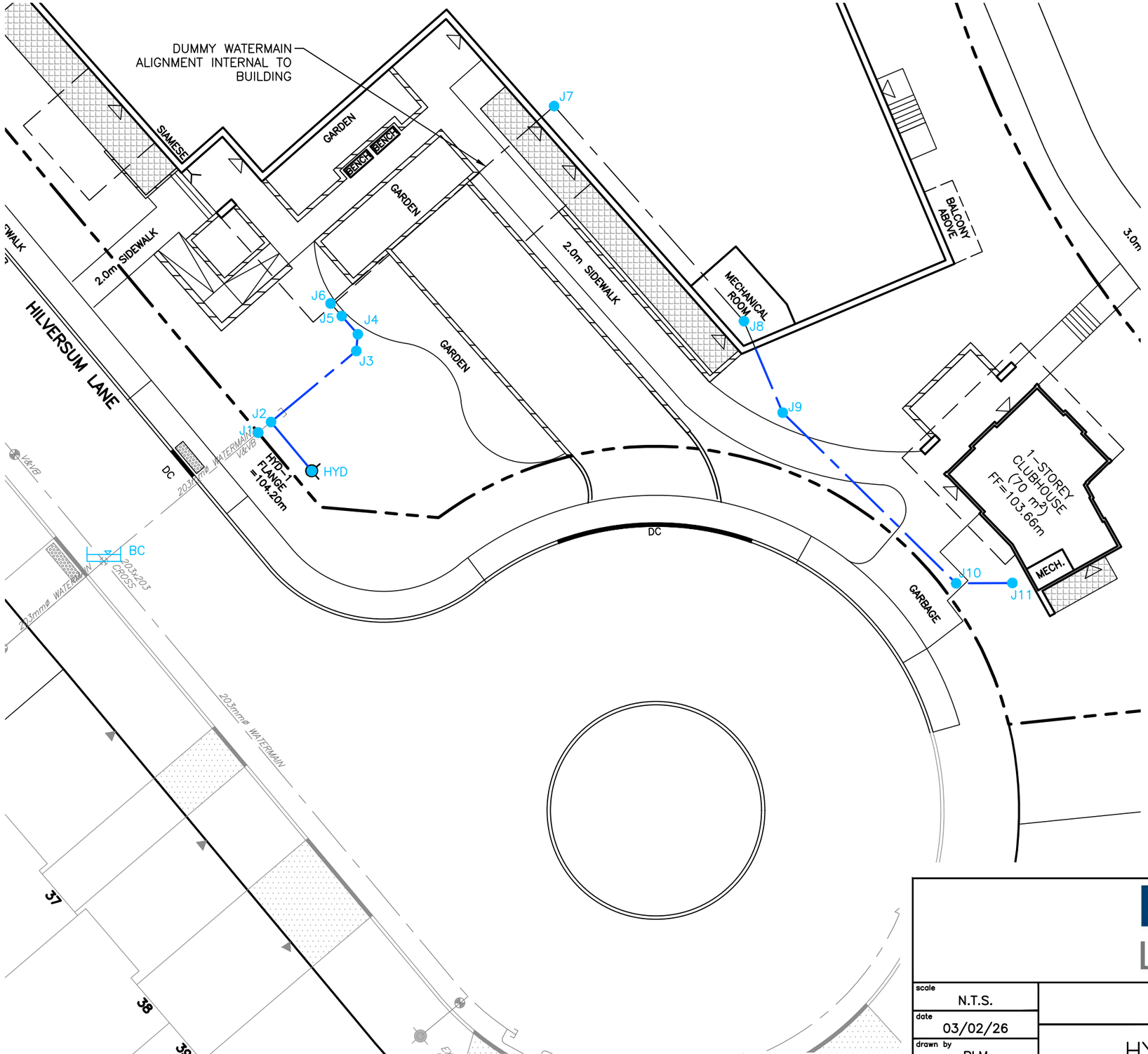
[1] Ground Elevation = 102.9 m

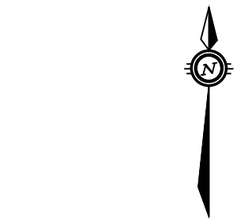
Notes

1. *Demands for proposed Connection 1 at existing water main stub were assigned to upstream junction at Hilversum Lane off the public looped watermains. The engineer must calculate headloss off the dead-end main.*
2. *As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:*
    - *If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.*
    - *Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.*

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.





LEGEND

- J1 — JUNCTION NODE AND ID
- RESERVOIR (BOUNDARY CONDITION)
- PROPOSED WATERMAIN

Robinson
Land Development

scale: N.T.S.	391 HILVERSUM LANE	project no.: 25094
date: 03/02/26		
drawn by: BLM	HYDRAULIC WATER MODEL	FIG. 3.0

Table C1: Peak Hour Model Outputs

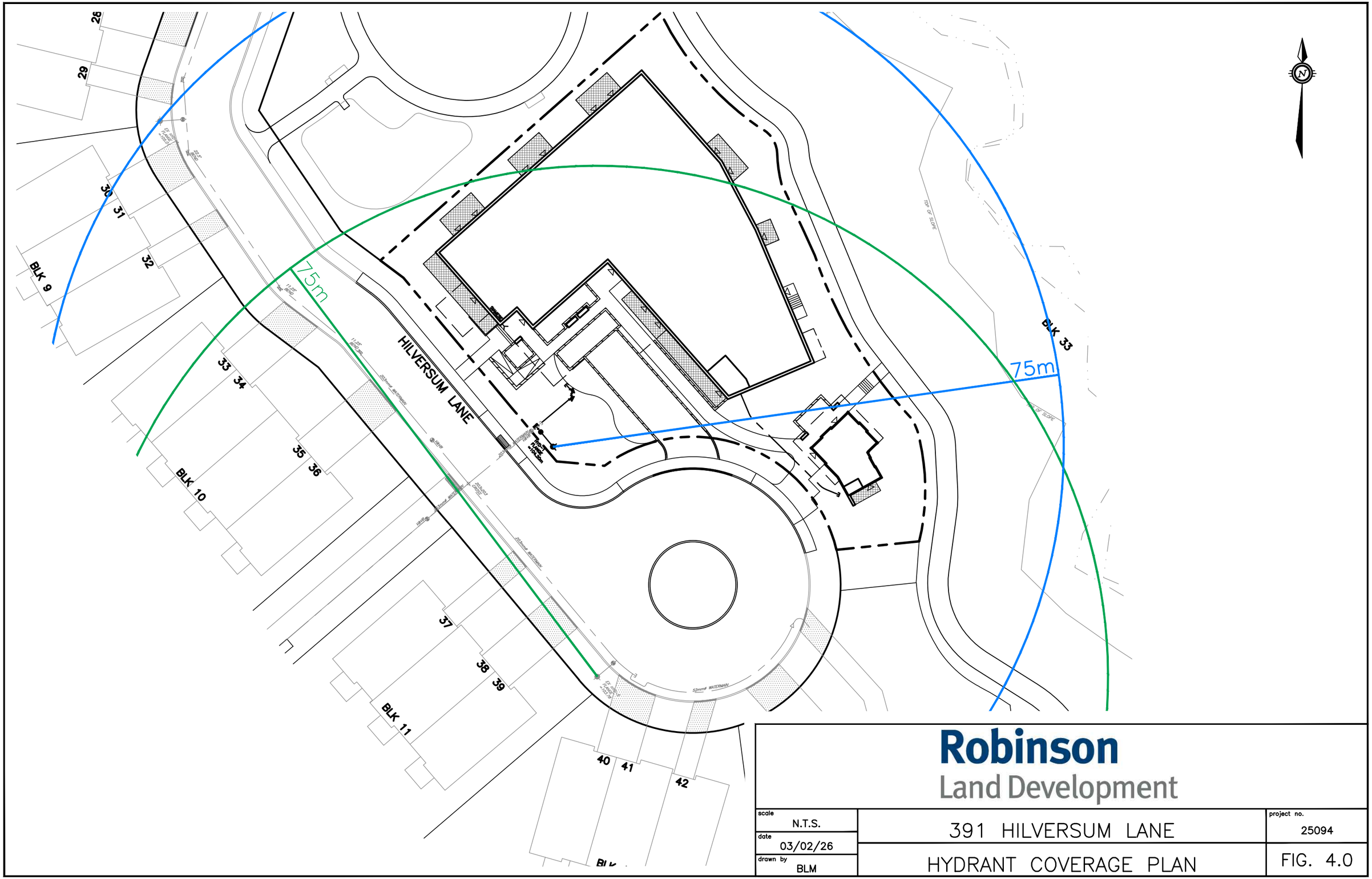
Junction ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.000	104.13	154.40	71.81
J2	0.000	104.12	154.40	71.83
J3	0.000	104.63	154.40	71.10
J4	0.000	104.73	154.40	70.96
J5	0.000	104.87	154.40	70.76
J6	0.000	105.10	154.40	70.43
J7	0.930	105.10	154.40	70.43
J8	0.000	105.10	154.40	70.43
J9	0.000	103.63	154.36	72.48
J10	0.000	103.44	154.23	72.55
J11	0.067	103.66	154.20	72.20
HYD	0.000	104.20	154.40	71.71

Table C2: Max. Day Model Outputs

Junction ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (psi)
J1	0.00	104.13	164.10	85.67
J2	0.00	104.12	164.10	85.69
J3	0.00	104.63	164.10	84.96
J4	0.00	104.73	164.10	84.81
J5	0.00	104.87	164.10	84.61
J6	0.00	105.10	164.10	84.29
J7	0.62	105.10	164.10	84.29
J8	0.00	105.10	164.10	84.29
J9	0.00	103.62	164.08	86.38
J10	0.00	103.44	164.02	86.54
J11	0.05	103.66	164.00	86.20
HYD	0.00	104.20	164.10	85.57

Table C3: Pipe Report

Pipe ID	Inlet Junction	Outlet Junction	Length (m)	Diameter (mm)	Roughness
C1	J1	J2	1.0	203	110
C2	J2	J3	6.6	203	110
C3	J3	J4	1.0	203	110
C4	J4	J5	1.5	203	110
C5	J5	J6	1.0	203	110
C6	J6	J7	18.9	203	110
C7	J7	J8	18.8	203	110
C8	J8	J9	3.7	19	100
C9	J9	J10	14.7	19	100
C10	J10	J11	2.8	19	100
C11	R1	J1	12.0	203	110
C12	J2	J12	3.8	152	100



Robinson
Land Development

scale N.T.S.	391 HILVERSUM LANE	project no. 25094
date 03/02/26		
drawn by BLM	HYDRANT COVERAGE PLAN	FIG. 4.0

Appendix D

Robinson Report Excerpts

Huntley Hollow Sanitary
Sewer Design Sheet

Huntley Hollow Sanitary Drainage Area
Plan (DWG. 19008-SAN1)

OSDG *Appendix 4-A*

Sanitary Sewer Design Sheet

- *Inflow and infiltration comprise a significant portion of the current instantaneous flow, likely due to the low population density of the Village of Carp.*
- *Flow increases due to future development will result in an estimated total instantaneous peak flow of 77.827 L/s – 94.197 L/s, depending if measured values or annual values are used.*
- *The forcemain operates well within its maximum operating and maximum surge pressures in the existing configuration, with significant headroom available on a pressure basis to increase the station capacity.*
- *Hydraulic evaluation (transient analysis) will be required to determine the maximum flowrate possible through the existing forcemain."*

Technical Memorandum #2 (prepared by RVA, dated March 2022)

With respect to capacity expansion, transient analysis evaluation determined that the maximum flow that can be safely conveyed by the existing forcemain at the wastewater pumping station is 75 L/s.

Functional Design Report (prepared by RVA, dated July 2022)

The existing piping and control devices within the station are suitable for use with the new pumps at the target flowrate of 75 L/s.

With regards to the pumping station, the proposed upgrades include replacement of pumps, MCC, and upgrades to address NFPA820 issues including HVAC replacement, replacement of non-rated electrical components and equipment, and building layout modifications.

The proposed improvements are intended to provide a short term upgrade to the water treatment facility and wastewater pumping station, to improve the reliability of both facilities, provide additional capacity to allow for development within the catchment area of the facilities, and ensure compliance with NFPA 820 requirements. It is understood that the long term plan for the water treatment facility and the pumping station involves significant capacity expansion, including twinning the sewage forcemain and potentially connecting the village of Carp to the City's main water distribution system, all of which will be examined as part of a separate assignment and are not included in the scope of work for this assignment. [source: RVA Report]

As identified in the Draft Conditions (condition 29; provided in **Appendix A**), the construction of buildings may be restricted on certain lots and/or blocks until such time as municipal servicing capacity is available. The City acknowledges that, as long as the Owner continues to develop the property in a continuous, timely and orderly manner, any and all available servicing capacity shall be allocated to this development (along with other developments given the same priority). Only after sufficient servicing capacity is available beyond the requirements of this development, shall the City assign the capacity to other developments.

The City confirmed via email that based on some short-term upgrades that will completed soon at the WWPS, the first phase of the proposed development should be able to be accommodated within the Village system. Refer to correspondence with the City in **Appendix C**.

6.2 Sanitary Sewer Design

A new municipal sanitary sewer system with connections to the existing village system will be required to service the proposed development for sewage flows. The sanitary sewer

system for the proposed development will provide a total of two connections to the existing sanitary systems as follows:

- A connection to the existing 250 mm diameter sanitary sewer on Carp Road via the unopened John Street road allowance (i.e. block of land located between 3740 Carp Road and 422 Donald B. Munro Drive); to be completed as part of Phase 1).
- A connection to the existing 250 mm diameter sanitary sewer on Langstaff Drive via Street 2; to be completed as part of Phase 2.

The proposed municipal sanitary sewers have been designed to be 200 mm in diameter. Each townhouse unit will be serviced with individual 135 mm sanitary services. The apartment blocks (to be developed under separate site plan applications) will be provided with 200 mm diameter sanitary sewer stubs. Population densities for the apartment blocks have been established based on assumed unit counts provided by the Developer.

The sanitary sewer system has been designed using the following parameters in keeping with the current OSDG:

Average Residential Flow	280 L/cap/day
Peaking Factor for Residential Flow (Harmon Formula, Max. = 4.0, Min. = 2.0, P = Population in 1000's)	$1 + (14 / (4 + P^{1/2})) \times 0.80$
Harmon Correction Factor	0.8
I/I Dry	0.05 L/s/ha
I/I Wet	0.28 L/s/ha
I/I Total	0.33 L/s/ha
Population Density (townhouse units)	2.7 persons/unit
Population Density (apartment units)	2.1 persons/unit
Minimum Full Flow Velocity	0.60 m/s
Maximum Full Flow Velocity	3.0 m/s
Minimum Pipe Diameter	200 mm

The peak sanitary design flow (Phase 1) to the existing 250 mm diameter sanitary sewer on Carp Road has been calculated as follows:

Population = 264.3 persons

Peaking Factor = **3.48**

Peak Population Flow = (3.48) x (264.3 persons) x (280 L/cap/day) / 86400 s/day = **2.98 L/s**

Extraneous Flow = (4.80 ha) x (0.33 L/sha) = **1.58 L/s**

Peak Design Flow = (2.98 L/s) + (1.58 L/s) = **4.57 L/s**

The peak sanitary design flow (Phase 2) to the existing 250 mm diameter sanitary sewer on Langstaff Drive has been calculated as follows:

Population = 223.2

Peaking Factor = **3.50**

Peak Population Flow = (3.50) x (223.2 persons) x (280 L/cap/day) / 86400 s/day = **2.53 L/s**

Extraneous Flow = (1.70 ha) x (0.33 L/sha) = **0.56 L/s**

Peak Design Flow = (2.53 L/s) + (0.56 L/s) = **3.10 L/s**

SANITARY SEWER DESIGN SHEET
for
147 LANGSTAFF DRIVE, CARP

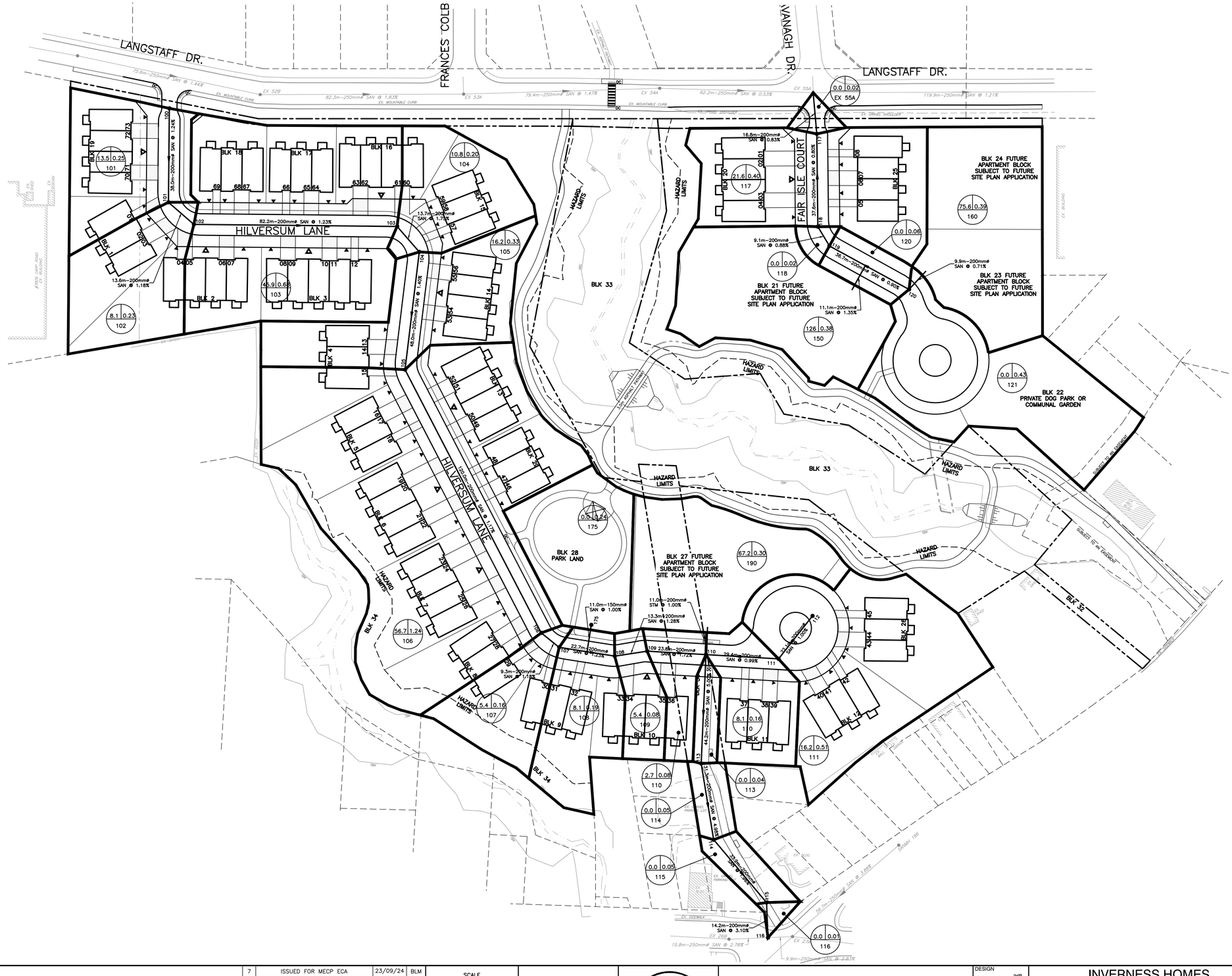
LOCATION			UNIT COUNT		RESIDENTIAL AREA AND POPULATION				COMM./INST. FLOW		RESIDENTIAL FLOW			PEAK DESIGN FLOW (L/s)	PIPE							
					INDIVIDUAL		CUMULATIVE															
STREET	FROM MH	TO MH	TOWNHOUSE	APARTMENTS	POP.	AREA (ha)	POP.	AREA (ha)	PEAK FACTOR	PEAK FLOW (L/s)	PEAK FACTOR	PEAK POP. FLOW (L/s)	EXTRAN. FLOW (L/s)		LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	ACTUAL VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
TO CARP ROAD SEWER (PHASE 1)																						
STREET 1	100	101	5		13.5	0.25	13.5	0.25			3.72	0.16	0.08	0.25	38.0	201.16	1.24	37.13	1.17	0.32	36.88	0.66
STREET 1	101	102	3		8.1	0.23	21.6	0.23			3.70	0.26	0.08	0.33	13.6	201.16	1.18	36.22	1.14	0.35	35.88	0.92
STREET 1	102	103	17		45.9	0.68	67.5	1.16			3.63	0.79	0.38	1.18	82.2	201.16	1.23	36.98	1.16	0.52	35.80	3.18
STREET 1	103	104	4		10.8	0.20	78.3	1.36			3.62	0.92	0.45	1.37	13.7	201.16	1.75	44.11	1.39	0.62	42.74	3.10
STREET 1	104	105	6		16.2	0.33	94.5	1.69			3.60	1.10	0.56	1.66	48.0	201.16	1.40	39.45	1.24	0.61	37.79	4.21
STREET 1	105	106	21		56.7	1.24	151.2	2.93			3.55	1.74	0.97	2.71	120.0	201.16	1.17	36.06	1.13	0.67	33.36	7.51
STREET 1	106	107	2		5.4	0.16	156.6	3.09			3.55	1.80	1.02	2.82	9.3	201.16	1.18	36.22	1.14	0.68	33.40	7.79
BLK 28 - PARK LAND	175	MAIN			0.0	0.24	0.0	0.24			3.80	0.00	0.08	0.08	11.0	150.29	1.00	15.32	0.86	0.22	15.24	0.52
STREET 1	107	108	3		8.1	0.19	164.7	3.52			3.54	1.89	1.16	3.05	22.7	201.16	1.23	36.98	1.16	0.70	33.93	8.25
STREET 1	108	109	2		5.4	0.08	170.1	3.60			3.54	1.95	1.19	3.14	13.3	201.16	1.28	37.72	1.19	0.71	34.58	8.32
STREET 1	109	110	1		2.7	0.08	172.8	3.68			3.54	1.98	1.21	3.19	23.8	201.16	1.72	43.73	1.38	0.80	40.53	7.31
BLK 27 - FUTURE APARTMENT	CAP	110		32	67.2	0.30	67.2	0.30			3.63	0.79	0.10	0.89	11.0	201.16	1.00	33.34	1.05	0.45	32.45	2.67
STREET 1	112	111	6		16.2	0.51	16.2	0.51			3.71	0.19	0.17	0.36	22.1	201.16	1.00	33.34	1.05	0.34	32.98	1.09
STREET 1	111	110	3		8.1	0.16	24.3	0.67			3.69	0.29	0.22	0.51	29.4	201.16	0.99	33.17	1.04	0.38	32.66	1.54
EASEMENT	110	113			0.0	0.04	264.3	4.69			3.48	2.98	1.55	4.53	44.2	201.16	5.00	74.55	2.35	1.29	70.03	6.08
EASEMENT	113	114			0.0	0.05	264.3	4.74			3.48	2.98	1.56	4.55	31.3	201.16	4.98	74.41	2.34	1.28	69.86	6.11
EASEMENT	114	115			0.0	0.05	264.3	4.79			3.48	2.98	1.58	4.56	33.2	201.16	1.96	46.68	1.47	0.93	42.12	9.77
EASEMENT	115	116			0.0	0.01	264.3	4.80			3.48	2.98	1.58	4.57	14.2	201.16	3.10	58.70	1.85	1.09	54.14	7.78
			73	**32**																		
CARP ROAD	116	*27A*												*31.57*	*9.9*	*251.46*	*2.83*	*101.71*	*2.05*	*1.80*	*70.14*	*31.04*
CARP ROAD	*27A*	*27B*												*43.77*	*47.2*	*251.46*	*0.91*	*57.67*	*1.16*	*1.28*	*13.91*	*75.88*
CARP ROAD	*27B*	*102A*												*43.97*	*65.9*	*251.46*	*0.91*	*57.67*	*1.16*	*1.28*	*13.71*	*76.23*
CARP ROAD	*102A*	*102B*												*44.67*	*38.1*	*447.87*	*0.34*	*164.32*	*1.04*	*0.88*	*119.65*	*27.18*
TO LANGSTAFF DRIVE SEWER (PHASE 2)																						
BLK 23/24 - FUTURE APARTMENT	CAP	120		36	75.6	0.82	75.6	0.82			3.62	0.89	0.27	1.16	9.9	201.16	0.71	28.09	0.88	0.43	26.94	4.12
BLK 21 - FUTURE APARTMENT	CAP	MAIN		60	126.0	0.38	126.0	0.38			3.57	1.46	0.13	1.58	11.1	201.16	1.35	38.74	1.22	0.60	37.16	4.09
STREET 2	120	119			0.0	0.06	201.6	1.26			3.52	2.30	0.42	2.71	36.7	201.16	0.90	31.63	1.00	0.60	28.92	8.58
STREET 2	119	118			0.0	0.02	201.6	1.28			3.52	2.30	0.42	2.72	9.1	201.16	0.88	31.28	0.98	0.60	28.56	8.70
STREET 2	118	117	8		21.6	0.40	223.2	1.68			3.50	2.53	0.55	3.09	36.7	201.16	0.80	29.82	0.94	0.61	26.73	10.36
STREET 2	117	*EX 55A*			0.0	0.02	223.2	1.70			3.50	2.53	0.56	3.10	16.8	201.16	0.83	30.38	0.96	0.61	27.28	10.19
			8	**96**																		
LANGSTAFF DRIVE	*55A*	*73A*												*29.70*	*119.9*	*251.46*	*1.21*	*66.51*	*1.34*	*1.30*	*36.81*	*44.65*
LANGSTAFF DRIVE	*73A*	*72A*												*30.90*	*90.7*	*251.46*	*2.61*	*97.67*	*1.97*	*1.74*	*66.78*	*31.63*
LANGSTAFF DRIVE	*72A*	*74A*												*34.00*	*35.5*	*251.46*	*2.85*	*102.07*	*2.06*	*1.85*	*68.07*	*33.31*
DONALD B. MUNRO DRIVE	*74A*	*91A*												*40.30*	*20.6*	*251.46*	*2.72*	*99.71*	*2.01*	*1.89*	*59.42*	*40.41*
PHASE 1 + PHASE 2			**81**	**128**			**487.5**	**6.50**			**3.38**	**5.52**	**2.15**	**7.66**								

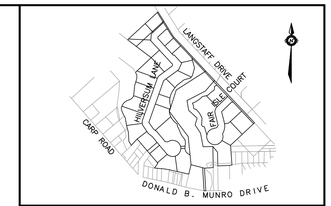
DESIGN PARAMETERS

Average Daily Flow =	280	L/person/day
Comm./Inst. Flow =	28000	L/ha/day
Industrial Flow =		
Maximum Residential Peak Factor =	4.0	
Harmon - Correction Factor (K) =	0.8	
Comm./Inst. Peak Factor =	1.5	
Extraneous Flow =	0.33	L/s/ha
Minimum Velocity =	0.6	m/s
Maximum Velocity =	3.0	m/s

Per Unit Populations:

Single Family	3.4	persons/unit
Semi-detached	2.7	persons/unit
Duplex	2.3	persons/unit
Townhouse	2.7	persons/unit
Apartments:		
Bachelor	1.4	persons/unit
1 Bedroom	1.4	persons/unit
2 Bedroom	2.1	persons/unit
3 Bedroom	3.1	persons/unit
Average Apt.	1.8	persons/unit





KEY PLAN

LEGEND

- SINGLE SERVICE: 135mmø SANITARY, 150mmø STORM, 19mmø WATER
- DOUBLE SERVICE: 2–135mmø SANITARY, 2–150mmø STORM, 2–19mmø WATER
- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- SANITARY SEWER AND MANHOLE
- EXISTING SANITARY SEWER AND MANHOLE
- SANITARY DRAINAGE AREA BOUNDARY

POPULATION / AREA (ha) / DOWNSTREAM MANHOLE

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP–STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83–9)

NO.	REVISION DESCRIPTION	DATE	BY
7	ISSUED FOR MECP ECA	23/09/24	BLM
6	ISSUED FOR PHASE 1 TENDER	06/09/24	BLM
5	REVISED PER CITY COMMENTS	12/07/24	BLM
4	REVISED PER CITY COMMENTS	28/05/24	BLM
3	REVISED PER CITY COMMENTS	22/03/24	BLM
2	REVISED PER CITY COMMENTS	09/11/23	BLM
1	ISSUED FOR REVIEW	24/05/23	BLM

SCALE: 0 5m 10m 30m — HORIZONTAL 1:750

LICENSED PROFESSIONAL ENGINEER — B. L. MACKECHNIE 100199554 — Sept. 23/24 — PROVINCE OF ONTARIO

Robinson Land Development

CONSULTING ENGINEERS

350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	BLM
DRAWN	JHB
CHECKED	BLM
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

147 LANGSTAFF DRIVE
CARP, ON

SANITARY DRAINAGE AREA PLAN

PROJECT No.	19008
SURVEY	RLD
DATED	SEPTEMBER 2024
DWG. No:	19008-SAN1

FILE No. D07-16-21-0012 PLAN No. 19168

APPENDIX 4-A

DAILY SEWAGE FLOW FOR VARIOUS TYPES OF ESTABLISHMENTS

APPENDIX 4-A DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

From The MOE Guidelines (* indicates adapted for Ottawa)

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
AIRPORTS		
- Not including food	per passenger	20
- Catering	per meal served	12
- Employees	per person	40
ASSEMBLY HALLS		
- Where no kitchen or meals provided	per person	8
- With varying facilities provided (range)	per person	8-36
BAR OR COCKTAIL LOUNGE		
- Separate establishment Minimum food service	per seat	125
- Part of a hotel or motel	per seat	70
- Customer	per customer	8
- Staff	per employee	50
BEAUTY SALON	per station	650
	per person	130
BOWLING ALLEYS		
- With no bar or restaurant	per alley	400
- With bar and/or restaurant	per alley	800
CAMPS		
- Day camps – no meals	per person	50
- Day & night camps	per person	150
- Primitive camps	per person	40
- Summer Camps with showers, Toilets, handwashing & cooking	per person	150
- as above without flush toilet	per person	75
- Construction camps – Flush toilet	per person	200
- No Flush toilet	per person	125
- Migrant workers camp – central Bathroom	per person	125
- Youth camps	per person	200
- Resort camps – limited pumping	per person	200
- Resort comps – non resident staff	per person	50
- Luxury camps	per person	400
CAMPGROUNDS, TENT AND TRAILER PARKS		
Site with water and sewer connection For recreational vehicles (e.g. trailer And motor homes)-TRL Sites		
• Sewer connected to sewage system (SS) At nearby comfort station (CS)	per site	375(475)-425(525)

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
• Sewer connected to a SS other than the one at SC		
- sewage generated at the CS	per site	275-375
- sewage to connected SS when CS is available	per site	100(200)-60(150)
- sewage to connected SS when no CS available	per site	125(425)
Sites with no sewer connections. Water supplied by a connection or From a nearby faucet		
• sewage generated at a nearby CS	per site	275-425
• sewage to vehicle tanks (TRL sites)	per site	60(150)-100(400)
• Grey water to nearby Class 2 SS	per site	15-25
For more details on designs flows and related assumptions see Section 14-2-16 and Appendix 14.2.1. Figures in brackets are for tank design.		
(CAR) WASH		
- Hand wash	per car	200
- Truck wash	per truck	400
CHURCHES		
- With kitchen facilities	per sanctuary seat	30
- No kitchen facilities	per sanctuary seat	15
- Kitchen wastes – paper service	per meal	5
- Kitchen wastes – normal service	per meal	15
COUNTRY CLUBS		
- Residents	per person	375
- Non residents – no meals	per person	100
- Showers during use	per fixture	1800
- Water closets	per fixture	550
- Wash basins	per fixture	350
- Urinals – hand flush	per fixture	350
- Showers	per person	20
- Day staff	per person	150
DANCE HALLS		
- Hall – washrooms only-per day in use	per m^2	15
- Dance hall restaurant	per seat	125
- Dance hall bar	per seat	20
- Dance hall plus restaurant plus bar	per patron	150

APPENDIX 4-A DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
DOG KENNELS	per closure	75
DINING HALLS – see restaurants		
DWELLINGS		
- Single family houses, apartments Condominiums, cottages, etc.	per person	350
- Each dwelling unit of -	1 bedroom	275
- Each dwelling unit of -	2 bedrooms	1100
- Each dwelling unit of -	3 bedrooms	1600
- Each dwelling unit of -	4 bedrooms	2000
- Add for each bedroom over 4	per bedroom	300
- Boarding or Rooming houses	per person	200
- Boarding or Rooming houses without meals or laundry	per person	150
- Non resident staff	per person	40
- Luxury homes – 4 bedrooms	per residence	3000
- Luxury homes – 5 bedrooms	per residence	3500
- Luxury homes – add for each bedroom over 5		500
EMPLOYEES – VARIOUS LOCATIONS		
- Factory or plant workers per day or per shift – includes showers but no industrial	per person	125
- Factory or plant workers as above but no showers	per person	75
- Various buildings and places of Employment – e.g. store employees, Office workers – depends on facilities	per person	75 *
- Medical Office buildings, dental Offices and medical clinics		
- Doctors, nurses & medical staff	per person	275
- Office staff	per person	75
- Patients	per person	25
HOTELS – See Motels		

APPENDIX 4-A DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
INSTITUTIONS		
- Hospitals – including laundry	per bed	1400 *
- Hospitals - excluding laundry	per bed	550
- Nursing homes & rest homes	per bed	450
- Other institutional residences	per person	400
LAUNDRY		
- Household type automatic washer Each use	per fill, wash and rinse	20
- Household type automatic washer Each use	as above plus permanent press	170
- Laundromat	per customer or per wash	170
- Laundromat per day	per machine	2000
- Auto washers in apartment bldgs	per machine	1200
MOTELS AND HOTELS		
Residential portion:		
- With full housekeeping facilities	per person	225
- With bath or toilet only (private)	per person	180
- With central bath only		150
No residential portions:		
- With dining room, add	per seat	125
- With bar or cocktail lounge, add	per seat	70
- Non resident staff, add	per person	40
MOBILE HOME PARKS		
- Mobile home – single bedroom	per unit	750
- Mobile home – 2 bedrooms	per unit	1000
- Mobile home – 3 bedrooms	per unit	1200
PARKS, BEACHES, PICNIC GROUNDS, PUBLIC SWIMMING POOLS**		
- Picnic and fairgrounds with Bathhouses showers and toilets	per person	50
- Picnic and fairgrounds Flush toilets only	per person	20
- Swimming pools & beaches with Bathrooms, showers and toilets	per person	40

** ***Varies with facilities provided. Based on parks and picnic grounds of about 75 people per acre***

APPENDIX 4-A DAILY SEWAGE FLOW FOR VARIOUS ESTABLISHMENTS

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
RESTAURANTS AND DINING ROOMS		
- Ordinary (not 24 hour) restaurant	per seat	125
- 24 hour restaurant	per seat	200
- 24 hour intercity freeway restaurant	per seat	375
- 24 hour intercity freeway restaurant with showers		400
- Auto dishwasher and/or waste disposer		
- ordinary restaurant	per seat	12
- 24 hour restaurant	per seat	24
- Kitchen and toilet wastes only	per seat	115
- Kitchen and toilet wastes	per patron	35 *
- Banquet rooms – each banquet	per seat	30
- Drive-in restaurants	per seat	125
- Drive-in - all paper service	per car space	60
- Drive-in - all paper service	per inside seat	60
- Taverns, bars and cocktail lounges With minimum food service	per seat	125
- Night club restaurant	per seat	175
SCHOOLS		
- Day school with cafeteria, gym And showers	per person	90
- Day school with cafeteria or Gym and showers	per person	60
- Day school without cafeteria or Gym and showers	per person	30
- Boarding schools	per resident	275
- Boarding schools non resident staff	per person	50
SERVICE STATIONS		
- Car servicing (one service bay)	per car	40
- Catch basins in garage floors for Floor cleaning	per basin	375
SHOPPING CENTRES		
- Retail stores – washrooms only	per square metre of store area	5
- Retail stores area – parking area	per parking space	6
- Retail store area – employees	per person	40
- Retail store area – toilet rooms	per toilet room	2000

ITEM	UNIT OF MEASURE	DAILY VOLUME IN LITRES
THEATRES		
- Drive-in theatres – no food service	per car space	20
- Drive-in theatres with food service	per car space	40
- Auditoriums or theatres – no food	per seat	20
- Movie theatre	per seat	15

MISCELLANEOUS WATER USE ESTIMATES

FOR SEWAGE FLOW COMPUTATIONS

DETAILS	UNITS	ESTIMATED WATER SUPPLY NEEDS PER UNITS (LITRES)
1. Showers		
(a) Golf clubs	per person	40
(b) Public parks, etc.	per fixture per hour of use	575
2. Water Closets – Public parks, etc.	per fixture per hour of use	150
3. Wash basins	per fixture per day	375
4. Urinals (hand flush) Public parks, etc.	per fixture per hour Of use	375
5. Whirlpools type baths depends on make and model.		
- Types discharging after Each use	per use	130-680
- Re-circulating type	per filling (or discharge)	1300 and up

SANITARY SEWER DESIGN SHEET
391 HILVERSUM LANE, VILLAGE OF CARP

Robinson Land Development

LOCATION			APARTMENT UNIT COUNT			RESIDENTIAL FLOW						CLUB HOUSE						INFILTRATION			PEAK DESIGN FLOW (L/s)	PIPE						
						INDIVIDUAL		CUMULATIVE		PEAK FACTOR	PEAK POP. FLOW (L/s)	WATER CLOSET DEMAND (L/s)	ACCU. DEMAND (L/s)	WASH BASIN DEMAND (L/s)	ACCU. DEMAND (L/s)	PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)	ACCU. AREA (ha)	EXTRAN. FLOW (L/s)		LENGTH (m)	DIAMETER (mm)	SLOPE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	EXCESS CAPACITY (L/s)	PERCENT FULL
STREET	FROM MH	TO MH	BACHELOR	1-BEDROOM	2-BEDROOM	POP.	AREA (ha)	POP.	AREA (ha)																			
TO HILVERSUM LANE SANITARY SEWER																												
PRIVATE	CLUB HOUSE	BLDG				0.0	0.06	0.0	0.06	3.80	0.00	0.013	0.013	0.008	0.008	3.68	0.08	0.06	0.06	0.02	0.10	19.2	135.00	1.04	11.74	0.82	11.64	0.82
PRIVATE	BLDG	STUB	2	20	17	66.5	0.25	66.5	0.31	3.63	0.78	0.000	0.013	0.000	0.008	3.68	0.08	0.25	0.31	0.10	0.96	3.7	201.16	1.08	34.65	1.09	33.69	2.77

DESIGN PARAMETERS

			Per Unit Populations:					
Average Daily Flow =	280	L/person/day	Single Family	3.4 persons/unit		Miscellaneous Water Use Estimates (Appendix 4-A):		
Institutional Flow =	28,000	L/ha/day	Semi-detached	2.7 persons/unit				
Industrial Flow =			Duplex	2.3 persons/unit		Water Closet	550	L/per fixture/per day
Maximum Residential Peak Factor =	4.0		Townhouse	2.7 persons/unit		Wash Basin	350	L/per fixture/per day
Harmon - Correction Factor (K) =	0.8		Apartments:					
Club House Peak Factor =	3.68		Bachelor	1.4 persons/unit				
Extraneous Flow =	0.33	L/s/ha	1 Bedroom	1.4 persons/unit		Fixture Counts:		
Minimum Velocity =	0.6	m/s	2 Bedroom	2.1 persons/unit		Water Closet Fixtures	2	
Maximum Velocity =	3.0	m/s	3 Bedroom	3.1 persons/unit		Wash Basin Fixtures	2	
			Average Apt.	1.8 persons/unit				

Appendix E

Robinson Report Excerpts

Huntley Hollow Storm
Sewer Design Sheet

Huntley Hollow Storm Drainage Area
Plan (DWG. 19008-STM1)

Runoff Coefficient Calculations

Storm Sewer Design Sheet

Storm Drainage Area Plan
(DWG. 25094-STM1)

outlet for the property (i.e. the existing SWM ravine). The proposed storm sewer system will consist of gravity storm sewers ranging from 250 mm to 750 mm in diameter. Each townhouse unit will be serviced with individual 150 mm storm services. The apartment blocks (to be developed under separate site plan applications) will be provided with storm sewer stubs which have been sized based on the block area and an assumed runoff coefficient. The storm sewer system for the proposed development will provide a total of three outlets to the existing SWM ravine as follows:

- A 750 mm diameter storm sewer outlet via Street 1 and Block 31 servicing the Phase 1 lands (to be completed as part of Phase 1).
- A 250 mm diameter storm sewer outlet via Block 26 servicing rear yard drainage from Blocks 11, 12 and 26 within the Phase 1 lands (to be completed as part of Phase 1).
- A 450 mm diameter storm sewer outlet via Street 2 servicing the Phase 2 lands (to be completed as part of Phase 2).

The storm sewer system has been designed using the following parameters:

Design Level of Service	2-Yr event for local roads
Inlet Time of Concentration	10 minutes
Rainfall Intensity	City of Ottawa IDF curve equations
Manning's Roughness Coefficient	0.013
Minimum Full Flow Velocity	0.80 m/s
Maximum Full Flow Velocity	3.0 m/s
Minimum Pipe Diameter	250 mm
Runoff Coefficients	0.90 for impervious areas (hard surface area and roofs) 0.80 for gravel surfaces 0.20 for pervious areas

The peak storm sewer design flows to the SWM ravine have been calculated using the Rational Method and are summarized in **Table 7.1** below.

Table 7.1: 2-Year Peak Storm Sewer Design Flows

SWM Ravine Cell Outlet	Outlet Pipe Diameter (mm)	2.78AC	Time of Conc. (min)	2-Yr Rainfall Intensity (mm/hr)	2-Yr Peak Design Flow (L/s)
G4	750	5.22	14.56	62.84	327.75
G4	250	0.38	15.00	61.77	23.26
G4	450	2.48	11.53	71.40	177.20

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Runoff coefficients calculated based on maximum zoning requirements. Refer to sample calculations under **Appendix D**.
3. Flows calculated using the Rational Method. Refer to Storm Sewer Design Sheet under **Appendix D**.

At the Site Plan Applications stage, the minor system flows from the apartment blocks will need to be controlled to the allocated rates. Allocated minor system flows from the apartment blocks have been summarized in **Table 7.2** below.

Table 7.2: Allocated Minor System Flows from Apartment Blocks

Block ID	Area (ha)	Runoff Coefficient	Peak Design Flow (L/s)
21	0.37	0.69	54.99
23-24	0.38	0.69	56.56
27	0.31	0.69	46.26

Notes:
1. Flows calculated using the Rational Method. Refer to Storm Sewer Design Sheet under **Appendix D**.

The current zoning provisions for the apartment blocks have a maximum 50% lot coverage requirement which equates to a runoff coefficient of 0.55. To be conservative and to account for any potential zoning amendments the runoff coefficients for the apartment blocks have been increased to 0.69 (70% impervious). Refer to Storm Drainage Area Plan (DWG. 19008-STM1), runoff coefficient calculations, and the Storm Sewer Design Sheets provided in **Appendix D** for more details.

As requested by the City, a 300 mm diameter storm service terminating at a catch basin manhole structure (2.0 m inside the property line) has been provided for the park block (Block 28). Minor system flows from the entire park block have been allocated for within the proposed storm sewer system on Street 1. To ensure a conservative design, the major system flows from the park block have also been assumed to drain towards the roadway and not directly to the ravine.

7.2 Storm Sewer Outlet Design

The proposed storm sewer systems for Street 1 and Street 2 outlet to the existing SWM ravine upstream of existing control structure G4. The outlet reaches between the end of the storm sewer pipes and the ravine bottom have been assessed to ensure that there is adequate capacity to convey peak flows and that adequate protection for erosive forces is provided. Each outlet channel has been assessed based on the peak flow rate through the outlet pipe (i.e. calculated using PCSWMM). To convey the peak flow rates, each outlet channel is proposed to have a 2.5 m flat bottom width, with 3H:1V side slopes, and a total depth of 0.40 m. The proposed channel depth of 0.40 m provides a freeboard of over 0.30 m beyond the minimum channel depth required to convey the 100-year flow rates. Refer to outlet channel calculations under **Appendix D**.

As requested by the City, the pipe outlets have been assessed using USDA design charts. The USDA design charts provide recommended apron lengths and rip-rap sizing for outlet protection. For the Street 1 pipe outlet, the USDA design charts recommend an apron length of 5.2 m and a nominal rip-rap diameter of 0.15 m based on a pipe discharge rate of 1.1 m^3/s (calculated using PCSWMM) and a 762 mm (30 inch) pipe diameter. Due to the natural topography of the ravine side slopes, the rip-rap treatment is proposed to extend to the bottom of the channel for a total length of 14.8 m. To further reduce erosive forces for the Street 1 pipe outlet, the headwall is proposed to include a pre-cast apron with energy dissipators (OPSD 804.040). The total width of rip-rap treatment will be 5.0 m. For the Street 2 pipe outlet, the USDA design charts recommend an apron length of 5.4 m and a nominal rip-rap diameter of 0.20 m based on a pipe discharge rate of 0.570 m^3/s (calculated using PCSWMM) and a 457 mm (18 inch) pipe diameter. Due to the natural topography of the

STORM SEWER DESIGN SHEET
for
147 LANGSTAFF DRIVE, CARP

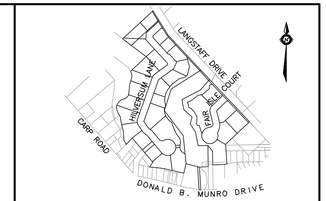
LOCATION				AREA (ha)	C	2 YR		TIME OF CONC. (min)	2 YR RAINFALL INTENSITY (mm/hr)	2 YR PEAK FLOW (L/s)	PROPOSED SEWER						
DRAINAGE AREA	STREET NAME	FROM MH	TO MH			INDIV. 2.78AC	ACCUM. 2.78AC				PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	2-YR PERCENT FULL
TO SWM RAVINE CELL G4:																	
	STREET 1	200	201	0.00	0.00	0.00	0.00	10.00	76.81	0.00	251.46	1.25	37.7	67.60	1.36	0.46	0%
	STREET 1	201	202	0.00	0.00	0.00	0.00	10.46	75.08	0.00	251.46	1.18	14.4	65.68	1.32	0.18	0%
STM21	STREET 1	RYCBT 38	MAIN	0.33	0.45	0.41	0.41	15.00	61.77	25.61	251.46	1.01	31.7	60.76	1.22	0.43	42%
	STREET 1	RYCB 23	MAIN	0.00	0.00	0.00	0.41	15.43	60.77	25.20	251.46	3.50	5.3	113.11	2.28	0.04	22%
STM1 + STM2	STREET 1	202	203	0.52	0.74	1.07	1.48	10.64	74.42	110.47	366.42	1.24	82.2	183.74	1.74	0.79	60%
	STREET 1	203	204	0.00	0.00	0.00	1.48	11.43	71.72	106.46	366.42	1.21	14.0	181.50	1.72	0.14	59%
	STREET 1	204	205	0.00	0.00	0.00	1.48	11.56	71.28	105.80	366.42	1.24	49.9	183.74	1.74	0.48	58%
STM3 + STM4 + STM5	STREET 1	205	206	0.83	0.73	1.68	3.17	12.04	69.76	220.96	457.00	1.23	116.9	329.82	2.01	0.97	67%
	STREET 1	206	207	0.00	0.00	0.00	3.17	13.01	66.90	211.89	457.00	1.16	8.6	320.29	1.95	0.07	66%
	STREET 1	207	208	0.00	0.00	0.00	3.17	13.08	66.69	211.24	457.00	1.23	22.8	329.82	2.01	0.19	64%
STM22	PARK	250	208	0.24	0.50	0.34	0.34	10.00	76.81	26.06	299.36	0.98	9.2	95.28	1.35	0.11	27%
	STREET 1	208	209	0.00	0.00	0.00	3.51	13.27	66.17	232.02	457.00	1.15	9.6	318.91	1.94	0.08	73%
STM6	STREET 1	209	210	0.24	0.72	0.48	3.99	13.36	65.94	262.85	533.00	0.80	26.1	400.89	1.80	0.24	66%
STM13	BLK 27	CAP	210	0.31	0.69	0.60	0.60	10.00	76.81	46.26	366.42	0.53	9.5	120.12	1.14	0.14	39%
	STREET 1	210	211	0.00	0.00	0.00	4.59	13.60	65.29	299.57	610.00	0.27	29.5	333.76	1.14	0.43	90%
STM7	STREET 1	211	OGS1	0.33	0.69	0.63	5.22	14.03	64.16	334.65	762.00	0.35	28.9	687.79	1.51	0.32	49%
	STREET 1	OGS1	212	0.00	0.00	0.00	5.22	14.35	63.35	330.43	762.00	0.43	20.8	762.36	1.67	0.21	43%
	STREET 1	212	HW1	0.00	0.00	0.00	5.22	14.56	62.84	327.75	762.00	0.34	8.7	677.90	1.49	0.10	48%
TO SWM RAVINE CELL G4:																	
STM8	STREET 2	220	221	0.19	0.80	0.42	0.42	10.00	76.81	32.04	251.46	1.30	37.8	68.93	1.39	0.45	46%
	STREET 2	221	222	0.00	0.00	0.00	0.42	10.45	75.10	31.33	251.46	1.26	9.5	67.87	1.37	0.12	46%
	STREET 2	222	223	0.00	0.00	0.00	0.42	10.57	74.68	31.15	251.46	1.28	18.7	68.40	1.38	0.23	46%
STM14	BLK 21	CAP	223	0.37	0.69	0.72	0.72	10.00	76.81	54.99	366.42	0.58	8.6	125.66	1.19	0.12	44%
STM11	STREET 2	RYCB 22	RYCB 21	0.09	0.59	0.15	0.15	15.00	61.77	9.44	251.46	3.50	6.0	113.11	2.28	0.04	8%
	STREET 2	RYCB 21	MAIN	0.00	0.00	0.00	0.15	15.04	61.66	9.43	251.46	3.50	6.3	113.11	2.28	0.05	8%
STM9	STREET 2	223	224	0.08	0.53	0.12	1.41	10.80	73.88	104.24	366.42	1.28	19.6	186.68	1.77	0.18	56%
STM15 + STM16	BLK 23/24	CAP	224	0.38	0.69	0.74	0.74	10.00	76.81	56.56	366.42	0.50	12.1	116.67	1.11	0.18	48%
STM10	STREET 2	224	OGS2	0.18	0.65	0.33	2.48	10.98	73.23	181.76	457.00	1.58	46.7	373.81	2.28	0.34	49%
	STREET 2	OGS2	225	0.00	0.00	0.00	2.48	11.32	72.08	178.89	457.00	0.46	15.2	201.70	1.23	0.21	89%
	STREET 2	225	HW2	0.00	0.00	0.00	2.48	11.53	71.40	177.20	457.00	0.61	8.2	232.27	1.42	0.10	76%
TO SWM RAVINE CELL G4:																	
STM12	BLK 26	CBMH 240	OUTLET	0.31	0.44	0.38	0.38	15.00	61.77	23.26	251.46	0.49	37.0	42.32	0.85	0.72	55%

Design Parameters

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
   Q = 2.78CIA, where:
   Q = Peak Flow (L/s)
   A = Drainage Area (ha)
   I = Rainfall Intensity (mm/hr)
   C = Runoff Coefficient
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)

IDF curve equations (Intensity in mm/hr)

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity = $1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity = $1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity = $1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$



KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- EXISTING STORM SEWER & MANHOLE
- EXISTING CATCH BASIN
- STORM SEWER & MANHOLE
- ROADSIDE CATCH BASIN
- ROADSIDE DOUBLE CATCH BASIN
- LANDSCAPE CATCH BASIN ELBOW
- LANDSCAPE CATCH BASIN TEE
- SWALE
- SWALE WITH 250mmø SUBDRAIN
- STORM DRAINAGE AREA BOUNDARY
- MAJOR OVERLAND FLOW ROUTE

RUNOFF COEFFICIENT
0.50 0.28 — AREA (ha)
STM1 — DRAINAGE AREA ID

ALLOCATED MINOR SYSTEM FLOWS

BLOCK ID	AREA (ha)	RUNOFF COEFFICIENT	MODELLED MINOR SYSTEM FLOW (L/s)
21	0.37	0.69	56
22	0.24	0.50	0
23	0.19	0.69	29
24	0.19	0.69	29
27	0.31	0.69	47
28	0.24	0.50	26

ALLOCATED MAJOR SYSTEM FLOWS

BLOCK ID	MAJOR SYSTEM FLOWS (L/s)		
	2-YR	5-YR	100-YR
21	0	32	116
22	21	31	65
23	0	13	53
24	0	14	54
27	0	22	87
28	0	4	54

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP-STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: GSVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83-9)

NO.	REVISION DESCRIPTION	DATE	BY
7	ISSUED FOR MECP ECA	23/09/24	BLM
6	ISSUED FOR PHASE 1 TENDER	06/09/24	BLM
5	REVISED PER CITY COMMENTS	12/07/24	BLM
4	REVISED PER CITY COMMENTS	28/05/24	BLM
3	REVISED PER CITY COMMENTS	22/03/24	BLM
2	REVISED PER CITY COMMENTS	09/11/23	BLM
1	ISSUED FOR REVIEW	24/05/23	BLM

SCALE
0 5m 10m 30m
HORIZONTAL 1:750

LICENSED PROFESSIONAL ENGINEER — B. L. MACKECHNIE — 100199554 — Sept. 23/24 — PROVINCE OF ONTARIO

Robinson Land Development
CONSULTING ENGINEERS
350 PALLADIUM DRIVE
KANATA, ONTARIO K2V 1A8
TELEPHONE (613) 592-6060

DESIGN	JHB
CHECKED	BLM
DRAWN	JHB
CHECKED	BLM
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

147 LANGSTAFF DRIVE
CARP, ON

STORM DRAINAGE AREA PLAN

PROJECT No.	19008
SURVEY	RLD
DATED	SEPTEMBER 2024
DWG. No:	19008-STM1

PLAN No. 19168
FILE No. D07-16-21-0012

Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
R1	0.10	0.00	0.00	0.10	0.90	1.00	100.0
STM1	0.01	0.01	0.00	0.02	0.50	0.63	43.1
STM2	0.01	0.03	0.00	0.04	0.35	0.44	21.5
FF1	0.01	0.00	0.00	0.01	0.90	1.00	100.0
FF2	0.03	0.01	0.00	0.04	0.68	0.85	68.4
FF3	0.03	0.08	0.00	0.11	0.42	0.53	31.4

Runoff Coefficients:
C impervious = 0.90
C pervious = 0.20
C gravel = 0.80
C_{100} = C * 1.25 (Max. 1.0)

Cummulative Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
R1 + FF1	0.11	0.00	0.00	0.11	0.90	1.00	100.0
MINOR SYSTEM	0.12	0.04	0.00	0.16	0.74	0.92	76.9
TO EX OGS	0.15	0.05	0.00	0.20	0.73	0.91	75.2
TOTAL SITE	0.18	0.12	0.00	0.31	0.62	0.77	59.6

Subcatchment Runoff Coefficient Calculations

Drainage Area ID	Impervious Area (ha)	Pervious Area (ha)	Gravel Area (ha)	Total Area (ha)	C	C (100 YR)	Percent Impervious (%)
SWALE-1	0.01	0.02	0.00	0.03	0.55	0.68	49.4
SWALE-2	0.00	0.01	0.00	0.02	0.39	0.48	26.4

STORM SEWER DESIGN SHEET
391 HILVERSUM LANE, VILLAGE OF CARP

LOCATION			AREA (ha)	C	C (100 YR)	2-YR		100-YR		TIME OF CONC. (min)	2-YR RAINFALL INTENSITY (mm/hr)	2-YR PEAK FLOW (L/s)	100-YR RAINFALL INTENSITY (mm/hr)	100-YR PEAK FLOW (L/s)	100-YR RESTRICTED FLOW (L/s)	CUMULATIVE RESTRICTED FLOW (L/s)	PROPOSED SEWER							
DRAINAGE AREA	FROM MH	TO MH				INDIV. 2.78AC	ACCUM. 2.78AC	INDIV. 2.78AC	ACCUM. 2.78AC								PIPE DIA. (mm)	GRADE (%)	LENGTH (m)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	TIME OF FLOW (min)	2-YR PERCENT FULL	100-YR PERCENT FULL WITH RESTRICTED CONTROLS
TO HILVERSUM LANE STORM SEWER																								
R1 + FF1	BLDG	200	0.11	0.90	1.00	0.27	0.27	0.30	0.30	10.00	76.81	20.82	178.56	53.79	8.75	8.75	251.46	1.59	4.4	76.24	1.54	0.05	27%	11%
STM1	CB 1	200	0.02	0.50	0.63	0.02	0.02	0.03	0.03	10.00	76.81	1.79	178.56	5.20	5.20	5.20	201.16	3.09	11.0	58.61	1.84	0.10	3%	9%
STM2	CB 2	200	0.04	0.35	0.44	0.03	0.03	0.04	0.04	10.00	76.81	2.63	178.56	7.65	7.65	7.65	201.16	3.37	17.2	61.21	1.93	0.15	4%	12%
	200	*EX210*	0.00	0.00	0.00	0.00	0.33	0.00	0.37	10.15	76.24	25.06	177.21	66.13	0.00	21.60	366.42	0.53	8.8	120.12	1.14	0.13	21%	18%

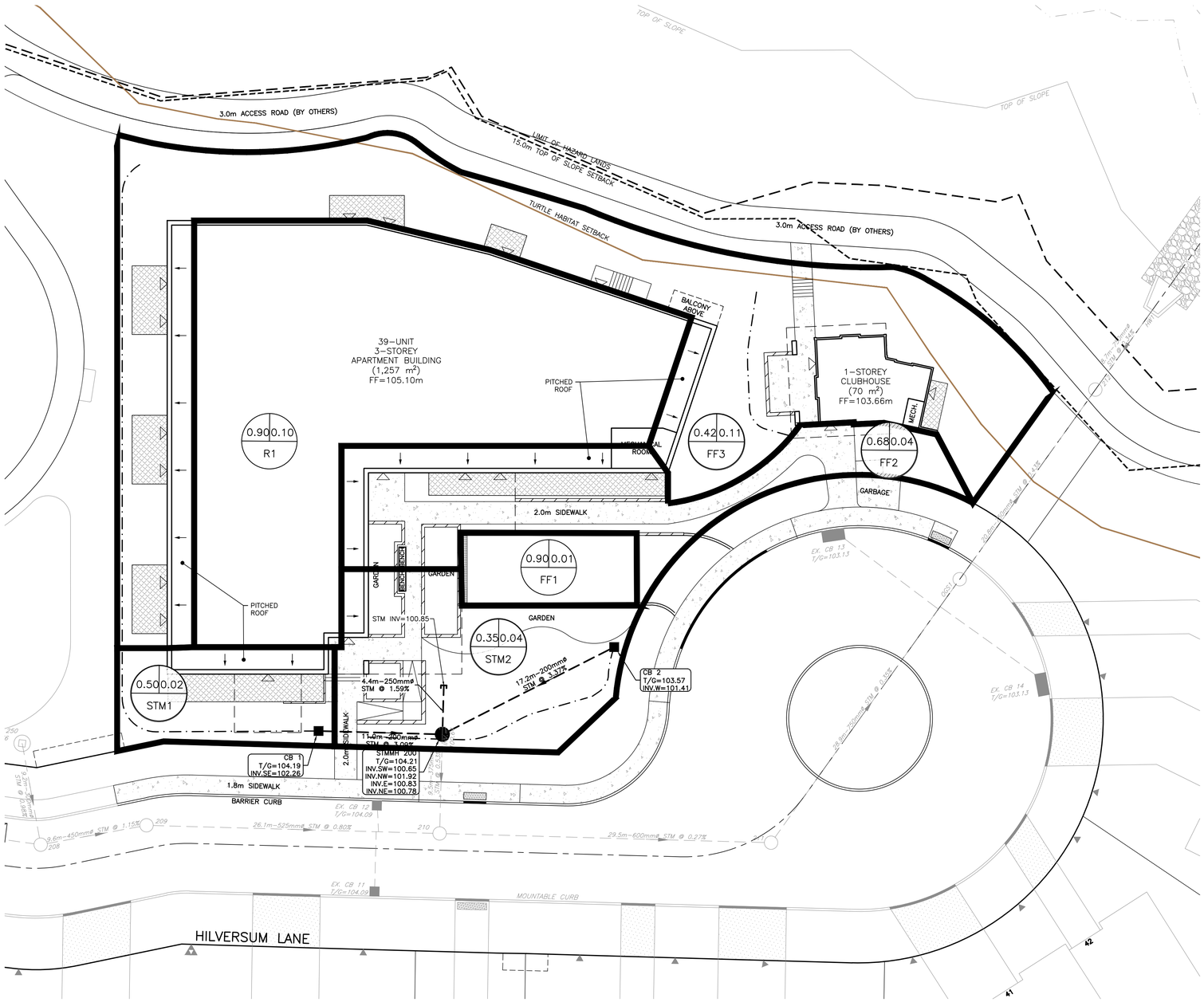
Design Parameters

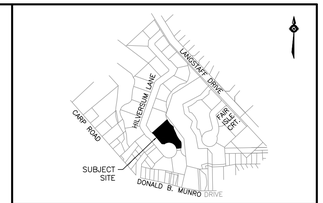
Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Peak flows calculated using the Rational Method.
   Q = 2.78CIA, where:
   Q = Peak Flow (L/s)
   A = Drainage Area (ha)
   I = Rainfall Intensity (mm/hr)
   C = Runoff Coefficient
3. Manning's roughness coefficient = 0.013
4. Full flow velocity: MIN 0.8 m/s; MAX 3.0 m/s (City of Ottawa Sewer Design Guidelines, v.2012)

IDF curve equations (Intensity in mm/hr)

100 year Intensity = $1735.688 / (\text{Time in min} + 6.014)^{0.820}$
50 year Intensity = $1569.580 / (\text{Time in min} + 6.014)^{0.820}$
25 year Intensity = $1402.884 / (\text{Time in min} + 6.018)^{0.819}$
10 year Intensity = $1174.184 / (\text{Time in min} + 6.014)^{0.816}$
5 year Intensity = $998.071 / (\text{Time in min} + 6.053)^{0.814}$
2 year Intensity = $732.951 / (\text{Time in min} + 6.199)^{0.810}$





KEY PLAN

LEGEND

- PROPERTY BOUNDARY
- LIMIT OF HAZARD LANDS
- 15.0m TOP OF SLOPE SETBACK
- TURTLE HABITAT SETBACK (AS PER EIS)
- EXISTING CATCH BASIN
- EXISTING STORM SEWER & MANHOLE
- CATCH BASIN
- STORM SEWER & MANHOLE
- BUILDING ENTRANCE
- SWALE
- STORM DRAINAGE AREA BOUNDARY

RUNOFF COEFFICIENT
0.85 | 0.10 — AREA (ha)
STM1 — DRAINAGE AREA ID

NOT FOR CONSTRUCTION

NOTES

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.

GEODETIC SURVEY DERIVED FROM COSINE STATION 0011968U054. LOCATION DESCRIPTION: OLD HIGHWAY 17 BRIDGE OVER CARP RIVER ON CARP-STITTSVILLE ROAD, 0.2 KM SOUTH OF C.N.R. CROSSING IN VILLAGE OF CARP, TABLET IN TOP OF WEST WALL, 30 CM FROM NORTH END, 24 CM FROM WEST EDGE. VERTICAL CONTROL DATA, DATUM: CGVD28:78, FIRST ORDER, ELEVATION: 93.861. COORDINATE SYSTEM: MTM ZONE 9; NAD 83 DATUM (CAN83-9)

NO.	REVISION DESCRIPTION	DATE	BY
3	REVISED PER CITY/MVCA COMMENTS	08/04/26	BLM
2	REVISED PER CITY COMMENTS	12/02/26	BLM
1	ISSUED FOR REVIEW	21/11/25	BLM

SCALE
0 2m 4m 8m
HORIZONTAL 1:200

LICENSED PROFESSIONAL ENGINEER
B. L. MACKECHNIE
100199554
PROVINCE OF ONTARIO
8 Apr. '26

Robinson Land Development
2936 Baseline Road, Suite 200, Ottawa, ON K2H 1B3
(613) 592-6060 rcii.com

DESIGN	BLM
CHECKED	SG
DRAWN	BLM
CHECKED	SG
APPROVED	BLM

INVERNESS HOMES
38 AURIGA DRIVE, SUITE 200
OTTAWA, ON K2E 8A6

391 HILVERSUM LANE
CARP, ON

STORM DRAINAGE AREA PLAN

PROJECT No.	25094
SURVEY	ROBINSON CONSULTANTS
DATED	APRIL 2026
DWG. No:	25094-STM1

FILE No. D07-12-25-0155 PLAN No. 19436

Appendix F

Robinson Report Excerpts

Free Flow Calculations

Storage Volume Tables

OSDG *Appendix 6-C*

Table F1: Drainage Swale Assessment

Figure 5.0: Swale Drainage Area Plan

Figure 5: OGS Unit Drainage Area Plan
(Huntley Hollow Subdivision)

Amended ECA

Geotechnical Excerpts

therefore is in accordance with the OSDG. Refer to **Table E5** in **Appendix E** for more details.

Park Land

The proposed grading design for the designated park land (Block 28) generally follows the natural topography of the property which slopes from the Street 1 right-of-way towards the existing SWM ravine. It is likely that major system flows from the park land will be conveyed uncontrolled to the existing SWM ravine upstream of existing control structure G4, although to ensure a conservative design while also allowing for park design flexibility, it has been assumed that all major system flow will be conveyed to the adjacent road network. The park block has been modelled using an assumed runoff coefficient value of 0.50 to account for the future development plans of the park.

Private Dog Park/Communal Garden

Also due to topography, major system flows from the private dog park/communal garden (Block 22) will be conveyed uncontrolled to the existing ravine downstream of control structure G4. These flows have been accounted for in the total flow tributary to the existing Donald B. Munro road crossing culvert. Block 22 has been modelled using an assumed runoff coefficient value of 0.50 to account for the future development plans of the block.

Apartment Blocks

To be conservative, the major system design has assumed that all major system flow from the apartment blocks (Block 21, 23, 24, and 27) will be conveyed to the proposed road networks. This approach ensures that the road network and overland flow routes are designed with adequate capacity to convey the full major system flows from the apartment blocks. At the Site Plan Application stage, it must be demonstrated that the major system flows from apartment blocks do not exceed the allocated values. Note that the modelling has assumed no major system storage on site, again to ensure design flexibility while also ensuring a conservative analysis.

As discussed with the City, a drainage easement will be required within Block 23 and Block 24 to allow major system flows from Block 24 to be conveyed through Block 23 to reach Street 2. This ensures that at the Site Plan Application stage, the development of Block 23 must be designed to accommodate major system flow from Block 24. The allocated major system flows from the blocks have been summarized in **Table 8.12** below.

Table 8.12: Allocated Major System Flows from Blocks

Block No.	Description	Minor System Flow (L/s)	Major System Flows (L/s)		
			2-Yr	5-Yr	100-Yr
Block 21	Apartment – Phase 2	56	0	32	116
Block 22	Dog Park – Phase 2	0	21	31	65
Block 23	Apartment – Phase 2	29	0	13	53
Block 24	Apartment – Phase 2	29	0	14	54
Block 27	Apartment – Phase 1	47	0	22	87
Block 28	Park – Phase 1	26	0	4	54

Table 8.14: West Ravine Peak Flows

Development Condition	C Value	Area (ha)	Tc*2 (min.)	Peak Flow*1 (L/s)		
				2-Yr	5-Yr	100-Yr
Pre	0.20	2.06	13.1	76.4	103.5	221.3
Post	0.43	0.95	10.0	87.2	118.3	249.9

Notes:
2. Peak flows calculated using the Rational Method (Q=2.78CiA)
3. Time of concentration values estimated using the Uplands Method (Minimum Tc = 10 min).

As demonstrated in the table above, the post-development peak flows to the west ravine will increase due to a higher runoff coefficient and shorter time of concentration. A section of the existing west ravine was assessed immediately downstream of the subject site (approximately 13 metres upstream of Carp Road). Channel calculations have demonstrated that only an additional 0.01 metres of channel depth is required to accommodate the increased peak flow under the post-development condition. Supporting calculations and a West Ravine Drainage Area Plan are provided under **Appendix E**. The use of surface drainage as opposed to storm sewers will minimize the potential for converged flows within the ravine. Since the majority of the runoff is conveyed to ravine via overland sheet flow from landscape areas and the ravine has adequate capacity to convey the increase in peak flow there are no concerns for negative impacts (i.e. erosion and/or flooding) within the ravine or adjacent properties as a result of the development. Since the runoff is considered "clean" (i.e. from grassed areas and roofs), quality control is not required prior to discharging off-site.

8.13 Quality Control

As outlined in the PSR Report, drainage areas 1 and 1a (i.e. the proposed development lands) may require additional treatment to achieve level 2 ("normal level" 70% TSS removal) quality control. A 70% TSS removal target was also outlined in the overarching CRWSS and recommended by the MVCA during pre-consultation. However, to be applicable for the City of Ottawa's Transfer of Review (TOR) program an enhanced level (80% TSS removal) target will be implemented for this development.

Quality control for the proposed development will be provided by installing inline oil-grit separator (OGS) units upstream of the storm outlets to the existing SWM ravine. One OGS unit per storm outlet will be required. The rear yard storm outlet from Block 26 will not require an inline OGS unit since the runoff is from grass and roof areas which are considered 'clean' and do not require additional treatment. The OGS units have been located within the municipal roadways to allow for easy access and maintenance.

The proposed OGS units have been appropriately sized to provide enhanced level (80% TSS removal) quality control based on parameters (i.e. area and percent impervious) of the tributary drainage areas and using a FINE PSD. The unit for the Street 1 outlet is proposed to be a Stormceptor EFO8 and the unit for the Street 2 outlet is proposed to be a Stormceptor EFO6, both designed by Imbrium Systems (or approved equivalent). The Stormceptor EFO model removes stormwater pollutants through gravity separation and floatation, and features a design which generates positive removal of total suspended solids (TSS) throughout each storm event, including high intensity storms. Captured pollutants include sediments, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. The EFO unit has been

third-party tested in accordance with the Canadian ETV Procedure for Laboratory Testing of Oil-Grit Separators and has been third-party verified in accordance with the ISO 14034 Environmental Technology Verification (ETV). Refer to the OGS specifications provided in **Appendix E** for more details. Note that the losses created by the OGS units have been accounted for in the modelling through an equivalent exit loss coefficient.

The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. When prescribed surface loading rates are exceeded, ponding water can overtop the weir height and bypass the lower treatment chamber, exiting directly through the outlet pipe. Hydraulic testing and scour testing demonstrate that the internal bypass effectively prevents scour at all bypass flow rates. Increasing the bypass flow rate does not increase the orifice-controlled flow rate into the lower treatment chamber where sediment is stored. This internal bypass feature allows for in-line installation, avoiding the cost of additional bypass structures. During bypass, treatment continues in the lower chamber at the maximum flow rate. The Stormceptor EFO's lower design surface loading rate is favorable for minimizing re-entrainment and washout of captured light liquids. An ISO 14034 ETV Verification Statement which summarizes the results of third-party testing and verification in accordance with ETV protocol has been provided in **Appendix E**.

Operation and maintenance of the units shall be performed in accordance with the manufacturer's recommendations (provided in **Appendix E**). Inspection of the units shall be performed as follows:

- Post-construction inspection is required prior to putting the Stormceptor into service.
- Routine inspections are recommended during the first year of operation to accurately assess pollutant accumulation.
- Inspection frequency in subsequent years is based on the maintenance plan developed in the first year.
- Inspections should also be performed immediately after oil, fuel, or other chemical spills.

For optimum performance and normal operation, the units should be cleaned out once the sediment depth reaches the recommended maintenance sediment depths noted below (refer also to *Table 3* of the Owner's Manual provided in **Appendix E**).

EFO6: 305 mm
EFO8: 610 mm

The sizing report for the EFO6 unit indicates an estimated average annual sediment volume of 842 litres per year which is far less than the noted maximum sediment volume capacity of 3470 litres. For the EFO8 unit, the estimated average annual sediment volume is 1628 litres per year which is also far less than the noted maximum sediment volume capacity of 8780 litres. The frequency of inspection and maintenance should be adjusted based on site conditions to ensure the units are operating and performing as intended, however, yearly inspection and maintenance (at minimum) is recommended.

The surface vegetation within the SWM ravine and off-site ditch system which will provide additional quality cleansing via filtration prior to stormwater reaching the downstream receiver (i.e. Carp River). From the Carp EMP, "*Protection of remnant natural vegetation, particularly in the lowermost forested areas of the two major ravines and anywhere in the largely open upper reaches of the stream channels, encourages the natural regeneration of tree cover along ravine slopes. This enhances the wildlife corridor capacity of the ravines as well as increasing their stormwater containment contributions.*"

Free Flow Calculations - Area FF1 (to U/G Parking Garage)

Area ID = FF1
Area (ha) = 0.01
C = 0.90
C (100 YR) = 1.00

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
2 Year	**10**	**76.8**	**1.9**
	15	61.8	1.5
	20	52.0	1.3
	25	45.2	1.1
	30	40.0	1.0
	35	36.1	0.9
5 Year	**10**	**104.2**	**2.5**
	15	83.6	2.0
	20	70.3	1.7
	25	60.9	1.5
	30	53.9	1.3
	35	48.5	1.2
100 Year	**10**	**178.6**	**4.8**
	15	142.9	3.8
	20	120.0	3.2
	25	103.8	2.8
	30	91.9	2.5
	35	82.6	2.2

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - Area FF2 (to Hilversum Lane)

Area ID = FF2
Area (ha) = 0.04
C = 0.68
C (100 YR) = 0.85

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
2 Year	**10**	**76.8**	**5.5**
	15	61.8	4.4
	20	52.0	3.7
	25	45.2	3.2
	30	40.0	2.9
	35	36.1	2.6
5 Year	**10**	**104.2**	**7.4**
	15	83.6	5.9
	20	70.3	5.0
	25	60.9	4.3
	30	53.9	3.8
	35	48.5	3.5
100 Year	**10**	**178.6**	**15.9**
	15	142.9	12.7
	20	120.0	10.7
	25	103.8	9.2
	30	91.9	8.2
	35	82.6	7.3

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Free Flow Calculations - Area FF3 (to Ravine)

Area ID = FF3
Area (ha) = 0.11
C = 0.42
C (100 YR) = 0.53

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
2 Year	**10**	**76.8**	**9.9**
	15	61.8	8.0
	20	52.0	6.7
	25	45.2	5.8
	30	40.0	5.2
	35	36.1	4.7
5 Year	**10**	**104.2**	**13.4**
	15	83.6	10.8
	20	70.3	9.1
	25	60.9	7.9
	30	53.9	7.0
	35	48.5	6.3
100 Year	**10**	**178.6**	**28.8**
	15	142.9	23.0
	20	120.0	19.3
	25	103.8	16.7
	30	91.9	14.8
	35	82.6	13.3

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - Area R1 (ROOF)

Area ID =	R1	2-Year Release Rate (L/s) =	3.9
Area (ha) =	0.10	5-Year Release Rate (L/s) =	3.9
C =	0.90	100-Year Release Rate (L/s) =	3.9
C (100 YR) =	1.00	100-Year + 20% Release Rate (L/s) =	3.9
		Roof Drain Release Rate (L/s/ha) =	40.0

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	15	61.8	15.3	3.9	11.3	10.2
	20	52.0	12.8	3.9	8.9	10.7
	25	**45.2**	**11.2**	**3.9**	**7.2**	**10.8**
	30	40.0	9.9	3.9	5.9	10.7
	35	36.1	8.9	3.9	5.0	10.4
	40	32.9	8.1	3.9	4.2	10.0
5 Year	25	60.9	15.0	3.9	11.1	16.6
	30	53.9	13.3	3.9	9.4	16.9
	35	**48.5**	**12.0**	**3.9**	**8.0**	**16.9**
	40	44.2	10.9	3.9	7.0	16.7
	45	40.6	10.0	3.9	6.1	16.4
	50	37.7	9.3	3.9	5.3	16.0
100 Year	50	64.0	17.5	3.9	13.6	40.8
	55	59.6	16.4	3.9	12.4	41.0
	60	**55.9**	**15.3**	**3.9**	**11.4**	**41.0**
	65	52.6	14.4	3.9	10.5	40.9
	70	49.8	13.7	3.9	9.7	40.8
	75	47.3	13.0	3.9	9.0	40.6
100 Year + 20%	60	67.1	18.4	3.9	14.5	52.0
	65	63.2	17.3	3.9	13.4	52.2
	70	**59.7**	**16.4**	**3.9**	**12.4**	**52.3**
	75	56.7	15.6	3.9	11.6	52.2
	80	54.0	14.8	3.9	10.9	52.1
	85	51.5	14.1	3.9	10.2	52.0

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Provided storage volumes have been calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - Area STM1 (CB 1)

Area ID =	STM1	2-Year Release Rate (L/s) =	UNCONTROLLED
Area (ha) =	0.02	5-Year Release Rate (L/s) =	UNCONTROLLED
C =	0.50	100-Year Release Rate (L/s) =	UNCONTROLLED
C (100 YR) =	0.63	100-Year + 20% Release Rate (L/s) =	UNCONTROLLED
		Available Surface Storage Volume (m^3) =	1.1

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	10	76.8	1.8	1.8	0.0	0.0
	15	61.8	1.4	1.4	0.0	0.0
	20	52.0	1.2	1.2	0.0	0.0
	25	45.2	1.1	1.1	0.0	0.0
	30	40.0	0.9	0.9	0.0	0.0
	35	36.1	0.8	0.8	0.0	0.0
5 Year	10	104.2	2.4	2.4	0.0	0.0
	15	83.6	1.9	1.9	0.0	0.0
	20	70.3	1.6	1.6	0.0	0.0
	25	60.9	1.4	1.4	0.0	0.0
	30	53.9	1.3	1.3	0.0	0.0
	35	48.5	1.1	1.1	0.0	0.0
100 Year	10	178.6	5.2	5.2	0.0	0.0
	15	142.9	4.2	4.2	0.0	0.0
	20	120.0	3.5	3.5	0.0	0.0
	25	103.8	3.0	3.0	0.0	0.0
	30	91.9	2.7	2.7	0.0	0.0
	35	82.6	2.4	2.4	0.0	0.0
100 Year + 20%	10	214.3	6.2	6.2	0.0	0.0
	15	171.5	5.0	5.0	0.0	0.0
	20	143.9	4.2	4.2	0.0	0.0
	25	124.6	3.6	3.6	0.0	0.0
	30	110.2	3.2	3.2	0.0	0.0
	35	99.1	2.9	2.9	0.0	0.0

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Provided storage volumes have been calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Storage Volume Calculations - Area STM2 (CB 2)

Area ID =	STM2	2-Year Release Rate (L/s) =	UNCONTROLLED
Area (ha) =	0.04	5-Year Release Rate (L/s) =	UNCONTROLLED
C =	0.35	100-Year Release Rate (L/s) =	UNCONTROLLED
C (100 YR) =	0.44	100-Year + 20% Release Rate (L/s) =	UNCONTROLLED
		Available Surface Storage Volume (m^3) =	0.6

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)	Release Rate (L/s)	Net Runoff to be Stored (L/s)	Storage Required (m^3)
2 Year	10	76.8	2.6	2.6	0.0	0.0
	15	61.8	2.1	2.1	0.0	0.0
	20	52.0	1.8	1.8	0.0	0.0
	25	45.2	1.5	1.5	0.0	0.0
	30	40.0	1.4	1.4	0.0	0.0
	35	36.1	1.2	1.2	0.0	0.0
5 Year	10	104.2	3.6	3.6	0.0	0.0
	15	83.6	2.9	2.9	0.0	0.0
	20	70.3	2.4	2.4	0.0	0.0
	25	60.9	2.1	2.1	0.0	0.0
	30	53.9	1.8	1.8	0.0	0.0
	35	48.5	1.7	1.7	0.0	0.0
100 Year	10	178.6	7.6	7.6	0.0	0.0
	15	142.9	6.1	6.1	0.0	0.0
	20	120.0	5.1	5.1	0.0	0.0
	25	103.8	4.4	4.4	0.0	0.0
	30	91.9	3.9	3.9	0.0	0.0
	35	82.6	3.5	3.5	0.0	0.0
100 Year + 20%	10	214.3	9.2	9.2	0.0	0.0
	15	171.5	7.3	7.3	0.0	0.0
	20	143.9	6.2	6.2	0.0	0.0
	25	124.6	5.3	5.3	0.0	0.0
	30	110.2	4.7	4.7	0.0	0.0
	35	99.1	4.2	4.2	0.0	0.0

Notes:
1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Provided storage volumes have been calculated using Civil3D by Autodesk.
3. Flow calculated using the Rational Method. Q=2.78CiA
4. C (100 YR) = C + 25% (Max. 1.0)

Increase values up to 15% for curved alignment.

		Manning 'n'
I	**CLOSED CONDUITS**	**See Section 6.1**
II	**LINED OPEN CHANNELS ****	
A.	Concrete, with surfaces as indicated:	
1.	Formed, no finish	0.013-0.017
2.	Trowel finish	0.012-0.014
3.	Float finish	0.013-0.015
4.	Float finish, some gravel on bottom	0.015-0.017
5.	Gunite, good section	0.016-0.019
6.	Gunite, wavy section	0.018-0.022
*	Range given is for good to fair construction unless stated otherwise.	
**	For important work see Ref. 85 or 86	
B.	Concrete bottom float-finished, sides as indicated:	
1.	Dressed stone in mortar	0.015-0.017
2.	Random stone in mortar	0.017-0.020
3.	Cement rubble masonry	0.020-0.025
4.	Dry, rubble (riprap)	0.020-0.030
C.	Gravel bottom, sides as indicated:	
1.	Formed concrete	0.017-0.020
2.	Random stone mortar	0.020-0.023
3.	Dry rubble (riprap)	0.023-0.033
D.	Asphalt	
1.	Smooth	0.013
2.	Rough	0.016
E.	Wood, planed, clean	0.011-0.013
F.	Concrete-lined excavated rock:	
1.	Good section	0.017-0.020
2.	Irregular section	0.022-0.027
III	**UNLINED OPEN CHANNELS ***	
A.	Earth, uniform section:	
1.	Clean, recently completed	0.016-0.018
2.	Clean, after weathering	0.018-0.020
3.	With short grass, few weeds	0.022-0.027
4.	In gravelly, soil, uniform section, clean	0.022-0.025
B.	Earth, fairly uniform section:	
1.	No vegetation	0.022-0.025
2.	Grass, some weeds	0.025-0.030
3.	Dense weeds in deep channels	0.030-0.035
4.	Sides clean, gravel bottom	0.025-0.030

PERMISSIBLE VELOCITIES FOR CHANNELS LINED WITH GRASS

Cover	Slope range %	Permissible velocity, m/s	
		Erosion-resistant soils	Easily eroded soils
Bermuda grass	0-5 5-10 >10	2.4 2.1 1.8	1.8 1.5 1.2
Buffalo grass, Kentucky bluegrass, smooth brome, blue grama	0-5 5-10 >10	2.1 1.8 1.5	1.5 1.2 0.9
Grass mixture	0-5 5-10 Do not use slopes steeper than 10%	1.5 1.2	1.2 0.9
Lespedeza services, weeping love grass, iseliaemum (yellow bluegrass), Kudzu, alfalfa, crab grass	0-5 Do not use slopes steeper than 5%, except for side slopes in a combination channel	1.1	0.8
Annuals – used on mild slopes or as temporary protection until permanent covers are established common lespedeza, Sudan grass	0-5 Use on slopes steeper than 5% is not recommended.	0.8	0.8

REMARKS. The values apply to average uniform stands of each type of cover. Use velocities exceeding 1.5 m/s only where good covers and proper maintenance can be obtained.

Table F1: Drainage Swale Assessment

Drinage Area ID	Design Event	Side Slope,z (H:1V)	Channel Slope[*4] (m/m)	Ditch Bottom Width, b (m)	Minimum Channel Depth, h[*4] (m)	Manning n Value[*1]	Flow, Q1[*2] (m^3/s)	Flow Area (m^2)	Wetted Perimeter, WP (m)	Hydraulic Radius, R (m)	Velocity, V (m/s)	Calculated Flow, Q2 (m^3/s)	Q1/Q2[*4]
SWALE-1	100-YR	3.0	0.020	0.00	0.077	0.027	0.010	0.02	0.49	0.04	0.58	0.010	1.00
SWALE-2	100-YR	3.0	0.063	0.00	0.045	0.027	0.004	0.01	0.28	0.02	0.72	0.004	1.00

Notes:

1. Manning n value for open channel, earth uniform section with short grass, few weeds. OSDG Appendix 6-C.
2. Flow, Q1, calculated using Rational Method at time of concentration of 10 minutes.
3. To calculate minimum channel depth, h, iterate until Q1/Q2 is equal to 1.0.
4. Maximum channel slope used.

Sample Calculations for Trapezoidal Ditch:

b - bottom width of ditch

h - height of ditch

z - horizontal to vertical ratio of side slope

Flow Area= $bh + zh^2$ $\quad R = A/WP$ $\quad Q1 = 2.78CiA$

$WP = b + 2h(1 + z^2)^{1/2}$ $\quad V = \frac{1}{n}R^{2/3}S^{1/2}$ $\quad Q2 = A \times V$

Swale Peak Flow Calculations

Area ID = SWALE-1
Area (ha) = 0.03
C = 0.55
C (100 YR) = 0.68

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
100-YR	10	178.6	10.2

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

Area ID = SWALE-2
Area (ha) = 0.02
C = 0.39
C (100 YR) = 0.48

Design Event	Time (min)	Rainfall Intensity (mm/hr)	Flow (L/s)
100-YR	10	178.6	4.4

Notes:

1. Rainfall intensity calculated using City of Ottawa IDF curve equations.
2. Flow calculated using the Rational Method. Q=2.78CiA
3. C (100 YR) = C + 25% (Max. 1.0)

3.0m ACCESS ROAD (BY OTHERS)

39–UNIT
3–STOREY
APARTMENT BUILDING
(1,257 m²)
FF=105.10m

BALCONY ABOVE

0.68 0.03
SWALE–1

1–STOREY
CLUBHOUSE
(70 m²)
FF=103.66m

MECH.

MECHANICAL ROOM

0.48 0.02
SWALE–2

GARBAGE

2.0m SIDEWALK

GARDEN

BENCH

BENCH

GARDEN

GARDEN

EX. CB 13
T/G=103.13

20.8m–750mmø STM @ 0.43%

DC

0GS1

0+450

112

@ 0.35%

LEGEND

PROPERTY BOUNDARY

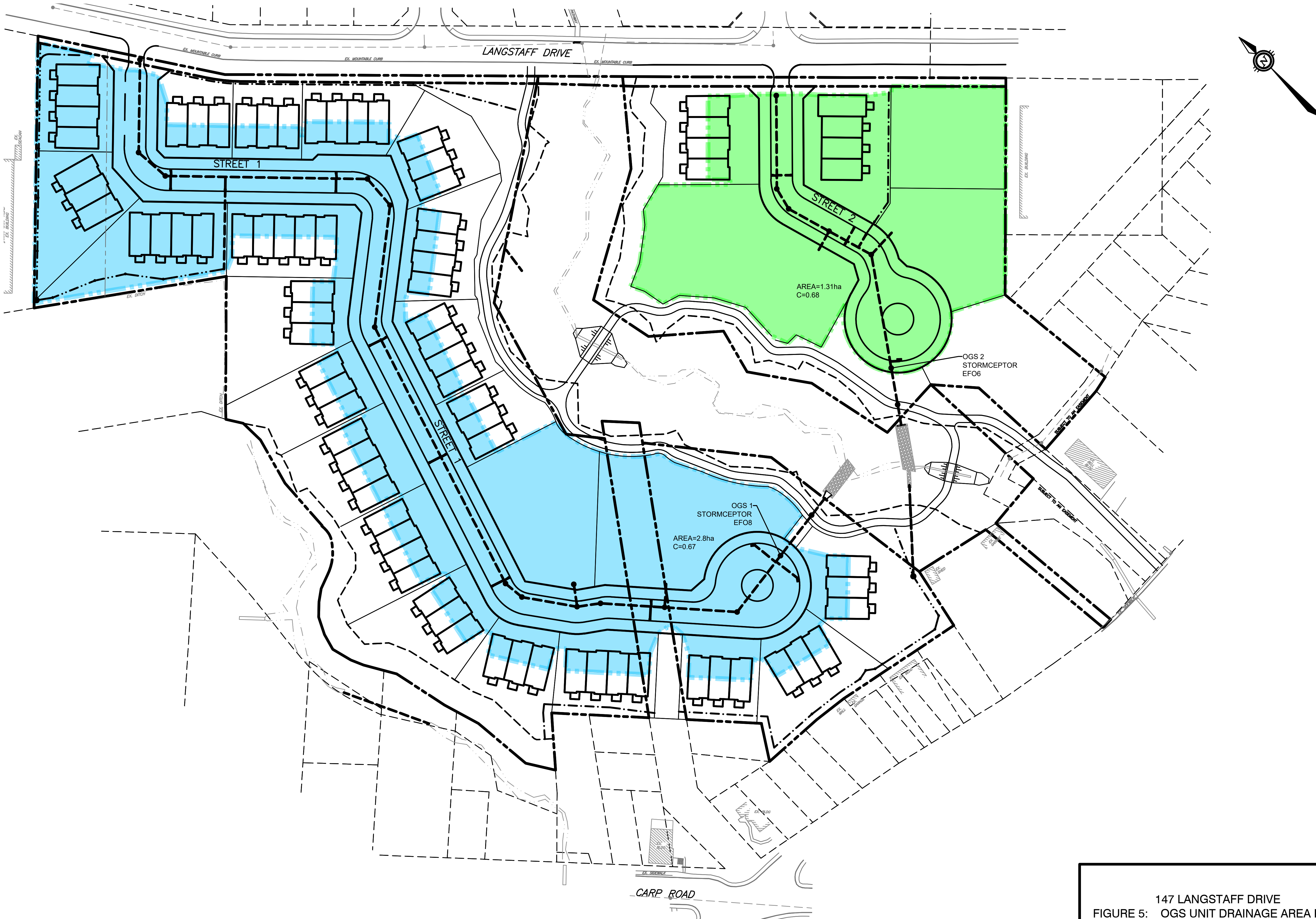
SWALE

SWALE DRAINAGE AREA BOUNDARY

RUNOFF COEFFICIENT
0.85 0.10 ← AREA (ha)
SWALE–1
DRAINAGE AREA ID

Robinson
Land Development

scale: N.T.S.	391 HILVERSUM LANE, CARP	project no.: 25094
date: 27/01/26		
drawn by: BLM	SWALE DRAINAGE AREA PLAN	FIG. 5.0



147 LANGSTAFF DRIVE
FIGURE 5: OGS UNIT DRAINAGE AREA PLAN

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 0840-DB8H9K
Issue Date: December 2, 2024

Inverness Homes Inc.
38 Auriga Drive, Unit 200
Ottawa, Ontario
K2E 8A5

Site Location: 147 Langstaff Drive, Village of Carp
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

The establishment of stormwater management Works to serve the current subdivision application of 147 Langstaff, located in the Village of Carp, consisting of the following:

- **oil and grit separator OGS 1 (catchment area 2.8 hectares):** one (1) oil and grit separator, Model EF08 or Equivalent Equipment, located within the Hilversum Lane cul-de-sac with a surface outlet 30 metres beyond, providing Enhanced Level of protection, having a sediment storage capacity of 8780 litres, an oil storage capacity of 1070 litres, and a maximum treatment rate of 1700 litres per second, receiving inflow from the storm sewer located in proposed Hilversum Lane discharging via a 750 millimetre diameter outlet pipe to the unnamed watercourse located between Langstaff Drive and Donald B. Munro Drive;
- **oil and grit separator OGS 2 (catchment area 1.31 hectares):** one (1) oil and grit separator, Model EF06 or Equivalent Equipment, located at the end of proposed Fair Ilse Court, providing Enhanced Level of protection, having a sediment storage capacity of 3470 litres, an oil storage capacity of 610 litres, and a maximum treatment rate of 990 litres per second, receiving inflow from the storm sewer located in proposed Fair Isle Court discharging via a 450 millimetre diameter outlet pipe to the unnamed watercourse located between Langstaff Drive and Donald B. Munro Drive;

the modifications to existing stormwater management Works to serve the 147 Langstaff development application and some upstream lands to the northeast of Langstaff Drive, located in the Village of Carp, for the collection, transmission, treatment and disposal of stormwater runoff from a total catchment area of 51.6 hectares, to attenuate post-development peak flows to pre-development peak flows for all storm events up to and including the 100-year storm event, discharging to the un-named watercourse located on 147 Langstaff between Langstaff Drive and Donald B. Munro Drive, consisting of the following:

- **Existing stormwater management facility G3 (catchment area 47.6 hectares- with 1.33 hectares from this development):** one (1) dry pond, located between Langstaff Drive and Donald B. Munro Drive, 130 meters south of Langstaff Drive, having a 100-year provided storage volume of 1759 cubic metres at a ponding elevation of 102.49 meters (2.59 meters depth), complete with one pipe, consisting of a 675 millimetre diameter storm sewer, one (1) emergency overflow weir and riprap-lined spillway, allowing a maximum discharge of 1940 litres per second under the 100-year storm event to watercourse located on 147 Langstaff between Langstaff Drive and Donald B. Munro Drive;
- **Existing stormwater management facility G4 (catchment area 51.8 hectares- with 5.48 hectares from this development):** one (1) dry pond, located between Langstaff Drive and Donald B. Munro Drive, 285 meters south of Langstaff Drive, having a 100-year provided storage volume of 3132 cubic metres at a ponding elevation of 99.86 meters (2.96 meters depth), complete with one pipe, consisting of a 450 millimetre diameter storm sewer, one (1) emergency overflow weir and riprap-lined spillway, allowing a maximum discharge of 1330 litres per second under the 100-year storm event to watercourse located on 147 Langstaff between Langstaff Drive and Donald B. Munro Drive;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

Previous Works:

Facility G1:

- a wet pond with a forebay located in the ravine block with an approximately 30 meters wide outlet structure on the north east side of Langstaff Drive having approximate permanent volume of 930 cubic meters, extended detention volume of 640 cubic meters and a maximum storage volume of 1,940 cubic meters,

- one (1) 450 millimetres diameter outlet conveyance pipe with a 600 millimetres by 600 millimetres grated ditch inlet catchbasin outlet structure fitted with a 90 millimetres diameter horizontal orifice plate,

- a 10.0 meters wide by 450 millimetres deep rip-rapped emergency overflow weir on the berm;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule "A" forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

Definitions:

1. "Approval" means this entire document and any schedules attached to it, and the application;
2. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;
3. "District Manager" means the District Manager of the appropriate local District Office of the

Ministry, where the Works are geographically located;

4. "EPA" means the *Environmental Protection Act,* R.S.O. 1990, c.E.19, as amended;
5. "Equivalent Equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of the approved named equipment;
6. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;
7. "MNRF" means the Ministry of Natural Resources and Forestry of the government of Ontario and includes all officials, employees or other persons acting on its behalf;
8. "OMAFRA" means the Ministry of Agriculture, Food and Rural Affairs of the government of Ontario and includes all officials, employees or other persons acting on its behalf;
9. "Owner" means Inverness Homes Inc., and includes its successors and assignees;
10. "OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;
11. "Previous Works" means those portions of the sewage Works previously approved under an Approval;
12. "Works" means the sewage Works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

Terms and Conditions:

1. GENERAL CONDITIONS

1. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.
2. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.
3. Where there is a conflict between a provision of any document in the schedule referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.
4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.
5. The conditions of this Approval are severable. If any condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of

this Approval shall not be affected thereby.

6. The issuance of, and compliance with the conditions of, this Approval does not:

    a. relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority/MNRF/OMAFRA necessary to construct or operate the sewage works; or

    b. limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

1. This Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

2. In the event that completion and commissioning of any portion of the Works is anticipated to be delayed beyond the specified expiry period, the Owner shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the Works are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. CHANGE OF OWNER

1. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the Owner;

    c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act,* R.S.O. 1990, c.B17 shall be included in the notification to the District Manager; or

    d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act,* R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

2. In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

3. The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this Approval.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this Approval can be constructed but not operated until the proposed stormwater management facilities in this Approval or any other Approval that are designed to service the storm sewers or other stormwater conveyance are in operation.
2. The Owner shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the Works do not constitute a safety or health hazard to the general public.
3. The Owner shall inspect and ensure that the design minimum liquid retention volume is maintained in the Works at all times, except when maintenance is required.
4. The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.
5. The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
6. The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:

    a. the name of the Works; and

    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

7. The Owner shall prepare an operations manual prior to the commencement of operation of the Works that includes, but is not necessarily limited to, the following information:

    a. operating and maintenance procedures for routine operation of the Works;

    b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

    c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the District Manager; and

    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

8. The Owner shall maintain the operations manual current and retain a copy at the Owner's administrative office for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.
2. The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

6. REPORTING

1. One (1) week prior to the start-up of the operation of the Works, the Owner shall notify the District Manager (in writing) of the pending start-up date.
2. The Owner shall, upon request, make all reports, manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.
3. The Owner shall prepare a performance report within ninety (90) days following the end of the period being reported upon, and submit the report(s) to the District Manager when requested. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be prepared to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:
    a. a description of any operating problems encountered and corrective actions taken;
    b. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works, including an estimate of the quantity of any materials removed from the Works;
    c. a summary of any complaints received during the reporting period and any steps taken to address the complaints;
    d. a summary of all spill or abnormal discharge events; and
    e. any other information the District Manager requires from time to time.

7. RECORD KEEPING

1. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the operation, maintenance and monitoring activities required by this Approval.

Schedule "A"

1. Application for Environmental Compliance Approval, dated September 13, 2024, received on October 16, 2024, submitted by Inverness Homes Inc.;

2. Transfer of Review Letter of Recommendation, dated October 16, 2024 and signed by Damien Whittaker, PEng., Senior Engineer - Infrastructure Applications, City of Ottawa, including the following supporting documents:

    a. Final Plans and Specifications prepared by Robinson Consultants Inc.

    b. Pipe Data Form - Watermain, Storm Sewer, Sanitary Sewer, and Forcemain Design Supplement to Application for Approval for Water and Sewage Works.

    c. Hydraulic Design Sheets prepared by Robinson Consultants Inc.

    d. Stormwater Management Report prepared by Robinson Consultants Inc.

    e. Design brief, calculations and specifications prepared by Robinson Consultants Inc..

3. Emails received on: November 01, 2024 from Connie Rivington-Howie, D & H Rivington Enterprises Inc., November 14, 2024 from Damien Whittaker, Citty of Ottawa, and November 27, 2024 from Damien Whittaker, Citty of Ottawa and Brandon MacKechnie, Robinson Consultants Inc.

4. Application for the Approval of the Municipal and Private Sewage Works dated April 19, 2001, design report, final drawings and addendum documents prepared and submitted by David McManus Engineering Ltd. and PSR Group Ltd., Consulting Engineers; submitted by D & H Rivington Enterprises Incorporated for the approval of ECA No. 8260-5LJQH5.

The reasons for the imposition of these terms and conditions are as follows:

Reasons:

1. Condition 1 is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.6 is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The Condition specifically highlights the need to obtain any necessary conservation authority approvals. The Condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.
2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.
3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.
4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the Works are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the Works. The Condition also ensures that adequate storage is maintained in the Works at all times as required by the design. Furthermore, this Condition is included to ensure that the Works are operated and maintained to function as designed.
5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.
6. Condition 6 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.
7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 8260-5LJQH5 issued on June 9, 2003

In accordance with Section 139 of the *Environmental Protection Act,* you may by written notice served upon

me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 142 of the *Environmental Protection Act* provides that the notice requiring the hearing ("the Notice") shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the *Environmental Protection Act,* a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

Registrar*
Ontario Land Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5
OLT.Registrar@ontario.ca

and

The Director appointed for the purposes of Part II.1 of the *Environmental Protection Act*
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the *Environmental Protection Act.*

DATED AT TORONTO this 2nd day of December, 2024

Aziz Ahmed, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AL/

c: District Manager, MECP Ottawa
Clerk, City of Ottawa (D07-16-21-0012 (formerly D07-16-19-0034))
Damien Whittaker, Senior Engineer, Infrastructure Applications, City of Ottawa
Brandon MacKechnie, Robinson Consultants Inc.
Kyle MacHutchon, President, Inverness Homes Inc.

4.0 Observations

4.1 Surface Conditions

The subject site located at Block 27 is currently vacant and undeveloped. An approximately 4 to 6 m deep ravine, with mature trees lining the top of the slope, is located approximately 15 to 25 m east of Block 27. The site is further bordered by Hilversum Lane and future residential development blocks to the south and west, and by future parklands to the north. The ground surface across Block 27 is relatively flat at an approximate geodetic elevation of 102 to 103 m.

4.2 Subsurface Profile

Overburden

Generally, the subsurface profile encountered at the borehole locations within, and in the surrounding area, of Block 27 consists of a silty clay deposit. It should be noted that the topsoil was stripped from this site in 2025.

The silty clay deposit generally consists of a hard to stiff silty clay extending to approximate depths of 4.6 to 5.9 m below the existing ground surface, underlain by a stiff to firm silty clay deposit. Silty sand to sandy silt seams were encountered throughout the silty clay deposit at various locations and depths throughout the borehole locations. A 1.1 m thick layer of sandy silt and a deposit of clayey silt were encountered directly above and below the silty clay deposit, respectively, at the location of borehole BH 3. Further, a deposit of silty sand was encountered underlying the silty clay at a depth of about 6 m below the existing ground surface at the locations of boreholes BH 1-26 and BH 4.

Bedrock

Practical refusal to the DCPT testing was encountered at a depth of 20.6 m below the existing ground surface in borehole BH 3-26. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the soil profiles encountered at each test hole location.

Based on available geological mapping, bedrock in the area consists of interbedded limestone and shale of the Verulam Formation, with an overburden drift thickness ranging between 15 and 50 m. The referenced geological mapping can be found at the Geological Survey of Canada website, Open File 5311, 2008. (https://doi.org/10.4095/226165).

Shrinkage Testing

Linear shrinkage testing was completed on a sample recovered during the current investigation for Block 27 at a depth of 1.07 m from borehole BH 2-26, which yielded a shrinkage limit of 21.16 and a shrinkage ratio of 1.774. The results of the linear shrinkage testing are attached to this memorandum.

Linear shrinkage testing was additionally completed on a sample recovered from the previous investigation at a depth of 1.83 m from borehole BH 3-23, and yielded a shrinkage limit of 16.69 and a shrinkage ratio of 1.885.

4.3 Groundwater

Groundwater levels (GWL) from the current investigation were measured in boreholes BH 1-26 through BH 3-26 on February 3, 2026. Additionally, groundwater levels (GWL) from previous investigations were measured in boreholes BH 1-23 through BH 6-23 on August 29, 2023, boreholes BH 1-19 through BH 7-19 on July 18, 2019, and in boreholes BH 1 through BH 6 on November 3, 2008. Groundwater levels were recorded at each borehole location and are presented in Table 3 below and on the Soil Profile and Test Data sheets in Appendix 1.

Table 3 – Summary of Groundwater Levels Readings

Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
		Depth (m)	Elevation (m)	
Current Investigation				
BH 1-26	103.15	7.00	96.15	February 3, 2026
BH 2-26	102.20	8.02	94.18	
BH 3-26	102.26	8.44	93.82	
Previous Investigations				
BH 3-23	104.40	NE	-	August 29, 2023
BH 4-23	102.25	NE	-	
BH 4-19	104.31	2.07	102.24	July 18, 2019
BH 5-19	100.75	Blocked	-	
BH 3	102.60	6.31	96.29	November 3, 2008
BH 4	102.80	6.95	95.85	

Notes:
- Current borehole elevations (BH 4-19 and BH 5-19) surveyed by Robinson Land Development are understood to be referenced to a geodetic datum.
- The ground surface elevation at the remaining borehole locations were surveyed using a handheld GPS using a geodetic datum.
- NE: Not encountered within the depth of the piezometer/monitoring well.

Further reference can be made to the groundwater monitoring results included in Appendix 1 for BH 2-24 and BH 3-24 from previous investigations.

It should be noted that groundwater levels are subject to seasonal fluctuations; therefore, the groundwater levels could vary at the time of construction.

Additional groundwater readings will be obtained in Spring 2026 in order to determine the seasonal high groundwater level.

The total earth force (P_{AE}) is considered to act at a height, h (m), from the base of the wall, where:

$h = \{P_o \cdot (H/3) + \Delta P_{AE} \cdot (0.6 \cdot H)\}/P_{AE}$

The earth forces calculated are unfactored. For the ULS case, the earth loads should be factored as live loads, as per the OBC 2024.

5.7 Pavement Structure

Pavement Structure Over Overburden

For design purposes, it is recommended that the rigid pavement structure for the underground parking level of the apartment building consist of Category C2, 32 MPa concrete at 28 days with air entrainment of 5 to 8%. The recommended rigid pavement structure is further presented in Table 4 below.

Table 4 – Recommended Rigid Pavement Structure – Underground Parking Level

Thickness (mm)	Material Description
150	**Exposure Class C2 – 32MPa Concrete** (5 to 8% Air Entrainment)
300	**BASE** – OPSS Granular A Crushed Stone
Subgrade – Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.	

To control cracking due to shrinking of the concrete floor slab, it is recommended that strategically located saw cuts be used to create control joints within the concrete floor slab of the underground parking level. The control joints are generally recommended to be located at the center of the column lines and spaced at approximately 24 to 36 times the slab thickness (for example, a 0.15 m thick slab should have control joints spaced between 3.6 and 5.4 m). The joints should be cut between 25 and 30% of the thickness of the concrete floor slab and completed as early as 4 hour after the concrete has been poured during warm temperatures and up to 12 hours during cooler temperatures.

For design purposes, the pavement structure presented in the following tables is recommended for the design of car-only parking areas and access lanes.

6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

A perimeter foundation drainage system is recommended for the proposed apartment building. The system should consist of a 100 mm diameter, geotextile-wrapped, perforated and corrugated plastic pipe which is surrounded on all sides by 150 mm of 19 mm clear crushed stone which is placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer.

A geocomposite drainage board, such as Delta Drain 6000, should be installed over the exterior below-grade foundation walls of the apartment building and connected to the perimeter drainage system. The exterior foundation walls can then be backfilled with the site excavated materials, provided that they are maintained in an unfrozen state and at a suitable moisture content for compaction. Imported granular materials, such as clean sand or OPSS Granular B Type II granular material, should otherwise be used for this purpose.

It should be noted that a geocomposite drainage board, perimeter drainage and sub-slab drainage are not required for the proposed clubhouse, as this structure will not have below-grade space.

For the proposed basement level of the apartment building, sub-slab drainage will be required to control water infiltration. For preliminary design purposes, it is recommended that 100 mm diameter perforated pipes be placed at approximate 6 m centres underlying the basement floor. The spacing of the sub-slab drainage system should be confirmed at the time of completing the excavation when water infiltration can be better assessed. It should be noted that sub-slab drainage is not required for the proposed clubhouse, as it will not have below-grade space.

6.2 Protection of Footings Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effects of frost action. A minimum 1.5 m thick soil cover, or an equivalent combination of soil cover and foundation insulation, should be provided in this regard.

A minimum of 2.1 m thick soil cover, or an equivalent combination of soil cover and foundation insulation, should be provided for other exterior unheated footings.

Generally, it should be possible to re-use the moist (not wet) stiff to very stiff silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

The installation of seepage barriers or clay seals, as per City of Ottawa Standard Drawing S8, is recommended at strategic locations (site boundaries and 60 m spacing) along the site services that are 4.0 m below the finished ground surface to reduce potential post-development groundwater lowering.

6.5 Groundwater Control

Due to the relatively impervious nature of the silty clay materials, it is anticipated that groundwater infiltration into the excavations should be relatively low and controllable using open sumps. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

Under the current regulations enacted by the Ministry of Environment, Conservation and Parks (MECP), any dewatering in excess of 50,000 L/day requires a registration on the Environmental Activity and Sector Registry (EASR), provided that dewatering is related to construction. If the dewatering is not related to construction, a Permit to Take Water obtained from the MECP will be required.

In the event that an EASR is required to facilitate dewatering of the proposed development, a minimum of 3 to 4 weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan, to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. Should a Permit to Take Water be required, a minimum of five to six months should be allotted for completion of the permit, due to the minimum review period imposed by the MECP.

6.6 Winter Construction

The subsurface conditions at this site mostly consist of frost susceptible materials. In presence of water and freezing conditions ice could form within the soil mass. Heaving and settlement upon thawing could occur.

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

391 Hilversum Land, Carp, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 341258.90 **NORTHING:** 5022954.06 **ELEVATION:** 103.15

PROJECT: Proposed Residential Development

ADVANCED BY: Track Mounted Drill Rig

REMARKS: Datum: NAD1983 (Canada) Geoid: HT2-2010 **DATE:** January 27, 2026

FILE NO. : PG4918

HOLE NO. : BH 1-26

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	MONITORING WELL CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
Hard to very stiff, brown **SILTY CLAY**		0	AU 1			32			103
		1	SS 2	100	P	31			102
- 100 mm silty sand seam at 1.7 m depth		2	SS 3	100	P	24	40		101
- 100 mm silty sand seam at 2.6 m depth		3	SS 4	100	P	33			100
		4	SS 5	100	P	41			99
		5	SS 6	100	P	45	45		98
		6	SS 7	100	P	39	30		97
		7	SS 8	79	P	48	25		96
6.02m [97.13m]									
Compact, brown **SILTY SAND**			SS 9	60	5-7-9-8 16	27			
- Trace clay to 6.7 m depth			SS 10	60	4-11-15-12 26	22			
- With clay by 7.6 m depth						20			
7.82m [95.33m]									
Stiff, grey **SILTY CLAY**		8	SS 11	80	3-1-1-1 2	32			95
- With sand by 8.4 m depth		9	SS 12	80	P	35			94
			SS 13	100	P	28			93
9.75m [93.40m]									
End of Borehole		10							92
GWL at 7.00 m depth - February 3, 2026		11							
		12							

249 179 249 249 209 159 129 121

7.00 m 2026-02-03

7.62m

9.14m

SOIL PROFILE AND TEST DATA

Geotechnical Investigation

391 Hilversum Land, Carp, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 341288.18 **NORTHING:** 5022934.93 **ELEVATION:** 102.20

PROJECT: Proposed Residential Development

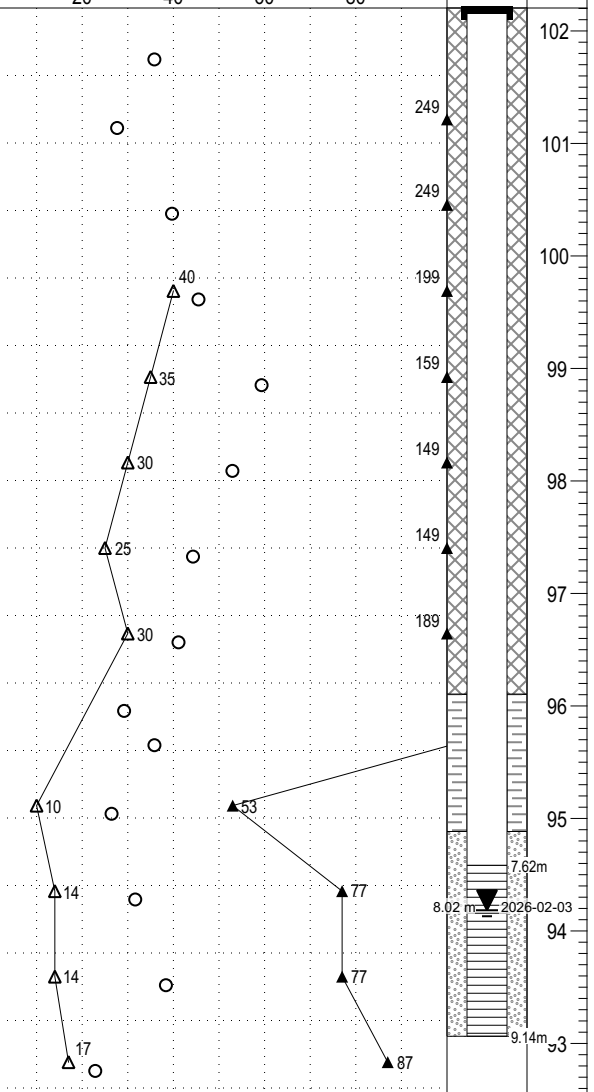
ADVANCED BY: Track Mounted Drill Rig

REMARKS: Datum: NAD1983 (Canada) Geoid: HT2-2010 **DATE:** January 27, 2026

FILE NO. : PG4918

HOLE NO. : BH 2-26

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	MONITORING WELL CONSTRUCTION	ELEVATION (m)
GROUND SURFACE									
Hard to very stiff, brown **SILTY CLAY**			AU 1			36			102
-Thin intermitent sand seams from 0.9 m to 1.5 m depth		1	SS 2	100	P	28			101
		2	SS 3	100	P	40			100
		3	SS 4	100	P	46			99
		4	SS 5	100	P	59			98
		5	SS 6	100	P	53			97
- Thin intermitent sand seams from 4.6 m to 6.1 m depth		6	SS 7	100	P	44			96
		7	SS 8	100	P	41			95
- With sand by 6.1 m depth		8	SS 9	100	P	29			94
6.45m [95.75m]									
Stiff, grey **SILTY CLAY**, trace to some sand		9	SS 10	100	P	36			93
		10	SS 11	100	P	26			92
		11	SS 12	100	P	32			91
9.75m [92.45m]		12	SS 13	100	P	38			
End of Borehole						23			
GWL at 8.02 m depth - February 3, 2026									



SOIL PROFILE AND TEST DATA

Geotechnical Investigation

391 Hilversum Land, Carp, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 341307.13 **NORTHING:** 5022923.31 **ELEVATION:** 102.26

PROJECT: Proposed Residential Development

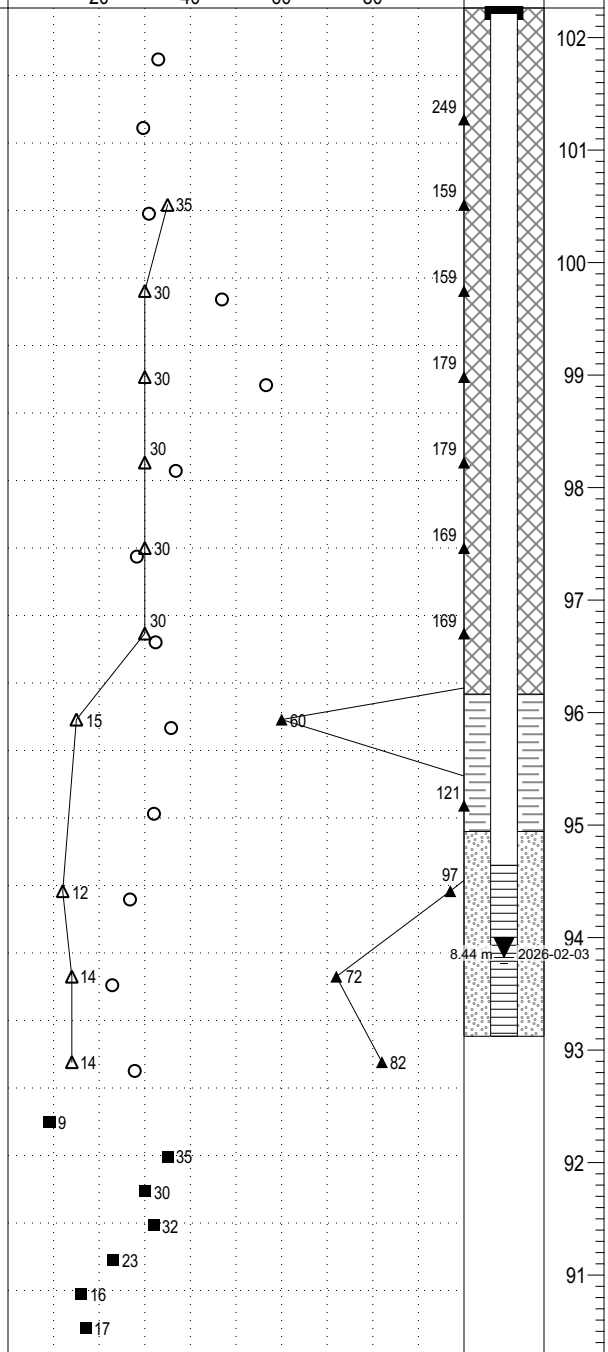
ADVANCED BY: Track Mounted Drill Rig

REMARKS: Datum: NAD1983 (Canada) Geoid: HT2-2010 **DATE:** January 28, 2026

FILE NO. : PG4918

HOLE NO. : BH 3-26

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									
Hard to very stiff, brown **SILTY CLAY** - Thin intermitent sand seams from 0.8 m to 2.1 m depth		0	AU 1			33			102
		1	SS 2	83	P	30			101
		2	SS 3	100	P	31			100
		3	SS 4	100	P	47			99
		4	SS 5	100	P	57			98
		5	SS 6	100	P	37			97
		6	SS 7		P	28			96
6.02m [96.24m]			SS 8	100	P	32			
Stiff, grey **SILTY CLAY**, trace to some sand - Thin intermitent sand seams throughout - 150 mm sand seam at 7.0 m depth		7	SS 9	100	P	36			95
		8	SS 10	100	P	32			94
		9	SS 11	100	P	27			93
		10	SS 12	100	P	23			92
9.75m [92.51m]			SS 13	100	P	28			
Dynamic Cone Penetration Test commenced at 9.75 m depth		11							91
		12							



SOIL PROFILE AND TEST DATA

Geotechnical Investigation

391 Hilversum Land, Carp, Ontario

COORD. SYS.: MTM ZONE 9 **EASTING:** 341307.13 **NORTHING:** 5022923.31 **ELEVATION:** 102.26

PROJECT: Proposed Residential Development

ADVANCED BY: Track Mounted Drill Rig

REMARKS: Datum: NAD1983 (Canada) Geoid: HT2-2010 **DATE:** January 28, 2026

FILE NO. : PG4918

HOLE NO. : BH 3-26

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)
Dynamic Cone Penetration Test		12					15				90
		13					10 14 18 23				89
		14					18 26 22 22				88
		15					19 35 34 34				87
		16					31 30 19				86
		17					23 24 24 24				85
		18					23 28 29				84
		19					33 36 26				83
		20					33 37				82
20.62m [81.64m]							100				
End of Borehole		21									81
Practical refusal to DCPT at 20.62 m depth		22									80
GWL at 8.44 m depth - February 3, 2026		23									79
		24									

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation
Proposed Residential Development - Langstaff Drive
Ottawa, Ontario

DATUM Borehole elevation inferred from nearby spot elevations on site survey, and is referenced top a geodetic datum.

FILE NO. PG1773

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** October 23, 2008

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	102.60
TOPSOIL 0.25		AU	1				
Compact, brown **SANDY SILTY**, trace clay		SS	2	100	12	1	101.60
1.37		SS	3	100	9	2	100.60
		SS	4	100	5		
		SS	5	100	5	3	99.60
Very stiff to stiff, brown **SILTY CLAY**		SS	6	100	4	4	98.60
		SS	7	100	5	5	97.60
		SS	8	100	4		
- firm and grey by 5.9m depth		SS	9	100	2	6	96.60
		SS	10	100	2	7	95.60
8.00		SS	11	100	2	8	94.60
Grey **CLAYEY SILT**		SS	12	100	2	9	93.60
		SS	13	100	2		
9.75							
End of Borehole							
(GWL @ 6.31m - Nov. 3, 2008)							

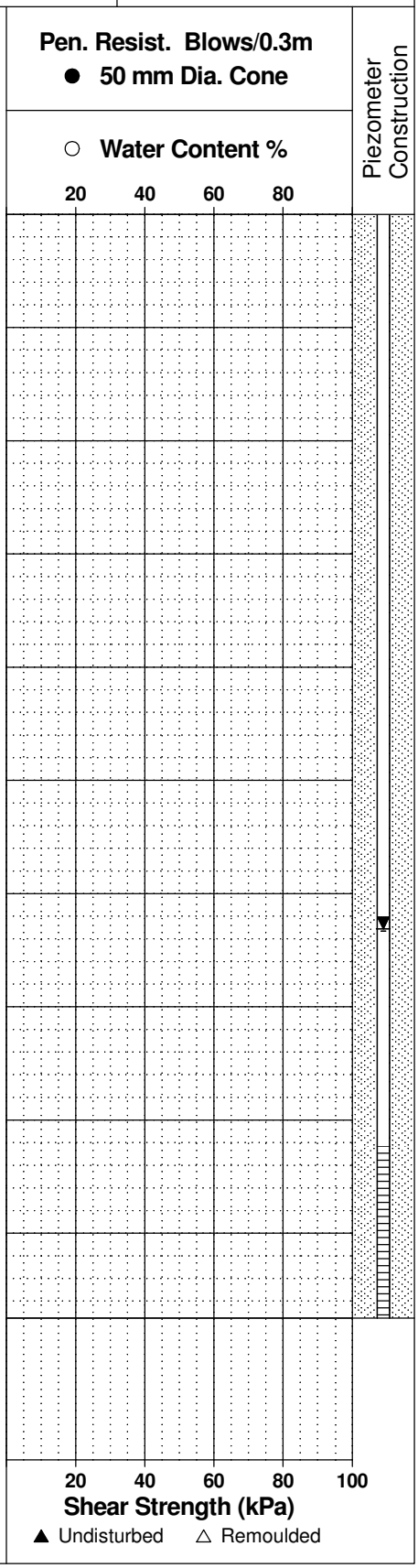


Figure 4: BH2-24 - Monitoring Well Water Elevations

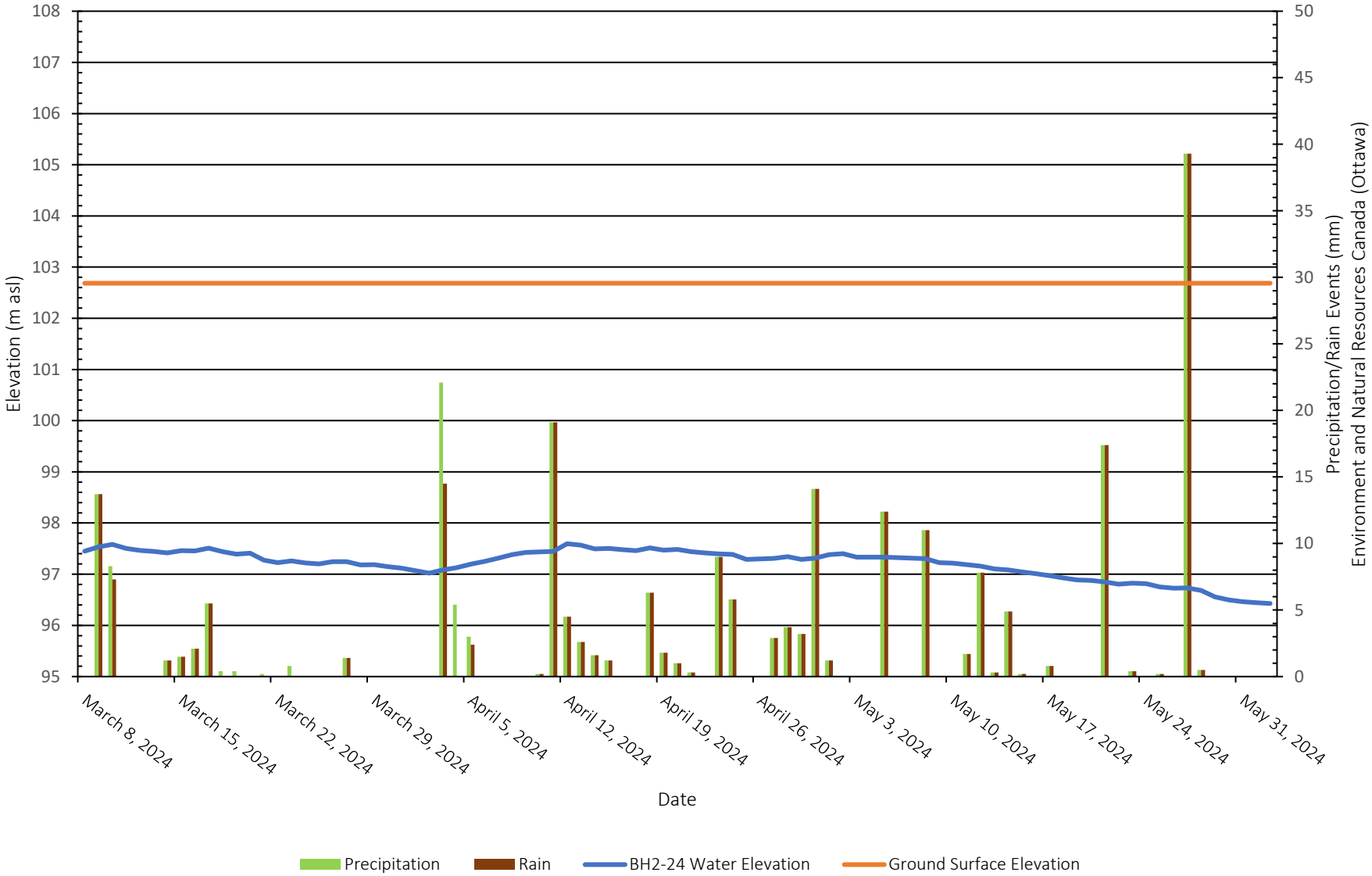
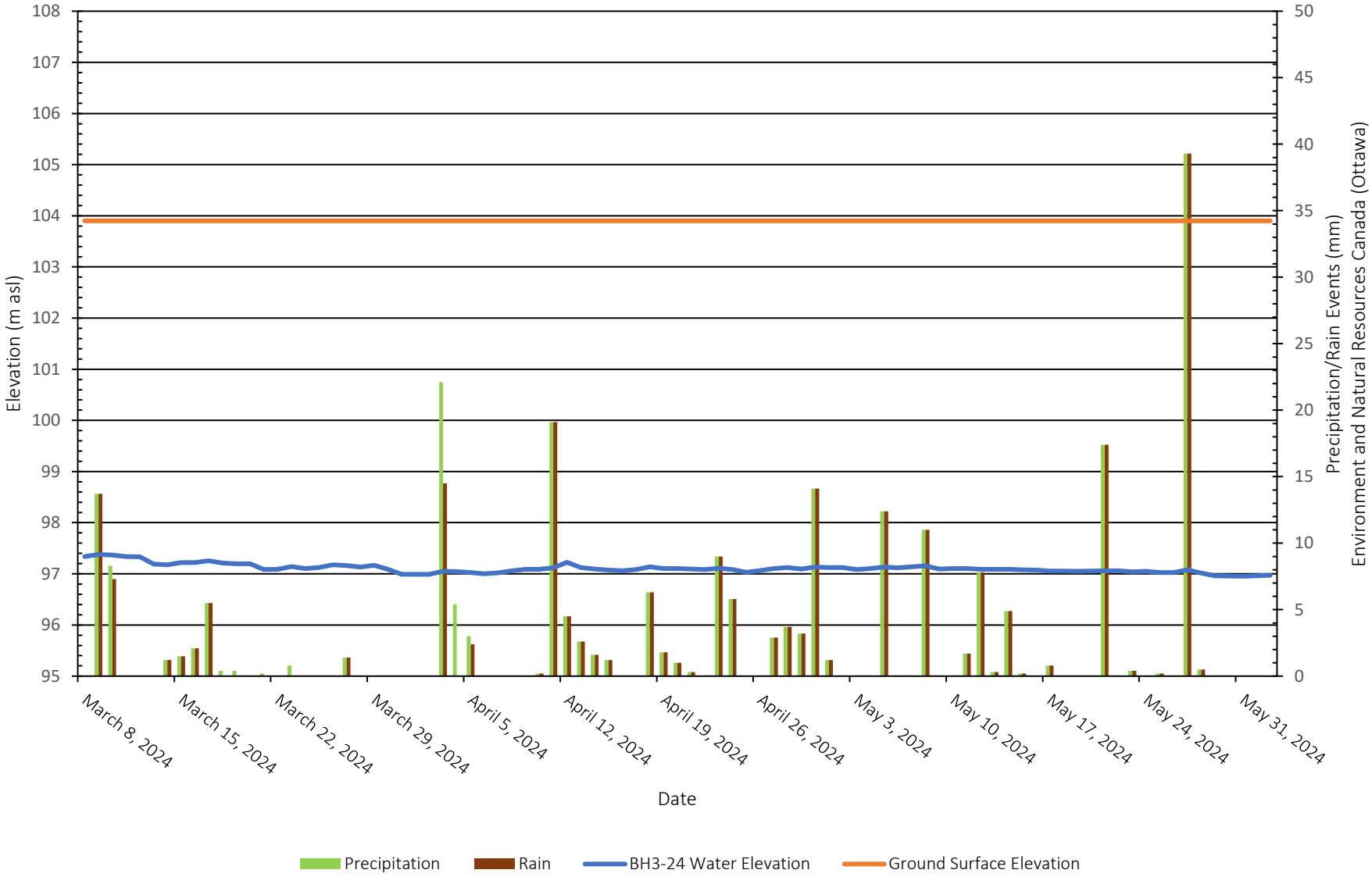
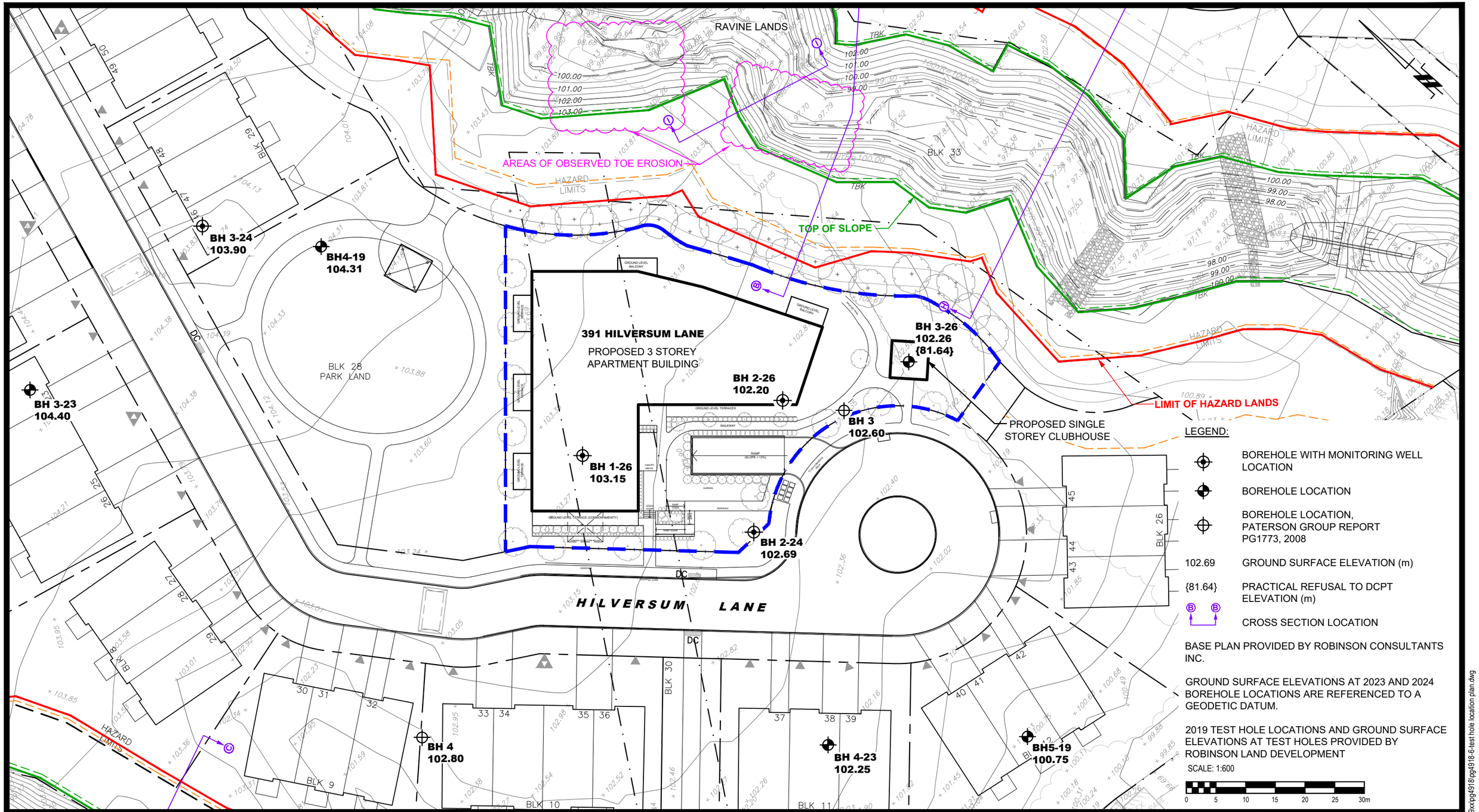


Figure 5: BH3-24 - Monitoring Well Water Elevations





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9 AURIGA DRIVE
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NO.	REVISIONS	DATE	INITIAL

INVERNESS HOMES
GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT - PHASE 1 APARTMENT BUILDING (BLOCK 27)
391 HILVERSUM LANE
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:600	Date: 02/2026
Drawn by: ZS	Report No.: PG4918-2
Checked by: OM	Dwg. No.: PG4918-6
Approved by: SD	Revision No.:

11x17

p:\autocad drawings\geotechnical\pg4xx\pg4918\pg4918-6-test hole location plan.dwg