ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES 5872, 5880, 5884 HAZELDEAN ROAD AND 7 SAVAGE DRIVE

Project No.: CCO-25-3864

City File No.:

Prepared for:

Hazeldean Heights Inc.
5872, 5880, 5884 Hazeldean Road and 7 Savage Drive

Prepared by:

Egis Canada
115 Walgreen Road
Carp, ON K0A 1L0

July 11, 2025

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1.0 PROJECT DESCRIPTION

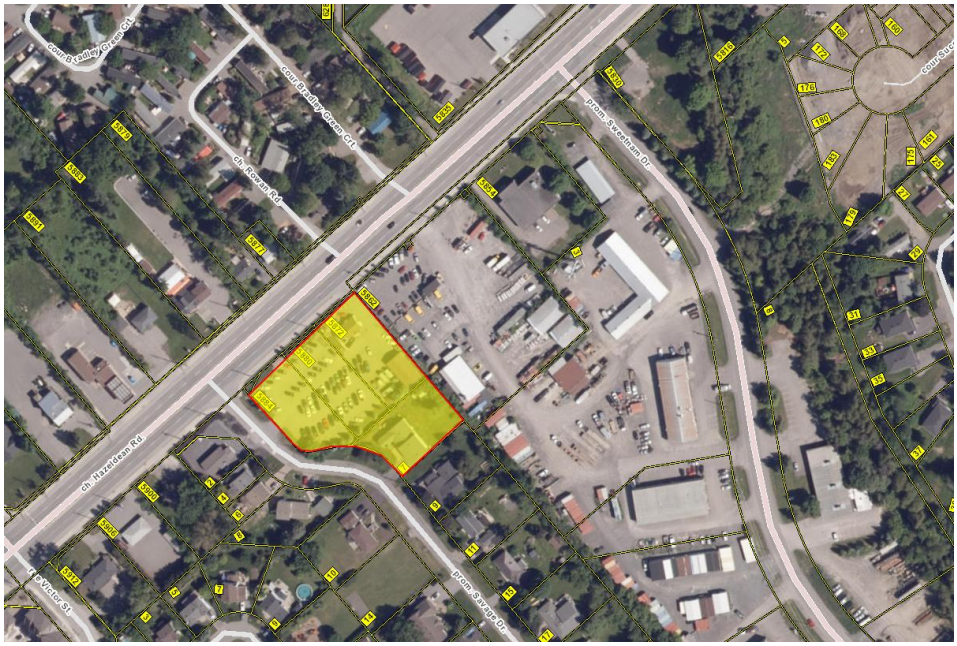
1.1 Purpose

Egis has been retained by Hazeldean Heights Inc. to prepare this Assessment of Adequacy of Public Services Report in support of the Zoning By-law Amendment (ZBLA) application process for the contemplated development at 5872, 5880, 5884 Hazeldean Road and 7 Savage Drive, within the City of Ottawa.

The main purpose of this report is to demonstrate that the proposed servicing and stormwater management design for the development follows the recommendations and guidelines provided by the City of Ottawa (City), the Mississippi Valley Conservation Authority (MVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address access to water, sanitary and storm servicing for the site, ensuring that existing services will adequately service the proposed development.

1.2 Site Description

Figure 1: Site Map



The subject property, herein referred to as the site, is located at 5872, 5880, 5884 Hazeldean Road and 7 Savage Drive in Stittsville in the City of Ottawa. The site covers approximately *0.59 ha* and is located at the southeast corner of the Hazeldean Road and Savage Drive intersection. Additional details are included on the Site Location Plan included in *Appendix B*.

1.3 Proposed Development and Statistics

The contemplated development consists of a three residential building including a 4-storey building (Building C), a 19-storey residential tower (Building A), and a 25-storey residential tower (Building B). The *Site Plan* proposes *456 residential units,* and *248* parking spaces, which are all underground. The site access will be from Hazeldean Road. Refer to the *Site Plan* prepared by Figurr Architects Collective in *Appendix B* for further details.

1.4 Existing Conditions and Infrastructure

The site was previously occupied by a single-family residential dwelling as well as a car dealership. Currently, the site is developed and has existing services which will require removals/abandonment.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

- Hazeldean Road
  - 305 mm diameter PVC watermain;
  - 762mm diameter Steel watermain;
  - 450mm diameter concrete sanitary sewer;
  - 350 mm diameter asbestos sanitary sewer; and a
  - 2400 mm diameter concrete storm sewer.
- Savage Drive
  - 203 mm diameter ductile iron watermain; and a
  - 450 mm diameter asbestos cement sanitary sewer which is a tributary to the Hazeldean Pump Station ;

1.5 Approvals

The contemplated development is subject to the City of Ottawa zoning by-law amendment approval process.

To allow construction to proceed, the proposed development will be subsequently subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

An Environmental Compliance Approval (ECA) through the Ministry of Environment, Conservation and Parks (MECP) is not anticipated to be required for the development. The stormwater management system is anticipated to meet the exemption requirements under O.Reg. 525/90 since the development is located within a single parcel, to be amalgamated through site plan, is not tributary to a combined sewer system, and does not propose industrial usage.

2.0 BACKGROUND STUDIES, STANDARDS, AND REFERENCES

2.1 Background Reports / Reference Information

As-built drawings of existing services, provided by the City of Ottawa Information centre, within the vicinity of the site were reviewed in order to identify infrastructure available to service the contemplated development. The following reports were also reviewed:

2.2 Applicable Guidelines and Standards

City of Ottawa:

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012. (*Ottawa Sewer Guidelines*)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014. *(ISTB-2014-01)*
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. *(PIEDTB-2016-01)*
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018. *(ISTB-2018-01)*
  - Technical Bulletin ISTB-2018-04 City of Ottawa, March 2018. *(ISTB-2018-04)*
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. *(ISTB-2019-02)*
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010. (*Ottawa Water Guidelines*)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. *(ISD-2010-2)*
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. (ISDTB-2014-02)
  - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. *(ISTB-2018-02)*
  - Technical Bulletin ISTB-2021-03 City of Ottawa, August 2021. *(ISTB-2021-03)*

Ministry of Environment, Conservation and Parks:

- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003. *(MECP Stormwater Design Manual)*
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008. (*MECP Sewer Design Guidelines*)

Other:

- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (*FUS Guidelines*)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on September 27th, 2024, regarding the contemplated development at 5872, 5880, 5884 Hazeldean Road and 7 Savage Drive. Specific design parameters to be incorporated within this design include the following.

- All Site Servicing and SWM design shall meet the design criteria set in Phase 1 Feeback form dated October 8, 2024.
- Post-development to be restricted to 5 year pre-development flows. The pre-development runoff coefficient will be limited to 0.5 unless sufficient backup is provided. Times of concentration will be calculated and limited to 10 minutes.
- Overland flow is to be provided for runoff of storm events greater than a 100 year storm.
- Confirm boundary conditions with City of Ottawa staff.
- Confirm sanitary capacity with City of Ottawa staff.

The notes from the City of Ottawa pre-consultation can be found in *Appendix B*.

4.0 WATER SERVICING

4.1 Existing Watermain

The subject site is located within the 3W pressure zone, as shown by the Water Distribution figure located in *Appendix C*. The following subsections outline the water infrastructure that exists within Hazeldean Road and Savage Road.

4.1.1 Hazeldean Road

There is an existing 305 mm diameter PVC watermain within Hazeldean Road. In addition, there is an existing fire hydrant on the northwest corner of the site at the Hazeldean Road and Savage Drive intersection.

4.1.2 Savage Drive

There is an existing 203 mm diameter ductile iron watermain within Savage Drive. In addition, there is an existing fire hydrant southeast of the proposed development on the south side of Savage Drive.

4.2 Proposed Water Servicing

In accordance with Section 4.3.1 of the *Ottawa Water Guidelines*, service areas with a basic day demand greater than 50 m^3/day require a dual connection to the municipal system. A dual connection will be required to service the contemplated development, based on the site statistics provided by the *Site Plan*. It is anticipated that the dual connection will be to Savage Drive.

The Fire Underwriters Survey 2020 (FUS) method was utilized to estimate the required fire flow for the site. Fire flow requirements were calculated per City of Ottawa Technical Bulletin *ISTB-2018-02*. The following parameters were provided by the building architect:

- Type of construction – Non-Combustible Construction
- Occupancy type – Limited Combustibility
- Sprinkler Protection – Standard Water Supply Sprinklered

The results of the calculations yielded a required fire flow of *15,000 L/min* (250.0 L/s). The detailed calculations for the FUS can be found in *Appendix C*.

The water demands for the proposed building have been calculated to adhere to *Ottawa Water Guidelines* and can be found in *Appendix C*. The results have been summarized below:

Table 1: Water Supply Design Criteria and Water Demands

Site Area	0.59 ha
Residential	280 L/day/person
Studio Apartment (20 units)	1.4 persons/unit
1 Bedroom Apartment (274 units)	1.4 persons/unit
2 Bedroom Apartment (162 units)	2.1 persons/unit
Average Day Demand (L/s)	2.44 L/s
Maximum Daily Demand (L/s)	6.09 L/s
Peak Hourly Demand (L/s)	13.53 L/s
FUS Fire Flow Requirement (L/s)	250.0 L/s (15,000 L/min)

The City provided the estimated water pressures for the average day scenario, peak hour scenario and the max day plus fire flow scenario for the demands indicated by the correspondence in Appendix C. The resulting pressures for the boundary conditions results are shown in Tables 2 and 3, below. Boundary conditions have been provided for the current pressure zone (3W).

Table 2: Boundary Conditions Results

	Connection 1 – Hazeldean Road		Connection 2 – Savage Drive	
Scenario	Estimated Demands (L/s)	HGL (m H_2O)*/kPa	Estimated Demands (L/s)	HGL (m H_2O)**/kPa
Average Day Demand	2.44	55.2 / 541.2	2.44	53.2 / 521.6
Maximum Daily + Fire Flow Demand	6.09	50.4 / 494.1	6.09	42.7 / 418.6
Peak Hourly Demand	13.53	50.4 / 494.1	13.53	48.4 / 474.5

**Adjusted for an estimated ground elevation of 106.0m above the connection point.*
***Adjusted for an estimated ground elevation of 108.0m above the connection point.*

The normal operating pressure range for the current zone is anticipated to be 418.6 kPa to 541.25 kPa and will not be less than 275 kPa (40 psi) or exceed 689 kPa (100 psi). The watermains will meet the minimum required 20 psi (140 kPa) from the *Ottawa Water Guidelines* at the ground level under maximum day demand and fire flow conditions.

To confirm the adequacy of fire flow to protect the proposed development, public and private fire hydrants within 150 m of the proposed building were accounted for per *ISTB 2018-03 Appendix I* Table 1. The results are summarized below in *Table 4*.

Table 3: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m	Fire Hydrant(s) within 150m	Combined Fire Flow (L/min.)
1034 McGarry Terrace	15,000 L/min – FUS	2 public	1 public	15,200

Based on City guidelines (*ISTB-2018-02*), it is anticipated that the existing municipal hydrants can provide adequate fire coverage to the contemplated development. A hydrant coverage figure can be found in *Appendix C*.

5.0 SANITARY SERVICING

5.1 Existing Sanitary Sewer

There is an existing 450 mm diameter concrete sanitary sewer within Hazeldean Road and an existing 450 mm diameter asbestos cement sanitary sewer within Savage Drive available to service the site. The Hazeldean sewer is tributary to the pumping station located on Maple Grove Road. The Savage Drive sewer is tributary to the Hazeldean Pumping Station.

5.2 Proposed Sanitary Sewer

Table 5, below, summarizes the wastewater design criteria identified by the *Ottawa Sewer Guidelines*.

Table 4: Sanitary Design Criteria

Design Parameter	Value
Studio Apartment (83 units)	1.4 persons/unit
Residential 1 Bedroom / Bachelor Apartment (250 Units)	1.4 persons/unit
Residential 2 Bedroom Apartment (247 Units)	2.1 persons/unit
Average Daily Demand	280 L/day/person

It is anticipated that the sanitary lateral will be connected to Savage Drive, however coordination will be required with the internal building layout and mechanical design during site plan control.

Table 6, below, summarizes the estimated wastewater flow from the contemplated development. Refer to *Appendix D* for detailed calculations.

Table 5: Summary of Estimated Sanitary Flow

Design Parameter	Total Flow (L/s)
Total Estimated Average Dry Weather Flow	2.47
Total Estimated Peak Dry Weather Flow	8.07
Total Estimated Peak Wet Weather Flow	8.24

City staff were contacted on July 8th, 2025, to review contemplated wastewater flows from the site and advise if there were any downstream constraints. At the time of this submission, the City has yet to provide a response confirming the flow capacity of the subject sewers.

6.0 STORM SEWER & STORMWATER MANAGEMENT DESIGN

6.1 Existing Storm Sewers

Stormwater runoff from the site is currently tributary to the Ottawa River through Poole Creek and the Carp River. The following subsections outline the storm infrastructure that exists within Hazeldean Road and Savage Drive.

6.1.1 Hazeldean Road

There is an existing 375 mm diameter PVC storm sewer located within Hazeldean Road. The storm sewer slopes to the north and discharges to an existing larger 1050 mm diameter storm sewer within Hazeldean Road.

6.1.2 Savage Drive

There are existing road side ditches within Savage Drive which appear to outlet to the existing 2400mm diameter concrete storm sewer within Hazeldean Road.

6.2 Proposed Storm Sewers

It is anticipated that runoff will be directed to the existing 375 mm diameter storm sewer within Hazeldean Road at a restricted rate. The release rates will be such that the 100year post-development runoff events discharge at the 5 year pre-development rates.

It is anticipated that a combination of surface, subsurface, rooftop, and internal cistern storage will be required to meet the SWM criteria identified by the City of Ottawa. Further details on the storm sewer design to be provided for the Site Plan Control application.

7.0 STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

Stormwater management for the site will be maintained through positive drainage away from the contemplated building and towards the adjacent ROWs. The quantitative and qualitative properties of the storm runoff for both the pre-development and post-development flows are further detailed below.

In summary, the following design criteria have been employed in developing the stormwater management design for the site as directed by the RVCA and City:

Quality Control

- Quality control to be provided by an OGS unit for proposed development.

Quantity Control

- 100 year post-development to be restricted to 5 year predevelopment flows, based on a calculated runoff coefficient (the lesser of either the calculated pre-development rational method coefficient or 0.50). Time of concentration must be equal to or greater than 10 minutes.

7.2 Runoff Calculations

Runoff calculations presented in this report are derived using the Rational Method, given as:

$$Q = 2.78CIA \quad \text{(L/s)}$$

Where: C = Runoff coefficient

I = Rainfall intensity in mm/hr (City of Ottawa IDF curves)

A = Drainage area in hectares

It is recognized that the Rational Method tends to overestimate runoff rates. As a result, the conservative calculation of runoff ensures that any stormwater management facility sized using this method is anticipated to function as intended.

The following coefficients were used to develop an average C for each area:

Roofs/Concrete/Asphalt	0.90
Gravel	0.60
Undeveloped and Grass	0.20

As per the *Ottawa Sewer Guidelines*, the 2 or 5-year balanced 'C' value must be increased by 25% for a 100-year storm event to a maximum of 1.0.

7.3 Site Drainage

Based on the criteria listed in *Section 7.1*, the contemplated development will be required to restrict flows for the 100 year post-development quantities to the 5 year pre-development runoff quantities.

It has been assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 5, and 100-year events are summarized below in *Table 7*.

Table 6: Pre-Development Runoff Summary

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)	
					5-Year	100-Year
A1	0.59	0.50	0.50	10	84.90	145.50
Total	0.59				84.90	145.50

The restriction of stormwater runoff from the site will create the need for on-site storage. To meet the stormwater objectives, the contemplated development may contain a combination of flow attenuation including surface and subsurface storage as well as building storage via an internal cistern and rooftops.

The following storage requirement estimate assumes the flow will be restricted to 84.9 L/s/ha up to the 100-year storm event. The estimated post-development peak flows for the 5 and 100-year events and the required storage volumes are summarized below in *Table 8*, below.

Table 7: Post Development Flow Rate and Storage Requirements

Drainage Area	Unrestricted Flow (L/S)		Restricted Flow (L/S)		Storage Required (m^3)	
	5-year	100-Year	5-Year	100-Year	5-Year	100-Year
B1	26.27	50.01	10.00	15.00	10.0	22.5
B2	25.30	48.17	10.00	15.00	9.3	21.2
B3	15.25	29.03	10.00	15.00	3.1	8.4
B4	60.78	116.11	10.00	15.00	38.6	81.3
B5	4.35	9.32	4.35	9.32	--	--
Total	131.94	252.65	44.35	69.32	60.98	133.44

It is anticipated that approximately *133m^3* of storage will be required on site to attenuate flow to the established release rate of *69.32 L/s*. Flow and storage calculations can be found within *Appendix E*. Actual storage volumes will need to be confirmed at the detailed design stage based on a number of factors including site imperviousness and grading constraints.

8.0 SUMMARY

- Development including a four-storey residential building, a 19-storey residential tower, and a 25-storey residential tower are contemplated at 3872, 3880, 3884 Hazeldean Road and 7 Savage Drive;
- The FUS method estimated a maximum fire flow of *15,000 L/min* is required for the contemplated development;
- The development is anticipated to have a peak wet weather flow of *8.24 L/s*. City to provide a response to confirm the sewer capacities to accommodate the anticipated sanitary flows;
- Based on the feedback phase 1 notes, the proposed development will be required to attenuate post development flows to an equivalent release rate of the 5 year pre-development release rate;
- To meet the stormwater objectives the contemplated development may contain a combination of flow attenuation including surface and subsurface storage as well as building storage via an internal cistern and rooftops. It is anticipated that approximately *133 m^3* of onsite storage will be required to attenuate flow to the established release rate.
- Quality controls are to be proposed for the development via an OGS unit in the detailed design phase.

9.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that City of Ottawa approve this Assessment of Adequacy of Public Services in support of the proposed rezoning for 3872, 3880, 3884 Hazeldean Road and 7 Savage Drive.

This report is respectfully being submitted for approval.

Regards,

Egis Canada Ltd.

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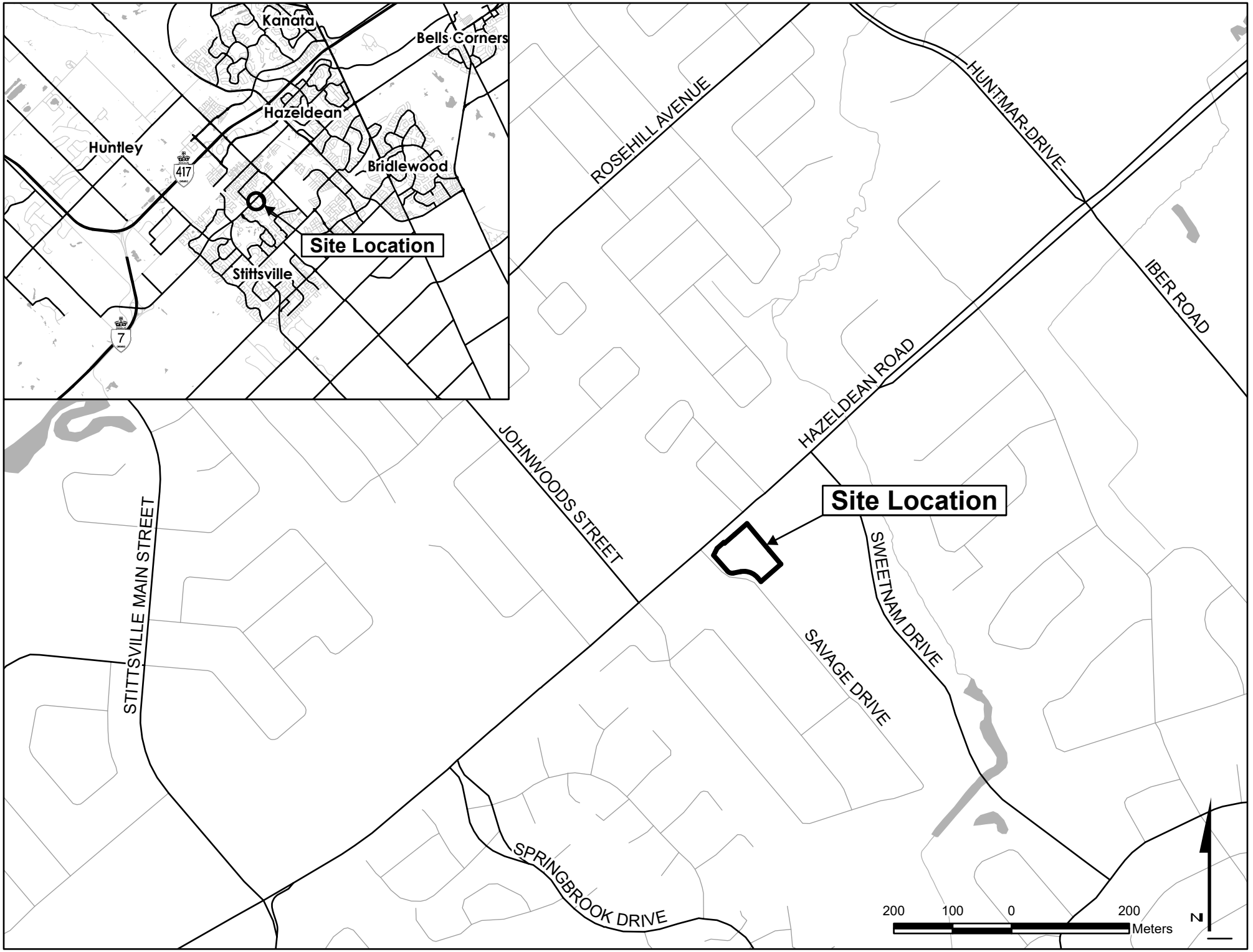
10.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Hazeldean Heights Inc. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, City of Ottawa and local approval agencies. Egis Canada reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by Egis Canada and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. Egis Canada accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, Egis Canada should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
KEY PLAN


Kanata
Bells Corners
Hazeldean
Huntley
Bridlewood
417
Site Location
Stittsville
7
ROSEHILL AVENUE
HUNTMAR DRIVE
IBER ROAD
HAZELDEAN ROAD
JOHNWOODS STREET
Site Location
STITTSVILLE MAIN STREET
SWEETNAM DRIVE
SAVAGE DRIVE
SPRINGBROOK DRIVE
200
100
0
200
Meters
N

APPENDIX B
BACKGROUND DOCUMENTS

TOPOGRAPHIC PLAN OF SURVEY OF
PART OF LOT 26
CONCESSION 11
GEOGRAPHIC TOWNSHIP OF GOULBOURN
CITY OF OTTAWA
MONUMENT-URSO SURVEYING LTD.

SCALE 1 : 150

0 4.5 10 5 3 6

METRIC

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

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 REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 18TH DAY OF NOVEMBER, 2024.

NOV. 20/2024
DATE

J.E. ANDERSON
ONTARIO LAND SURVEYOR

LEGEND

■	DENOTES	FOUND SURVEY MONUMENT
●	-	PLANTED SURVEY MONUMENT
IB	-	IRON BAR
SIB	-	STANDARD IRON BAR
SSIB	-	SHORT STANDARD IRON BAR
PB	-	PLASTIC BAR
RIB	-	ROUND IRON BAR
(WIT)	-	WITNESS
ACC.	-	ACCEPTED
MEAS.	-	MEASURED
(1478)	-	MONUMENT-URSO SURVEYING LTD.
(P1)	-	REGISTERED PLAN 701
(P2)	-	PLAN 4R - 27244
(P3)	-	(1736) PLAN DATED OCTOBER 27, 2007
(P4)	-	PLAN 4R - 22057
(P5)	-	PLAN 4R - 18441
(P6)	-	PLAN 4R - 26657
(P7)	-	(857) SURVEY DATED FEBRUARY 18, 2005
BF	-	BOARD FENCE
MF	-	METAL FENCE
CLF	-	CHAIN LINK FENCE
EOI	-	EDGE OF INTERLOCK
EOC	-	EDGE OF CONCRETE
EOA	-	EDGE OF ASPHALT
T/P	-	TOP OF PIPE
T/G	-	TOP OF GRATE
DC	-	DITCH CENTRELINE
TOS	-	TOP OF SLOPE
WRW	-	WOODEN RETAINING WALL
TRANS	-	TRANSFORMER
CMP	-	CORRUGATED STEEL PIPE
AC	-	AIR CONDITIONER
CB	-	CATCH BASIN
	-	GATE
GM	-	GAS METER
SIGN	-	SIGN
WV	-	WATER VALVE
UP	-	UTILITY POLE
AN	-	ANCHOR
Ø	-	DIAMETER
	-	BOLLARD
CB	-	CATCH BASIN
DI	-	DITCH INLET
FH	-	FIRE HYDRANT
HH	-	HAND HOLE
LS	-	LIGHT STANDARD
MH	-	MAINTENANCE HOLE - UNIDENTIFIED
MH-S	-	MAINTENANCE HOLE - SANITARY
MH-ST	-	MAINTENANCE HOLE - STORMWATER
UPED	-	UNKNOWN UTILITY PEDESTAL
W	-	WELL
OHW	-	OVERHEAD WIRES
	-	DECIDUOUS TREE
	-	CONIFEROUS TREE
x 68.00	-	EXISTING ELEVATIONS
x 68.00	-	TOP OF WALL ELEVATIONS

BEARING NOTES

BEARINGS ARE MTM GRID, DERIVED FROM CAN-NET OBSERVATIONS AND ARE REFERRED TO THE CENTRAL MERIDIAN 73°30' WEST LONGITUDE OF MTM ZONE 9 NAD83 (CSRS)(2010.0).

FOR BEARING COMPARISONS A ROTATION OF 00°27'10" COUNTER-CLOCKWISE WAS APPLIED TO P1, AND A ROTATION OF 00°1'29" COUNTER-CLOCKWISE WAS APPLIED TO P7 TO CONVERT TO GRID BEARINGS.

UTILITY NOTE

THIS DRAWING DOES NOT SERVE AS A COMPREHENSIVE CONFIRMATION OF ALL UTILITIES PRESENT. IT IS THE USERS RESPONSIBILITY TO CONTACT THE RELEVANT UTILITY AUTHORITIES FOR VERIFICATION.

ONLY UTILITIES VISIBLE ON THE SURFACE HAVE BEEN IDENTIFIED PRIOR TO ANY ACTIVITIES SUCH AS DIGGING, IT IS MANDATORY TO OBTAIN A FIELD LOCATION OF UNDERGROUND UTILITIES FROM THE APPROPRIATE AUTHORITY.

ELEVATION NOTE

ELEVATIONS ARE GEODETIC AND REFERRED TO THE CANADIAN GEODETIC VERTICAL DATUM (CGVD2013) BY DIRECT MEASUREMENT TO A REAL TIME NETWORK.

THE USER OF THIS INFORMATION BEARS THE RESPONSIBILITY TO CONFIRM THAT THE JOB BENCHMARK REMAINS UNALTERED AND UNDISTURBED, AND THAT ITS RELATIVE HEIGHT AND DESCRIPTION ALIGN WITH THE DETAILS PRESENTED IN THIS PLAN.

ASSOCIATION OF ONTARIO LAND SURVEYORS
PLAN SUBMISSION FORM
V-93081

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN ACCORDANCE WITH REGULATION 0216, Section 29(3).

Monument-Urso Surveying Ltd.
Ontario Land Surveyors | Canada Land Surveyors
1755 WOODWARD DRIVE, SUITE 300
OTTAWA, ONTARIO
CANADA K2C 0P9
TEL: (613) 843-1183
TEL: (705) 254-7851
SAULT STE. MARIE ON, P6A 6J8
FAX: (705) 254-7272

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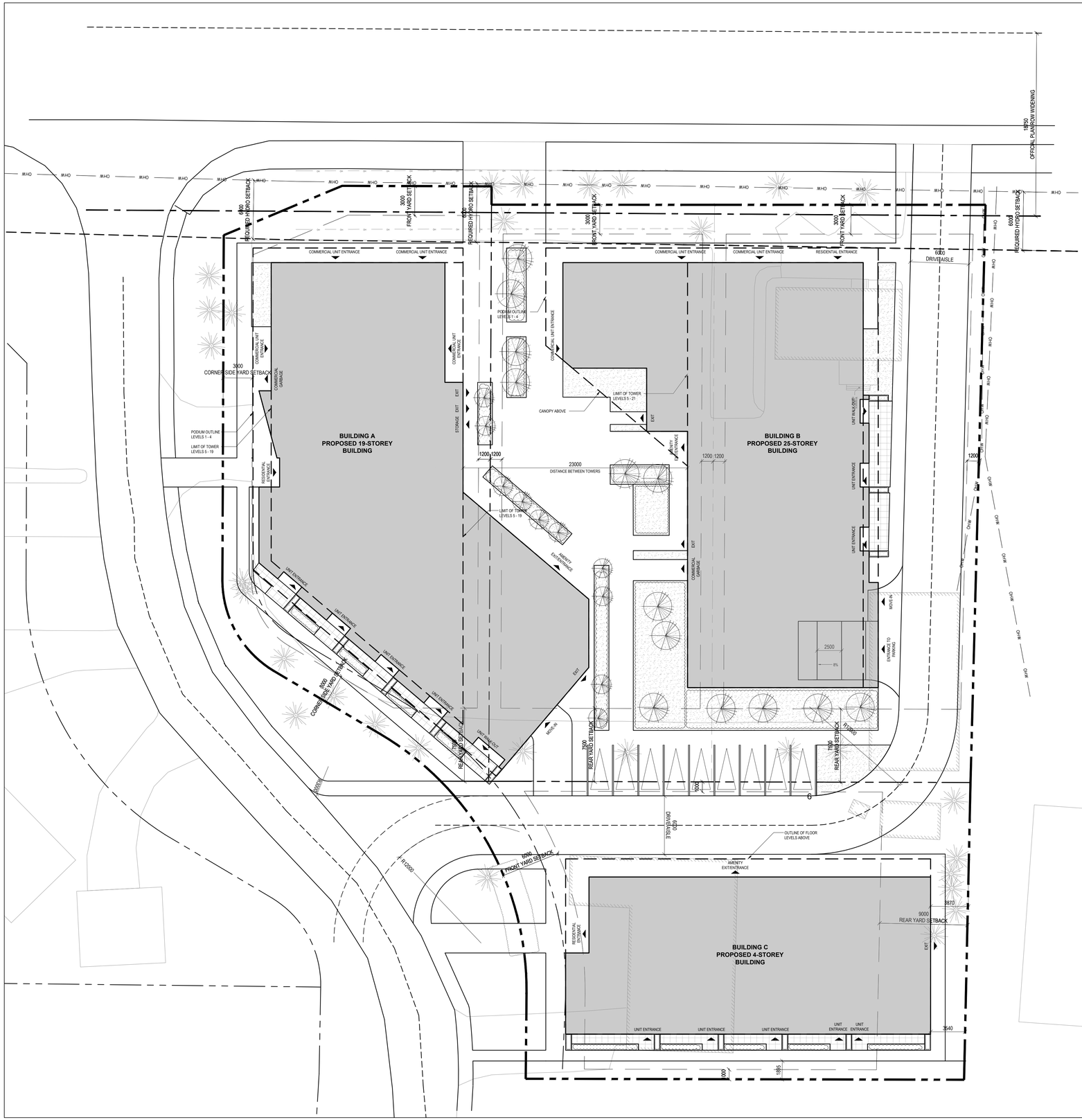


PROPERTY DESCRIPTION

REZONE DEVELOPMENT PROJECT

CITY OF OTTAWA PIN NUMBER	04462-0719, 04462-0733, 04462-0481 & 04462-0484
MUNICIPAL ADDRESS	5872, 5880, 5884 HAZELDEAN ROAD & 7 SAVAGE DRIVE

SITE INFORMATION

TOTAL SITE AREA: 5405 m²

SITE & ZONING	5872, 5880, 5884 HAZELDEAN ROAD	7 SAVAGE DRIVE	
ZONING TABLE	GM14 H(11)	R1D	
CITY OF OTTAWA ZONING BY-LAW No. 2008-250	REQUIRED	REQUIRED	PROPOSED
MINIMUM LOT AREA	no minimum	20m	
MINIMUM LOT WIDTH	no minimum	600m²	
MINIMUM FRONT YARD AND CORNER SIDE YARD SETBACK	3m	FY = 6m CSY = 4.5m	
HYDRO SETBACK	6m	6m	
MINIMUM INTERIOR SIDE YARD SETBACK	1.2m	1m	
MINIMUM REAR YARD SETBACK	7.5m	9m	
MAXIMUM BUILDING HEIGHT	11m	11m (AREA C)	
MAXIMUM LOT COVERAGE		40 %	
MINIMUM WIDTH OF LANDSCAPED AREA	3m, ABUTTING STREET		
VEHICLE PARKING REQUIREMENTS (AREA C, SCHEDULE 1A)	1.2 PER UNIT = 456 SPOTS	1.2 PER UNIT = 456 SPOTS	239 SPOTS BELOW GRADE 9 SURFACE PARKING = 248 TOTAL
BICYCLE PARKING SPACES	0.5 PER UNIT = 228 SPACES		319 SPACES

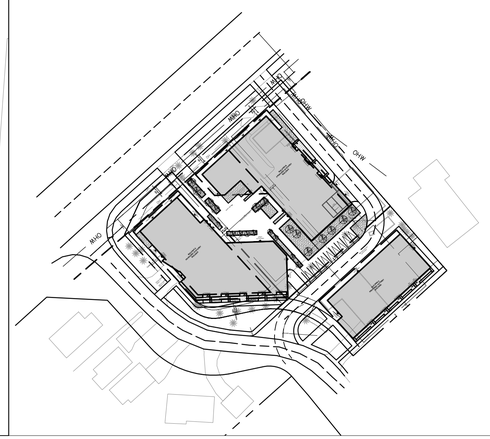
UNIT COUNT

BUILDING A = 174 UNITS

BUILDING B = 247 UNITS

BUILDING C = 35 UNITS

TOTAL = 456 UNITS



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–	– – –	– – –
–	– – –	– – –
–	– – –	– – –

Ingénieur / *Engineer*
(Mécanique & Électricité / *Mechanical & Electrical*)

Ingénieur / *Engineer*
(*Structure* / *Structure*)

Architecte/ *Architect*
(paysagiste / *Landscape*)

Ingénieur / *Engineer*
(Civil / *Civil*)

Client / *Client*

Architecte / *Architect* — Collectif d'architectes / Architects Collective

fig. 1
3550, Saint-Antoine O.
Montréal QC H4C 1A9
T. 514 861-0122

fig. 2
190 Somerset St W #206
Ottawa ON K2P 0J4
T. 613 695-6122
www.figurr.ca

Sceau / *Seal*

Note:

L'entrepreneur doit vérifier toutes les dimensions et informations sur le site et aviser immédiatement l'architecte de toutes erreurs ou omissions.

Contractor shall verify all information and dimensions on site and immediately report any errors or omissions to the architect.

Projet / *Project*

2428 - HAZELDEAN ROAD REZONE

5872, 5880, 5884 HAZELDEAN ROAD & 7 SAVAGE DRIVE

Titre / *Title*

SITE PLAN

Dessiné par / *Drawn by*	No. projet / *Project number*	
KJ	*2428*	
Vérifié par / *Verified by*	No. dessin / *Drawing number*	Révision / Revision
RC		0
Échelle / *Scale*		
1:200		
Date de création du dessin / *Drawing creation date*		
08/19/2024		A000

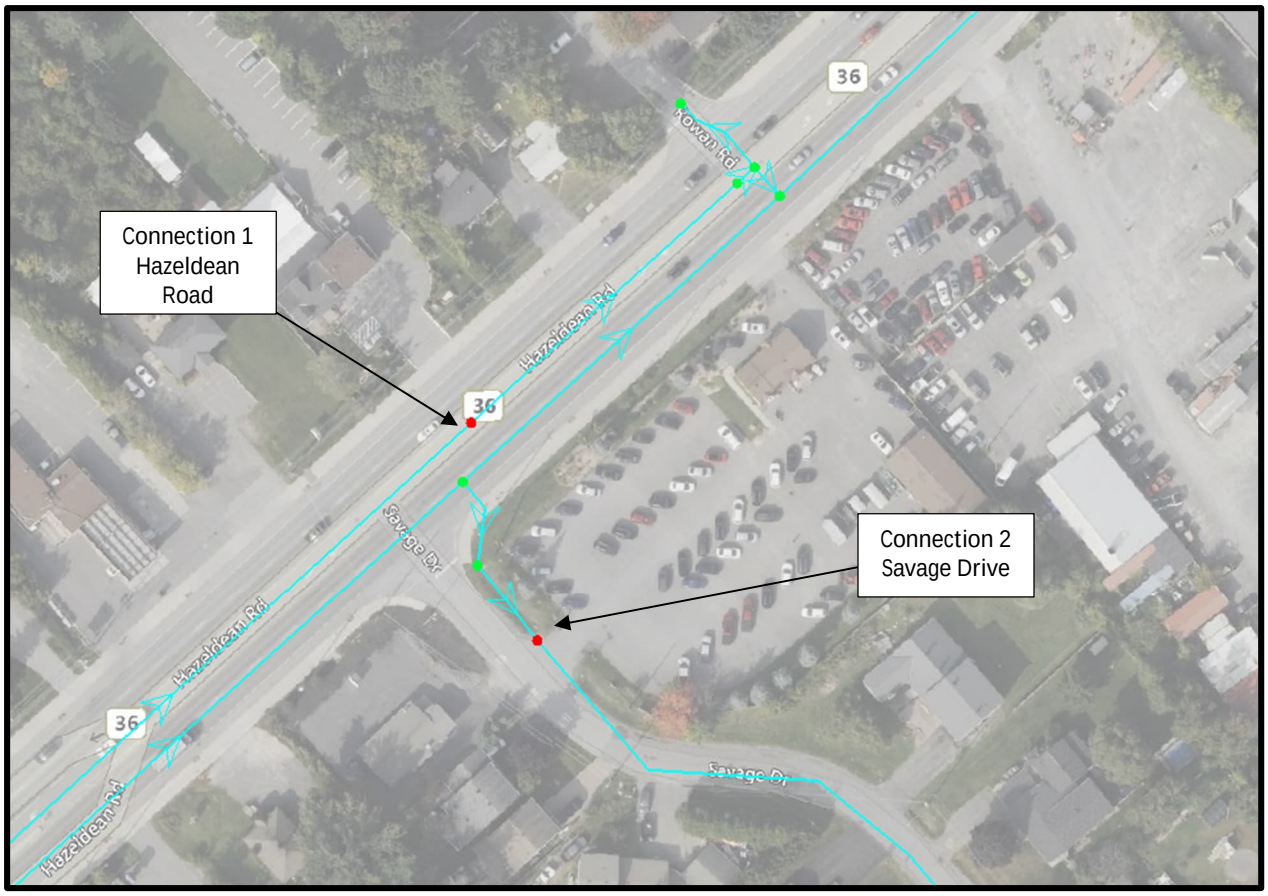
APPENDIX C
WATERMAIN CALCULATIONS

Boundary Conditions
5872 Hazeldean Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	146	2.44
Maximum Daily Demand	365	6.09
Peak Hour	812	13.53
Fire Flow Demand #1	13,000	216.67

Location



Results

Connection 1 – Hazeldean Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.2	73.0
Peak Hour	156.4	66.2
Max Day plus Fire Flow #1	156.4	66.2

[1] Ground Elevation = 109.8 m

Connection 2 – Savage Drive

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.2	72.4
Maximum HGL	156.4	65.6
Max Day plus Fire Flow #1	150.7	57.4

[1] Ground Elevation = 110.3 m

Notes

1. The IWSD has recently updated their water modelling software. Any significant difference between previously received BC results and newly received BC results could be attributed to this update.

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.

CCO-25-3864 - 5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025
Site Area:	0.59 gross ha

Residential	NUMBER OF UNITS		UNIT RATE	
Studio Apartment	20	units	1.4	persons/unit
1 Bedroom Apartment	274	units	1.4	persons/unit
2 Bedroom Apartment	162	units	2.1	persons/unit
Total Population	752	persons		

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	
Residential	280	L/c/d	
Industrial - Light	35,000	L/gross ha/d	
Industrial - Heavy	55,000	L/gross ha/d	
Shopping Centres	2,500	L/(1000m² /d	
Hospital	900	L/(bed/day)	
Schools	70	L/(Student/d)	
Trailer Park with no Hook-Ups	340	L/(space/d)	
Trailer Park with Hook-Ups	800	L/(space/d)	
Campgrounds	225	L/(campsite/d)	
Mobile Home Parks	1,000	L/(Space/d)	
Motels	150	L/(bed-space/d)	
Hotels	225	L/(bed-space/d)	
Tourist Commercial	28,000	L/gross ha/d	
Other Commercial	28,000	L/gross ha/d	
AVERAGE DAILY DEMAND	Residential	2.44	L/s
	Commercial/Industrial/ Institutional	0.00	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	2.5	x avg. day	L/c/d
Industrial	1.5	x avg. day	L/gross ha/d
Commercial	1.5	x avg. day	L/gross ha/d
Institutional	1.5	x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	Residential	6.09	L/s
	Commercial/Industrial/ Institutional	0.00	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	2.2	x max. day	L/c/d
Industrial	1.8	x max. day	L/gross ha/d
Commercial	1.8	x max. day	L/gross ha/d
Institutional	1.8	x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	Residential	13.53	L/s
	Commercial/Industrial/ Institutional	0.00	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT
CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	2.44	L/s
MAXIMUM DAILY DEMAND	6.09	L/s
MAXIMUM HOUR DEMAND	13.53	L/s

5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building A

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building A
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Building A

Building is classified as Group : C - Residential (from table 3.2.2.55)
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with subsections 3.2.2., including loadbearing walls, columns and arches

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	10	(from Table 1 pg A-31)
V	70,980	(Total building volume in m³, provided by Architect.)
Stot	1.0	(From figure 1 pg A-32)
Q =	709,800.00 L	

From Figure 1 (A-32)

Snorth	40	m	0.0
Seast	11	m	0.0
Ssouth	15	m	0.0
Swest	25	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9,000 L/min if Q > 270,000 L
2378 gpm
150 L/s

5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building B

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building B
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Building B

Building is classified as Group : C - Residential (from table 3.2.2.55)
Building is of noncombustible construction with fire separations and fire-resistance ratings provided in accordance with subsections 3.2.2., including loadbearing walls, columns and arches

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	10	(from Table 1 pg A-31)
V	87,048	(Total building volume in m³, provided by Architect.)
Stot	1.0	(From figure 1 pg A-32)
Q =	870,480.00 L	

From Figure 1 (A-32)

Snorth	30	m	0.0
Seast	15	m	0.0
Ssouth	20	m	0.0
Swest	11	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

9,000 L/min if Q > 270,000 L
2378 gpm
150 L/s

5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building C

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building C
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

Ontario 2006 Building Code Compendium (Div. B - Part 3)

Water Supply for Fire-Fighting - Building C

Building is classified as Group : C - Residential (from table 3.2.2.55)
Building is of combustible construction. Floor assemblies are fire separations but with no fire-resistance ratings. Roof assemblies, mezzanies, loadbearing walls, columns and arches do not have a fire-resistance rating.

From Div. B A-3.2.5.7. of the Ontario Building Code - 3. Building On-Site Water Supply:

(a) Q = K x V x Stot

where:

Q = minimum supply of water in litres

K = water supply coefficient from Table 1

V = total building volume in cubic metres

Stot = total of spatial coefficient values from the property line exposures on all sides as obtained from the formula:

Stot = 1.0 + [Sside1+Sside2+Sside3+...etc.]

K	10	(from Table 1 pg A-31)
V	6,384	(Total building volume in m³.)
Stot	1.4	(From figure 1 pg A-32)
Q =	89,376.00 L	

From Figure 1 (A-32)

Snorth	15	m	0.0
Seast	6	m	0.4
Ssouth	10	m	0.0
Swest	25	m	0.0

*approximate distances

From Table 2: Required Minimum Water Supply Flow Rate (L/s)

2,700 L/min if Q < 108,000 L
713 gpm

CCO-25-3864 - 5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building A - Fire Underwriters Survey - Apartment Building

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building A
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type: Non-Combustible Construction

C: 0.8

Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area): 15,692.7 m^2 **Unprotected Vertical Openings*

Calculated Fire Flow	22,047.6 L/min
	22,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%
Fire Flow	18,700.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Standard Water Supply Sprinklered	-40%
Reduction	-7,480.0 L/min

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor		
Exposure 1	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	14	25	350.0	6%	East
Exposure 2	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	10	4	40.0	4%	South
Exposure 3	Over 30 m	Wood frame	NA	2	NA	0%	West
Exposure 4	Over 30 m	Wood frame	NA	3	NA	0%	North
					% Increase*	10%	

Increase*	1,870.0 L/min

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	13,090.0 L/min
Fire Flow Required**	13,000.0 L/min

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

CCO-25-3864 - 5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building B - Fire Underwriters Survey - Apartment Building

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building B
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where:

F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type: Non-Combustible Construction

C: 0.8

Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area): 20,015.5 m^2 **Unprotected Vertical Openings*

Calculated Fire Flow	24,899.8 L/min
	25,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%
Fire Flow	21,250.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Standard Water Supply Sprinklered	-40%
Reduction	-8,500.0 L/min

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor		
Exposure 1	Over 30 m	Wood frame	N/A	1	N/A	0%	North
Exposure 2	20.1 to 30	Wood frame	20	2	40.0	2%	East
Exposure 3	20.1 to 30	Fire Resistive - Non Combustible (Unprotected Openings)	35	4	140.0	2%	South
Exposure 4	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	14.0	19	266.0	6%	West
					% Increase*	10%	

Increase*	2,125.0 L/min

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	14,875.0 L/min
Fire Flow Required**	15,000.0 L/min

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

CCO-25-3864 - 5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building C - Fire Underwriters Survey - Apartment Building

Project:	5872, 5880 & 5884 Hazeldean Road and 7 Savage Drive Building C
Project No.:	CCO-25-3864
Designed By:	MR
Checked By:	RF
Date:	July 11, 2025

From the Fire Underwriters Survey (2020)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:
City of Ottawa Technical Bulletin ISTB-2018-02 Applied Where Applicable

A. BASE REQUIREMENT (Rounded to the nearest 1000 L/min)

F = 220 x C x √A Where: F = Required fire flow in liters per minute
C = Coefficient related to the type of construction.
A = The total floor area in square meters (including all storey's, but excluding basements at least 50 percent below grade) in the building being considered.

Construction Type Non-Combustible Construction

C 0.8

Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area) 2,599.3 m^2 **Unprotected Vertical Openings*

Calculated Fire Flow	8,973.1 L/min
	9,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:
Limited Combustible -15%

Fire Flow	7,650.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Standard Water Supply Sprinklered -40%

Reduction	-3,060.0 L/min

D. INCREASE FOR EXPOSURE (No Rounding)

	Separation Distance (m)	Cons.of Exposed Wall	Length Exposed Adjacent Wall (m)	Height (Stories)	Length-Height Factor		
Exposure 1	20.1 to 30	Fire Resistive - Non Combustible (Unprotected Openings)	20	25	500.0	2%	North
Exposure 2	Over 30 m	Ordinary - Mass Timber (Unprotected)	N/A	1	N/A	0%	East
Exposure 3	20.1 to 30	Fire Resistive - Non Combustible (Unprotected Openings)	25.4	2	50.8	1%	South
Exposure 4	10.1 to 20	Fire Resistive - Non Combustible (Unprotected Openings)	16.5	3	49.5	5%	West
					% Increase*	8%	

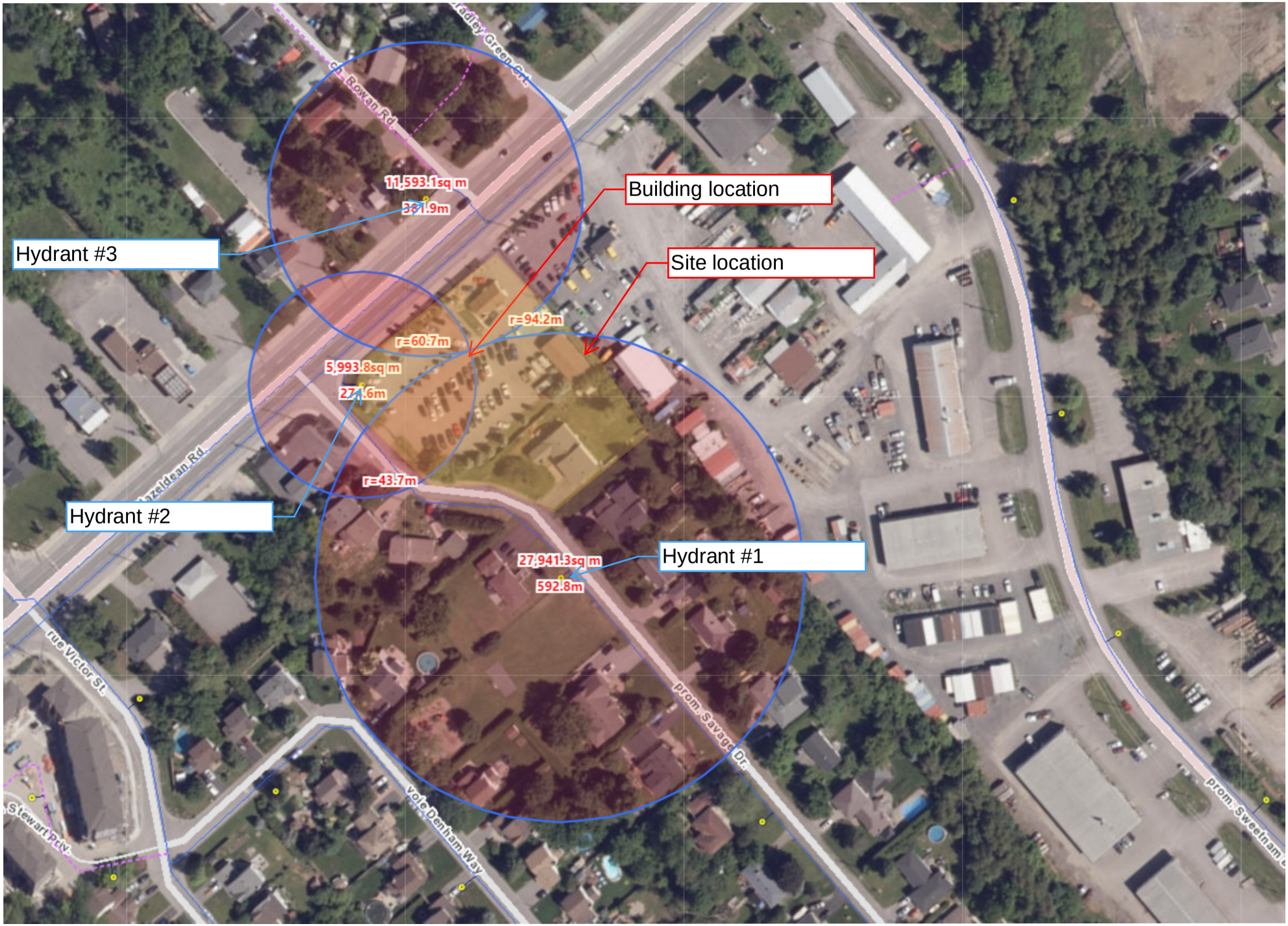
Increase*	612.0 L/min

E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

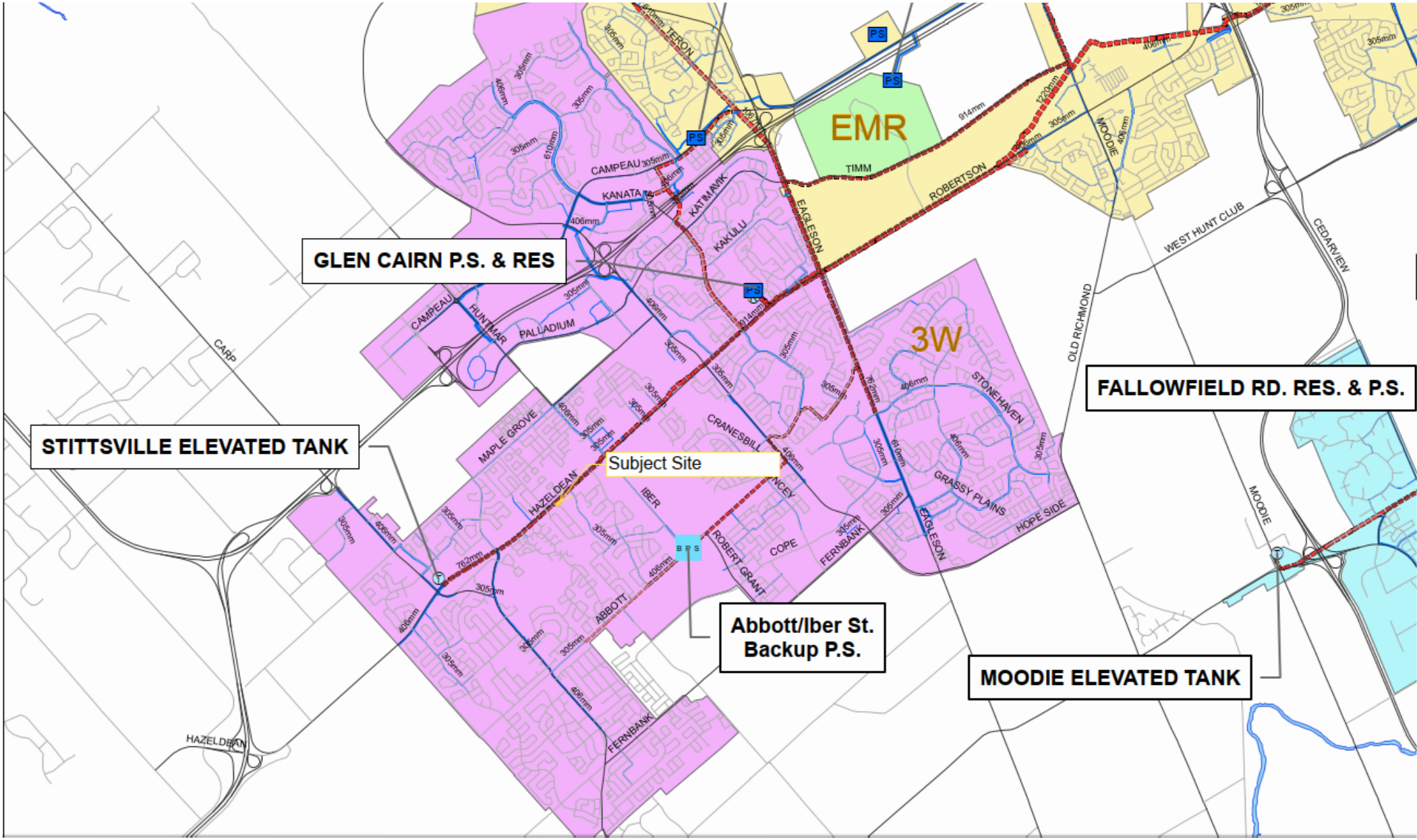
Fire Flow	5,202.0 L/min
Fire Flow Required**	5,000.0 L/min

*In accordance with Part II, Section 4, the Increase for separation distance is not to exceed 75%
**In accordance with Section 4 the Fire flow is not to exceed 45,000 L/min or be less than 2,000 L/min

3872, 3880, 3884 Hazeldean Road 7 Savage Drive - Hydrant Distance Figure



3872, 3880, 3884 Hazeldean Road & 7 Savage Drive - City of Ottawa
Pressure Zone Mapping Site Figure



APPENDIX D
SANITARY CALCULATIONS

CCO-25-3864 - 3872, 3880, 3884 Hazeldean Road & 7 Savage Drive - Sanitary Demands

Project:	3872, 3880, 3884 Hazeldean Road & 7 Savage Drive		
Project No.:	CCO-25-3864		
Designed By:	FV		
Checked By:	RF		
Date:	Jul-25		
Site Area	0.59	Gross ha	
Studio	20	1.40	Persons per unit
1 Bedroom	274	1.40	Persons per unit
2 Bedroom	162	2.10	Persons per unit
3 Bedroom	0	3.10	Persons per unit
Total Population	752	Persons	
Commercial/Amenity	0	m^2	

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.0	
Residential Peaking Factor	3.30	* *Using Harmon Formula* = 1+(14/(4+P^0.5))*0.8 *where P = population in thousands, Harmon's Correction Factor = 0.8*
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.03
Wet	0.16
Total	0.19

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	752	2.44
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m² /d)	0.00	0.00
Hospital	900	L/(bed/day)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	2.44	L/s
PEAK RESIDENTIAL FLOW	8.04	L/s
AVERAGE ICI FLOW	0.00	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.00	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.00	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	2.47	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	8.07	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	8.24	L/s

APPENDIX E
STORMWATER MANAGEMENT CALCULATIONS

Tc (min)	Intensity (mm/hr)		
	5-Year	100-Year	
20	70.3	120.0	PRE-DEVELOPMENT
10	104.2	178.6	POST-DEVELOPMENT

C-Values	
Impervious	0.90
Gravel	0.60
Pervious	0.20

Pre-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (5-year)	Average C (100-year)
A1	3,963	0	1,899	0.67	0.76

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)	
					5-Year	100-Year
A1	0.59	0.50	0.50	10	84.90	145.50
Total	0.59				84.90	145.50

**Runoff coefiicient limited to 0.5 per preconsult feedback form - phase 1 dated October 8, 2024*

Post-Development Runoff Coefficient

Drainage Area	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (5-year)	Average C (100-year)	
B1	1,008	0	0	0.90	1.00	*Building A*
B2	970	0	0	0.90	1.00	*Building B*
B3	585	0	0	0.90	1.00	*Building C*
B4	2,269	0	279	0.82	0.92	
B5	0	0	751	0.20	0.25	

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)	
					5-Year	100-Year
B1	0.10	0.90	1.00	10	26.27	50.01
B2	0.10	0.90	1.00	10	25.30	48.17
B3	0.06	0.90	1.00	10	15.25	29.03
B4	0.25	0.82	0.92	10	60.78	116.11
B5	0.08	0.20	0.25	10	4.35	9.32
Total	0.59				131.94	252.65

Required Restricted Flow for areas B1 -B4

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)	
					5-Year	100-Year
A1	0.59	0.50	0.50	10	84.90	145.50

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/S)		Restricted Flow (L/S)		Storage Required (m^3)	
	5-year	100-Year	5-Year	100-Year	5-Year	100-Year
B1	26.27	50.01	10.00	15.00	10.0	22.5
B2	25.30	48.17	10.00	15.00	9.3	21.2
B3	15.25	29.03	10.00	15.00	3.1	8.4
B4	60.78	116.11	10.00	15.00	38.6	81.3
B5	4.35	9.32	4.35	9.32	--	--
Total	131.94	252.65	44.35	69.32	60.98	133.44

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	26.27	10.00	16.27	9.76
15	83.6	21.07	10.00	11.07	9.97
20	70.3	17.72	10.00	7.72	9.27
25	60.9	15.35	10.00	5.35	8.03
30	53.9	13.59	10.00	3.59	6.46
35	48.5	12.23	10.00	2.23	4.68
40	44.2	11.14	10.00	1.14	2.74
45	40.6	10.23	10.00	0.23	0.63
50	37.7	9.50	10.00	-0.50	-1.49
55	35.1	8.85	10.00	-1.15	-3.80
60	32.9	8.29	10.00	-1.71	-6.14
65	31.0	7.81	10.00	-2.19	-8.52

Maximum Storage Required 5-year =	10	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	50.03	15.00	35.03	21.02
15	142.9	40.03	15.00	25.03	22.52
20	120.0	33.61	15.00	18.61	22.33
25	103.8	29.07	15.00	14.07	21.11
30	91.9	25.74	15.00	10.74	19.33
35	82.6	23.14	15.00	8.14	17.09
40	75.1	21.04	15.00	6.04	14.48
45	69.1	19.35	15.00	4.35	11.76
50	64.0	17.93	15.00	2.93	8.78
55	59.6	16.69	15.00	1.69	5.59
60	55.9	15.66	15.00	0.66	2.37
65	52.6	14.73	15.00	-0.27	-1.04
70	49.8	13.95	15.00	-1.05	-4.41
75	47.3	13.25	15.00	-1.75	-7.88

Maximum Storage Required 100-year =	23	m^3

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	25.30	10.00	15.30	9.18
15	83.6	20.30	10.00	10.30	9.27
20	70.3	17.07	10.00	7.07	8.48
25	60.9	14.79	10.00	4.79	7.18
30	53.9	13.09	10.00	3.09	5.56
35	48.5	11.78	10.00	1.78	3.73
40	44.2	10.73	10.00	0.73	1.76
45	40.6	9.86	10.00	-0.14	-0.39
50	37.7	9.15	10.00	-0.85	-2.54
55	35.1	8.52	10.00	-1.48	-4.88
60	32.9	7.99	10.00	-2.01	-7.24
65	31.0	7.53	10.00	-2.47	-9.65

Maximum Storage Required 5-year =	9	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	48.18	15.00	33.18	19.91
15	142.9	38.55	15.00	23.55	21.19
20	120.0	32.37	15.00	17.37	20.85
25	103.8	28.00	15.00	13.00	19.50
30	91.9	24.79	15.00	9.79	17.62
35	82.6	22.28	15.00	7.28	15.29
40	75.1	20.26	15.00	5.26	12.62
45	69.1	18.64	15.00	3.64	9.83
50	64.0	17.27	15.00	2.27	6.80
55	59.6	16.08	15.00	1.08	3.56
60	55.9	15.08	15.00	0.08	0.29
65	52.6	14.19	15.00	-0.81	-3.16
70	49.8	13.43	15.00	-1.57	-6.58
75	47.3	12.76	15.00	-2.24	-10.08

Maximum Storage Required 100-year =	21	m^3

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	15.25	10.00	5.25	3.15
15	83.6	12.23	10.00	2.23	2.01
20	70.3	10.29	10.00	0.29	0.35
25	60.9	8.91	10.00	-1.09	-1.63
30	53.9	7.89	10.00	-2.11	-3.80
35	48.5	7.10	10.00	-2.90	-6.10
40	44.2	6.47	10.00	-3.53	-8.48
45	40.6	5.94	10.00	-4.06	-10.96
50	37.7	5.52	10.00	-4.48	-13.45
55	35.1	5.14	10.00	-4.86	-16.05
60	32.9	4.81	10.00	-5.19	-18.67
65	31.0	4.54	10.00	-5.46	-21.31

Maximum Storage Required 5-year =	3	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	29.04	15.00	14.04	8.42
15	142.9	23.24	15.00	8.24	7.41
20	120.0	19.51	15.00	4.51	5.41
25	103.8	16.88	15.00	1.88	2.82
30	91.9	14.94	15.00	-0.06	-0.10
35	82.6	13.43	15.00	-1.57	-3.30
40	75.1	12.21	15.00	-2.79	-6.69
45	69.1	11.24	15.00	-3.76	-10.16
50	64.0	10.41	15.00	-4.59	-13.78
55	59.6	9.69	15.00	-5.31	-17.52
60	55.9	9.09	15.00	-5.91	-21.28
65	52.6	8.55	15.00	-6.45	-25.14
70	49.8	8.10	15.00	-6.90	-28.99
75	47.3	7.69	15.00	-7.31	-32.89

Maximum Storage Required 100-year =	8	m^3

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	60.78	10.00	50.78	30.47
15	83.6	48.76	10.00	38.76	34.89
20	70.3	41.01	10.00	31.01	37.21
25	60.9	35.52	10.00	25.52	38.28
30	53.9	31.44	10.00	21.44	38.59
35	48.5	28.29	10.00	18.29	38.41
40	44.2	25.78	10.00	15.78	37.88
45	40.6	23.68	10.00	13.68	36.94
50	37.7	21.99	10.00	11.99	35.97
55	35.1	20.47	10.00	10.47	34.56
60	32.9	19.19	10.00	9.19	33.09
65	31.0	18.08	10.00	8.08	31.52

Maximum Storage Required 5-year =	39	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	116.14	15.00	101.14	60.68
15	142.9	92.92	15.00	77.92	70.13
20	120.0	78.03	15.00	63.03	75.64
25	103.8	67.50	15.00	52.50	78.75
30	91.9	59.76	15.00	44.76	80.57
35	82.6	53.71	15.00	38.71	81.30
40	75.1	48.84	15.00	33.84	81.20
45	69.1	44.93	15.00	29.93	80.82
50	64.0	41.62	15.00	26.62	79.85
55	59.6	38.76	15.00	23.76	78.39
60	55.9	36.35	15.00	21.35	76.86
65	52.6	34.20	15.00	19.20	74.90
70	49.8	32.38	15.00	17.38	73.01
75	47.3	30.76	15.00	15.76	70.91

Maximum Storage Required 100-year =	81	m^3

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

4. Development Servicing Study Checklist

The following section describes the checklist of the required content of servicing studies. It is expected that the proponent will address each one of the following items for the study to be deemed complete and ready for review by City of Ottawa Infrastructure Approvals staff.

The level of required detail in the Servicing Study will increase depending on the type of application. For example, for Official Plan amendments and re-zoning applications, the main issues will be to determine the capacity requirements for the proposed change in land use and confirm this against the existing capacity constraint, and to define the solutions, phasing of works and the financing of works to address the capacity constraint. For subdivisions and site plans, the above will be required with additional detailed information supporting the servicing within the development boundary.

4.1 General Content

Criteria	Location (if applicable)
☐ Executive Summary (for larger reports only).	N/A
☐ Date and revision number of the report.	On Cover
☐ Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix A
☐ Plan showing the site and location of all existing services.	N/A
☐ Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.1 Purpose 1.2 Site Description 6.0 Proposed Stormwater Management
☐ Summary of pre-consultation meetings with City and other approval agencies.	Appendix B
☐ Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	1.1 Purpose 1.2 Site Description 6.0 Proposed Stormwater Management
☐ Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

☐ Identification of existing and proposed infrastructure available in the immediate area.	N/A
☐ Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☐ Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	N/A
☐ Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
☐ Proposed phasing of the development, if applicable.	N/A
☐ Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Background Studies, Standards and References
☐ All preliminary and formal site plan submissions should have the following information: o Metric scale o North arrow (including construction North) o Key plan o Name and contact information of applicant and property owner o Property limits including bearings and dimensions o Existing and proposed structures and parking areas o Easements, road widening and rights-of-way o Adjacent street names	N/A

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
☐ Confirm consistency with Master Servicing Study, if available	N/A
☐ Availability of public infrastructure to service proposed development	N/A
☐ Identification of system constraints	N/A
☐ Identify boundary conditions	Appendix C
☐ Confirmation of adequate domestic supply and pressure	N/A
☐ Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Appendix C
☐ Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	N/A
☐ Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐ Address reliability requirements such as appropriate location of shut-off valves	N/A
☐ Check on the necessity of a pressure zone boundary modification.	N/A
☐ Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range	Appendix C, Section 4.2 Proposed Water Servicing

☐ Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
☐ Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☐ Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix C
☐ Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

Criteria	Location (if applicable)
☐ Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	N/A
☐ Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐ Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☐ Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Proposed Sanitary Servicing

☐ Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Section 5.2 Proposed Sanitary Servicing
☐ Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☐ Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Servicing
☐ Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A
☐ Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐ Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐ Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐ Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
☐ Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Analysis of available capacity in existing public infrastructure.	N/A
☐ A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	N/A
☐ Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5-year event (dependent on the receiving sewer design) to 100-year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Set-back from private sewage disposal systems.	N/A
☐ Watercourse and hazard lands setbacks.	N/A
☐ Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
☐ Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☐ Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	Appendix G

☐ Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☐ Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Appendix G, Section 7.0 Proposed Stormwater Management
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐ Identification of potential impacts to receiving watercourses	N/A
☐ Identification of municipal drains and related approval requirements.	N/A
☐ Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Storm Sewer Servicing & Section 7.0 Proposed Stormwater Management
☐ 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
☐ Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

☐ Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	N/A
☐ Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐ Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development as well as the relevant issues affecting each approval. The approval and permitting shall include but not be limited to the following:

Criteria	Location (if applicable)
☐ Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	N/A
☐ Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐ Changes to Municipal Drains.	N/A
☐ Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

Criteria	Location (if applicable)
☐ Clearly stated conclusions and recommendations	Section 8.0 Summary
☐ Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	All are stamped
☐ All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped