

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES 1047 RICHMOND ROAD



Project No.: CCO-22-2242

Prepared for:

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1.0 PROJECT OVERVIEW

1.1 Purpose

McIntosh Perry (MP) has been retained by Fengate 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 1047 Richmond Road, 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 Rideau Valley Conservation Authority (RVCA), 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

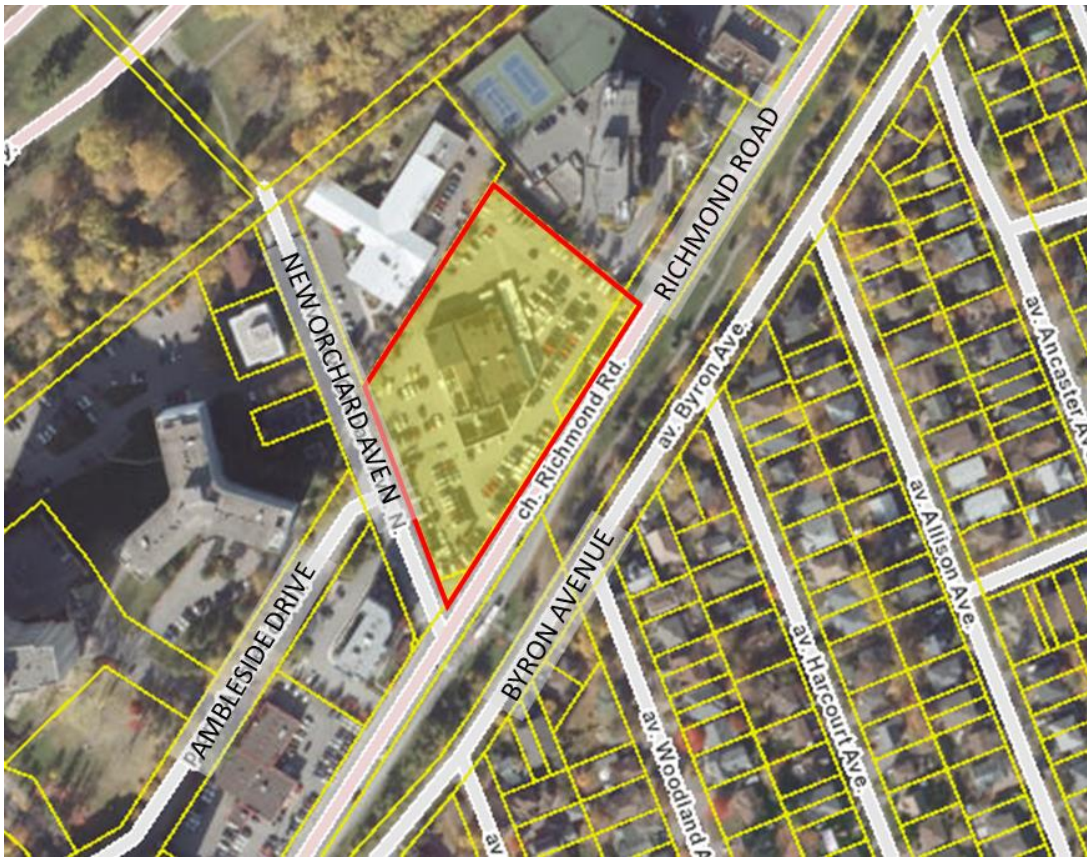


Figure 1: Site Map

The subject property, herein referred to as the site, is located at 1047 Richmond Road within the Bay Ward in the City of Ottawa. The site covers approximately **1.02 ha** and is located at the north east corner of the Richmond Road and New Orchard Avenue North intersection. The site is zoned for Traditional Mainstreet use (TM[2494] H[25]). Additional details are included on the Site Location Plan included in Appendix 'A'.

1.3 Proposed Development and Statistics

The contemplated development consists of three residential towers ranging from 36 to 40-storeys connected via a 6-storey podium level and park land to be dedicated to the City. The **Site Plan** proposes **1322 residential units** and **1213 m²** of retail space. Refer to **Site Plan** prepared by IBI Group and included in **Appendix B** for further details.

1.4 Existing Conditions and Infrastructure

The site is currently developed as a car dealership with asphalt parking areas. Based on available mapping, the existing building appears to be serviced by the municipal infrastructure within Richmond Road.

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:

- ❖ Ambleside Drive
 - 203 mm diameter PVC watermain; and
 - 300 mm diameter concrete storm sewer, tributary to the Ottawa River.
- ❖ New Orchard Drive
 - 203/152 mm diameter cast iron watermain;
 - 300 mm diameter concrete sanitary sewer, tributary to the West Nepean Collector; and
 - 675 mm diameter concrete storm Sewer, tributary to the Ottawa River.
- ❖ North of 1071 Ambleside Drive
 - 1220 mm diameter concrete feedermain; and
 - 1350 mm diameter concrete sanitary West Nepean Collector sewer.

1.5 Approvals

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

The development will be 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, 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.

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 ISTB-2018-01 City of Ottawa, January 2018. (***ISTB-2018-01***)
 - Technical Bulletin ISTB-2018-03 City of Ottawa, March 2018. (***ISTB-2018-03***)
 - Technical Bulletin ISTB-2019-01 City of Ottawa, January 2019. (***ISTB-2019-01***)
 - 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-2018-03 City of Ottawa, March 2018. (***ISTB-2018-03***)
- ◆ Stormwater management Design Criteria for the Pinecrest Creek/Westboro Area, City of Ottawa, May 2020. (***Pinecrest Creek Study***)

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***)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on October 14th, 2021 regarding the contemplated development at 1047 Richmond Road. Specific design parameters to be incorporated within this design include the following.

- ◆ RCVA to confirm quality controls requirements.
- ◆ Any storm events greater than 5 year, up to 100 year, and including 100-year storm event must be detained on site.
- ◆ Post-development to be restricted to the 2-year storm event, based on a calculated time of concentration and 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.
- ◆ 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 WATERMAIN

4.1 Existing Watermain

The subject site is located within the 1W pressure zone, as shown by the Water Distribution figure located in **Appendix C**. The following subsections outline the water infrastructure that exists within Richmond Road and New Orchard Drive.

4.1.1 Richmond Road

There is an existing 203 mm diameter PVC watermain within Richmond Road. Based on City of Ottawa mapping, the existing building is currently serviced by this watermain. In addition, there is an existing fire hydrant fronting the site along Richmond Road.

4.1.2 New Orchard Drive

There is an existing 203 mm diameter PVC watermain within New Orchard Avenue N. Approximately 79 m north of Richmond Road, the municipal system transitions from a 203 mm diameter watermain to a 152 mm diameter watermain. The watermain stops short of the 1220 mm diameter transmission main at the north end of New Orchard Ave N. In addition, there is are two existing fire hydrants fronting the site along New Orchard Ave N.

4.2 Proposed Watermain

In accordance with Section 4.3.1 of the **Ottawa Water Guidelines**, service areas with a basic day demand greater than 50 m³/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**.

The Fire Underwriters Survey 1999 (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-2018-03**. The following parameters were assumed:

- ◆ Type of construction – Fire Resistive Construction
- ◆ Occupancy type – Limited Combustibility
- ◆ Sprinkler Protection – Fully Supervised Sprinkler

The results of the calculations yielded a required fire flow of **7,000 L/min** (116.7 L/s) for Tower A and **13,000 L/min** (216.7 L/s) for Towers B and C. 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		1.02 ha
Residential		280 L/day/person
Residential 1 Bedroom & Bachelor Apartment		1.4 person/unit
Residential 2 Bedroom Apartment		2.1 person/unit
Residential 3 Bedroom Apartment		3.1 person/unit
Commercial Space		28,000 L/gross ha/day
Tower A	Average Day Demand (L/s)	2.50 L/s
	Maximum Daily Demand (L/s)	6.25 L/s
	Peak Hourly Demand (L/s)	13.73 L/s
Tower B, C	Average Day Demand (L/s)	5.20 L/s
	Maximum Daily Demand (L/s)	12.97 L/s
	Peak Hourly Demand (L/s)	28.51 L/s
Total	Average Day Demand (L/s)	7.70 L/s
	Maximum Daily Demand (L/s)	19.20 L/s
	Peak Hourly Demand (L/s)	42.22 L/s
Tower A - FUS Fire Flow Requirement (L/s)		116.7 L/s (7,000 L/min)
Tower B, C - FUS Fire Flow Requirement (L/s)		216.7 L/s (13,000 L/min)

Boundary Conditions have been requested from the City however were not available at the time of submission. Once boundary conditions are provided by the City, the minimum and maximum water pressures will be compared to those proposed to ensure they fall within the required range identified by in the City of Ottawa Water Supply Guidelines and to confirm the system has adequate capacity for the proposed development.

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**. As demonstrated by **Table 2**, below.

Table 2: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m	Fire Hydrant(s) within 150m	Combined Fire Flow (L/min.)
1047 Richmond Road	7,000 L/min - FUS 13,000 L/min - FUS	4 public	1 public	26,400

Based on City guidelines (*ISTB-2018-03*), it is anticipated that the existing municipal hydrants can provide adequate fire protection to the contemplated development.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

There is an existing 225 mm diameter sanitary sewer within Richmond Road and an existing 300 mm diameter sanitary sewer within New Orchard Drive available to service the site. Both sanitary sewers are tributary to the same outlet, the West Nepean Collector, at the north end of New Orchard Avenue N.

5.2 Proposed Sanitary Sewer

Table 3, below, summarizes the wastewater design criteria identified by the *Ottawa Sewer Guidelines*.

Table 3: Sanitary Design Criteria

Design Parameter	Value
Residential 1 Bedroom / Bachelor Apartment	1.4 persons/unit
Residential 2 Bedroom Apartment	2.1 persons/unit
Residential 3 Bedroom Apartment	3.1 persons/unit
Average Daily Demand	280 L/day/person
Commercial Space	2800 L/(1000m ² /day)

It is anticipated that the contemplated development will be serviced by the 300 mm diameter sanitary sewer within New Orchard Drive.

Table 4, below, summarizes the estimated wastewater flow from the contemplated development. Refer to **Appendix D** for detailed calculations.

Table 4: Summary of Estimated Sanitary Flow

Design Parameter	Total Flow (L/S)
Total Estimated Average Dry Weather Flow	7.75
Total Estimated Peak Dry Weather Flow	23.26
Total Estimated Peak Wet Weather Flow	23.54

City staff were contacted on October 15th, 2020 to review contemplated wastewater flows from the site and advise if there were any downstream constraints. City staff confirmed on October 27th, 2020 that there were no concerns with the municipal system based on a contemplated flow of **22.77 L/s**. Revised site statistics were received after initial consultation, as demonstrated by **Table 4**, above.

It is requested that City staff advise if there are any concerns with the increase in wastewater flow from the initial assessment.

6.0 STORM SEWER & STORMWATER MANAGEMENT DESIGN

6.1 Existing Storm Sewers

Stormwater runoff from the site is currently tributary to the Ottawa River within the Ottawa Central sub-watershed. The following subsections outline the storm infrastructure that exists within New Orchard Avenue N and Richmond Road.

6.1.1 New Orchard Avenue N

There is an existing 675 mm diameter storm sewer located within New Orchard Drive. The storm sewer slopes to the north and discharges directly into the Ottawa river approximately 300 m downstream.

6.1.2 Richmond Road

There is an existing 1050 mm diameter storm sewer located within Richmond Road. The storm sewer slopes to the west and connects to New Orchard Avenue N.

6.2 Proposed Storm Sewers

It is anticipated that runoff will be directed to the existing storm infrastructure at a restricted rate, as discussed in *Section 7.1*. 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- 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

- Based on coordination with the RVCA, quality controls may not be required for the development if the grading is enhanced, and best management practices are incorporated. The RVCA will confirm this requirement when the Site Plan is reviewed as part of the Site Plan Control application.

Quantity Control

- Any storm events greater than 5 year, up to 100 year, and including 100-year storm event must be detained on site.
- Post-development to be restricted to the 2-year storm event, based on a calculated time of concentration and 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:

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

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
Undeveloped and Grass	0.20

As per the *Ottawa Sewer Guidelines*, the 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 flow to the 2-year storm event. It is estimated that the target release rate during the 100-year event will be **103.94 L/s**.

It has been assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2, 5, and 100-year events are summarized below in *Table 5*.

Table 5: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Q (L/s)		
		2-Year	5-Year	100-Year
A1	0.974	187.23	253.99	483.64

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 that approximately 10% of the development area will be directed to the outlet without flow attenuation. The estimated post-development peak flows for the 5 and 100-year events and the required storage volumes are summarized below in *Table 6*, below.

Table 6: 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 (Restricted)	206.33	435.25	46.69	98.48	111.2	233.3
B2 (Unrestricted)	2.55	5.46	2.55	5.46	-	-
Total	208.88	440.71	49.23	103.94		

It is anticipated that approximately **233 m³** of storage will be required on site to attenuate flow to the established release rate of **103.94 L/s**. Flow and storage calculations can be found within **Appendix G**. 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 three residential towers ranging from 36 to 40-storeys connected via a 6-storey podium and park land to be dedicated to the City is contemplated at 1047 Richmond Road;
- The FUS method estimated a maximum fire flow of **13,000 L/min** is required for the contemplated development;
- The development is anticipated to have a peak wet weather flow of **23.54 L/s**. Based on coordination with City staff, it is anticipated that the municipal system can accommodate the wastewater flow;
- Based on City of Ottawa guidelines, the development will be required to attenuate post-development 5 and 100-year flows to the 2-year release rate of **103.94 L/s**;
- 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 **233 m³** of onsite storage will be required to attenuate flow to the established release rate. 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;
- Based on coordination with the RVCA, quality controls may not be required for the development if the grading is enhanced, and best management practices are incorporated. The RVCA will confirm this requirement when the Site Plan is reviewed as part of the Site Plan Control application.

9.0 RECOMMENDATION

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 1047 Richmond Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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10.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Fengate. 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, Parks and Climate Change, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry 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. McIntosh Perry 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, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

**APPENDIX A
KEY PLAN**



LEGEND

-  Site Location
-  Watercourse
-  Local Road
-  Waterbody
-  Major Road
-  Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2021.

CLIENT:		FENGATE	
PROJECT:		1047 RICHMOND ROAD	
TITLE:		SITE LOCATION PLAN	
PROJECT NO: CCO-22-2242		FIGURE:	
Date	Dec., 17, 2021	1	
GIS	SK		
Checked By	AG		

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C:\Users\stiles.Hansen\McIntosh_Perry\GIS - Documents\Projects\2022\CCO-22-2242_Fengate_Richmond_Road\Key_Maps\LandDevelopment\CCO-22-2242_01_KeyPlan.aprx

**APPENDIX B
BACKGROUND DOCUMENTS**

- The Servicing Study Guidelines for Development Applications are available at the following link: <https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans>
- Record drawings and utility plans are available for purchase from the City's Information Centre. Contact the City's Information Centre by email at informationcentre@ottawa.ca or by phone at (613) 580-2424 x44455
- Stormwater quantity control criteria – Control the 100-yr to the 2-yr allowable release rate using on site SWM. The allowable release rate is to be determined using the lesser of $c=0.5$ or existing. T_c is to be computed but not less than 10 minutes.
- As for the sanitary, the pipe on New Orchard is only 300 mm. Therefore, please provide the sanitary flow estimate from this site to determine if there is capacity available for this existing pipe or if the pipe needs to be upgraded. Note that west Nepean Collector is only 100 m away, so it would not be difficult to upgrade the pipe if required.
- Existing 203 mm dia. watermain is available on New Orchard Ave. N. for service connection.
- Looping may be required depends on the water demand.
- Stormwater quality control – Consult with the Conservation Authority (RVCA) for their requirements. Include the correspondence with RVCA in the stormwater/site servicing report.
- Please note that as per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 2-year storm rainfall event. Depending on the SWM strategy proposed underground or additional underground storage may be required to satisfy this requirement.
- Please note that the minimum orifice dia. for a plug style ICD is 83mm and the minimum flow rate from a vortex ICD is 6 L/s in order to reduce the likelihood of plugging.
- Please provide an Existing Conditions/Removals Plan as part of the engineering drawing set. Any existing services are to be removed or abandoned in accordance with City standards.
- As per the City of Ottawa Slope Stability Guidelines for Development Applications an engineering report is required for any retaining walls proposed 1.0 m or greater in height within the subject site that addresses the global stability of the wall and provides structural details. A Retaining Wall Stability Analysis Report and Retaining Wall Structural Details are required to be provided from a Professional Engineer licensed in the Province of Ontario that demonstrates the proposed retaining wall structure has been assessed for global instability as per City standards. Please ensure the analysis and required documentation are provided as part of the submission to address this comment.
- Emergency routes will need to be satisfactory to Fire Services. Please show fire routes on the site plan. For information regarding fire route provisions, please

consult with Kevin Heiss at kevin.heiss@ottawa.ca.

- Clearly show and label the property lines on all sides of the property.
- Clearly show and label all the easements (if any) on the property, on all plans.
- When calculating the post development composite runoff coefficient (C), please provide a drawing showing the individual drainage area and its runoff coefficient.
- When using the modified rational method to calculate the storage requirements for the site, the underground storage should not be included in the overall available storage. The modified rational method assumes that the restricted flow rate is constant throughout the storm which, in this case, underestimates the storage requirement prior to the 1:100-year head elevation being reached. Alternately, if you wish to include the underground storage, you may use an assumed average release rate equal to 50% of the peak allowable rate. Otherwise, disregard the underground storage as available storage or provide modeling to support the design.
- Engineering plans are to be submitted on standard A1 size (594mm x 841mm) sheets.
- Phase 1 ESA and Phase 2 ESA must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- Provide the following information for water main boundary conditions:
 1. Location map with water service connection location(s).
 2. Average daily demand (l/s).
 3. Maximum daily demand (l/s).
 4. Maximum hourly demand (l/s).
 5. Fire flow demand (provide detailed fire flow calculations based on Fire Underwriters survey (FUS) Water Supply for Public Fire Protection). Exposure separation distances shall be defined on a figure to support the FUS calculation and required fire flow (RFF).
 6. Hydrant capacity shall be assessed to demonstrate the RFF can be achieved. Please identify which hydrants are being considered to meet the RFF on a fire hydrant coverage plan as part of the boundary conditions request.
- If you are proposing any exterior light fixtures, all must be included and approved as part of the site plan approval. Therefore, the lights must be clearly identified by make, model and part number. All external light fixtures must meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America (IESNA or IES), and must result in minimal light spillage onto adjacent properties (as a guideline, 0.5 fc is normally the maximum allowable spillage). In order to satisfy these criteria, the applicant must provide certification from an

acceptable professional engineer. The location of all exterior fixtures, a table showing the fixture types (including make, model, part number), and the mounting heights must be included on a plan.

- As per Ottawa Sewer Design Guideline section 4.4.4.7, a monitoring maintenance hole shall be required just inside the property line for all non-residential and multi residential buildings connections from a private sewer to a public sewer. See the sewer use By-law 2003-514(14) monitoring devices for details.

PART OF LOTS 24 AND 25
CONCESSION 1 (OTTAWA FRONT)
GEOGRAPHIC TOWNSHIP OF NEPEAN
CITY OF OTTAWA

Surveyed by Annis, O'Sullivan, Vollebek Ltd.

Scale 1 : 300



Metric

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

Surveyor's Certificate

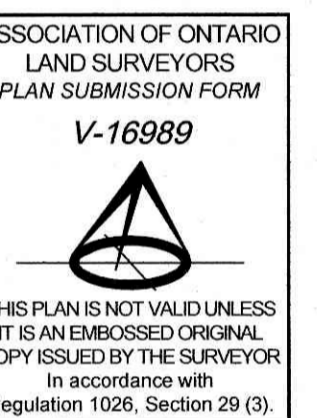
- I CERTIFY THAT:
1. This survey and plan are correct and in accordance with the Surveys Act and the Regulations made under them.
2. The survey was completed on the 29th day of September, 2021.

Date: 29/09/2021
Signature: E. H. Henveyer
Ontario Land Surveyor

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999982.

For bearing comparisons, a rotation of 0°01'00" counter-clockwise was applied to bearings on P1, P4 & P5. For bearing comparisons, a rotation of 0°19'10" counter-clockwise was applied to bearings on P6. For bearing comparisons, a rotation of 0°01'30" counter-clockwise was applied to bearings on P2 & P7.

Coordinates are derived from Can-Net 2016 Real Time Network GPS observations referenced to Specified Control Points 0191980005 and 01919750705, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).



ELEVATION NOTES

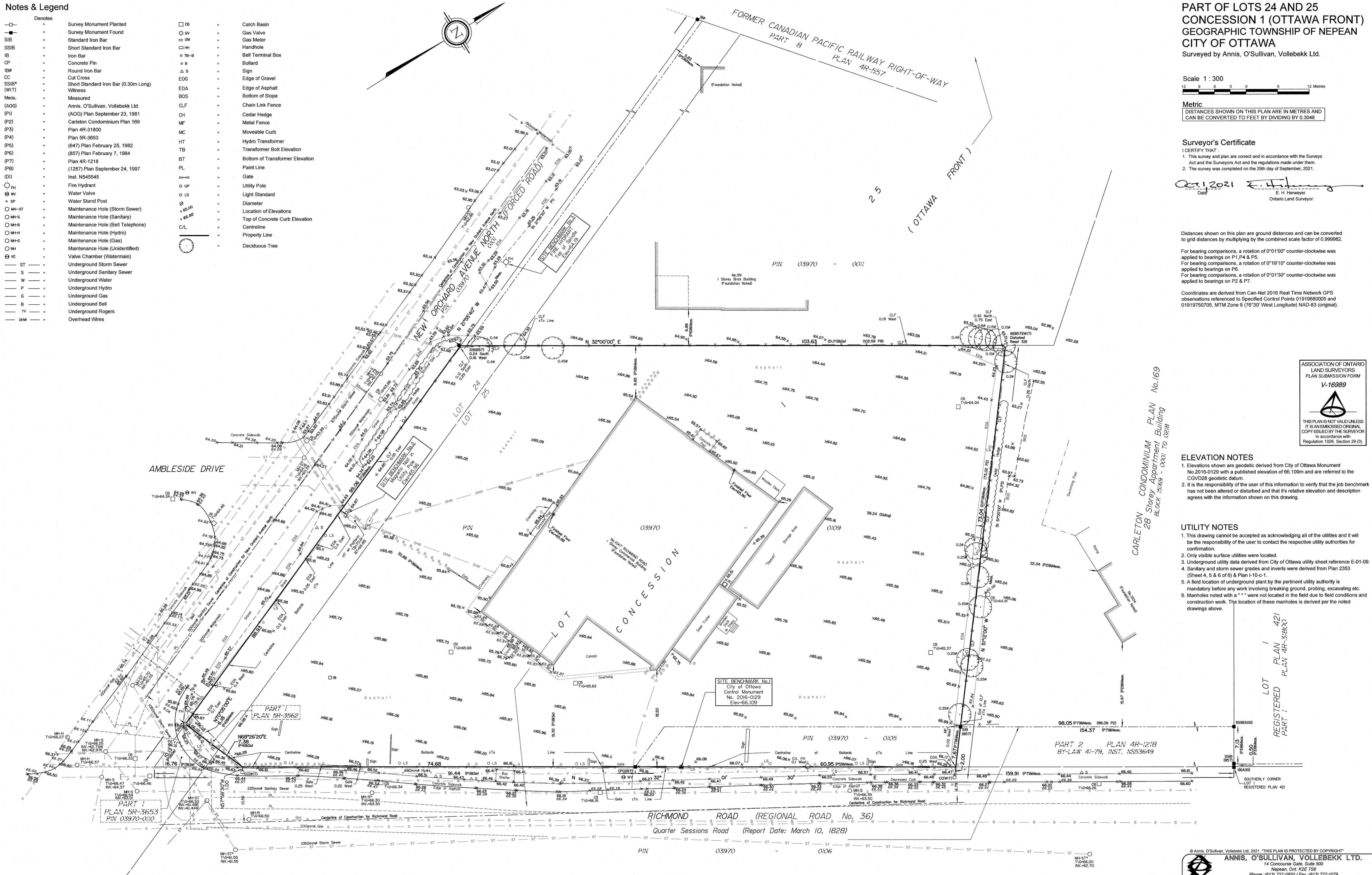
- 1. Elevations shown are geodetic derived from City of Ottawa Monument No.2016-0129 with a published elevation of 66.109m and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that its relative elevation and description agrees with the information shown on this drawing.

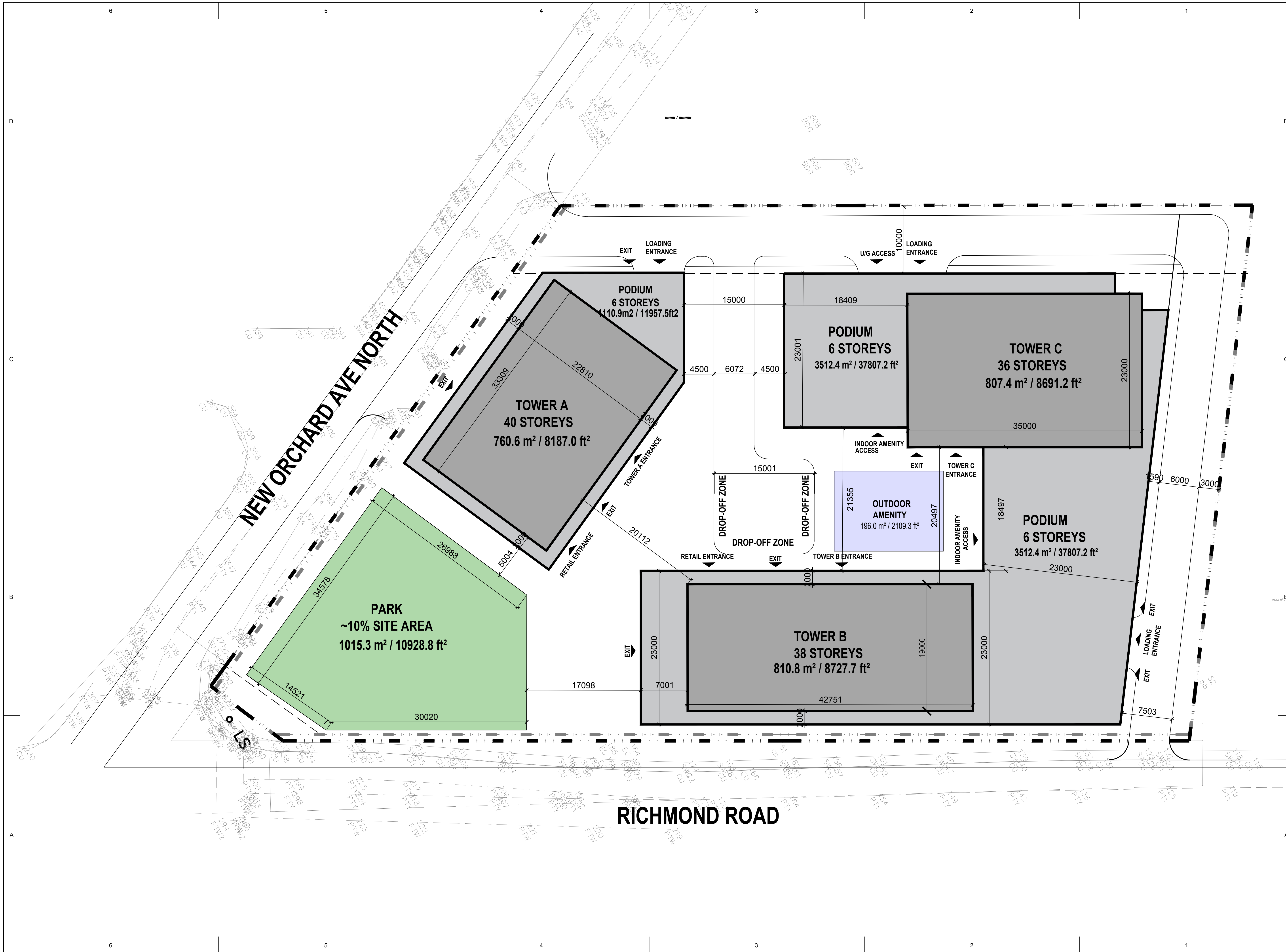
UTILITY NOTES

- 1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. Underground utility data derived from City of Ottawa utility sheet reference E-01-09.
4. Sanitary and storm sewer grades and inverts were derived from Plan 2353 (Sheet 4, 5 & 6 of 8) & Plan I-10-c-1.
5. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
6. Manholes noted with a "*" were not located in the field due to field conditions and construction work. The location of these manholes is derived per the noted drawings above.

Notes & Legend

Table with 2 columns: Denotes (symbols) and descriptions (e.g., Survey Monument Planted, Catch Basin, Gas Valve, etc.).





CLIENT
1047 RICHMOND ROAD
OTTAWA, ON K2B 6R1

OWNER
FENGATE ASSET MANAGEMENT

PROPOSED 3 TOWER
HIGH-RISE BUILDING

DRAFT

PLANNER

ISSUES

SEAL

IBI GROUP
55 St. Clair Avenue West,
Toronto, ON M4V 2Y7, Canada
Tel: 416 596 1030 Fax: 416 596 0544
ibigroup.com

PROJECT

PROJECT NO:

DRAWN BY: CHECKED BY:

PROJECT MGR: APPROVED BY:

SHEET TITLE
SITE PLAN
1:250

SHEET NUMBER ISSUE

SCALE CHECK 1/16" = 1' = 30mm

1047 RICHMOND RD. - Ottawa

December 2, 2021

PROJECT STATISTICS		
SUMMARY	TOTAL	
	SQ.M.	SQ.FT.
Site Area	10,188	109,623
Net Site Area (excludes ROWs)	9,894	106,459
Total GCA (Above grade)	103,523	1,113,907
Total GFA (82% of GCA except GF)	82,947	892,514
Total NSA (Residential + Retail)	86,471	930,423
Building Efficiency		
Total Retail Saleable (Ground)	1,213	13,049
PARK Area (10% of Site area)	1,015	10,925
Total Number of Units in podium	270	
Total Number of Units in towers	1,052	
Total Number of Units	1,322	

PROJECT STATISTICS		
Tower A (40)	TOTAL	
	SQ.M.	SQ.FT.
Total Tower GCA	25,626	275,739
Total Tower GFA	21,014	226,106
Total Tower NSA	21,712	233,618
Building Efficiency		
Total Number of Units (tower only)	370	
Tower B (38)	SQ.M.	SQ.FT.
Total Tower GCA	25,925	278,950
Total Tower GFA	21,258	228,739
Total Tower NSA	22,213	239,009
Building Efficiency		
Total Number of Units (tower only)	352	
Tower C (36)	SQ.M.	SQ.FT.
Total GCA	24,237	260,790
Total GFA	19,874	213,848
Total NSA	20,637	222,054
Building Efficiency		
Total Number of Units (tower only)	330	
Podium (6 storeys)	SQ.M.	SQ.FT.
Total GCA	27,735	298,429
Total GFA	20,801	223,821
Total NSA (Res.)	20,697	222,694
Building Efficiency		
Total Number of Units	270	

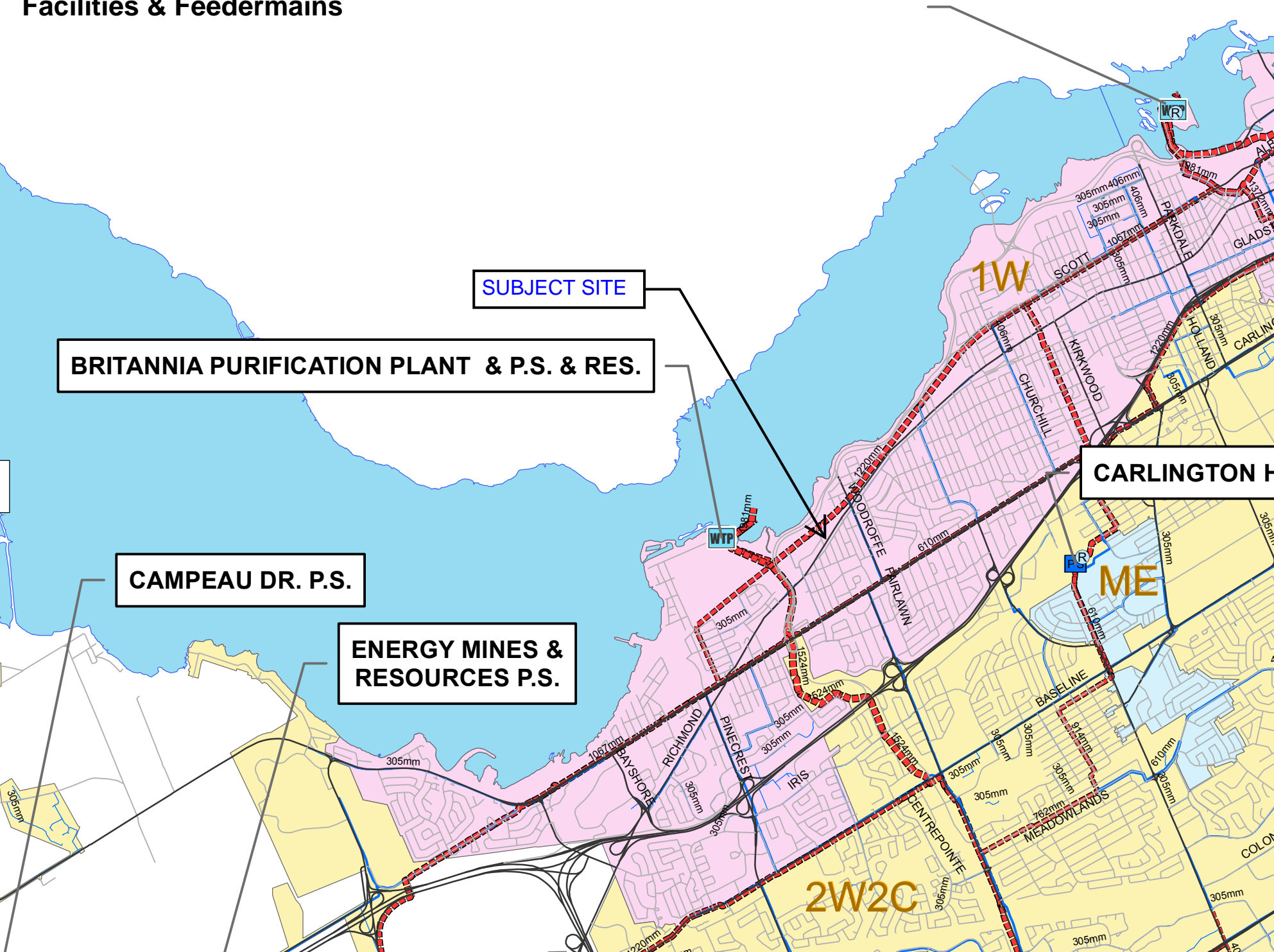
UNDERGROUND PARKING GCA	SQ.M.	SQ.FT.
P1	8326.5	89,593
P2	8326.5	89,593
P3	8326.5	89,593
TOTAL	24979.5	268779.42

PARKING PROVIDED	Parking Count
VISITOR	133
RESIDENTIAL	659
TOTAL	789

AMENITY AREAS PROVIDED	Tower A (m2)	Tower B (m2)	Tower C (m2)	Podium (m2)	Total (m2)	Required
INDOOR (communal)	72	0	0	1967.5	2,039	1983
OUTDOOR (communal)	419	887	424	196	1,926	1983
BALCONIES & TERRACES (private)						
TOTAL provided	491.3	887	424	2,164	3,966	3,966

APPENDIX C
WATERMAIN CALCULATIONS

City of Ottawa - Water Distribution System Facilities & Feeder mains



SUBJECT SITE

BRITANNIA PURIFICATION PLANT & P.S. & RES.

CAMPEAU DR. P.S.

ENERGY MINES & RESOURCES P.S.

CARLINGTON H

1W

ME

2W2C

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Water Demands - Tower A & Podium Levels

Project:	1047 Richmond Road
Project No.:	CCO-22-2242
Designed By:	AJG
Checked By:	AJG
Date:	December 9, 2021
Site Area:	1.02 gross ha

Residential	NUMBER OF UNITS	UNIT RATE	
Bachelor Apartment	33 units	1.4	persons/unit
1 Bedroom Apartment	193 units	1.4	persons/unit
2 Bedroom Apartment	193 units	2.1	persons/unit
3 Bedroom Apartment	15 units	3.1	persons/unit

Total Population **769** persons

Commercial	312 m2
Industrial - Light	m2
Industrial - Heavy	m2

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/(1000m ² /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	2.49	L/s
	Commercial/Industrial/Institutional	0.01	L/s

McINTOSH PERRY

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	6.23	L/s
	Commerical/Industrial /Institutional	0.02	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	13.71	L/s
	Commerical/Industrial /Institutional	0.03	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT

CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	2.50	L/s
MAXIMUM DAILY DEMAND	6.25	L/s
MAXIMUM HOUR DEMAND	13.73	L/s

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Fire Underwriters Survey - Tower A

Project: 1047 Richmond Road
 Project No.: CCO-22-2242
 Designed By: AJG
 Checked By: AJG
 Date: December 9, 2021

From the Fire Underwriters Survey (1999)

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

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

F = 220 x C x v 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 **Fire-Resistive Construction** *Modified (per Tech Bulletin ISTB-2018-02)

A (Floors 1-2) 2221.8 m²

A (Floors 3-8) 5964.8 m²

*100% Area for Floors 1-2, 50% Area for Floors 3-8

C 0.6 A 5,204.2 m²

Calculated Fire Flow 9,522.5 L/min
 10,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From note 2, Page 18 of the Fire Underwriter Survey:

Limited Combustible -15%

Fire Flow 8,500.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered -50%

Reduction -4,250.0 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	Non-Combustible	77	2	154.0	15%
Exposure 2	10.1 to 20	Non-Combustible	67.5	36	2430.0	15%
Exposure 3	>45	Non-Combustible	15	2	30.0	0%
Exposure 4	30.1 to 45	Non-Combustible	20	4	80.0	5%
% Increase*						35%

Increase* 2,975.0 L/min

McINTOSH PERRY

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

Fire Flow	7,225.0 L/min
Fire Flow Required**	7,000.0 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

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Water Demands - Tower B, C, and Podium

Project:	1047 Richmond Road
Project No.:	CCO-22-2242
Designed By:	AJG
Checked By:	AJG
Date:	December 9, 2021
Site Area:	1.02 gross ha

<u>Residential</u>	NUMBER OF UNITS	UNIT RATE	
Bachelor Apartment	67 units	1.4	persons/unit
1 Bedroom Apartment	334 units	1.4	persons/unit
2 Bedroom Apartment	477 units	2.1	persons/unit
3 Bedroom Apartment	10 units	3.1	persons/unit

Total Population 1595 persons

<u>Commercial</u>	901 m2
<u>Industrial - Light</u>	m2
<u>Industrial - Heavy</u>	m2

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/(1000m ² /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	5.17	L/s
	Commerical/Industrial		
	/Institutional	0.03	L/s

McINTOSH PERRY

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	12.92	L/s
	Commerical/Industrial /Institutional	0.04	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	28.43	L/s
	Commerical/Industrial /Institutional	0.08	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT

CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	5.20	L/s
MAXIMUM DAILY DEMAND	12.97	L/s
MAXIMUM HOUR DEMAND	28.51	L/s

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Water Demands - Total

Project:	1047 Richmond Road
Project No.:	CCO-22-2242
Designed By:	AJG
Checked By:	AJG
Date:	December 9, 2021
Site Area:	1.02 gross ha

<u>Residential</u>	NUMBER OF UNITS	UNIT RATE	
Bachelor Apartment	100 units	1.4	persons/unit
1 Bedroom Apartment	527 units	1.4	persons/unit
2 Bedroom Apartment	670 units	2.1	persons/unit
3 Bedroom Apartment	25 units	3.1	persons/unit

Total Population **2363 persons**

<u>Commercial</u>	1213 m2
<u>Industrial - Light</u>	m2
<u>Industrial - Heavy</u>	m2

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/(1000m ² /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	7.66	L/s
	Commerical/Industrial/ Institutional	0.04	L/s

McINTOSH PERRY

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	19.14	L/s
	Commerical/Industrial/ Institutional	0.06	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	42.12	L/s
	Commerical/Industrial/ Institutional	0.11	L/s

WATER DEMAND DESIGN FLOWS PER UNIT COUNT

CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

AVERAGE DAILY DEMAND	7.70	L/s
MAXIMUM DAILY DEMAND	19.20	L/s
MAXIMUM HOUR DEMAND	42.22	L/s

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Fire Underwriters Survey - Tower B,C, Podium

Project: 1047 Richmond Road
 Project No.: CCO-22-2242
 Designed By: AJG
 Checked By: AJG
 Date: December 9, 2021

From the Fire Underwriters Survey (1999)

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

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

F = 220 x C x v 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 Fire-Resistive Construction *Modified (per Tech Bulletin ISTB-2018-02)

A (Floors 1-2) 7024.8 m²

A (Floors 3-8) 17286 m²

*100% Area for Floors 1-2, 50% Area for Floors 3-8

C 0.6 A 15,667.8 m²

Calculated Fire Flow

16,522.6 L/min

17,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From note 2, Page 18 of the Fire Underwriter Survey:

Limited Combustible -15%

Fire Flow

14,450.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered -50%

Reduction

-7,225.0 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	Non-Combustible	77	2	154.0	15%
Exposure 2	20.1 to 30	Non-Combustible	90	28	2520.0	10%
Exposure 3	>45	Non-Combustible	15	2	30.0	0%
Exposure 4	10.1 to 20	Non-Combustible	45	40	1800.0	15%
% Increase*						40%

Increase*

5,780.0 L/min

McINTOSH PERRY

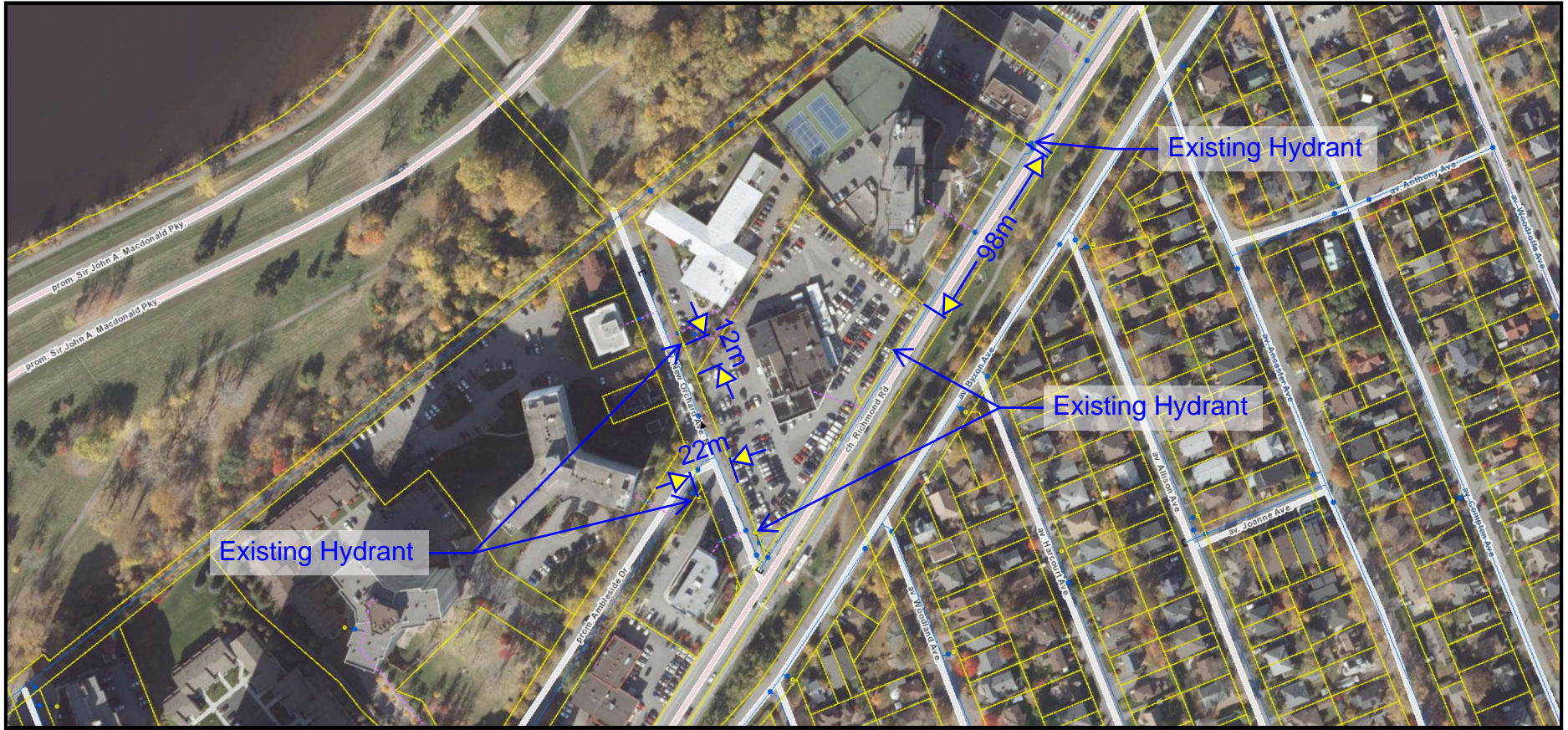
E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	13,005.0 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

1047 Richmond Road Hydrant Coverage Figure



APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road - Sanitary Demands

Project:	1047 Richmond Road		
Project No.:	CCO-22-2242		
Designed By:	AJG		
Checked By:	RDF		
Date:	December 17, 2021		
Site Area	1.02	Gross ha	
Bachelor	100		1.40 Persons per unit
1 Bedroom	527		1.40 Persons per unit
2 Bedroom	670		2.10 Persons per unit
3 Bedroom	25		3.10 Persons per unit
Total Population	2363	Persons	
Commercial Area	1213.00	m ²	
Amenity Space	0.00	m ²	

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.5	
Residential Peaking Factor	3.02	* 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

EXTRANEIOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.05
Wet	0.29
Total	0.34

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	2363	7.66
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m ² /d)	1213.00	0.04
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

McINTOSH PERRY

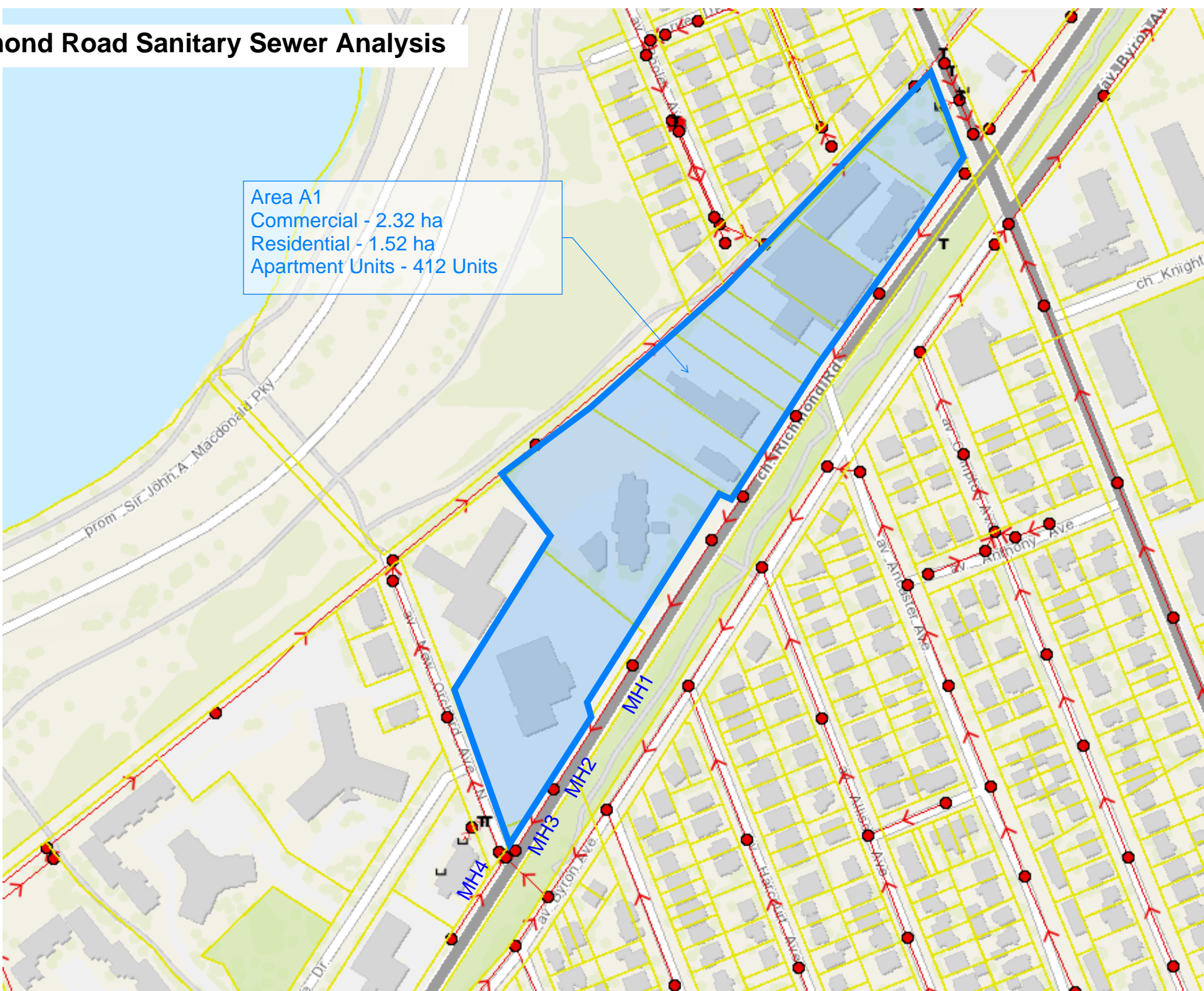
AVERAGE RESIDENTIAL FLOW	7.66	L/s
PEAK RESIDENTIAL FLOW	23.15	L/s
AVERAGE ICI FLOW	0.04	L/s
PEAK INSTITUTIONAL/COMMERCIAL FLOW	0.06	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.06	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	7.75	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	23.26	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	23.54	L/s

Richmond Road Sanitary Sewer Analysis

Area A1
Commercial - 2.32 ha
Residential - 1.52 ha
Apartment Units - 412 Units



SANITARY SEWER DESIGN SHEET

PROJECT: 1047 RICHMOND ROAD
 LOCATION:
 CLIENT: FENGATE

McINTOSH PERRY

LOCATION				RESIDENTIAL									ICI AREAS						INFILTRATION ALLOWANCE			FLOW		SEWER DATA															
1	2	3	4	UNIT TYPES				9	10		11	12	13	14	15	16		17	18	19	20	21		22	23	24	25	26	27	28	29	30		31					
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	AREA (ha)	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY										
									IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								IND	CUM	IND	CUM	L/s	%	L/s	%			
Richmond Road	A-1	MH1	MH2				412	1.52	947.6	947.6	3.25	9.99		0.00	2.32	2.32			0.00	1.13	3.84	3.84	1.27	12.38	26.91	91.44	225	0.33	0.656	14.53	53.99								
Richmond Road		MH2	MH3						0.0	947.6	3.25	9.99		0.00		2.32			0.00	1.13	0.00	3.84	1.27	12.38	30.72	44.20	225	0.43	0.748	18.34	59.69								
Richmond Road		MH3	MH4						0.0	947.6	3.25	9.99		0.00		2.32			0.00	1.13	0.00	3.84	1.27	12.38	44.19	9.66	225	0.89	1.077	31.81	71.98								
Design Parameters:				Notes:									Designed: AJG						No.		Revision					Date													
Residential				ICI Areas									Checked: AJG						1.		Due Diligence Brief					2021-10-08													
SF	3.4	p/p/u									Peak Factor																												
TH/SD	2.7	p/p/u	INST	28,000	L/Ha/day	1.5																																	
APT	2.3	p/p/u	COM	28,000	L/Ha/day	1.5																																	
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart																																	
												Project No.: CCO-22-2242																							Sheet No: 1 of 1				

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road

1 of 3

Tc (min)	Intensity (mm/hr)				C-Values	
	2-Year	5-Year	100-Year			
10	76.8	104.2	178.6	PRE-DEVELOPMENT	Impervious	0.90
10	76.8	104.2	178.6	POST-DEVELOPMENT	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	9,743	0	0	0.90	1.00

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	Q (L/s)		
					2-Year	5-Year	100-Year
A1	0.974	0.90	1.00	10	187.23	253.99	483.64
Total	0.974				187.23	253.99	483.64

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	7,627	0	1,142	0.81	1.00	<i>Restricted (Assumed to be 90% of the total area)</i>
B2	847	0	127	0.09	0.11	<i>Unrestricted (Assumed to be 10% of the total area)</i>

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)		
					5-Year	100-Year	
B1	0.877	0.81	1.00	10	206.33	435.25	<i>Restricted</i>
B2	0.097	0.09	0.11	10	2.55	5.46	<i>Unrestricted</i>
Total	0.974				208.88	440.71	

Required Restricted Flow

Drainage Area	Area (ha)	C 2/5-Year	Tc (min)	Q (L/s)
				2-Year
A1	0.974	0.50	10	103.94

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	206.33	435.25	46.69	98.48	111.2	233.3
B2	2.55	5.46	2.55	5.46		
Total	208.88	440.71	49.23	103.94		

McINTOSH PERRY

CCO-22-2242 - 1047 Richmond Road

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	206.35	46.69	159.66	95.80
12	94.7	187.53	46.69	140.85	101.41
14	86.9	172.09	46.69	125.40	105.34
16	80.5	159.41	46.69	112.73	108.22
18	75.0	148.52	46.69	101.84	109.98
20	70.3	139.21	46.69	92.53	111.03
22	66.1	130.90	46.69	84.21	111.16
24	62.5	123.77	46.69	77.08	111.00
26	59.3	117.43	46.69	70.74	110.36

Maximum Storage Required 5-year = 111 m³

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	435.35	98.48	336.87	202.12
12	162.1	395.13	98.48	296.65	213.59
14	148.7	362.47	98.48	263.98	221.75
16	137.5	335.17	98.48	236.68	227.22
18	128.1	312.25	98.48	213.77	230.87
20	120.0	292.51	98.48	194.03	232.83
22	112.9	275.20	98.48	176.72	233.27
24	106.7	260.09	98.48	161.61	232.71
26	101.2	246.68	98.48	148.20	231.19
28	96.3	234.74	98.48	136.25	228.91

Maximum Storage Required 100-year = 233 m³

**APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST**

City of Ottawa

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)
<input type="checkbox"/> Executive Summary (for larger reports only).	N/A
<input type="checkbox"/> Date and revision number of the report.	On Cover
<input type="checkbox"/> Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix A
<input type="checkbox"/> Plan showing the site and location of all existing services.	N/A
<input type="checkbox"/> 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 Stormwater Management
<input type="checkbox"/> Summary of pre-consultation meetings with City and other approval agencies.	Appendix B
<input type="checkbox"/> 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 defensible design criteria.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
<input type="checkbox"/> Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary

<input type="checkbox"/> Identification of existing and proposed infrastructure available in the immediate area.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Proposed phasing of the development, if applicable.	N/A
<input type="checkbox"/> Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Background Studies, Standards and References
<input type="checkbox"/> All preliminary and formal site plan submissions should have the following information: <ul style="list-style-type: none"> ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names 	N/A

4.2 Development Servicing Report: Water

Criteria	Location (if applicable)
<input type="checkbox"/> Confirm consistency with Master Servicing Study, if available	N/A
<input type="checkbox"/> Availability of public infrastructure to service proposed development	N/A
<input type="checkbox"/> Identification of system constraints	N/A
<input type="checkbox"/> Identify boundary conditions	Appendix C
<input type="checkbox"/> Confirmation of adequate domestic supply and pressure	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
<input type="checkbox"/> Address reliability requirements such as appropriate location of shut-off valves	N/A
<input type="checkbox"/> Check on the necessity of a pressure zone boundary modification.	N/A
<input type="checkbox"/> 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

<input type="checkbox"/> 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
<input type="checkbox"/> Description of off-site required feeder mains, 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
<input type="checkbox"/> Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix C
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 5.2 Proposed Sanitary Sewer

<input type="checkbox"/> 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 5.3 Proposed Sanitary Design
<input type="checkbox"/> 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
<input type="checkbox"/> Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 5.2 Proposed Sanitary Sewer
<input type="checkbox"/> 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
<input type="checkbox"/> Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
<input type="checkbox"/> Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
<input type="checkbox"/> 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 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> Analysis of available capacity in existing public infrastructure.	N/A
<input type="checkbox"/> A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Pre & Post-Development Plans
<input type="checkbox"/> 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 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> 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 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> Set-back from private sewage disposal systems.	N/A
<input type="checkbox"/> Watercourse and hazard lands setbacks.	N/A
<input type="checkbox"/> Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	N/A
<input type="checkbox"/> Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
<input type="checkbox"/> 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

<input type="checkbox"/> 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
<input type="checkbox"/> 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.	Section 7.0 Proposed Stormwater Management Appendix G
<input type="checkbox"/> Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> 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
<input type="checkbox"/> Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/> Identification of municipal drains and related approval requirements.	N/A
<input type="checkbox"/> Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Sewer Design & Section 7.0 Proposed Stormwater Management
<input type="checkbox"/> 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
<input type="checkbox"/> Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

<input type="checkbox"/> Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	N/A
<input type="checkbox"/> 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
<input type="checkbox"/> 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)
<input type="checkbox"/> 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
<input type="checkbox"/> Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
<input type="checkbox"/> Changes to Municipal Drains.	N/A
<input type="checkbox"/> 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)
<input type="checkbox"/> Clearly stated conclusions and recommendations	Section 8.0 Summary Section 9.0 Recommendations
<input type="checkbox"/> 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
<input type="checkbox"/> All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped