SERVICING & STORMWATER MANAGEMENT REPORT
1815 MONTREAL ROAD

Project No.: CCO-23-3469

City File No.: D07-XX-XX-XXXX

Prepared for:

CSV Architects
190 O'Connor Street
Ottawa, Ontario
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Prepared by:

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Carp, ON K0A 1L0

Rev01: May 30, 2023

McINTOSH PERRY

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by CSV Architects to prepare this Servicing and Stormwater Management Report in support of the Site Plan Control process for the proposed development located at 1815 Montreal Road within the City of Ottawa.

The main purpose of this report is to present a servicing and stormwater management design for the development in accordance with 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 the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

This report should be read in conjunction with the following drawings:

- CCO-23-3469, C101 – Lot Grading, Drainage, Erosion & Sediment Control Plan
- CCO-23-3469, C102 – Site Servicing Plan
- CCO-23-3469, PRE – Pre-Development Drainage Area Plan (Appendix E)
- CCO-23-3469, POST – Post-Development Drainage Area Plan (Appendix F)

1.2 Site Description

Figure 1: Site Map

The subject property, herein referred to as the site, is located at 1815 Montreal Road within the Beacon Hill-Cyrville ward. The site covers approximately 0.44 ha and is located along Montreal Road between Beckenham Lane and Elsmere Road. The site is zoned for Residential First Density (R1AA). See Site Location Plan in Appendix 'A' for more details.

1.3 Proposed Development and Statistics

The proposed development consists of the addition of a 9-storey 1902 m² ground floor area apartment building, complete with underground parking with street access from Montreal Road. Development is proposed within 0.44 ha of the site. Refer to Site Plan prepared by CSV Architects for further details.

1.4 Existing Conditions and Infrastructures

The site is currently developed containing a 1-storey home and detached garage. The existing building is assumed to be serviced via a water service connection to the existing municipal watermain with Montreal Road, and a septic tank for sanitary servicing.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal rights-of-way(s):

- Montreal Road
  - 305 mm diameter DI watermain, and a
  - 250 mm diameter PVC storm sewer, tributary to Green's Creek approximately 2.0km downstream.
- Servicing Easement
  - 200 mm diameter private PVC Sanitary Sewer, connected to the existing 250 mm diameter Sanitary Sewer within Rothwell Drive
- Rothwell Drive
  - 250 mm diameter PVC Sanitary Sewer

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control approval process. Site plan control requires the City to review, provide 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 since the proposed storm sewer system services one parcel of land and does not propose industrial use.

2.0 BACKROUND 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 proposed site were reviewed in order to identify infrastructure available to service the proposed development.

A topographic survey (22-10-111-00) of the site was completed by J.D. Barnes and dated November 10th, 2022, 2022.

The Site Plan (A100) was prepared by CSV Architects (Site Plan).

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 held with City staff on April 24th, 2023 regarding the proposed site servicing. Specific design parameters to be incorporated within this design include the following:

- Pre-development and post-development flows shall be calculated using a time of concentration (Tc) no less than 10 minutes.
- Control 5- and 100-year post-development flows to the 5- and 100-year pre-development flows, respectively

4.0 WATERMAIN

4.1 Existing Watermain

The site is located within the MONT pressure zone, as per the Water Distribution System mapping included in Appendix C. There are two existing fire hydrants on Montreal Road available to service the proposed development.

4.2 Proposed Watermain

It is proposed to service the new building with a 150 mm diameter water service connection to the 305 mm diameter watermain within Montreal Road. A dual connection is proposed to provide redundancy, with the connections located on both sides of an existing valve chamber. The existing service connection to the existing building will be blanked at the main and removed.

Table 1, below, summarizes the water supply design criteria obtained from the Ottawa Water Guidelines and utilized for the water analysis.

Table 1: Water Supply Design Criteria

Site Area	0.44 ha
Residential	280 L/day/person
Townhouse	2.7 persons/unit
Residential Apartment – 1 Bedroom	1.4 persons/unit
Residential Apartment – 2 Bedroom	2.1 persons/unit
Residential Apartment – 3 Bedroom	3.1 persons/unit
Max Day Peaking Factor - Residential	4.2 x avg. day
Peak Hour Peaking Factor - Residential	6.3 x avg. day

The OBC and Fire Underwriters Survey 2020 (FUS) methods were utilized to estimate the required fire flow for the proposed building. Fire flow requirements were calculated per City of Ottawa Technical Bulletin ISTB-2018-02. The following parameters were utilized for the calculations:

FUS:

- Type of construction – Fire-Resistive Construction
- Occupancy Type – Limited Combustible
- Sprinkler Protection – Fully Supervised Sprinkler System

OBC:

- Type of construction – Non-Combustible Construction
- Occupancy Type: Group C
- Water Supply Coefficient (K): 10

The results of the FUS calculations yielded a required fire flow of 6,000 L/min (100.0 L/s), and the results of the OBC calculation yielded a required fire flow of 9,000 L/min (150.0 L/s). The detailed calculations for the FUS and OBC can be found in Appendix C.

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, existing hydrants within 150 m of the proposed building were analysed per City of Ottawa ISTB 2018-02 Appendix I Table 1. The results are summarized below.

Table 2: Fire Protection Confirmation

Building	Fire Flow Demand (L/min.)	Fire Hydrant(s) within 75m (5,700 L/min)	Fire Hydrant(s) within 150m (3,800 L/min)
1815 Montreal Road	9,000 (OBC) 6,000 (FUS)	1 Public	1 Private

Based on City guidelines (ISTB-2018-02), the existing hydrants provide adequate protection for the proposed development. A hydrant coverage figure can be found in Appendix C.

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

The existing dwelling is assumed to be serviced by an on-site septic system. There is no existing sanitary sewer within Montreal Road.

5.2 Proposed Sanitary Sewer

A new 150 mm diameter gravity sanitary service will be extended from the existing private 200 mm diameter sanitary main within the adjacent servicing easement along the west property line. The existing private sanitary main conveys flow to the existing 250 mm diameter municipal sanitary main within Rothwell Drive.

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

Table 3: Sanitary Design Criteria

Design Parameter	Value
Site Area	0.44 ha
Residential	280 L/person/day
Townhouse	2.7 persons/unit
1 Bedroom Apartment	1.4 persons/unit
2 Bedroom Apartment	2.1 persons/unit
3 Bedroom Apartment	3.1 persons/unit
Residential Peaking Factor	3.50
Extraneous Flow Allowance	0.33 L/s/ha
Estimated Population	229 persons

Table 4 below, summarizes the estimated wastewater flow from the proposed building. 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	0.78
Total Estimated Peak Dry Weather Flow	2.64
Total Estimated Peak Wet Weather Flow	2.76

As noted above, the development is proposed to be serviced via a proposed 150 mm sanitary service connection to the existing private 200 mm PVC sanitary sewer within the servicing easement west of the site.

The full flowing capacity of the existing private 200 mm diameter main at 4.0% slope is estimated to be 68.43 L/s. Based on the Novatech "Development Servicing and Stormwater Management Report" for the adjacent development at 1795 Montreal Road, the existing private sanitary main has a peak wet weather flow of 0.40 L/s, which corresponds to an available capacity of approximately 68.03 L/s. Excerpts from the Novatech report can be found in Appendix D. Per Table 4, a peak wet weather flow of 2.76 L/s will only occupy 4.0% of the private sanitary main's capacity, therefore the existing private sanitary main can accommodate flows from the proposed development.

The full flowing capacity of the existing municipal 250 mm diameter sewer main at 1.0% slope is estimated to be 62.04 L/s. Per Table 4, a peak wet weather flow of 2.76 L/s will only occupy 4.4% of the pipe capacity, therefore capacity concerns are not anticipated. Due to the complexity of the downstream network, the City will need to advise of any downstream constraints.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

Stormwater runoff from the existing site flows overland towards the Rothwell drive right of way. A small portion of the site directs runoff to the existing swale fronting Montreal Road, however this swale terminates just east of the subject site, where runoff is ultimately directed through the neighbouring residential properties to Rothwell Circle and Rothwell Drive.

6.2 Proposed Storm Sewers

The proposed development will be serviced through new 150- and 200-mm diameter storm services. The proposed storm services will discharge runoff to a proposed enhanced swale at the rear of the site. The proposed enhanced swale will direct runoff to the existing municipal ditch along Rothwell Drive, which is collected by an existing municipal catch basin. Runoff collected by the municipal catch basin will travel approximately 2.7km before discharging to Green's Creek.

Runoff collected on the roof of the proposed building will be stored and controlled internally using 20 roof drains. The roof drains will be used to limit the flow from the roof to the specified allowable release rate. Roof drainage will be directed to a proposed 200 mm diameter storm service connected to the proposed maintenance hole MH3. For calculation purposes a Watts Accutrol roof drain in various positions was used to estimate a reasonable roof flow. Other products may be specified at detailed building design provided release rates and storage volumes are respected.

Runoff from the west walkway and landscaped areas (B3) will be collected by a trench drain and catch basin maintenance hole and conveyed to the proposed enhanced swale at the rear of the site without restriction.

Runoff from the drive aisle and east landscaped areas (B4) will be collected by a trench drain and catch basin. Runoff will be conveyed to a proposed depressed surface storage area at the rear of the site. An orifice within the outlet of CBMH7 will restrict flow to the allowable release rate before discharging runoff from area B4 to the proposed swale.

Runoff from the front of the property (B5) will be collected by a proposed catch basin and conveyed to the existing 250 mm diameter storm sewer within Montreal Road.

Foundation drainage is proposed to be conveyed via a 200 mm storm service connected to the proposed maintenance hole MH3. Foundation drainage will be pumped via a sump pump with a back flow preventer and appropriate backup power. Refer to drawing C102 for a detailed servicing layout.

See CCO-23-3469 - POST include in Appendix F of this report for more details. The Stormwater Management design for the subject property will be outlined in Section 7.0 of this report.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

As per Section 6.2, stormwater management for the proposed development will be provided by roof storage and surface storage. The controlled stormwater flow will be directed to the existing municipal ditch within Rothwell Drive.

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 is required up to an enhanced level of treatment (80% TSS Removal)

Quantity Control

- Control post-development 5- and 100-year flows to the pre-development 5- and 100-year flows, respectively.

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 SWM facility sized using this method is expected 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 City of Ottawa - Sewer Design 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 Pre-Development Drainage

It has been assumed that the development area contains 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 5. See CCO-23-3469 - PRE in Appendix E and Appendix G for calculations.

Table 5: Pre-Development Runoff Summary

Drainage Area	Area (ha)	C 5 & 100-Year	5-Year	100-Year
A1	0.44	0.31 / 0.38	39.66	81.52
Total	0.44	0.31/0.38	39.66	81.52

7.4 Post-Development Drainage

To meet the stormwater objectives, the development will contain flow attenuation via surface and rooftop storage. Table 6, below, summarizes the required restricted flow.

Table 6: Required Restricted Flow

Drainage Area	Area (ha)	C 5 & 100-Year	Q (L/s) 5-Year	Q (L/s) 100-Year
A1	0.44	0.31/0.38	39.66	81.52

Based on the criteria listed in Section 7.1, the development will be required to match pre-development flow rates. It is estimated that the target release rate during the 100-year event will be 81.52 L/s. See Appendix G for calculations.

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-23-3469 - POST in Appendix F of this report for more details. A summary of the post-development runoff calculations can be found below.

Table 7: Post-Development Runoff Summary

Drainage Area	Area (ha)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)	100-year Storage Required (m^3)	100-year Storage Available (m^3)
B1A	0.006	0.32	0.32	2.35	2.36
B1B	0.062	2.65	3.53	22.71	22.91
B1C	0.038	2.60	4.59	9.74	10.08
B1D	0.005	0.63	0.63	1.37	1.37
B1E	0.033	1.94	2.51	10.76	10.83
B1F	0.003	0.32	0.32	0.89	0.90
B1G	0.011	0.65	0.84	3.57	3.59
B1H	0.004	0.32	0.32	1.15	1.22
B1I	0.005	0.32	0.32	1.65	1.70
B1J	0.002	0.44	0.76	0.19	0.20
B1K	0.002	0.38	0.65	0.18	0.20
B1L	0.05	0.73	1.20	0.78	0.81
Roof Total	0.177	11.28	15.96	55.35	56.17

B2	0.094	6.87	14.29	-	-
B3	0.018	3.35	6.47		
B4	0.105	13.26	14.40	14.26	14.37
B5	0.041	4.31	8.65		
Site Total	0.44	39.07	59.78	69.61	70.54

Runoff from areas B1A-B1L will be controlled and stored on the roof of the proposed building (B1) using 20 roof drains. The roof drains will be used to limit the flow from the roof to the specified allowable release rate.

For calculation purposes a Watts Accutrol roof drain in various positions was used to estimate a reasonable roof flow. Other products may be specified at detailed building design provided release rates and storage volumes are respected.

Runoff for area B2 will flow overland towards the Rothwell Drive right of way.

Runoff for area B3 will be collected by a proposed trench drain and catch basin maintenance hole before discharging to the proposed enhanced swale at the rear of the site. The enhanced swale will direct runoff to the municipal ditch within Rothwell Drive. Flow restriction is not proposed for area B3.

Runoff for area B4 will be collected by a proposed trench drain and catch basin. Captured runoff will be directed to a proposed depressed surface storage area at the rear of the site before discharging to the proposed enhanced swale. A 90mm orifice within the outlet of CBMH7 will be used to restrict runoff from the depressed storage area to a maximum release rate of 14.40 L/s, allowing for a proposed 14.37 m^3 of storage. The depressed surface storage area will have ponding depths of 20 cm and 31 cm during the 5- and 100-year events, respectively, resulting in a design head of 0.66m and 0.79m, respectively.

Runoff for area B5 will be collected by a proposed catch basin and directed to the existing 250 mm diameter storm sewer within Montreal Road.

As seen in Table 8 below, roof runoff will be restricted to a maximum release rate of 15.96 L/s, allowing for a proposed 56.17 m^3 of roof storage. Emergency roof scuppers have been proposed to ensure roof ponding does not exceed 150mm.

Table 8: Roof Drainage Summary

Drainage Area	Area (ha)	# of Roof Drains	Storage Depth (mm)		Total Flow Rate (L/s)	
			5-Year	100-Year	5-Year	100-Year
B1A	0.006	1	55	135	0.32	0.32
B1B	0.062	4	60	130	2.65	3.53
B1C	0.038	3	75	145	2.60	4.59
B1D	0.005	2	45	135	0.63	0.63
B1E	0.033	3	55	115	1.94	2.51
B1F	0.003	1	35	100	0.32	0.32
B1G	0.011	1	55	115	0.65	0.84
B1H	0.004	1	40	115	0.32	0.32
B1I	0.005	1	50	125	0.32	0.32
B1J	0.002	1	35	90	0.44	0.76
B1K	0.002	1	30	55	0.38	0.65
B1L	0.05	1	65	140	0.73	1.20
Total	0.177	20	-	-	11.28	15.96

7.5 Quality Control

As noted in Section 7.1, quality controls are required up to an enhanced level of treatment.

The development of this lot will employ Best Management Practices (BMP's) wherever possible. The intent of implementing stormwater BMP's is to ensure that water quality and quantity concerns are addressed at all stages of development. Lot level BMP's typically include temporary retention of the parking lot runoff, minimizing ground slopes and maximizing landscaped areas. Some of these BMP's cannot be provided for this site due to site constraints and development requirements.

The enhanced grassed swales have a variant cross-slope and a drainage conveyance slope of 1.5% to slow down the stormwater which creates an opportunity for infiltration and removal of total suspended solids. It is suggested that the grassed swale be evaluated yearly to determine if the amount of suspended solid accumulation requires removal. The minimum travel path of water through the swale is approximately 46 m providing sufficient total suspended solid removal to satisfy the requirement of 80%.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

Before construction begins, temporary silt fence, straw bale or rock flow check dams will be installed at all-natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catch basins and filter fabric is to be placed under the grates of all existing catch basins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures are to be removed only after all areas have been paved. Care shall be taken at the removal stage to ensure that any silt that has accumulated is properly handled and disposed of. Removal of silt fences without prior removal of the sediments shall not be permitted.

Although not anticipated, work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the City and/or Conservation Authority to review the site conditions and determine the appropriate course of action. As the ground begins to thaw, the Contractor shall place silt fencing at all required locations as soon as ground conditions warrant. Please see the Site Grading, Drainage and Sediment & Erosion Control Plan for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

9.0 SUMMARY

- A new 9-storey 1902 m^2 ground floor area apartment building is proposed to be constructed at 1815 Montreal Road. The development is proposed within 0.44 ha of the site.
- It is proposed to service the new building through a new 150 mm diameter water service and 150 mm diameter sanitary service. New 150 mm and 200 mm diameter storm services are proposed to collect and control drainage within the development area.
- It is proposed to blank the existing water service at the main and remove it.
- It is proposed to service the development area via roof storage and surface storage. The storm system will discharge to the existing municipal ditch within Rothwell Drive.
- Quality controls will be provided via an enhanced grass swale.

10.0 RECOMMENDATION

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management report in support of the proposed development at 1815 Montreal Road.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.

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11.0 STATEMENT OF LIMITATIONS

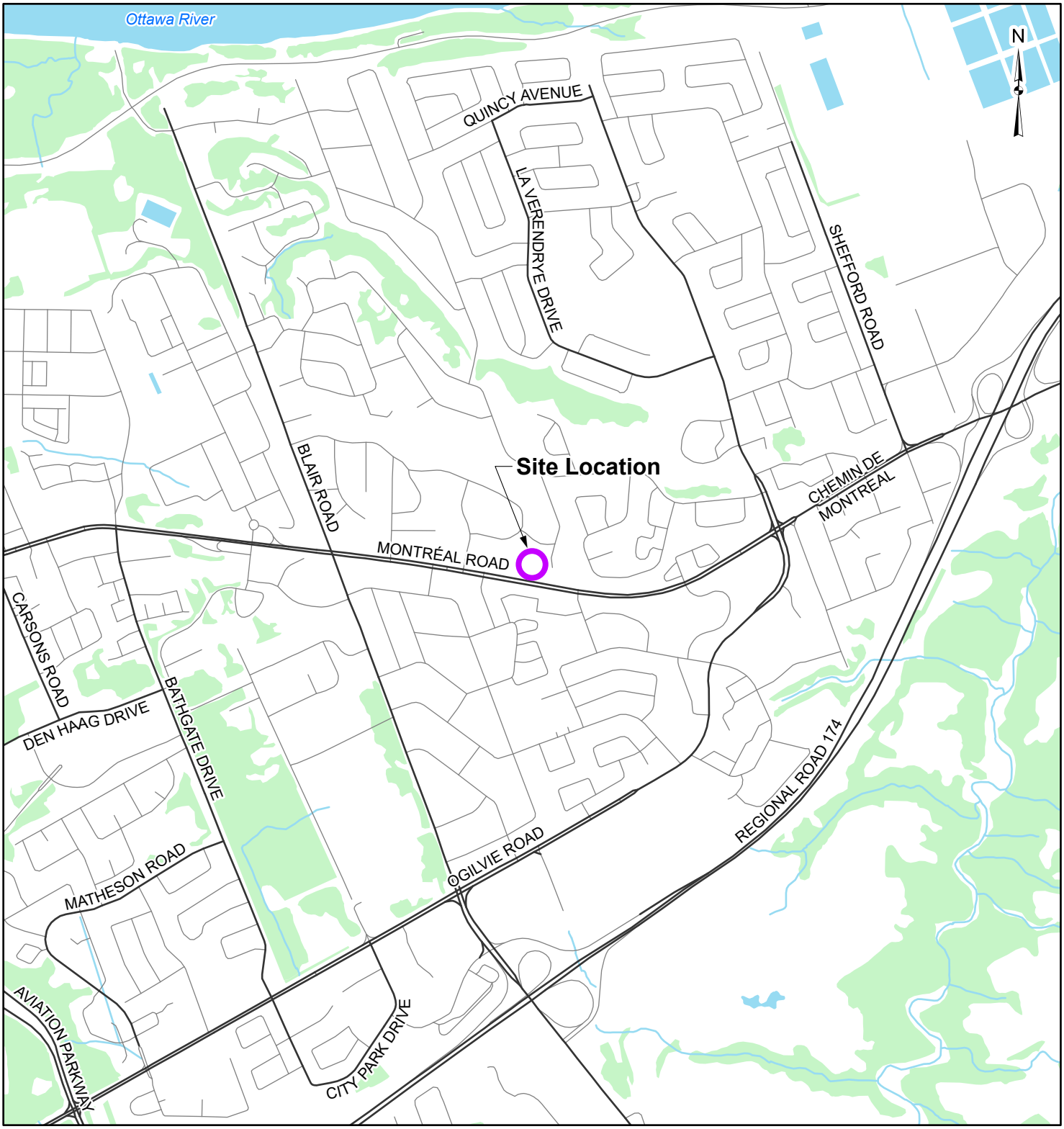
This report was produced for the exclusive use of CSV Architects. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the 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

McINTOSH PERRY



600 300 0 600

Scale 1:20,000

Metres

LEGEND

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

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2023.

CLIENT: CSV ARCHITECTS

PROJECT: 1815 MONTREAL ROAD

TITLE: SITE LOCATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	PCO-23-3469
Date	May., 26, 2023
GIS	AH
Checked By	FV

FIGURE: 1

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APPENDIX B
BACKGROUND DOCUMENTS

McINTOSH PERRY

1815 Montréal Road (Ward 11) – Pre-application Consultation PC2023-0082

Meeting Date: Tuesday, April 4, 2023, at 10:30 am

Pre-application consultation notes sent: Monday, April 24, 2023

Attendees	Brian Casagrande, Planner and Partner, Fotenn Cam Elsby, Project Manager Infrastructure Approvals, City of Ottawa Carina Guzman, Owner, Creative Development Ventures Catherine Humphrey, Creative Development Ventures Christopher Moise, Urban Designer, City of Ottawa Curtis Melanson, McIntosh Perry Consulting Engineers Ltd. Darryl Hood, Principal, CSV Architects Dave Wallace, Owner, Creative Development Ventures Haris Khan, Planner, Fotenn Lee-Christine Bushey, Project Architect, CSV Architects Lucy Ramirez, Planner (Development Review), City of Ottawa Patrick McMahon, Project Manager (Transportation), City of Ottawa Phil Castro, Planner (Parks and Facilities Planning) Russell Robertson, Architectural Technologist, CSV Architects
Regrets	Hayley Murray, Forester – PRED, City of Ottawa

Contents

Proposal Summary

The Applicant is proposing to re-develop the property at 1815 Montréal Road. Currently, there is a vacant building on the site.

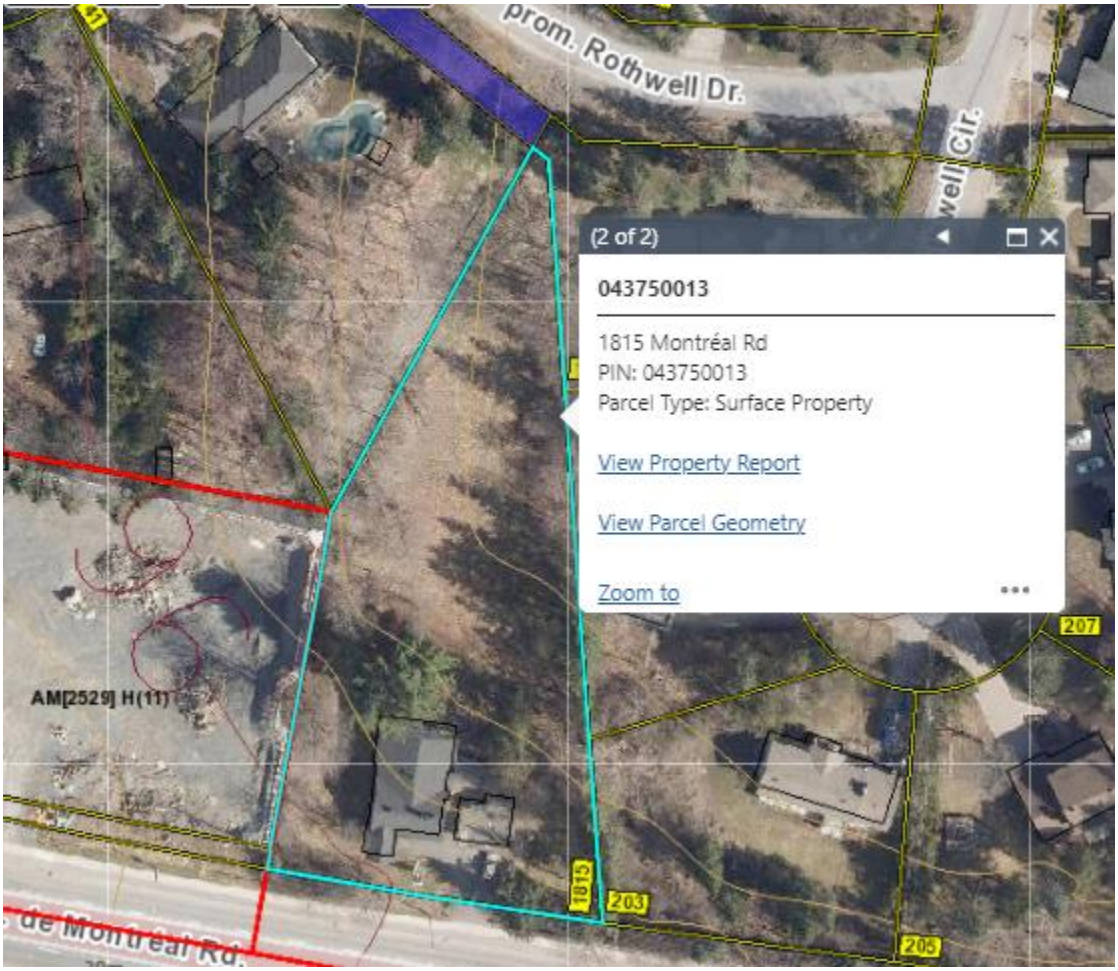


Figure 1: Capture from geoOttawa of 1815 Montréal Road with topographic layers on, the property has frontage on Montreal Road, an arterial road.

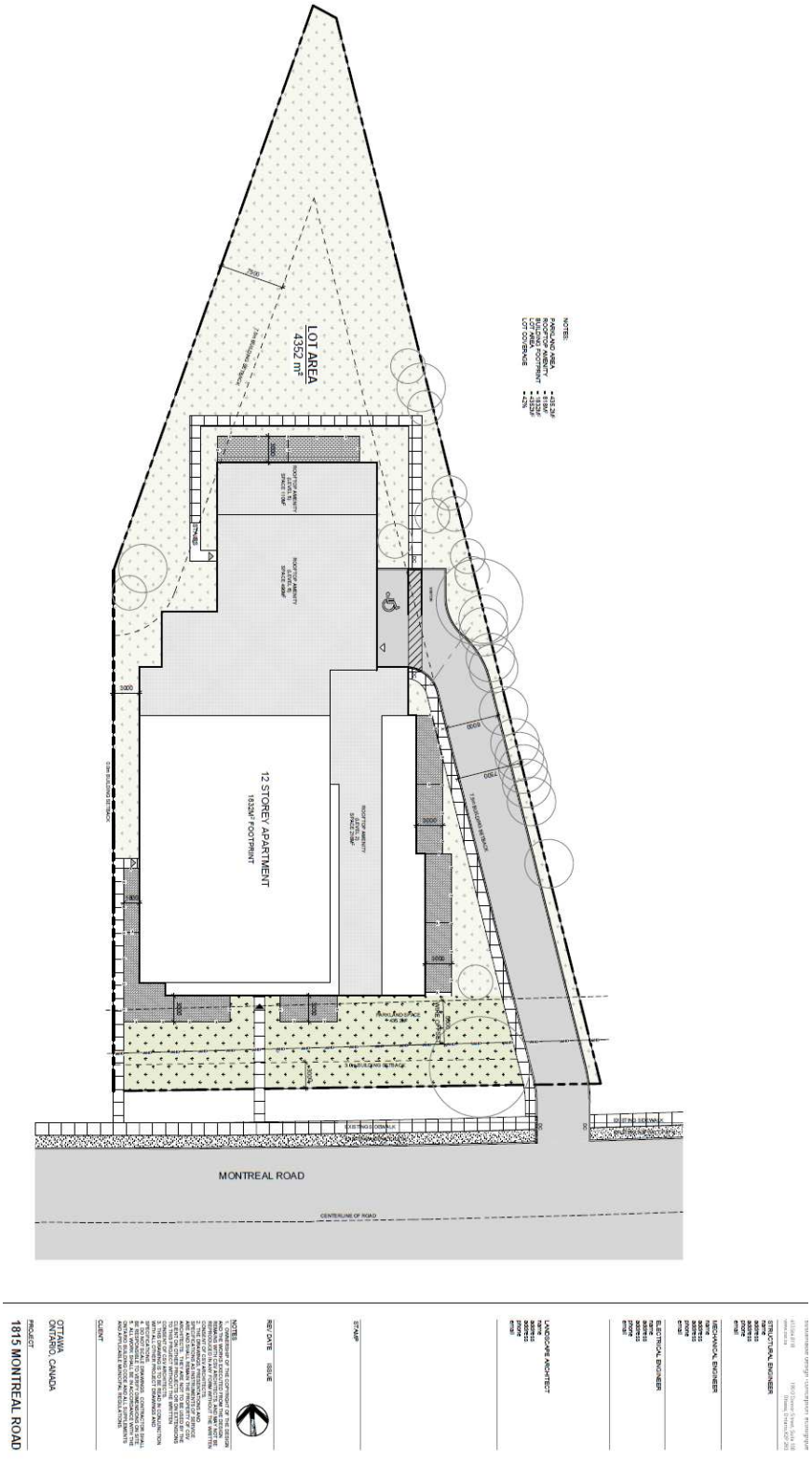


Figure 2:Concept plan, 12-storey high rise apartment, 131 units, 102 parking spaces

City Surveyor

Bill Harper, City's Surveyor | Bill.Harper@ottawa.ca

The determination of property boundaries, minimum setbacks and other regulatory constraints are a critical component of development. An Ontario Land Surveyor (O.L.S.) needs to be consulted at the outset of a project to ensure properties are properly defined and can be used as the geospatial framework for the development.

Topographic details may also be required for a project and should be either carried out by the O.L.S. that has provided the Legal Survey or done in consultation with the O.L.S. to ensure that the project is integrated to the appropriate control network.

Engineering

Cam Elsby, Project Manager, Infrastructure Approvals | Cam.Elsby@ottawa.ca

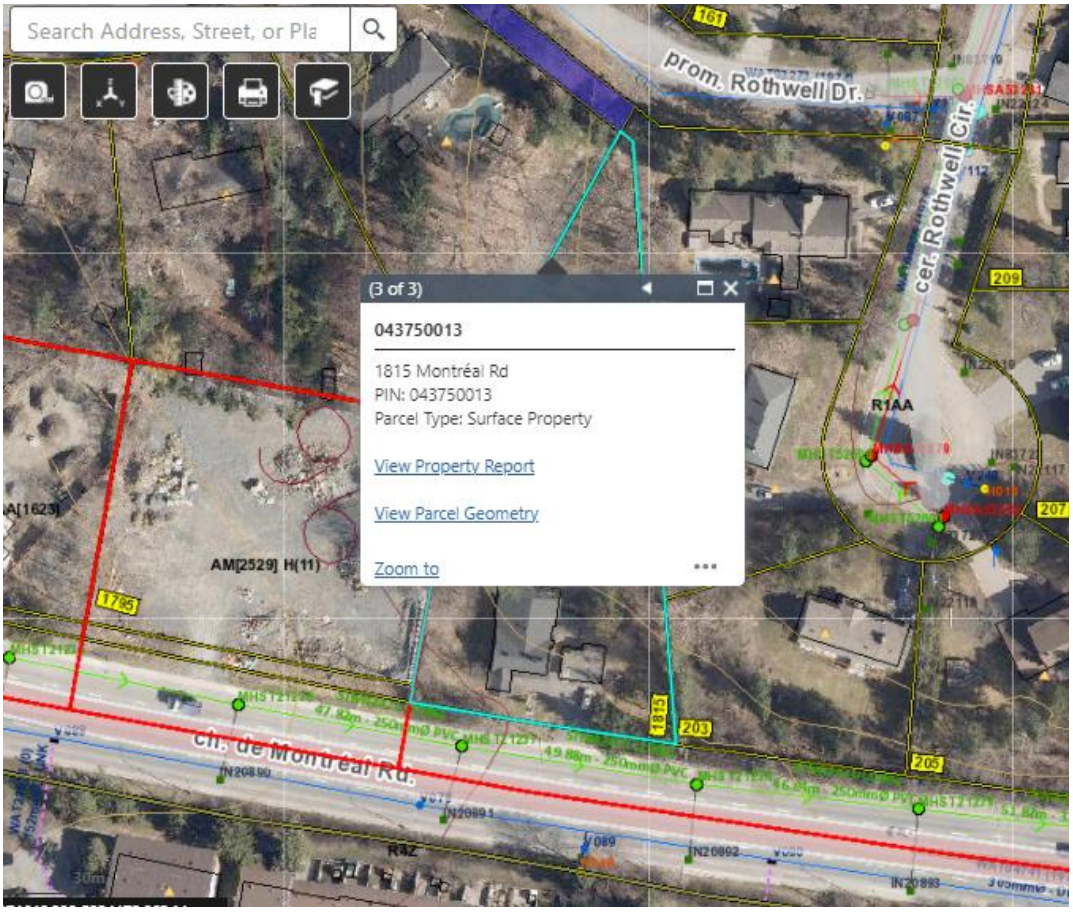


Figure 3: Capture from geoOttawa with Water and Wastewater Infrastructure layer. There is no sanitary sewer in Montréal

Water

Accessible Water Main: direct access to 305mm DI municipal watermain on Montreal Road.

Submission documents must include:

- Boundary Conditions - civil consultant to request boundary conditions from the City's assigned Project Manager, Development Review. Water boundary conditions request must include the location of the service and the expected loads required by the proposed development. Please provide all the following information:
  - Location of service (show on a plan or map)
  - Type of development
  - Average daily demand: ___ l/s.
  - Maximum daily demand: ___l/s.
  - Maximum hourly daily demand: ___ l/s.
  - Required fire flow and completed FUS Design Declaration if applicable
  - Supporting Calculations for all demands listed above and required fire flow as per Ontario Building Code or Fire Underwriter Surveys (See technical Bulletin ISTB-2021-03.
- Watermain system analysis demonstrating adequate pressure as per section 4.2.2 of the Water Distribution Guidelines.
- Demonstrate adequate hydrant coverage for fire protection. Please review Technical Bulletin ISTB-2018-02, Appendix I table 1 – maximum flow to be considered from a given hydrant
- Any proposed emergency route (to be satisfactory to Fire Services)

Sanitary Sewers

Accessible Sanitary Sewer: no direct access; recommended solution would be to arrange a servicing easement through 162 Rothwell Drive and connect directly into the municipal sanitary sewer on Rothwell Drive. Alternatively, a private easement could be arranged through 1795 Montreal Road to connect into private sanitary main which connects to Rothwell Drive. If these options cannot be arranged, a municipal infrastructure extension

would be required in order to provide direct sanitary sewer connection to the site through Montreal Road.

- Provide an analysis to demonstrate that there is adequate residual capacity in the receiving and downstream wastewater system to accommodate the proposed development.
- Please apply the wastewater design flow parameters in Technical Bulletin PIEDTB-2018-01.

Storm Water Management

Accessible Storm Sewer: direct access to 250mm PVC municipal storm sewer on Montreal Road, however this sewer is at capacity and should not be used as a connection for this site.

- Quality Control:
  - 80% TSS removal is required for all runoff prior to leaving the site.
- Quantity Control:
  - Control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm event.

MECP ECA Requirements

- An MECP ECA may be required if a municipal infrastructure extension is pursued to provide sanitary servicing for the site through Montreal Road.

Additional Notes:

- No Capital Work Project that would impact the application has been identified at this time
- No road moratorium that would impact the application has been identified
- Any easement identified should be shown on all plans
- For any proposed exterior light fixtures, please provide certification from a licensed professional engineer confirming lighting has been designed only using fixtures that meet the criteria for full cut-off classification as recognized by the Illuminating Engineering Society of North America and result in minimal light spillage onto adjacent properties (maximum allowable spillage is 0.5 fc). Additionally, include in the submission the location of the fixtures, fixture type (make, model, part number and mounting height

- Sensitive Marine Clay (SMC) is widely found across Ottawa- geotechnical reports should include Atterberg Limits, consolidation testing, sensitivity values, and vane
- Note that an easement will be required for storm drainage overland through the small portion of land on 162 Rothwell Drive in order to convey drainage to the ROW ditch on Rothwell Drive, unless proof of legal outlet through 162 Rothwell Drive is provided.

Plan and Study Requirement

Refer to following list of required supporting plans and studies required for the infrastructure component of your submission

Zoning By-law Amendment and Site Plan applications

1. Geotechnical Study/Slope Stability Study
2. Environmental Site Assessment Report(s)
3. Site Servicing Study/Assessment of Adequacy of Public Services
4. Stormwater Management Report
5. Site Servicing Plan
6. Grade Control and Drainage Plan
7. Erosion and Sediment Control Plan

For information on preparing required studies and plans refer to:

http://ottawa.ca/en/development-application-review-process-0/guide-preparing-studies-and-plans

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

- Ottawa Sewer Design Guidelines (October 2012)
- Ottawa Design Guidelines – Water Distribution (2010)
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
- City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)
- City of Ottawa Park and Pathway Development Manual (2012)

- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)

Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455

Should you have any questions or require additional information, please contact Cam Elsby at (613) 580-2424, ext. 21443 or by email at Cam.Elsby@ottawa.ca.

Forestry

Hayley Murray, Forester – PRED | hayley.murray@ottawa.ca

Project Comments:

1. A Tree Conservation Report (TCR) must be submitted with this application.
2. Tree retention where feasible should be incorporated into the design of this site.
3. Removal of a boundary or adjacently owned tree would require written approval from the neighboring landowner.
4. City owned tree removal would need to be justified and would require compensation (monetary and planting).
5. There are quite a few trees on this property in the as of right building footprint. It's expected that the landscape plan accounts for the trees removed on the site due to the development.

Tree Conservation Report (TCR) requirements

6. The TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition
   a. please identify trees by ownership – private onsite, private on adjoining site, city owned, boundary (trees on a property line)
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained
8. All retained trees must be shown, and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
9. The location of tree protection fencing must be shown on the plan

10. The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
11. For more information on the process or help with tree retention options, contact Hayley Murray hayley.murray@ottawa.ca or on City of Ottawa

Landscape Plan (LP) tree planting requirements

Minimum Setbacks

- Maintain 1.5m from sidewalk or MUP/cycle track or water service laterals.
- Maintain 2.5m from curb
- Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
- Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when **planting around overhead primary conductors.**

Tree specifications

- Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
- Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
- Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
- Plant native trees whenever possible
- No root barriers, dead-man anchor systems, or planters are permitted.
- No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

Hard surface planting

- Curb style planter is highly recommended

- No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
- Trees are to be planted at grade

Soil Volume

- Please document on the LP that adequate soil volumes can be met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

- Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy

- The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.

At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate. Indicate on the plan the projected future canopy cover at 40 years for the site.

Parks

Phil Castro, Planner (Parks and Facilities Planning) | Phil.Castro@ottawa.ca

Please note that there have been significant changes in Parkland dedication requirements. These changes are reflected in, but not limited to, the Official Plan and Parkland dedication By-law. As such we will be requiring a Parkland dedication of around 400 square metres. Additional comments from Parks & Facilities Planning on the above-noted development application below.

Official Plan Policy (2021)

Section 4.4 – Parks and Recreation Facilities:

1. Prioritize land for parks on-site over cash-in-lieu of parkland
2. Where the development site is more than 4,000 square metres, the City shall place a priority on acquisition of land for park(s) as per the Planning Act and the Parkland Dedication By-law
3. As per Section 4.4.1, parkland conveyance is to:
    a. Be free of encumbrances above and below ground
    b. Be a usable shape, topography and size that reflects its intended use
    c. Meet applicable provincial soil regulations; and
    d. Meet the minimum standards for drainage, grading and general condition.

Parkland Dedication By-law (2022)

4. The amount of parkland dedication that is required is to be calculated as per Parkland Dedication By-law No.2022-280, as amended:

a. For residential development (Site Plan) the maximum amount of land that can be conveyed or paid in lieu is now capped at 10% of the land or the value of the land for sites less than 5 hectares.

b. For townhouses the maximum dedication rate is 1ha/600 units or 16.6667m2 per unit.

c. Where land is developed for a mix of land uses that are located on discrete parts of the site, the cumulative sum for each use, as calculated using the applicable rate and based upon the portion of the site allocated to each use, including, but not limited to, required and provided parking spaces, amenity space, landscape buffers, driveways, and drive aisles;

d. Where land is developed for a mix of uses within a building, the required conveyance shall be the cumulative sum for each use, as calculated using the applicable rate prorated proportionally to the gross floor area allocated to each use

Parks & Facilities Planning (PFP) comments on the proposed Site Plan:

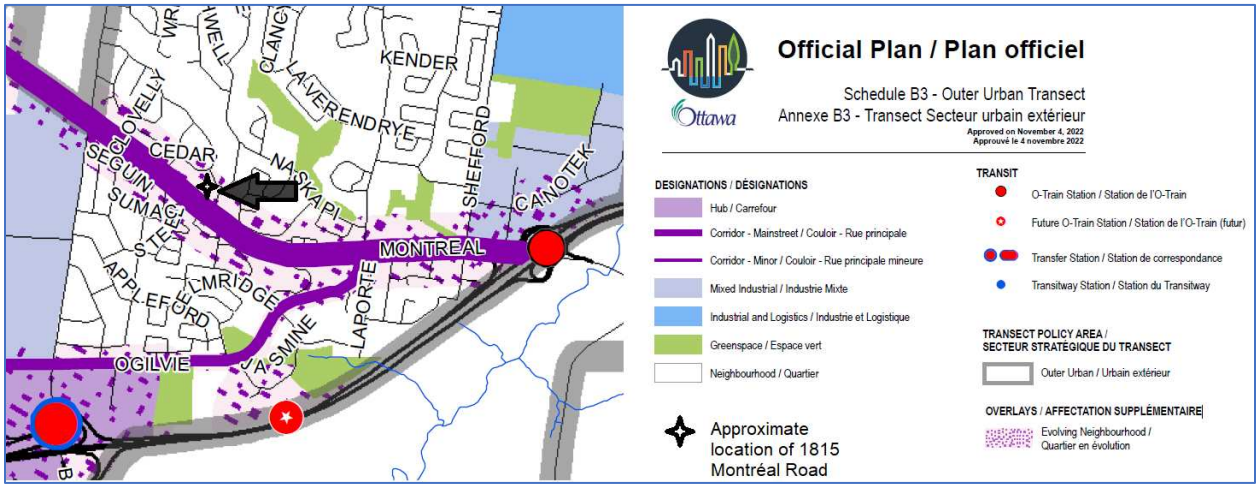
5. PFP is requesting land conveyance for parkland dedication; a preliminary analysis indicates a Parkland dedication of around 400 square metres.
6. Note that the Parkland must have frontage on the public right-of-way.
7. PFP will request a surveyor's certificate to confirm parkland dedication required, prior to Zoning By-law amendment approval.

Planning

Lucy Ramirez, Planner – Development Review | Lucy.Ramirez@ottawa.ca

Official Plan

Per the Official Plan (2022) the subject property is designated Outer Urban Corridor - Mainstreet, (Schedule A and B3).



In the Outer Urban Transect development will be generally Mid- or High-rise along Mainstreets, except where the lot is too small to provide **a suitable transition to abutting low-rise areas**, in which case only low-rise development shall be permitted (Policy 5.3.1.2.b).

Urban Design Policies

Policy 4.6.6. 7

7) *Mid-rise buildings shall be designed to respond to context, and transect area policies, and should:*
   a) *Frame the street block and provide mid-block connections to break up large blocks;*
   b) *Include a base with active frontages, and a middle portion that relates to the scale and character of the surrounding buildings, or, planned context;*
   c) *Be generally proportionate in height to the width of the right of way as illustrated in the Figure below, with additional height permitted in the Downtown Core Transect; and*

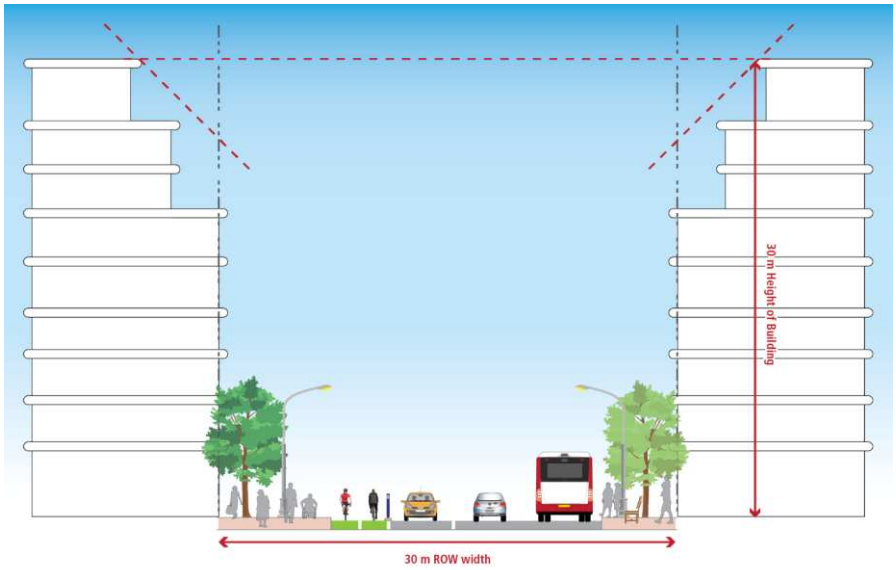


Figure 4: Figure 16 from the Official Plan (2022)

   d) *Provide sufficient setbacks and step backs to:*
      i. *Provide landscaping and adequate space for tree planting;*
      ii. *Avoid a street canyon effect; and*
      iii. *Minimize microclimate impacts on the public realm and private amenity areas.*

Corridor -Mainstreet Policies (Section 6.2)

The Corridor designation applies to bands of land along specified streets whose planned function combines a higher density of development, a greater degree of mixed uses and a higher level of street transit service than abutting Neighbourhoods, but lower density than nearby Hubs.

Development within the Corridor designation shall establish buildings that locate the maximum permitted building heights and highest densities close to the Corridor, subject to building stepbacks where appropriate.

Policy 6.2.1 3

3) *Corridors will generally permit residential uses and such non-residential uses that integrate with a dense, mixed-use urban environment. The City may require through the Zoning By-law and/or development applications to amend the Zoning By-law:*
   a) *Commercial and service uses on the ground floor of otherwise residential, office and institutional buildings with a strong emphasis on uses needed to contribute to 15-minute neighbourhoods;*
   b) *Residential and/or office uses on the upper floors of otherwise commercial buildings; and/or*
   c) *Minimum building heights in terms of number of storeys to ensure multi-storey structures where uses can be mixed vertically within the building.*

Policy 6.2.2 1

1) *In the Mainstreet Corridor designation, this Plan shall permit a mix of uses including offices. These uses are permitted throughout the building, however the Zoning By-law may require active commercial or service uses on the ground floor, which include those that support cultural development in order to maintain, extend, or create a continuous stretch of active frontages along a Mainstreet.*

Zoning By-law Amendment

The subject property is currently zoned Residential First Density Subzone AA (R1AA), there is an existing vacant home on the property. The Applicant wants to rezone the property to permit a high-rise apartment building.

Arterial Mainstreet Subzone 10 (AM10)

AM10 is the Active Street Frontage subzone, a purpose of the subzone is to help create pedestrian friendly “active frontage” streets. The new Official Plan (2022) also aims to create active frontage streets, see Policy 4.6.6. 7. The AM10 subzone is recommended as it’s a zoning tool meant to assist in the creation of pedestrian friendly Arterial Mainstreets over time. The AM 10 subzone was adopted by Ottawa City Council on February 11, 2015, see **2014 ZONING REVIEW: OFFICIAL PLAN IMPLEMENTATION FOR MAJOR HUBS AND CORRIDORS**.

Guidelines

Please take note of the following guidelines:

1. Bird-Safe Design Guidelines

   Site Plan Applications: Mid to high rise residential and medium to large scale commercial / industrial / institutional:

   - Bird-safe glass or integrated protection measures may be required through conditions of site plan approval for projects involving large expanses of glazing. However, it is important that the Bird-Safe Design Guidelines do not have a significant impact on the affordability or timelines of the respective project. Recognize that corporate standards or other design requirements may limit or preclude use of bird-safe glass or integrated protection measures in cases of small-scale commercial buildings (e.g. restaurant, retail pads).

2. Urban Design Guidelines for Development along Arterial Mainstreets
3. Urban Design Guidelines for High-rise Buildings

Committee of Adjustment

If you come to an agreement with the Owner of 162 Rothwell Drive to purchase land from them so 1815 Montréal Road has frontage on Rothwell Drive, then you'll need to submit a consent application to the Committee of Adjustment for a lot line adjustment.

If you come to an agreement with the Owner of 162 Rothwell Drive for a servicing easement (sanitary and possibly storm water), then you'll need to submit a consent application to the Committee of Adjustment for the easement. Cam Elsby has noted that an easement will be required for storm drainage overland through the small portion of land on 162 Rothwell Drive in order to convey drainage to the ROW ditch on Rothwell Drive, unless proof of legal outlet through 162 Rothwell Drive is provided.

On November 21, 2018, the Committee of Adjustment granted a servicing easement over 41 Cedar Road, 45 Cedar Road, and 1795 Montreal Road for the benefit of 1777 Montreal Road. The property known municipally as 1815 Montreal Road was not a part of the arrangement. To be able to tie into this sanitary sewer you'd need to submit consent applications to the Committee of Adjustment to obtain a servicing easement over the other propertie(s). Further, the Joint Use and Maintenance Agreement (JUMA) that is registered on title would need to be amended.

Figure 5: Sanitary sewer easement highlighted, approved by Committee of Adjustment Decisions D08-01-18/B-00369; D08-01-18/B-00370; D08-01-18/B-00368.

Trees

Section 4.8.2 of the *Official Plan* provides strong direction to maintain the urban forest canopy and its ecosystem services during intensification noting when considering the impacts on individual trees, planning and development decisions shall give priority to the retention and protection of large, healthy trees over replacement plantings and compensation. From aerial imagery there are quite a few boundary trees, as Hayley Murray remarks, removal of a boundary or adjacently owned tree would require written approval from the neighboring landowner. I want to highlight that there is a boundary tree between 1798 and 1815 Montreal Road that looks like it was purposefully protected. Please investigate this tree in the TCR and proposed development should take this tree into consideration.

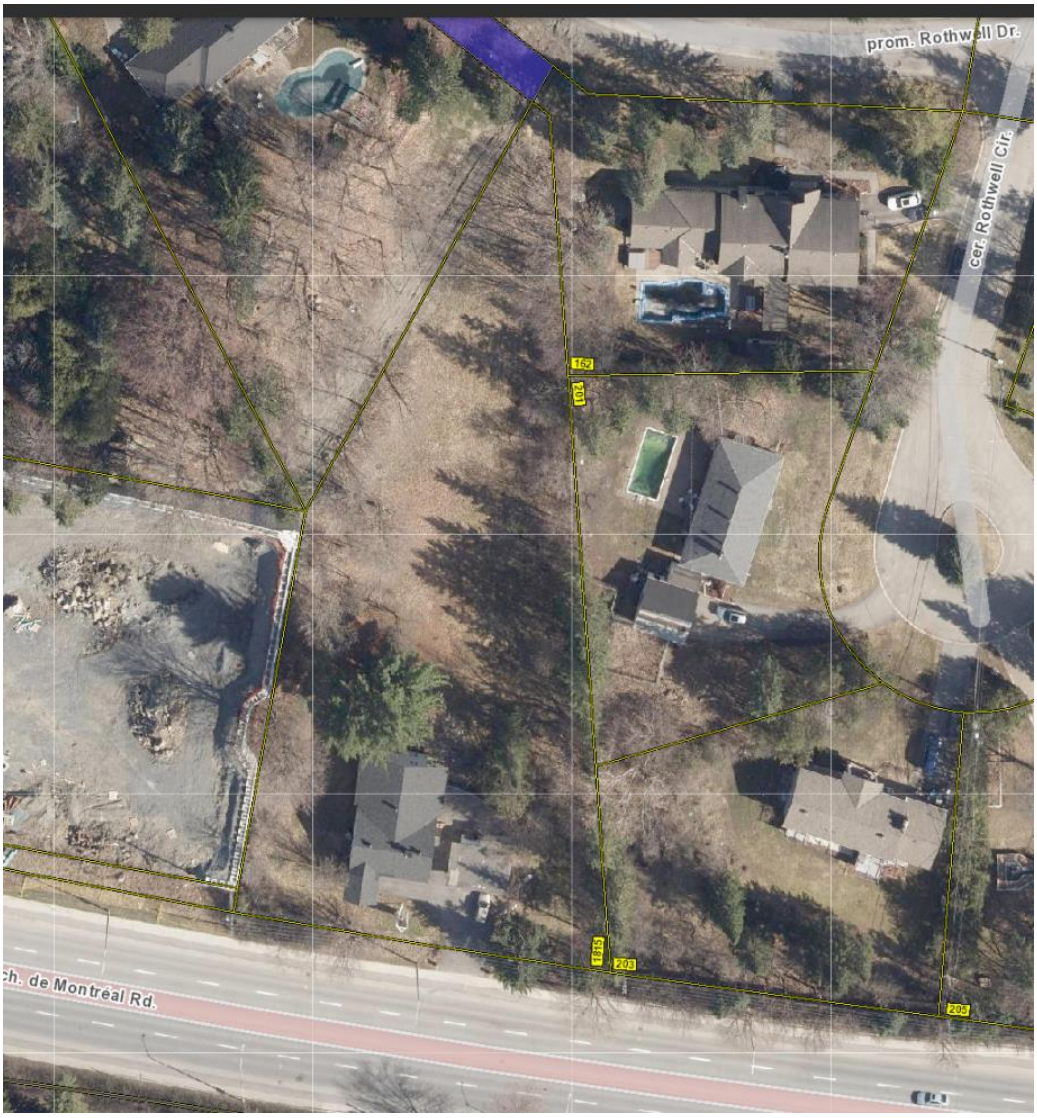


Figure 6: Aerial imagery from geoOttawa, there appears to be quite a few boundary trees.

Planning Application Fees

The following outlines the application fees (effective April 1, 2023). Please note fees increase each year.

Zoning By-law Amendment

$23,107.27 plus an initial Conservation Authority fee of $ 410*.

* The Conservation Authority will invoice for any additional fees and technical report review as required.

Site Plan Control - Complex

$48,102.27 (planning fee) + $2,8882.00+HST (legal fee) = Total $51,358.93

Plus, an initial engineering design review and inspection fee (includes HST)

- value of Hard and Soft Servicing is less than (<) $50,000, or $1,000, or
- value of Hard and Soft Servicing is $50,000 - $300,000, or $5,000, or
- value of Hard and Soft Servicing is greater than (>) $300,000$10,000

Plus, an initial Conservation Authority fee of $1,120.00*

* The Conservation Authority will invoice for any additional fees and technical report review as required.

** Each planning fee will be reduced by 10 per cent if two or more planning applications listed below are submitted at the same time and for the same lands. Applicable applications are: 30cm Reserve, Demolition Control, Lifting of Holding Zone, Official Plan Amendment, Part Lot Control, Plan of Condominium, Plan of Subdivision, Site Plan Control, Street/Lane Closure, Street/Lane Opening, and Zoning By-Law Amendment ONLY.

Additional information regarding fees related to planning applications can be found here.

Submission Requirements

Attachment 1 is the Applicant Study and Plan.

Plans are to be standard A1 size (594 mm x 841 mm) or Arch D size (609.6 mm x 914.4 mm) sheets, dimensioned in metric and utilizing an appropriate Metric scale (1:200, 1:250, 1:300, 1:400 or 1:500).

All PDF submitted documents are to be unlocked and flattened.

Community Benefits Charge

On August 31, 2022, City Council considered and carried a Community Benefits Charge Strategy, By-law and Policy.

The Community Benefits Charge (CBC) will apply only to residential and mixed-use developments and redevelopments that are five or more storeys and that add ten or more residential units. It will be a flat charge of four percent of the land value. The CBC will be used to fund prioritized projects within the City and the charge will be collected before the issuance of a building permit. In-kind contributions can be drawn down from a CBC charge, subject to the staff approval and ward Councillor engagement.

To ensure you are aware of the community benefit charge for your proposed development, we encourage you to familiarize yourself with the staff report, proposed strategy, by-law, and policy. For any questions or information, please contact the project lead at Ranbir.Singh@ottawa.ca

High Performance Development Standards

The High Performance Development Standards (HPDS) were passed by Council on April 13, 2022. The HPDS will set performance targets for new construction to achieve sustainable development and climate change goals.

The High-Performance Development Standard (HPDS) is a collection of mandatory and voluntary standards or “metrics” that raise the performance of new building projects to achieve “sustainable and resilient design” objectives. The HPDS consists of three tiers of performance. The standards, also known as ‘metrics’ in Tier one are mandatory. Tiers two and three contain higher level voluntary standards.

The HPDS apply to new **site plan** and **plan of subdivision** applications. On April 18, 2023, staff provided an update to the Environment and Climate Change Committee and a revised HPDS implementation phasing plan. See the report entitled, High Performance Development Standard Update 2023, which will rise to Council on May 10, 2023.

Transportation

Patrick McMahon, Project Manager, Infrastructure Approvals | Patrick.McMahon@ottawa.ca

1. A Transportation Impact Assessment (TIA) is not required.
2. Noise Impact Studies required for the following:

    a. Road (proximity to Montreal Road)

3. The clear throat requirement is 25m for 100-200 residential units, which is met as presented.
4. On site plan:
    a. Show all details of the roads abutting the site up to and including the opposite curb; include such items as pavement markings, accesses and/or sidewalks.
    b. Turning templates will be required for all accesses showing the largest vehicle to access the site; required for internal movements and at all access (entering and exiting and going in both directions).
    c. Show all curb radii measurements; ensure that all curb radii are reduced as much as possible
    d. Show lane/aisle widths at the accessible parking space, ensure it is 6.7m wide. The aisles within the garage also require a width of 6.7m.
    e. Sidewalk is to be continuous across access as per City Specification 7.1.
5. As the site proposed is residential, AODA legislation applies for all areas accessible to the public (i.e. outdoor pathways, parking, etc.). Dimension the pedestrian connection from the public sidewalk to the site entrance.
6. Montreal Road has a protected right-of-way of 35.5m fronting this development as per the Montreal-Blair Road Transit Priority Environmental Study Report. Show this on the plan, it appears that a small widening will need to be conveyed, to be confirmed by a surveyor.

Urban Design

Christopher Moise, Urban Designer | Christopher.Moise@ottawa.ca

1. This proposal does not run along one of the City's Design Priority Areas(DPA) and need not attend the City’s Urban Design Review Panel (UDRP). Staff will be responsible for evaluating the proposal and providing design direction.
2. This section of Montreal Road is not a DPA (however, Montreal Road is designated a DPA both half a block to the west and to the east where the R1 neighbourhood intersects with Ogilvie). We can surmise that is because this stretch of Montreal was not anticipated to intensify at the scale of this proposal.
3. The proposed site is adjacent a major corridor and surrounded by a sensitive low-rise residential context. We have the following comments to help guide how to

analysis and understand the competing factors at play, while trying to find the most suitable scale of development.

a. **Transition** from the sensitive, low-rise residential community to the east is a key metric for establishing appropriate scale and height. We recommend the development keep the proposed height below the 45-degree angular plane drawn from the shared eastern property line.

b. **High-rise guidelines**: We recommend observing the City's high-rise guidelines and provide a separation of 11.5m to the property to the west, for any portion of the building above nine storeys.

c. **Shadow Analysis:** A shadow analysis is required for re-zonings above 5 storeys. See attached Terms of Reference and let us know if you have any questions. - note the document reads 'DRAFT' in error and was approved by Council in 2016. This will be corrected in the latest Omnibus process.

d. **Park/Pops**: The area to the north is most appropriate for use as greenspace/amenity.

    i. The proposed park facing Montreal Road may be contrary to the direction of intensification along a corridor like Montreal Rd. We recommend supporting pedestrian connections, improved walk-ability and buildings that frame the street for sites seeking this scale of intensification.

4. A scoped Design Brief is a required submittal for all Site Plan/Re-zoning applications and can be combined with the Planning Rationale. Please see the Design Brief Terms of Reference provided.

    4.1. It is important to study the broader existing and future contexts.

    4.2. It is important to explore and analyze alternative site planning and massing options. Alternative options explored and the analysis should be documented in the Design Brief.

    4.3. Both wind and shadow studies are required. Please refer to the Terms of Reference for the wind analysis and shadow analysis to conduct the studies and evaluate the impacts.

    4.4. ***Note. The Design Brief submittal should have a section which addresses these pre-consultation comments.***

5. This is an exciting project in an area full of potential. We look forward to helping you achieve its goals with the highest level of design resolution. We are happy to assist and answer any questions regarding the above. Good luck.

Waste Services

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

Waste Reduction Workplan Summary

For sites containing one or more buildings with a total GFA greater than 2,000 square metres a Waste Reduction Workplan Summary is required for the construction project as required by O.Reg. 102/94, being "Waste Audits and Waste Reduction Work Plans" made under the Environmental Protection Act, RSO 1990, c E.19, as amended.

Next Steps

You are encouraged to contact the Ward Councillor, Councillor Tim Tierney at Tim.Tierney@ottawa.ca about your proposal. Please also consider contacting the Rothwell Heights Community Association at info@rhpoa.ca and the Beacon Hill Community Association at president@bhca.ca.

Bill 109

It is anticipated that, as a result of the Bill 109, *More Homes for Everyone Act, 2022*, for applications for site plan approval and zoning by-law amendments, new processes in respect of pre-application consultation will be put in place. The new processes are anticipated to require a multiple phase pre-application consultation approach before an application will be deemed complete. Applicants who have not filed a complete application by the effective date may be required to undertake further pre-application consultation(s) consistent with the provincial changes. The by-laws to be amended include By-law 2009-320, the Pre-Consultation By-law, By-law 2022-239, the planning fees by-law and By-law 2022-254, the Information and Materials for Planning Application By-law.

I've included a link regarding the changes expected because of Bill 109 on the City's engage website.

https://engage.ottawa.ca/provincial-legislation-planning/news_feed/bill-109-next-steps

There will be a report going to Council in either Q1 or Q2 of 2023, that will speak more to the upcoming changes and the implementation date.

Attachments

1. Study and Plan Requirements
2. High Performance Development Standards Applicant Handout
3. Design Brief
4. Shadow Study Terms of Reference
5. Wind Study Terms of Reference
6. City of Ottawa, Accessible Design Standard (ADS) Site Plan Checklist

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CCO-23-3469 - 1815 Montreal Road - Water Demands

Project:	1815 Montreal Road
Project No.:	CCO-23-3469
Designed By:	FV
Checked By:	AM
Date:	May 17, 2023
Site Area:	0.44 gross ha

Residential	NUMBER OF UNITS		UNIT RATE	
Townhouse	6	homes	2.7	persons/unit
1 Bedroom Apartment	72	units	1.4	persons/unit
2 Bedroom Apartment	50	units	2.1	persons/unit
3 Bedroom Apartment	2	units	3.1	persons/unit
Total Population	229	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	0.74	L/s
	Commercial/ Industrial / Institutional	0.00	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	4.2	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	3.13	L/s
	Commercial/ Industrial / Institutional	0.00	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT		UNITS
Residential	6.3	x avg. 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	4.71	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	0.74	L/s
MAXIMUM DAILY DEMAND	3.13	L/s
MAXIMUM HOUR DEMAND	4.71	L/s

McINTOSH PERRY

CCO-23-3469 - 1815 Montreal Road - OBC Fire Calculations

Project:	1815 Montreal Road
Project No.:	CCO-23-3469
Designed By:	FV
Checked By:	AM
Date:	May 17, 2023

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

Water Supply for Fire-Fighting - Apartment Building

Building is classified as Group : C - Residential

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	
V	32,754	(Total building volume in m³.)
Stot	1.9	(From figure 1 pg A-32)
Q =	622,326.00 L	

From Figure 1 (A-32)

Shorth	7.5	m	0.2
Seast	7.8	m	0.2
Ssouth	10.6	m	0.0
Swest	3.0	m	0.5

* approximate distances

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

9000 L/min if Q > 270,000 L

2378 gpm

McINTOSH PERRY

CCO-23-3469 - 1815 Montreal Road - Fire Underwriters Survey

Project:	1815 Montreal Road
Project No.:	CCO-23-3469
Designed By:	FV
Checked By:	AM
Date:	May 17, 2023

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 Fire-Resistive Construction

C 0.6 A 10,918.0 m^2

Total Floor Area (per the 2020 FUS Page 20 - Total Effective Area) 6,765.0 m^2

Calculated Fire Flow	10,856.9 L/min
	11,000.0 L/min

B. REDUCTION FOR OCCUPANCY TYPE (No Rounding)

From Page 24 of the Fire Underwriters Survey:

Limited Combustible	-15%

Fire Flow	9,350.0 L/min

C. REDUCTION FOR SPRINKLER TYPE (No Rounding)

Fully Supervised Sprinklered	-50%

Reduction	-4,675.0 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 (N)	Over 30 m	Wood frame	34.4	2	68.8	0%
Exposure 2 (E)	10.1 to 20	Wood frame	7.5	1	7.5	10%
Exposure 3 (S)	Over 30 m	Wood frame	20	2	40.0	0%
Exposure 4 (W)	10.1 to 20	Ordinary - Mass Timber (Unprotected)	22	2	44.0	0% ***
					%Increase*	10%

Increase*	935.0 L/min

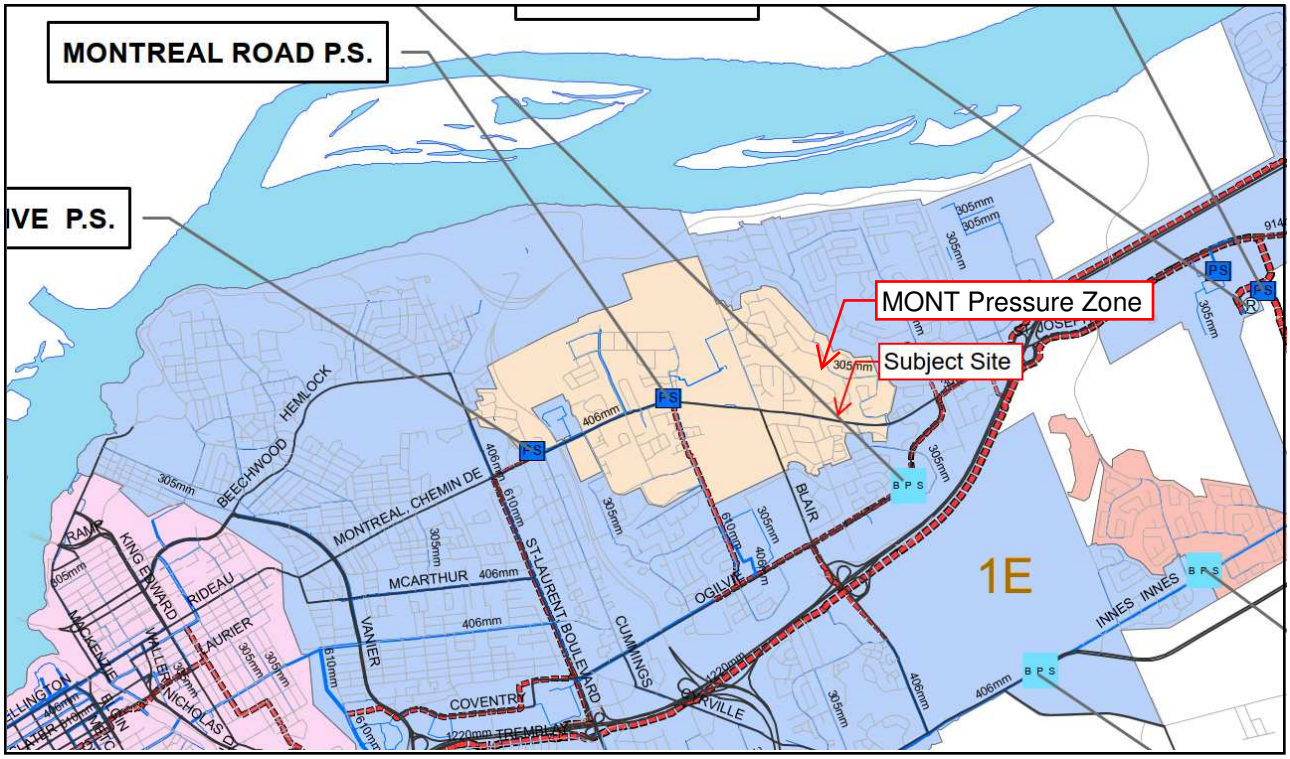
E. Total Fire Flow (Rounded to the Nearest 1000 L/min)

Fire Flow	5,610.0 L/min
Fire Flow Required**	6,000.0 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
*** If both the subject building and the exposed building are fully protected with automatic sprinkler systems, no Exposure Adjustment Charge should be applied.

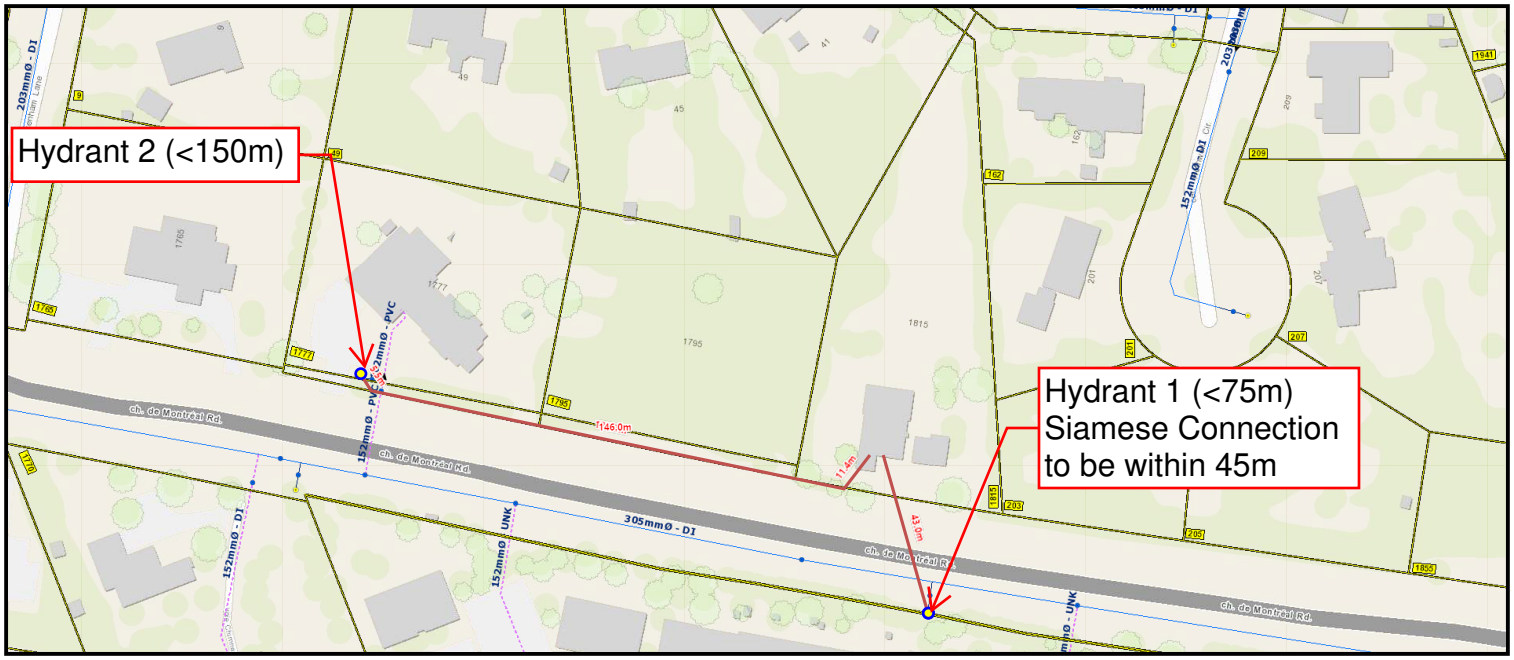
1815 Montreal Road

Pressure Zone Figure



1815 Montreal Road

Hydrant Coverage Figure



APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

1815 Montreal Road - CCO-23-3469 - Sanitary Demands

Project:	CCO-23-3469			
Project No.:	CCO-23-3469			
Designed By:	FV			
Checked By:	BC			
Date:	May-23			
Site Area	0.44	Gross ha		
Townhouse	6	homes	2.7	persons/unit
1 Bedroom	72	units	1.4	persons/unit
2 Bedroom	50	units	2.1	persons/unit
3 Bedroom	2	units	3.1	persons/unit
Total Population	229	Persons		
Amenity Space	601.00	m^2		

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.0	
Residential Peaking Factor	3.50	* 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	0.02
Wet	0.12
Total	0.14

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	229	0.74
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)	601.00	0.02
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	0.74	L/s
PEAK RESIDENTIAL FLOW	2.60	L/s
AVERAGE ICI FLOW	0.02	L/s
PEAK INSTITUTIONAL/ COMMERCIAL FLOW	0.02	L/s
PEAK INDUSTRIAL FLOW	0.00	L/s
TOTAL PEAK ICI FLOW	0.02	L/s

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	0.78	L/s
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	2.64	L/s
TOTAL ESTIMATED PEAK WET WEATHER FLOW	2.76	L/s

3.2 Sanitary Sewer

There is no municipal sanitary sewer in Montreal Road in front of the property. There is an existing 250mm diameter municipal sanitary sewer in Rothwell Avenue located northeast from the site. In order to service the proposed development, it is proposed to extend the 250mm diameter Rothwell Avenue sewer approximately 48m to the west and construct approximately 92m of private 200mm diameter sanitary sewer from the site and connect to the Rothwell Drive sewer. Since the development property does not front Rothwell Avenue, a portion of the new 200mm diameter sanitary sewer will have to be constructed in side and rear yards of the adjacent residential properties (41 Cedar Road and 45 Cedar Road). A 6m wide sewer easement is being proposed where the sanitary sewer crosses the adjacent private properties. In addition, the proposed 200mm diameter sanitary sewer will be extended to the west along the north property line to provide service to the Monfort Renaissance facility located at 1777 Montreal Road.

The calculated peak sanitary flow from the site, calculated as per the City of Ottawa Sewer Design Guidelines, including infiltration, is 0.14 L/s. Refer to **Appendix C** for detailed calculations.

The peak sanitary flow from the Monfort Renaissance facility, including infiltration, is calculated to be 0.26 L/s. The flow is based on previously approved *"1777 Montreal Road Ottawa Withdrawal Management Centre, Septic System Design Brief prepared by Novatech Engineering Consultants Ltd."* Detailed calculations and an excerpt from *Septic System Design Brief* are enclosed in **Appendix C**.

The proposed 200 mm dia. private sanitary sewer will be a gravity pipe at a minimum slope of 4.0% with a full flow conveyance capacity of at least 68.4 L/s. The proposed 250mm diameter sanitary sewer extension in Rothwell Avenue at a minimum slope of 1.0% slope has a full flow capacity of approximately 62.0 L/s. Therefore, the proposed sanitary sewer system has sufficient capacity to convey anticipated sanitary flows (0.40 L/s) generated from the proposed development and the existing Montfort Renaissance facility.

The existing 250mm sanitary sewer in Rothwell Avenue at a minimum slope of 0.24% has a full flow capacity of 30.4 L/s. The additional flow of 0.40 L/s to the Rothwell Avenue sewer can be considered negligible and will not negatively affect the level of service provided by the existing sewer.

3.3 Stormwater Management

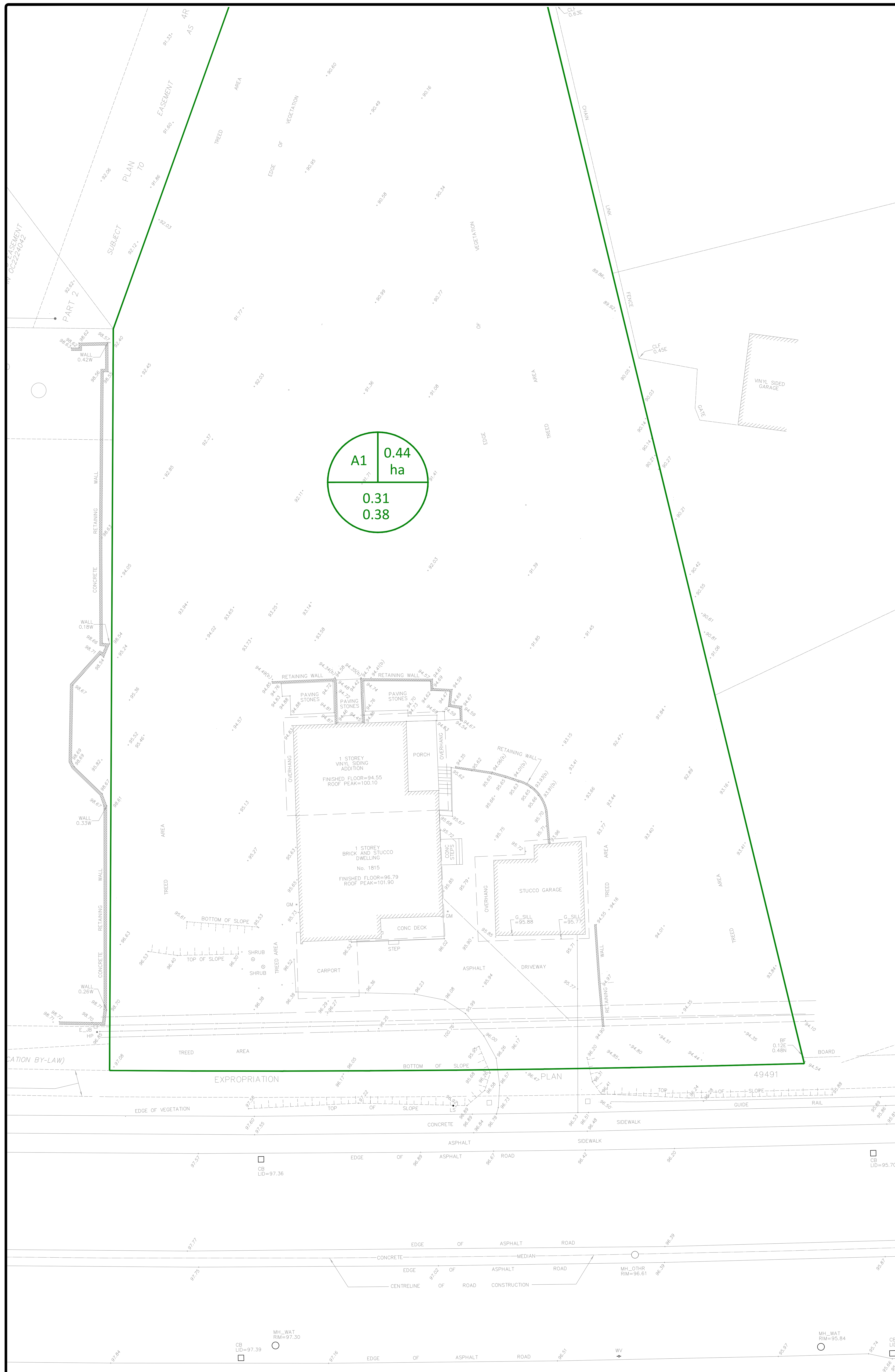
The 0.415 ha site is currently wooded and overlain with grasses. The majority of the existing overland stormwater runoff is conveyed from the site to the adjacent residential properties to the north and east. A portion of the stormwater runoff for the adjacent Monfort Renaissance site (1777 Montreal Road) currently drains towards the subject site.

The stormwater management design for the proposed development will include on-site water quantity control prior to releasing flows from the site. The proposed development will be serviced by connecting a new private storm sewer to the existing 250mm diameter storm sewer in Montreal Road.

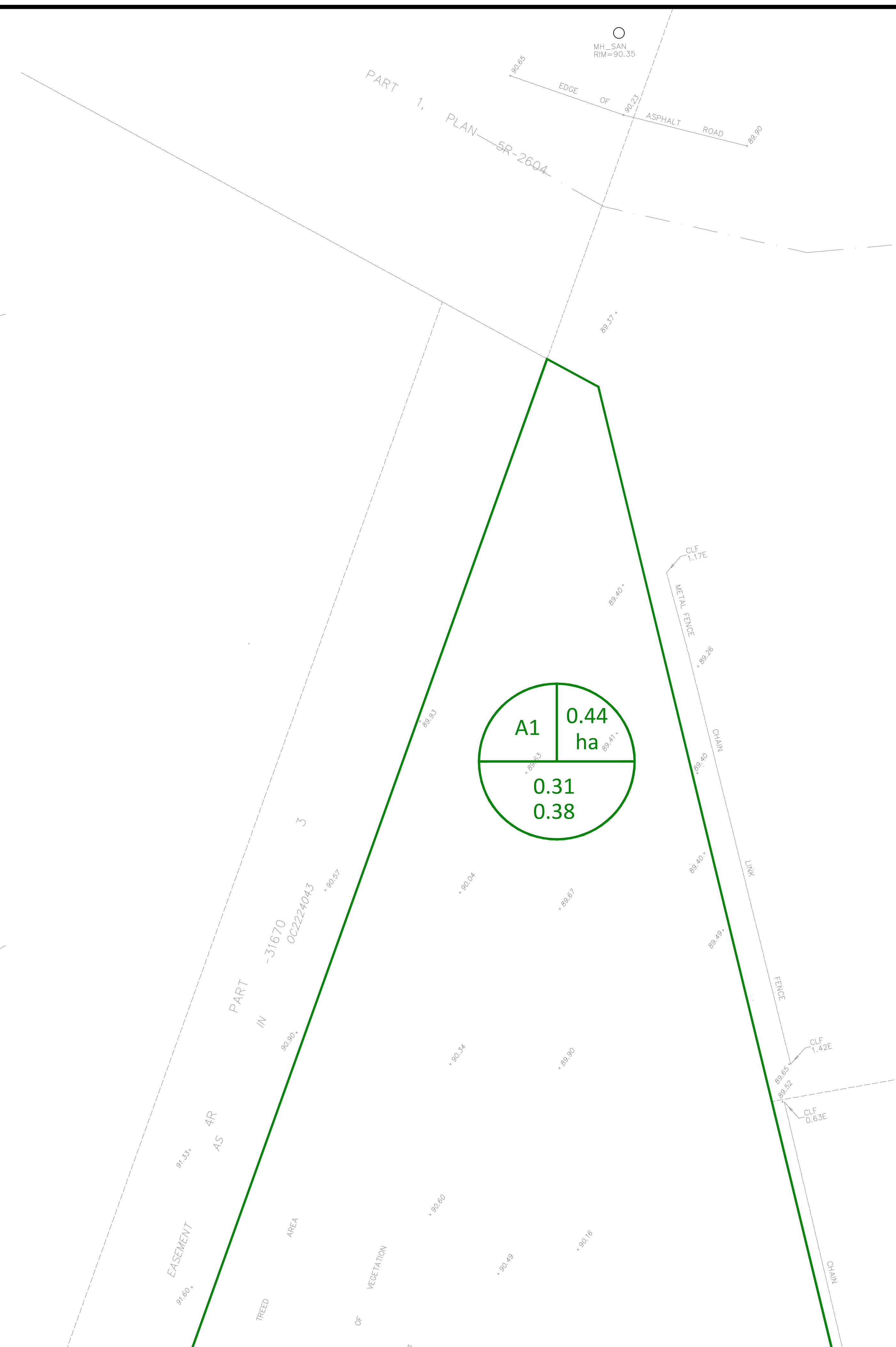
Stormwater management will be provided by rooftop storage, surface storage within the paved parking and landscaped areas as well as by underground storage pipes. Further details on the drainage sub catchment areas captured within the on-site storm sewer systems are explained in subsequent sections of the report. See the Stormwater Management Plan (116151-SWM) included in **Appendix G**, for catchment locations, areas, and runoff coefficients.

APPENDIX E
PRE-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY



1 PRE — PRE-DEVELOPMENT DRAINAGE AREA PLAN
1 : 200



2 PRE — PRE-DEVELOPMENT DRAINAGE AREA PLAN
1 : 200

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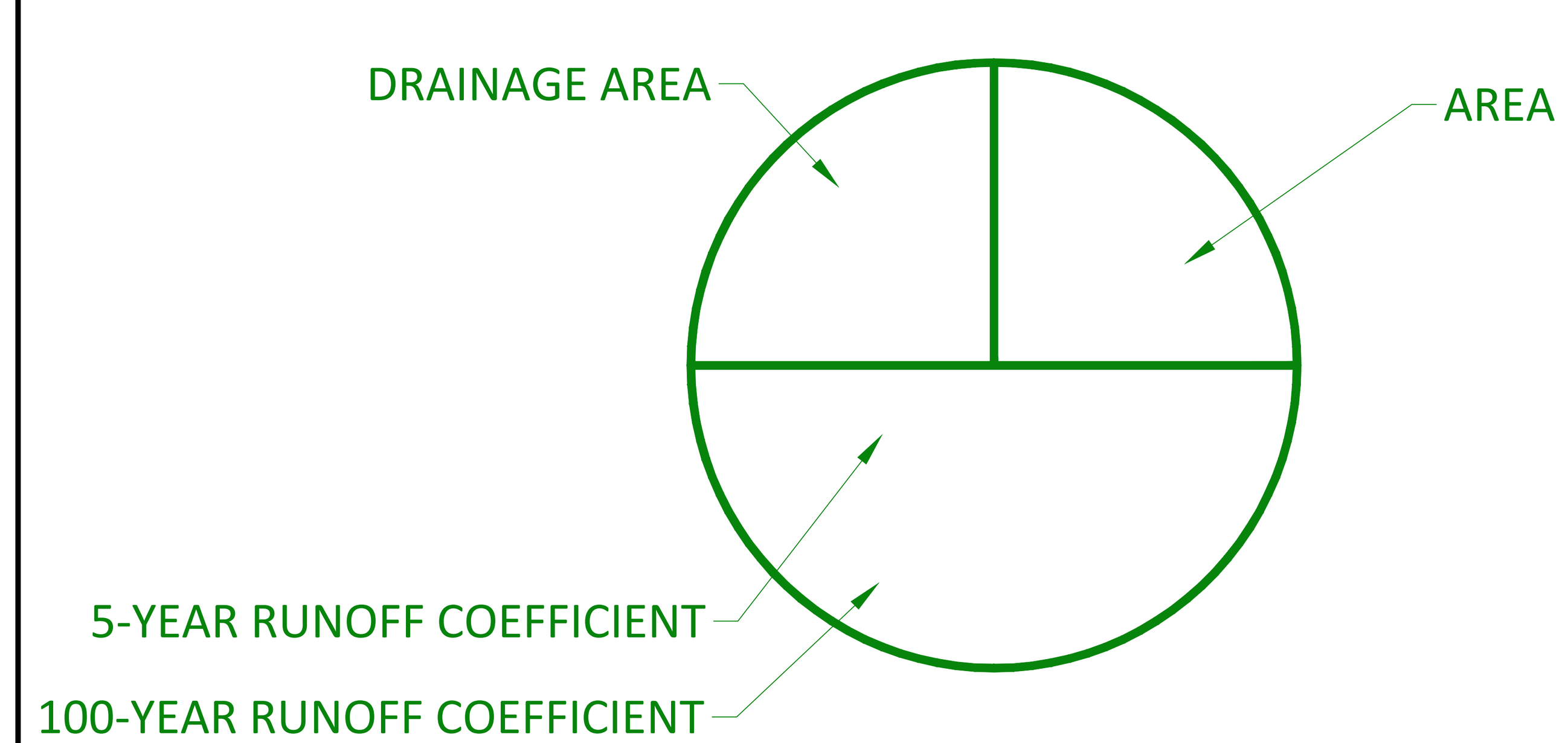
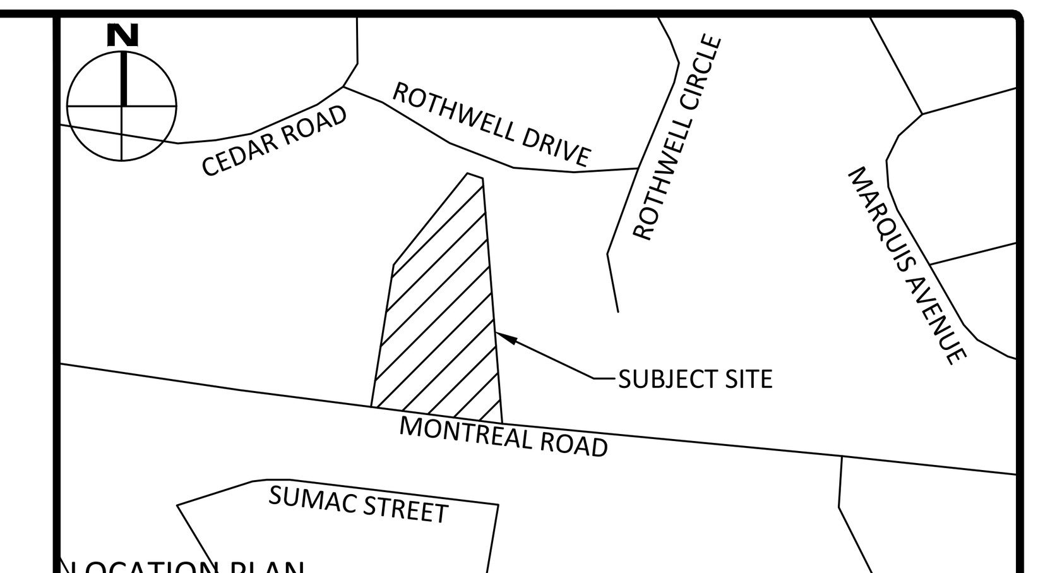
LEGEND:





LOCATION PLAN

No.	Revisions	Date
1	ISSUED FOR SITE PLAN CONTROL	MAY 30, 2023

Check and verify all dimensions before proceeding with the work — Do not scale drawings

SCALE 1 : 200 (0 — 10 — 20 Metres)

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Stamp: LICENSED PROFESSIONAL ENGINEER — B. S. CUMING — 100209498 — 23-3469 — 2023.05.30 — PROVINCE OF ONTARIO

Client: CSV ARCHITECTS
190 O'CONNOR STREET, SUITE 100
OTTAWA, ON K2P 2R3

Project: 9-STOREY APARTMENT BUILDING
1815 MONTREAL ROAD

Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Scale:	1:200	Project Number:	CCO-23-3469
Drawn By:	FV		
Checked By:	BC	Drawing Number:	PRE
Designed By:	FV		

D07-12-XX-XXXX

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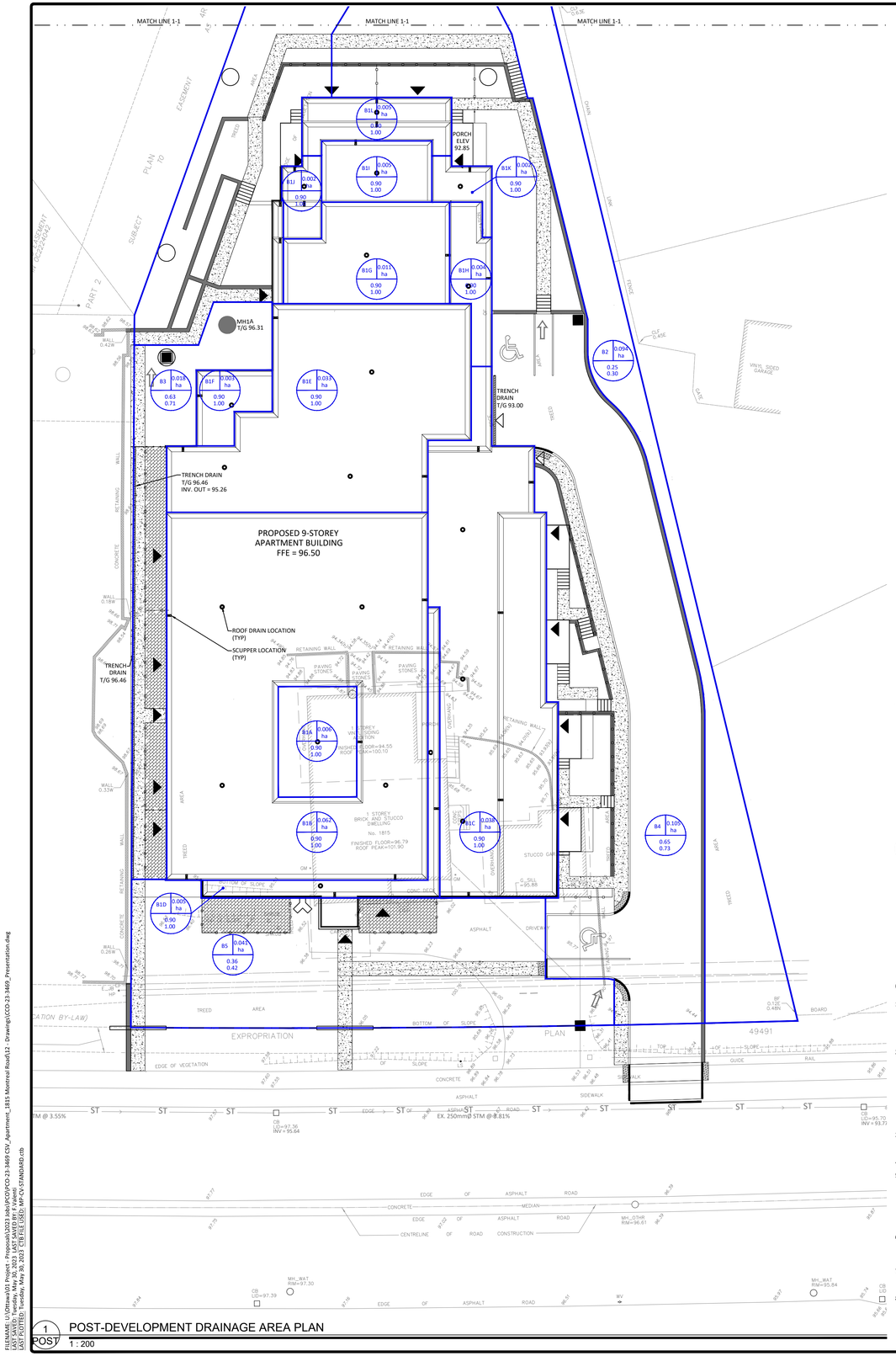
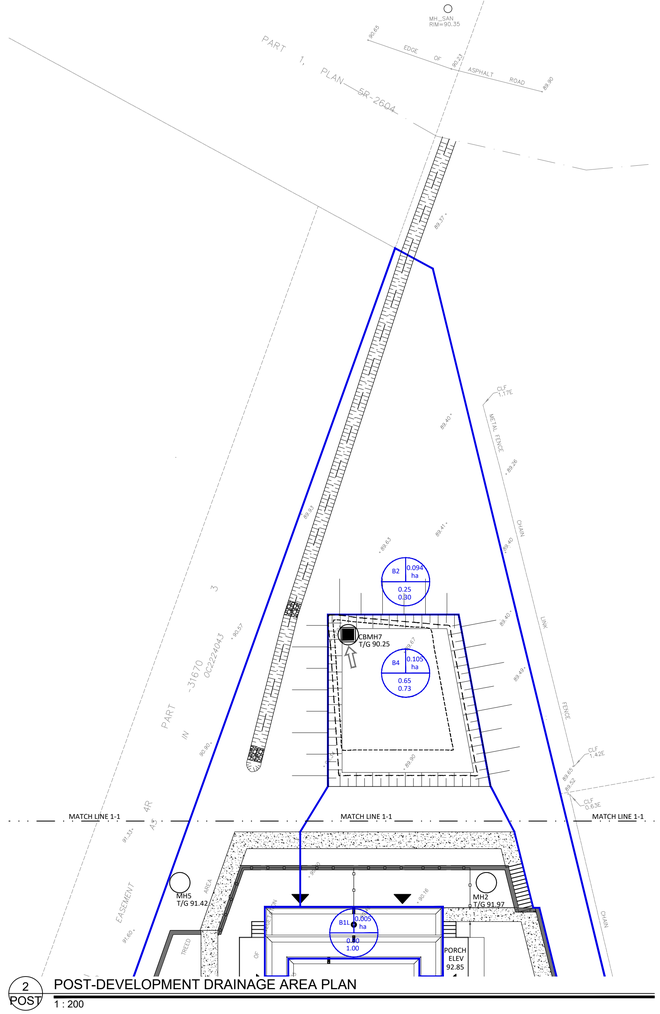
APPENDIX F
POST-DEVELOPMENT DRAINAGE PLAN

McINTOSH PERRY





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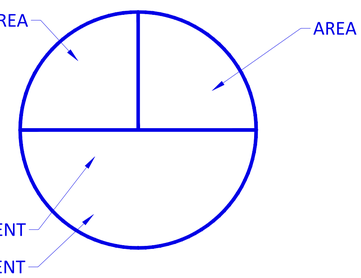

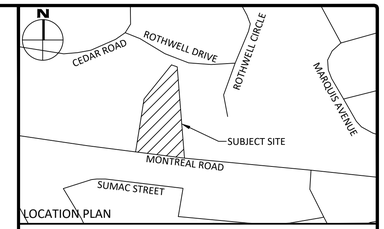

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0 10 20 Metres

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N

Stamp: LICENSED PROFESSIONAL ENGINEER — B. S. Cumins — 100209498 — 23-3469 — 2023.05.30 — PROVINCE OF ONTARIO

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190 O'CONNOR STREET, SUITE 100
OTTAWA, ON K2P 2R3

Project:
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1815 MONTREAL ROAD

Drawing Title:
POST-DEVELOPMENT DRAINAGE AREA PLAN

Scale: 1:200	Project Number: CCO-23-3469
Drawn By: FV	
Checked By: BC	Drawing Number: POST
Designed By: FV	

D07-12-XX-XXXX

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FILENAME: \\Ottawa\01 Project - Proposals\2023 edm\PCO\PCO-23-3469 CSV_Apartment_1815 Montreal Road\12 - Drawing\CCO-23-3469_Presentation.dwg
LAST SAVED: Tuesday, May 30, 2023 LAST SAVED BY: F Valenti
LAST PLOTTED: Tuesday, May 30, 2023 CTB FILE USED: MP-CV-STANDARD.ctb

APPENDIX G
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

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

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	552	0	4,361	0.31	0.38

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s)	
					5-Year	100-Year
A1	0.44	0.31	0.38	10	39.66	81.52
Total	0.44				39.66	81.52

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)	
B1A	62	0	0	0.90	1.00	Proposed Building Roof
B1B	622	0	0	0.90	1.00	
B1C	381	0	0	0.90	1.00	
B1D	53	0	0	0.90	1.00	
B1E	332	0	0	0.90	1.00	
B1F	32	0	0	0.90	1.00	
B1G	110	0	0	0.90	1.00	
B1H	37	0	0	0.90	1.00	
B1I	48	0	0	0.90	1.00	
B1J	22	0	0	0.90	1.00	
B1K	19	0	0	0.90	1.00	
B1L	50	0	0	0.90	1.00	
B2	69	0	876	0.25	0.30	Unrestricted Surface - Rear
B3	113	0	71	0.63	0.71	Unrestricted Collected - Rear
B4	675	0	374	0.65	0.73	Restricted - Rear
B5	94	0	320	0.36	0.42	Unrestricted - Montreal Rd

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	Q (L/s) 5-Year	Q (L/s) 100-Year	
B1A	0.006	0.90	1.00	10	1.61	3.07	Proposed Building Roof
B1B	0.062	0.90	1.00	10	16.22	30.88	
B1C	0.038	0.90	1.00	10	9.94	18.92	
B1D	0.005	0.90	1.00	10	1.39	2.64	
B1E	0.033	0.90	1.00	10	8.66	16.49	
B1F	0.003	0.90	1.00	10	0.83	1.57	
B1G	0.011	0.90	1.00	10	2.88	5.48	
B1H	0.004	0.90	1.00	10	0.98	1.86	
B1I	0.005	0.90	1.00	10	1.25	2.38	
B1J	0.002	0.90	1.00	10	0.56	1.07	
B1K	0.002	0.90	1.00	10	0.50	0.95	
B1L	0.005	0.90	1.00	10	1.32	2.51	
B2	0.094	0.25	0.30	10	6.87	14.29	Unrestricted Surface - Rear
B3	0.018	0.63	0.71	11	3.35	6.47	Unrestricted Collected - Rear
B4	0.105	0.65	0.73	11	19.77	38.16	Restricted - Rear
B5	0.041	0.36	0.42	10	4.31	8.65	Unrestricted - Montreal Rd
Total	0.44				80.42	155.39	

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	Tc (min)	Q (L/s) 5-Year	Q (L/s) 100-Year
A1	0.44	0.31	10	39.66	81.52

Post-Development Restricted Runoff Calculations

Drainage Area	Unrestricted Flow (L/S)		Restricted Flow (L/S)		Storage Required (m^3)		Storage Provided (m^3)	
	5-year	100-Year	5-Year	100-Year	5-Year	100-Year	5-Year	100-Year
B1A	1.61	3.07	0.32	0.32	0.93	2.35	0.96	2.36
B1B	16.22	30.88	2.65	3.53	10.33	22.71	10.58	22.91
B1C	9.94	18.92	2.60	4.59	4.92	9.74	5.21	10.08
B1D	1.39	2.64	0.63	0.63	0.45	1.37	0.46	1.37
B1E	8.66	16.49	1.94	2.51	4.68	10.76	5.18	10.83
B1F	0.83	1.57	0.32	0.32	0.31	0.89	0.31	0.90
B1G	2.88	5.48	0.65	0.84	1.55	3.57	1.72	3.59
B1H	0.98	1.86	0.32	0.32	0.41	1.15	0.42	1.22
B1I	1.25	2.38	0.32	0.32	0.63	1.65	0.68	1.70
B1J	0.56	1.07	0.44	0.76	0.07	0.19	0.08	0.20
B1K	0.50	0.95	0.38	0.65	0.07	0.18	0.11	0.20
B1L	1.32	2.51	0.73	1.20	0.35	0.78	0.38	0.81
Roof Total	46.12	87.82	11.28	15.96	24.73	55.35	26.08	56.17
B2	6.87	14.29	6.87	14.29				
B3	3.35	6.47	3.35	6.47				
B4	19.77	38.16	13.26	14.40	3.91	14.26	4.38	14.37
B5	4.31	8.65	4.31	8.65				
Site Total	80.42	155.39	39.07	59.78	28.63	69.61	30.46	70.54

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	1.61	0.32	1.29	0.78
20	70.3	1.09	0.32	0.77	0.92
30	53.9	0.83	0.32	0.52	0.93
40	44.2	0.68	0.32	0.37	0.88
50	37.7	0.58	0.32	0.27	0.80
60	32.9	0.51	0.32	0.19	0.69
70	29.4	0.45	0.32	0.14	0.58

Maximum Storage Required 5-Year (m^3) =	0.93

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	3.07	0.32	2.75	1.65
20	120.0	2.06	0.32	1.74	2.09
30	91.9	1.58	0.32	1.26	2.27
40	75.1	1.29	0.32	0.97	2.34
50	64.0	1.10	0.32	0.78	2.35
60	55.9	0.96	0.32	0.64	2.32
70	49.8	0.85	0.32	0.54	2.26

Maximum Storage Required 100-Year (m^3) =	2.35

Storage Parameters	
Roof Area (m^2)	61.75
Usable Roof Area (m^2)	52.49

5-Year Storage Summary	
Max. Storage Available (m^3)	0.96
Storage Required (m^3)	0.93
Max. Ponding Depth (m)	0.055

100-Year Storage Summary	
Max. Storage Available (m^3)	2.36
100-Year Storage Required (m^3)	2.35
Max. Ponding Depth (m)	0.135

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	Closed	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.96	2.36
Rooftop Storage Required (m^3)	0.93	2.35
Storage Depth (m)	0.055	0.135
Flow (Per Roof Drain) (L/s)	0.32	0.32
Total Flow (L/s)	0.32	0.32

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.32
35	0.32
40	0.32
45	0.32
50	0.32
55	0.32
60	0.32
65	0.32
70	0.32
75	0.32
80	0.32
85	0.32
90	0.32
95	0.32
100	0.32
105	0.32
110	0.32
115	0.32
120	0.32
125	0.32
130	0.32
135	0.32
140	0.32
145	0.32
150	0.32

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.32	30	0.32
	0.32	35	0.32
	0.32	40	0.32
	0.32	45	0.32
	0.32	50	0.32
	0.32	55	0.32
5-Year	0.32	60	0.32
	0.32	65	0.32
	0.32	70	0.32
	0.32	75	0.32
	0.32	80	0.32
	0.32	85	0.32
	0.32	90	0.32
	0.32	95	0.32
	0.32	100	0.32
	0.32	105	0.32
	0.32	110	0.32
	0.32	115	0.32
	0.32	120	0.32
	0.32	125	0.32
	0.32	130	0.32
100-Year	0.32	135	0.32
	0.32	140	0.32
	0.32	145	0.32
	0.32	150	0.32

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	16.22	2.65	13.57	8.14
20	70.3	10.94	2.65	8.29	9.95
30	53.9	8.39	2.65	5.74	10.33
40	44.2	6.88	2.65	4.23	10.15
50	37.7	5.87	2.65	3.22	9.65
60	32.9	5.12	2.65	2.47	8.89
70	29.4	4.58	2.65	1.93	8.09

Maximum Storage Required 5-Year (m^3) =	10.33

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	30.88	3.53	27.35	16.41
20	120.0	20.74	3.53	17.21	20.65
30	91.9	15.89	3.53	12.35	22.24
40	75.1	13.00	3.53	9.46	22.71
50	64.0	11.06	3.53	7.53	22.58
60	55.9	9.67	3.53	6.13	22.08
70	49.8	8.61	3.53	5.08	21.32

Maximum Storage Required 100-Year (m^3) =	22.71

Storage Parameters	
Roof Area (m^2)	622.07
Usable Roof Area (m^2)	528.76

5-Year Storage Summary	
Max. Storage Available (m^3)	10.58
Storage Required (m^3)	10.33
Max. Ponding Depth (m)	0.06

100-Year Storage Summary	
Max. Storage Available (m^3)	22.91
100-Year Storage Required (m^3) *	22.71
Max. Ponding Depth (m)	0.130

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	4	
Roof Drain Position	1/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	10.58	22.91
Rooftop Storage Required (m^3)	10.33	22.71
Storage Depth (m)	0.060	0.130
Flow (Per Roof Drain) (L/s)	0.66	0.88
Total Flow (L/s)	2.65	3.53

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.65
60	0.66
65	0.68
70	0.69
75	0.71
80	0.73
85	0.74
90	0.76
95	0.77
100	0.79
105	0.80
110	0.82
115	0.84
120	0.85
125	0.87
130	0.88
135	0.90
140	0.91
145	0.93
150	0.95

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.25
	0.13	10	0.50
	0.19	15	0.76
	0.25	20	1.01
	0.32	25	1.26
	0.38	30	1.51
	0.44	35	1.77
	0.50	40	2.02
	0.57	45	2.27
	0.63	50	2.52
	0.65	55	2.59
5-Year	0.66	60	2.65
	0.68	65	2.71
	0.69	70	2.78
	0.71	75	2.84
	0.73	80	2.90
	0.74	85	2.97
	0.76	90	3.03
	0.77	95	3.09
	0.79	100	3.15
	0.80	105	3.22
	0.82	110	3.28
	0.84	115	3.34
	0.85	120	3.41
	0.87	125	3.47
100-Year	0.88	130	3.53
	0.90	135	3.60
	0.91	140	3.66
	0.93	145	3.72
	0.95	150	3.79

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	9.94	2.60	7.33	4.40
20	70.3	6.70	2.60	4.10	4.92
30	53.9	5.14	2.60	2.54	4.57
40	44.2	4.21	2.60	1.61	3.87
50	37.7	3.59	2.60	0.99	2.98
60	32.9	3.14	2.60	0.53	1.93
70	29.4	2.80	2.60	0.20	0.84

Maximum Storage Required 5-Year (m^3) =	4.92

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	18.92	4.59	14.33	8.60
20	120.0	12.71	4.59	8.12	9.74
30	91.9	9.73	4.59	5.14	9.26
40	75.1	7.96	4.59	3.37	8.09
50	64.0	6.78	4.59	2.19	6.56
60	55.9	5.92	4.59	1.33	4.80
70	49.8	5.28	4.59	0.69	2.88

Maximum Storage Required 100-Year (m^3) =	9.74

Storage Parameters	
Roof Area (m^2)	381.12
Usable Roof Area (m^2)	208.53

5-Year Storage Summary	
Max. Storage Available (m^3)	5.21
Storage Required (m^3)	4.92
Max. Ponding Depth (m)	0.075

100-Year Storage Summary	
Max. Storage Available (m^3)	10.08
100-Year Storage Required (m^3)	9.74
Max. Ponding Depth (m)	0.145

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	3	
Roof Drain Position	3/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	5.21	10.08
Rooftop Storage Required (m^3)	4.92	9.74
Storage Depth (m)	0.075	0.145
Flow (Per Roof Drain) (L/s)	0.87	1.53
Total Flow (L/s)	2.60	4.59

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.68
60	0.73
65	0.77
70	0.82
75	0.87
80	0.91
85	0.96
90	1.01
95	1.06
100	1.10
105	1.15
110	1.20
115	1.25
120	1.29
125	1.34
130	1.39
135	1.44
140	1.48
145	1.53
150	1.58

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.19
	0.13	10	0.38
	0.19	15	0.57
	0.25	20	0.76
	0.32	25	0.95
	0.38	30	1.14
	0.44	35	1.32
	0.50	40	1.51
	0.57	45	1.70
	0.63	50	1.89
	0.68	55	2.03
	0.73	60	2.18
	0.77	65	2.32
	0.82	70	2.46
5-Year	0.87	75	2.60
	0.91	80	2.74
	0.96	85	2.89
	1.01	90	3.03
	1.06	95	3.17
	1.10	100	3.31
	1.15	105	3.45
	1.20	110	3.60
	1.25	115	3.74
	1.29	120	3.88
	1.34	125	4.02
	1.39	130	4.16
	1.44	135	4.31
	1.48	140	4.45
100-Year	1.53	145	4.59
	1.58	150	4.73

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	1.39	0.63	0.76	0.45
20	70.3	0.94	0.63	0.31	0.37
30	53.9	0.72	0.63	0.09	0.16
40	44.2	0.59	0.63	-0.04	-0.10
50	37.7	0.50	0.63	-0.13	-0.39
60	32.9	0.44	0.63	-0.19	-0.69
70	29.4	0.39	0.63	-0.24	-1.01

Maximum Storage Required 5-Year (m^3) =	0.45

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	2.64	0.63	2.01	1.21
20	120.0	1.77	0.63	1.14	1.37
30	91.9	1.36	0.63	0.73	1.31
40	75.1	1.11	0.63	0.48	1.15
50	64.0	0.95	0.63	0.32	0.95
60	55.9	0.83	0.63	0.20	0.71
70	49.8	0.74	0.63	0.11	0.44

Maximum Storage Required 100-Year (m^3) =	1.37

Storage Parameters	
Roof Area (m^2)	53.22
Usable Roof Area (m^2)	30.39

5-Year Storage Summary	
Max. Storage Available (m^3)	0.46
Storage Required (m^3)	0.45
Max. Ponding Depth (m)	0.045

100-Year Storage Summary	
Max. Storage Available (m^3)	1.37
100-Year Storage Required (m^3)	1.37
Max. Ponding Depth (m)	0.135

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	2	
Roof Drain Position	Closed	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.46	1.37
Rooftop Storage Required (m^3)	0.45	1.37
Storage Depth (m)	0.045	0.135
Flow (Per Roof Drain) (L/s)	0.32	0.32
Total Flow (L/s)	0.63	0.63

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.32
35	0.32
40	0.32
45	0.32
50	0.32
55	0.32
60	0.32
65	0.32
70	0.32
75	0.32
80	0.32
85	0.32
90	0.32
95	0.32
100	0.32
105	0.32
110	0.32
115	0.32
120	0.32
125	0.32
130	0.32
135	0.32
140	0.32
145	0.32
150	0.32

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.13
	0.13	10	0.25
	0.19	15	0.38
	0.25	20	0.50
	0.32	25	0.63
	0.32	30	0.63
	0.32	35	0.63
	0.32	40	0.63
5-Year	0.32	45	0.63
	0.32	50	0.63
	0.32	55	0.63
	0.32	60	0.63
	0.32	65	0.63
	0.32	70	0.63
	0.32	75	0.63
	0.32	80	0.63
	0.32	85	0.63
	0.32	90	0.63
	0.32	95	0.63
	0.32	100	0.63
	0.32	105	0.63
	0.32	110	0.63
	0.32	115	0.63
	0.32	120	0.63
	0.32	125	0.63
	0.32	130	0.63
100-Year	0.32	135	0.63
	0.32	140	0.63
	0.32	145	0.63
	0.32	150	0.63

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	8.66	1.94	6.72	4.03
20	70.3	5.84	1.94	3.90	4.68
30	53.9	4.48	1.94	2.54	4.57
40	44.2	3.67	1.94	1.73	4.16
50	37.7	3.13	1.94	1.19	3.58
60	32.9	2.74	1.94	0.80	2.86
70	29.4	2.44	1.94	0.50	2.12
80	26.6	2.21	1.94	0.27	1.30
90	24.3	2.02	1.94	0.08	0.43
100	22.4	1.86	1.94	-0.08	-0.47
110	20.8	1.73	1.94	-0.21	-1.39
120	19.5	1.62	1.94	-0.32	-2.30
130	18.3	1.52	1.94	-0.42	-3.27
140	17.3	1.44	1.94	-0.50	-4.22
150	16.4	1.36	1.94	-0.58	-5.19

Maximum Storage Required 5-Year (m^3) =	4.68

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	16.49	2.51	13.99	8.39
20	120.0	11.08	2.51	8.57	10.29
30	91.9	8.49	2.51	5.98	10.76
40	75.1	6.94	2.51	4.43	10.64
50	64.0	5.91	2.51	3.40	10.20
60	55.9	5.16	2.51	2.66	9.56
70	49.8	4.60	2.51	2.09	8.78
80	45.0	4.16	2.51	1.65	7.91
90	41.1	3.80	2.51	1.29	6.96
100	37.9	3.50	2.51	0.99	5.96
110	35.2	3.25	2.51	0.74	4.91
120	32.9	3.04	2.51	0.53	3.82
130	30.9	2.85	2.51	0.35	2.70
140	29.2	2.69	2.51	0.18	1.55
150	27.6	2.55	2.51	0.04	0.38

Maximum Storage Required 100-Year (m^3) =	10.76

Storage Parameters	
Roof Area (m^2)	332.26
Usable Roof Area (m^2)	282.42

5-Year Storage Summary	
Max. Storage Available (m^3)	5.18
Storage Required (m^3)	4.68
Max. Ponding Depth (m)	0.055

100-Year Storage Summary	
Max. Storage Available (m^3)	10.83
100-Year Storage Required (m^3)	10.76
Max. Ponding Depth (m)	0.115

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	3	
Roof Drain Position	1/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	5.18	10.83
Rooftop Storage Required (m^3)	4.68	10.76
Storage Depth (m)	0.055	0.115
Flow (Per Roof Drain) (L/s)	0.65	0.84
Total Flow (L/s)	1.94	2.51

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.65
60	0.66
65	0.68
70	0.69
75	0.71
80	0.73
85	0.74
90	0.76
95	0.77
100	0.79
105	0.80
110	0.82
115	0.84
120	0.85
125	0.87
130	0.88
135	0.90
140	0.91
145	0.93
150	0.95

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.19
	0.13	10	0.38
	0.19	15	0.57
	0.25	20	0.76
	0.32	25	0.95
	0.38	30	1.14
	0.44	35	1.32
	0.50	40	1.51
	0.57	45	1.70
	0.63	50	1.89
5-Year	0.65	55	1.94
	0.66	60	1.99
	0.68	65	2.03
	0.69	70	2.08
	0.71	75	2.13
	0.73	80	2.18
	0.74	85	2.22
	0.76	90	2.27
	0.77	95	2.32
	0.79	100	2.37
	0.80	105	2.41
	0.82	110	2.46
100-Year	0.84	115	2.51
	0.85	120	2.56
	0.87	125	2.60
	0.88	130	2.65
	0.90	135	2.70
	0.91	140	2.74
	0.93	145	2.79
	0.95	150	2.84

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.83	0.32	0.51	0.31
20	70.3	0.56	0.32	0.24	0.29
30	53.9	0.43	0.32	0.11	0.20
40	44.2	0.35	0.32	0.03	0.08
50	37.7	0.30	0.32	-0.02	-0.05
60	32.9	0.26	0.32	-0.05	-0.20
70	29.4	0.23	0.32	-0.08	-0.35

Maximum Storage Required 5-Year (m^3) =	0.31

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.57	0.32	1.26	0.75
20	120.0	1.06	0.32	0.74	0.89
30	91.9	0.81	0.32	0.49	0.89
40	75.1	0.66	0.32	0.35	0.83
50	64.0	0.56	0.32	0.25	0.74
60	55.9	0.49	0.32	0.18	0.64
70	49.8	0.44	0.32	0.12	0.52

Maximum Storage Required 100-Year (m^3) =	0.89

Storage Parameters	
Roof Area (m^2)	31.68
Usable Roof Area (m^2)	26.93

5-Year Storage Summary	
Max. Storage Available (m^3)	0.31
Storage Required (m^3)	0.31
Max. Ponding Depth (m)	0.035

100-Year Storage Summary	
Max. Storage Available (m^3)	0.90
100-Year Storage Required (m^3)	0.89
Max. Ponding Depth (m)	0.100

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	Closed	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.31	0.90
Rooftop Storage Required (m^3)	0.31	0.89
Storage Depth (m)	0.035	0.100
Flow (Per Roof Drain) (L/s)	0.32	0.32
Total Flow (L/s)	0.32	0.32

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.32
35	0.32
40	0.32
45	0.32
50	0.32
55	0.32
60	0.32
65	0.32
70	0.32
75	0.32
80	0.32
85	0.32
90	0.32
95	0.32
100	0.32
105	0.32
110	0.32
115	0.32
120	0.32
125	0.32
130	0.32
135	0.32
140	0.32
145	0.32
150	0.32

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.32	30	0.32
5-Year	0.32	35	0.32
	0.32	40	0.32
	0.32	45	0.32
	0.32	50	0.32
	0.32	55	0.32
	0.32	60	0.32
	0.32	65	0.32
	0.32	70	0.32
	0.32	75	0.32
	0.32	80	0.32
	0.32	85	0.32
	0.32	90	0.32
	0.32	95	0.32
100-Year	0.32	100	0.32
	0.32	105	0.32
	0.32	110	0.32
	0.32	115	0.32
	0.32	120	0.32
	0.32	125	0.32
	0.32	130	0.32
	0.32	135	0.32
	0.32	140	0.32
	0.32	145	0.32
	0.32	150	0.32

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	2.88	0.65	2.23	1.34
20	70.3	1.94	0.65	1.29	1.55
30	53.9	1.49	0.65	0.84	1.51
40	44.2	1.22	0.65	0.57	1.38
50	37.7	1.04	0.65	0.39	1.18
60	32.9	0.91	0.65	0.26	0.94
70	29.4	0.81	0.65	0.16	0.69
80	26.6	0.73	0.65	0.09	0.42
90	24.3	0.67	0.65	0.02	0.13
100	22.4	0.62	0.65	-0.03	-0.17
110	20.8	0.57	0.65	-0.07	-0.48
120	19.5	0.54	0.65	-0.11	-0.78
130	18.3	0.51	0.65	-0.14	-1.10
140	17.3	0.48	0.65	-0.17	-1.42
150	16.4	0.45	0.65	-0.19	-1.75

Maximum Storage Required 5-Year (m^3) =	1.55

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	5.48	0.84	4.64	2.78
20	120.0	3.68	0.84	2.84	3.41
30	91.9	2.82	0.84	1.98	3.57
40	75.1	2.30	0.84	1.47	3.52
50	64.0	1.96	0.84	1.13	3.38
60	55.9	1.71	0.84	0.88	3.16
70	49.8	1.53	0.84	0.69	2.90
80	45.0	1.38	0.84	0.54	2.61
90	41.1	1.26	0.84	0.42	2.29
100	37.9	1.16	0.84	0.33	1.96
110	35.2	1.08	0.84	0.24	1.61
120	32.9	1.01	0.84	0.17	1.24
130	30.9	0.95	0.84	0.11	0.87
140	29.2	0.89	0.84	0.06	0.49
150	27.6	0.85	0.84	0.01	0.10

Maximum Storage Required 100-Year (m^3) =	3.57

Storage Parameters	
Roof Area (m^2)	110.30
Usable Roof Area (m^2)	93.76

5-Year Storage Summary	
Max. Storage Available (m^3)	1.72
Storage Required (m^3)	1.55
Max. Ponding Depth (m)	0.055

100-Year Storage Summary	
Max. Storage Available (m^3)	3.59
100-Year Storage Required (m^3)	3.57
Max. Ponding Depth (m)	0.115

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	1/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	1.72	3.59
Rooftop Storage Required (m^3)	1.55	3.57
Storage Depth (m)	0.055	0.115
Flow (Per Roof Drain) (L/s)	0.65	0.84
Total Flow (L/s)	0.65	0.84

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.65
60	0.66
65	0.68
70	0.69
75	0.71
80	0.73
85	0.74
90	0.76
95	0.77
100	0.79
105	0.80
110	0.82
115	0.84
120	0.85
125	0.87
130	0.88
135	0.90
140	0.91
145	0.93
150	0.95

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
5-Year	0.65	55	0.65
	0.66	60	0.66
	0.68	65	0.68
	0.69	70	0.69
	0.71	75	0.71
	0.73	80	0.73
	0.74	85	0.74
	0.76	90	0.76
	0.77	95	0.77
	0.79	100	0.79
	0.80	105	0.80
	0.82	110	0.82
100-Year	0.84	115	0.84
	0.85	120	0.85
	0.87	125	0.87
	0.88	130	0.88
	0.90	135	0.90
	0.91	140	0.91
	0.93	145	0.93
	0.95	150	0.95

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.98	0.32	0.66	0.40
20	70.3	0.66	0.32	0.34	0.41
30	53.9	0.50	0.32	0.19	0.34
40	44.2	0.41	0.32	0.10	0.24
50	37.7	0.35	0.32	0.04	0.11
60	32.9	0.31	0.32	-0.01	-0.03
70	29.4	0.28	0.32	-0.04	-0.17

Maximum Storage Required 5-Year (m^3) =	0.41

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.86	0.32	1.54	0.93
20	120.0	1.25	0.32	0.93	1.12
30	91.9	0.96	0.32	0.64	1.15
40	75.1	0.78	0.32	0.47	1.12
50	64.0	0.67	0.32	0.35	1.05
60	55.9	0.58	0.32	0.27	0.96
70	49.8	0.52	0.32	0.20	0.85

Maximum Storage Required 100-Year (m^3) =	1.15

Storage Parameters	
Roof Area (m^2)	37.44
Usable Roof Area (m^2)	31.82

5-Year Storage Summary	
Max. Storage Available (m^3)	0.42
Storage Required (m^3)	0.41
Max. Ponding Depth (m)	0.04

100-Year Storage Summary	
Max. Storage Available (m^3)	1.22
100-Year Storage Required (m^3)	1.15
Max. Ponding Depth (m)	0.115

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	Closed	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.42	1.22
Rooftop Storage Required (m^3)	0.41	1.15
Storage Depth (m)	0.040	0.115
Flow (Per Roof Drain) (L/s)	0.32	0.32
Total Flow (L/s)	0.32	0.32

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.32
35	0.32
40	0.32
45	0.32
50	0.32
55	0.32
60	0.32
65	0.32
70	0.32
75	0.32
80	0.32
85	0.32
90	0.32
95	0.32
100	0.32
105	0.32
110	0.32
115	0.32
120	0.32
125	0.32
130	0.32
135	0.32
140	0.32
145	0.32
150	0.32

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.32	30	0.32
	0.32	35	0.32
5-Year	0.32	40	0.32
	0.32	45	0.32
	0.32	50	0.32
	0.32	55	0.32
	0.32	60	0.32
	0.32	65	0.32
	0.32	70	0.32
	0.32	75	0.32
	0.32	80	0.32
	0.32	85	0.32
	0.32	90	0.32
	0.32	95	0.32
	0.32	100	0.32
	0.32	105	0.32
	0.32	110	0.32
100-Year	0.32	115	0.32
	0.32	120	0.32
	0.32	125	0.32
	0.32	130	0.32
	0.32	135	0.32
	0.32	140	0.32
	0.32	145	0.32
	0.32	150	0.32

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	1.25	0.32	0.94	0.56
20	70.3	0.84	0.32	0.53	0.63
30	53.9	0.65	0.32	0.33	0.60
40	44.2	0.53	0.32	0.22	0.52
50	37.7	0.45	0.32	0.14	0.41
60	32.9	0.40	0.32	0.08	0.29
70	29.4	0.35	0.32	0.04	0.16

Maximum Storage Required 5-Year (m^3) =	0.63

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	2.38	0.32	2.07	1.24
20	120.0	1.60	0.32	1.29	1.54
30	91.9	1.23	0.32	0.91	1.64
40	75.1	1.00	0.32	0.69	1.65
50	64.0	0.85	0.32	0.54	1.61
60	55.9	0.75	0.32	0.43	1.55
70	49.8	0.66	0.32	0.35	1.47

Maximum Storage Required 100-Year (m^3) =	1.65

Storage Parameters	
Roof Area (m^2)	48.01
Usable Roof Area (m^2)	40.81

5-Year Storage Summary	
Max. Storage Available (m^3)	0.68
Storage Required (m^3)	0.63
Max. Ponding Depth (m)	0.05

100-Year Storage Summary	
Max. Storage Available (m^3)	1.70
100-Year Storage Required (m^3)	1.65
Max. Ponding Depth (m)	0.125

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	Closed	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.68	1.70
Rooftop Storage Required (m^3)	0.63	1.65
Storage Depth (m)	0.050	0.125
Flow (Per Roof Drain) (L/s)	0.32	0.32
Total Flow (L/s)	0.32	0.32

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.32
35	0.32
40	0.32
45	0.32
50	0.32
55	0.32
60	0.32
65	0.32
70	0.32
75	0.32
80	0.32
85	0.32
90	0.32
95	0.32
100	0.32
105	0.32
110	0.32
115	0.32
120	0.32
125	0.32
130	0.32
135	0.32
140	0.32
145	0.32
150	0.32

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.32	30	0.32
	0.32	35	0.32
	0.32	40	0.32
	0.32	45	0.32
5-Year	0.32	50	0.32
	0.32	55	0.32
	0.32	60	0.32
	0.32	65	0.32
	0.32	70	0.32
	0.32	75	0.32
	0.32	80	0.32
	0.32	85	0.32
	0.32	90	0.32
	0.32	95	0.32
	0.32	100	0.32
	0.32	105	0.32
	0.32	110	0.32
	0.32	115	0.32
	0.32	120	0.32
100-Year	0.32	125	0.32
	0.32	130	0.32
	0.32	135	0.32
	0.32	140	0.32
	0.32	145	0.32
	0.32	150	0.32

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.56	0.44	0.12	0.07
20	70.3	0.38	0.44	-0.06	-0.07
30	53.9	0.29	0.44	-0.15	-0.27
40	44.2	0.24	0.44	-0.20	-0.49
50	37.7	0.20	0.44	-0.24	-0.71
60	32.9	0.18	0.44	-0.26	-0.95
70	29.4	0.16	0.44	-0.28	-1.19

Maximum Storage Required 5-Year (m^3) =	0.07

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	1.07	0.76	0.32	0.19
20	120.0	0.72	0.76	-0.04	-0.04
30	91.9	0.55	0.76	-0.20	-0.37
40	75.1	0.45	0.76	-0.31	-0.73
50	64.0	0.38	0.76	-0.37	-1.12
60	55.9	0.34	0.76	-0.42	-1.51
70	49.8	0.30	0.76	-0.46	-1.92

Maximum Storage Required 100-Year (m^3) =	0.19

Storage Parameters	
Roof Area (m^2)	21.64
Usable Roof Area (m^2)	6.61

5-Year Storage Summary	
Max. Storage Available (m^3)	0.08
Storage Required (m^3)	0.07
Max. Ponding Depth (m)	0.035

100-Year Storage Summary	
Max. Storage Available (m^3)	0.20
100-Year Storage Required (m^3)	0.19
Max. Ponding Depth (m)	0.090

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	1/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.08	0.20
Rooftop Storage Required (m^3)	0.07	0.19
Storage Depth (m)	0.035	0.090
Flow (Per Roof Drain) (L/s)	0.44	0.76
Total Flow (L/s)	0.44	0.76

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.65
60	0.66
65	0.68
70	0.69
75	0.71
80	0.73
85	0.74
90	0.76
95	0.77
100	0.79
105	0.80
110	0.82
115	0.84
120	0.85
125	0.87
130	0.88
135	0.90
140	0.91
145	0.93
150	0.95

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
5-Year	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.65	55	0.65
	0.66	60	0.66
	0.68	65	0.68
	0.69	70	0.69
	0.71	75	0.71
	0.73	80	0.73
	0.74	85	0.74
100-Year	0.76	90	0.76
	0.77	95	0.77
	0.79	100	0.79
	0.80	105	0.80
	0.82	110	0.82
	0.84	115	0.84
	0.85	120	0.85
	0.87	125	0.87
	0.88	130	0.88
	0.90	135	0.90
	0.91	140	0.91
	0.93	145	0.93
	0.95	150	0.95

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	0.50	0.38	0.12	0.07
20	70.3	0.34	0.38	-0.04	-0.05
30	53.9	0.26	0.38	-0.12	-0.22
40	44.2	0.21	0.38	-0.17	-0.40
50	37.7	0.18	0.38	-0.20	-0.59
60	32.9	0.16	0.38	-0.22	-0.80
70	29.4	0.14	0.38	-0.24	-1.00

Maximum Storage Required 5-Year (m^3) =	0.07

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	0.95	0.65	0.30	0.18
20	120.0	0.64	0.65	-0.01	-0.01
30	91.9	0.49	0.65	-0.16	-0.28
40	75.1	0.40	0.65	-0.25	-0.59
50	64.0	0.34	0.65	-0.31	-0.92
60	55.9	0.30	0.65	-0.35	-1.26
70	49.8	0.27	0.65	-0.38	-1.60

Maximum Storage Required 100-Year (m^3) =	0.18

Storage Parameters	
Roof Area (m^2)	19.15
Usable Roof Area (m^2)	10.71

5-Year Storage Summary	
Max. Storage Available (m^3)	0.11
Storage Required (m^3)	0.07
Max. Ponding Depth (m)	0.03

100-Year Storage Summary	
Max. Storage Available (m^3)	0.20
100-Year Storage Required (m^3)	0.18
Max. Ponding Depth (m)	0.055

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	1/4 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.11	0.20
Rooftop Storage Required (m^3)	0.07	0.18
Storage Depth (m)	0.030	0.055
Flow (Per Roof Drain) (L/s)	0.38	0.65
Total Flow (L/s)	0.38	0.65

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.65
60	0.66
65	0.68
70	0.69
75	0.71
80	0.73
85	0.74
90	0.76
95	0.77
100	0.79
105	0.80
110	0.82
115	0.84
120	0.85
125	0.87
130	0.88
135	0.90
140	0.91
145	0.93
150	0.95

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
5-Year	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
100-Year	0.65	55	0.65
	0.66	60	0.66
	0.68	65	0.68
	0.69	70	0.69
	0.71	75	0.71
	0.73	80	0.73
	0.74	85	0.74
	0.76	90	0.76
	0.77	95	0.77
	0.79	100	0.79
	0.80	105	0.80
	0.82	110	0.82
	0.84	115	0.84
	0.85	120	0.85
	0.87	125	0.87
	0.88	130	0.88
	0.90	135	0.90
	0.91	140	0.91
	0.93	145	0.93
	0.95	150	0.95

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	1.32	0.73	0.59	0.35
20	70.3	0.89	0.73	0.16	0.19
30	53.9	0.68	0.73	-0.04	-0.08
40	44.2	0.56	0.73	-0.17	-0.40
50	37.7	0.48	0.73	-0.25	-0.75
60	32.9	0.42	0.73	-0.31	-1.12
70	29.4	0.37	0.73	-0.35	-1.49

Maximum Storage Required 5-Year (m^3) =	0.35

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	2.51	1.20	1.31	0.78
20	120.0	1.68	1.20	0.48	0.58
30	91.9	1.29	1.20	0.09	0.16
40	75.1	1.05	1.20	-0.14	-0.35
50	64.0	0.90	1.20	-0.30	-0.90
60	55.9	0.78	1.20	-0.41	-1.49
70	49.8	0.70	1.20	-0.50	-2.10

Maximum Storage Required 100-Year (m^3) =	0.78

Storage Parameters	
Roof Area (m^2)	50.48
Usable Roof Area (m^2)	17.44

5-Year Storage Summary	
Max. Storage Available (m^3)	0.38
Storage Required (m^3)	0.35
Max. Ponding Depth (m)	0.065

100-Year Storage Summary	
Max. Storage Available (m^3)	0.81
100-Year Storage Required (m^3)	0.78
Max. Ponding Depth (m)	0.140

Roof Drains Summary		
Type of Control Device	Watts Drainage - Accutrol Weir	
Number of Roof Drains	1	
Roof Drain Position	1/2 Open	
	5-Year	100-Year
Rooftop Storage Available (m^3)	0.38	0.81
Rooftop Storage Required (m^3)	0.35	0.78
Storage Depth (m)	0.065	0.140
Flow (Per Roof Drain) (L/s)	0.73	1.20
Total Flow (L/s)	0.73	1.20

Flow Rate Vs. Build-Up (Individual Drain)	
Depth (mm)	Flow (L/s)
0	0.00
5	0.06
10	0.13
15	0.19
20	0.25
25	0.32
30	0.38
35	0.44
40	0.50
45	0.57
50	0.63
55	0.66
60	0.69
65	0.73
70	0.76
75	0.79
80	0.82
85	0.85
90	0.88
95	0.91
100	0.95
105	0.98
110	1.01
115	1.04
120	1.07
125	1.10
130	1.14
135	1.17
140	1.20
145	1.23
150	1.26

	Roof Drain Flow		
	Individual Flow (l/s)	Storage Depth (mm)	Cumulative Flow (l/s)
	0.00	0	0.00
	0.06	5	0.06
	0.13	10	0.13
	0.19	15	0.19
	0.25	20	0.25
	0.32	25	0.32
	0.38	30	0.38
	0.44	35	0.44
	0.50	40	0.50
	0.57	45	0.57
	0.63	50	0.63
	0.66	55	0.66
	0.69	60	0.69
5-Year	0.73	65	0.73
	0.76	70	0.76
	0.79	75	0.79
	0.82	80	0.82
	0.85	85	0.85
	0.88	90	0.88
	0.91	95	0.91
	0.95	100	0.95
	0.98	105	0.98
	1.01	110	1.01
	1.04	115	1.04
	1.07	120	1.07
	1.10	125	1.10
	1.14	130	1.14
	1.17	135	1.17
100-Year	1.20	140	1.20
	1.23	145	1.23
	1.26	150	1.26

* Roof Drain model to be Accutrol Weirs, See attached sheets
* Roof Drain Flow information taken from Watts Drainage website

Note: The flow leaving through a restricted roof drain is based on flow vs. head information

Storage Requirements for area B4

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	19.77	13.26	6.51	3.91
20	70.3	13.34	13.26	0.08	0.10
30	53.9	10.23	13.26	-3.03	-5.46
40	44.2	8.39	13.26	-4.87	-11.69
50	37.7	7.15	13.26	-6.11	-18.32

Maximum Storage Required 5-year =	4	m^3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	178.6	38.17	14.40	23.77	14.26
20	120.0	25.64	14.40	11.24	13.49
30	91.9	19.64	14.40	5.24	9.43
40	75.1	16.05	14.40	1.65	3.96
50	64.0	13.68	14.40	-0.72	-2.17

5-Year Storm Event Storage Summary

		Water Elev. (m) =		90.45	
Location	T/G	INV. (out)	Area (m^2)	Head (m)	Volume (m^3)
CBMH7	90.25	89.79	65.9	0.66	4.4

Storage Available (m^3) = 4.4
Storage Required (m^3) = 3.9

100-Year Storm Event Storage Summary

		Water Elev. (m) =		90.56	
Location	T/G	INV. (out)	Area (m^2)	Head (m)	Volume (m^3)
CBMH7	90.25	89.79	101.2	0.79	14.4

Storage Available (m^3) = 14.4
Storage Required (m^3) = 14.3

For Orifice Flow, C= 0.60
For Weir Flow, C= 1.84

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	89.79	X		X
center of crest elevation	89.84	X		X
orifice width / weir length	90 mm	X		X
weir height				X
orifice area (m^2)	0.006	X	x	X

Elevation Discharge Table - Storm Routing

	Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total	
		H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	H [m]	Q [m^3/s]	Q [L/s]	
#	90.25	0.41	0.011	x	x			x	x	10.89	
	90.26	0.42	0.01	x	x			x	x	11.02	
	90.27	0.44	0.01	x	x			x	x	11.15	
	90.28	0.45	0.01	x	x			x	x	11.28	
	90.29	0.46	0.01	x	x			x	x	11.40	
	90.30	0.47	0.01	x	x			x	x	11.53	
	90.31	0.48	0.01	x	x			x	x	11.65	
	90.32	0.49	0.01	x	x			x	x	11.77	
	90.33	0.50	0.01	x	x			x	x	11.90	
	90.34	0.51	0.01	x	x			x	x	12.01	
	90.35	0.52	0.01	x	x			x	x	12.13	
	90.36	0.53	0.01	x	x			x	x	12.25	
	90.37	0.54	0.01	x	x			x	x	12.37	
	90.38	0.55	0.01	x	x			x	x	12.48	
	90.39	0.56	0.01	x	x			x	x	12.60	
	90.40	0.57	0.01	x	x			x	x	12.71	
	90.41	0.58	0.01	x	x			x	x	12.82	
	90.42	0.59	0.01	x	x			x	x	12.93	
	90.43	0.60	0.01	x	x			x	x	13.04	
	90.44	0.61	0.01	x	x			x	x	13.15	
	90.45	0.62	0.01	x	x			x	x	13.26	5-Year
	90.46	0.63	0.01	x	x			x	x	13.37	
	90.47	0.64	0.01	x	x			x	x	13.47	
	90.48	0.65	0.01	x	x			x	x	13.58	
	90.49	0.66	0.01	x	x			x	x	13.68	
	90.50	0.67	0.01	x	x			x	x	13.79	
	90.51	0.68	0.01	x	x			x	x	13.89	
	90.52	0.69	0.01	x	x			x	x	13.99	
	90.53	0.70	0.01	x	x			x	x	14.10	
	90.54	0.71	0.01	x	x			x	x	14.20	
	90.55	0.72	0.01	x	x			x	x	14.30	
	90.56	0.73	0.01	x	x			x	x	14.40	100-Year
	90.57	0.74	0.01	x	x			x	x	14.50	
	90.58	0.75	0.01	x	x			x	x	14.59	
	90.59	0.76	0.01	x	x			x	x	14.69	
	90.60	0.77	0.01	x	x			x	x	14.79	
	90.61	0.78	0.01	x	x			x	x	14.88	
	90.62	0.79	0.01	x	x			x	x	14.98	

Notes:
1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.
2. Orifice Equation: $Q = cA(2gh)^{1/2}$
3. Weir Equation: $Q = CLH^{3/2}$
4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.
5. H for orifice equations is depth of water above the centroide of the orifice.
6. H for weir equations is depth of water above the weir crest.

STORM SEWER DESIGN SHEET

PROJECT: CCO-23-3469
LOCATION: 1815 Montreal Road
CLIENT: CSV Architects

McINTOSH PERRY

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW								SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	19	20	21	22	23	24	25	26	27	28
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr)	
																		DIA	W	H			(L/s)	(%)
Montreal Road	B3	Trench Drain	CBMH4	0.63	0.02	0.01	0.01	10.00	0.06	10.06	104.19	122.14	178.56	3.35	3.35	76.51	8.00	200			5.00	2.359	73.16	95.62%
		CBMH4	MH3				0.01	10.06	0.10	10.16	103.90	121.79	178.04	3.34	3.34	48.39	8.82	200			2.00	1.492	45.05	93.10%
	B1	BLDG	MH3	0.90	0.18	0.16	0.16	10.00	0.07	10.07	104.19	122.14	178.56	46.12	46.12	64.86	8.42	200			2.00	2.000	18.74	28.89%
	B1+B3	MH3	MH5				0.17	10.16	0.13	10.29	103.38	121.19	177.15	49.08	49.08	64.86	15.78	200			2.00	2.000	15.78	24.32%
		MH5	Swale				0.17	10.29	0.08	10.37	102.70	120.39	175.98	48.76	48.76	64.86	10.13	200			2.00	2.000	16.10	24.82%
	B4	Trench Drain	CB1	0.65	0.10	0.07	0.07	10.07	0.08	10.15	103.82	121.71	177.92	19.70	19.70	31.78	8.52	150			4.00	1.742	12.08	38.01%
		CB1	MH2				0.07	10.15	0.30	10.45	103.40	121.21	177.18	19.62	19.62	22.47	21.85	150			2.00	1.232	2.85	12.69%
		MH2	CBMH7				0.07	10.45	0.19	10.64	101.89	119.43	174.57	19.33	19.33	31.78	20.16	150			4.00	1.742	12.44	39.16%
		CBMH7	Swale				0.07	10.64	0.06	10.70	100.93	118.30	172.91	19.15	19.15	20.72	4.30	150			1.70	1.136	1.57	7.56%

Definitions:
Q = 2.78CIA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed:
FV

Checked:
BC

Project No.:
CCO-23-3469

No.	Revision	Date
1.	ISSUED FOR REVIEW	2023.05.26

Date:
2023.05.08

Sheet No:
1 of 1

APPENDIX H
CITY OF OTTAWA DESIGN CHECKLIST

McINTOSH PERRY

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)
☐ 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.	Site Servicing Plan (C102)
☐ 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
☐ 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 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).	Site Grading Plan (C101)
☐ 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.	Site Grading Plan (C101)
☐ 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	Site Grading Plan (C101)

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

☐ 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.	Site Servicing Plan (C101)
☐ 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 Sewer

☐ 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
☐ 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 Sewer
☐ 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 Stormwater Sewer Design & 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.	Pre & Post-Development Plans
☐ 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
☐ 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
☐ 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
☐ 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.	Site Grading Plan
☐ 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
☐ Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Sewer Design & 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 Stormwater Sewer Design & 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 Stormwater Sewer Design & 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.	Site Grading Plan (C101)
☐ 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.	Section 8.0 Sediment & Erosion Control
☐ 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 9.0 Summary Section 10.0 Recommendations
☐ 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