

SERVICING & STORMWATER MANAGEMENT REPORT

1633/1635 LYCÉE CLAUDEL-SPA



Project No.: CCO-22-1100

City File No.: D07-12-22-0022

Prepared for:
Figurr Collectif D'architectes
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January 7, 2022

Revised May 10, 2022

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Figurr Collectif D'architectes to prepare a Servicing and Stormwater Management Report in support of the Site Plan Control application for the proposed modifications to the Lycée Claudel School, located at 1635 Lycée Claudel Place within the City of Ottawa.

The purpose of this report is to present the changes to the stormwater management system to support the proposed modifications to the site, which have been prepared 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 should be read in conjunction with the following drawings:

- CCO-22-1100, C101 – Site Grading and Drainage Plan, and
- CCO-22-1100, C102 – Site Servicing Plan.

1.2 Site Description

The subject property, herein referred to as the site, is located at 1635 Lycée Claudel Place within the Capital ward in the City of Ottawa and consists of approximately 2.89 ha. The site is located on Lycée Claudel Place (**Figure 1**) and is currently zoned for Institutional Use (I1A S173). Additional details are included on the Site Location Plan included in Appendix 'A'.



Figure 1: Site Location

Additional details are included on the Site Location Plan included in Appendix 'A'.

1.3 Proposed Development and Statistics

The proposed work on the site consists of an addition to the existing parking lot and refurbishment of the outdoor spaces as outline in the *Site Plan*.

1.4 Existing Conditions and Infrastructure

The site is located within the Lower Rideau River Sub-Watershed and is currently developed as a School. Sewer and watermain mapping data collected from the City of Ottawa indicate that the following services exist across the property frontages within the adjacent municipal right-of-ways:

- **Lycee Place**
 - 203mm diameter PVC water service connected to the 203mm diameter cast iron in the right of way.
 - 200mm diameter PVC sanitary service connected to the 300mm diameter concrete sewer within the right of way, tributary to the Rideau River Collector Twin and ultimately the interceptor sewer
 - A 375mm diameter PVC storm service and a 300mm diameter storm service that drain the 600mm diameter concrete storm sewer, tributary to the rideau river.

2.0 BACKGROUND STUDIES

Background studies and surveys that have been completed for the proposed site include topographical survey, and geotechnical report.

City of Ottawa as-built drawings of existing services within the vicinity of the proposed site were collected and reviewed in order to determine the availability of municipal services in order to develop the proposed servicing and stormwater management designs for the site.

A topographic survey of the site was completed by JD Branes Ltd., dated June 18th, 2021.

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on August 19, 2021 regarding the proposed site plan, direction for specific design parameters to be incorporated within this design, include the following:

- Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
- Post-development runoff up to and including the 100-year storm event to be restricted to the 5-year pre-development flow rate. Time of concentration calculated and not less than 10 minutes. Pre-development runoff coefficient to be determine but not more than 0.5.

The notes from the City of Ottawa can be found in Appendix 'A'.

4.0 STORM SEWER DESIGN

4.1 Existing Storm Sewers

There are various existing storm sewers on site ranging from 300 to 375 mm in diameter. In the existing parking area, the storm sewers outlet at the southwest end of the subject property to the municipal storm sewer within Lycee Place. Along the east, south, and west of the existing building, the existing storm sewers collect and convey runoff to the northwest end of the subject property with an outlet to Lycee Place. Runoff along the northeast portion of the existing building is captured and conveyed to an existing storm outlet on the north side of the site.

4.2 Proposed Storm Sewers

The existing storm sewer systems will be modified and extended to capture and convey post development runoff to the existing infrastructure on site and within Lycee Place. Existing CB's and MH's will be utilized where possible.

Runoff from the site will be collected utilizing surface ponding to attenuate flows before discharging to the existing storm sewer at a controlled rate. Catchbasins are proposed throughout the subject property to collect stormwater; the storm sewers will range from 300 mm to 375 mm in diameter. To achieve the required flow restriction an ICD will be placed in MH9. The required storage for the subject property will be provided by surface ponding.

The minor system is comprised of storm sewers and will be sized for the 5-year flow without any restriction. A storm sewer design sheet was created using the rational method and City of Ottawa 5-year storm event.

The storm design sheet calculates the proper sizing of the storm pipes within the development. Drainage area information, along with respective pipe slopes and other necessary information was utilized to evaluate the performance of the storm sewer network.

The time of concentration calculated for the storm sewer system is based on a 10 minute inlet time at the uppermost sewer run. Within the design sheet, pipe capacities and associated full flow velocities have been calculated. The design flow (peak flow) was checked against the theoretical capacity to ensure that each storm sewer pipe can convey the 5-year unrestricted flow.

See CCO-22-1100 - *POST* and *Storm Sewer Design Sheet* in Appendix 'C' of this report for more details. The Stormwater Management design for the subject property will be outlined in Section 6.0.

5.0 PROPOSED STORMWATER MANAGEMENT

5.1 Design Criteria and Methodology

Stormwater management for the proposed site will be maintained through positive drainage away from the existing building and into the new and existing underground storm sewer system. The storm system will capture the parking lot runoff and control flow using an inlet control device (ICD), to create surface ponding. The restricted flow will then release into a proposed storm sewer that connects to the existing 300 mm storm sewer located within Lycee Place. The emergency overland flow route for the proposed site will be directed west towards Lycee Place. The quantitative and qualitative properties of the storm runoff for both the pre & post development flows are further detailed below.

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

Quality Control

- Enhanced level of protection, 80% TSS removal.

Quantity Control

- Post-development flow 5/100-year is be restricted to match the 5-year pre-development flow with a maximum C value of 0.5. Refer to Appendix 'A' for correspondence.

5.2 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
Gravel	0.60
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.

As per the pre-consultation meeting with the City of Ottawa the time of concentration (Tc) used for pre- and post-development flows shall be calculated with a Tc of no less than 10 minutes.

5.3 Pre-Development Drainage

The existing site drainage limits are demonstrated on the Pre-Development Drainage Area Plan. A summary of the Pre-Development Runoff Calculations can be found below.

Table 1: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (2/5-Year)	Runoff Coefficient (100-Year)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
A1	0.11	0.62	0.70	20.04	38.78
A2	0.91	0.52	0.60	138.42	270.32
Total	1.02			158.46	309.10

See CCO-22-1100 - PRE in Appendix 'B' and Appendix 'D' for calculations.

5.4 Post-Development Drainage

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. See CCO-22-1100 - POST in Appendix 'C' of this report for more details. A summary of the Post-Development Runoff Calculations can be found below.

Table 2: Post-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient (2/5-Year)	Runoff Coefficient (100-Year)	5-year Peak Flow (L/s)	100-year Peak Flow (L/s)
B1	0.11	0.60	0.68	19.53	37.86
B2	0.26	0.55	0.63	42.01	81.77
B3	0.65	0.65	0.73	122.09	235.69
Total	1.02			183.63	355.32

See Appendix 'D' for calculations.

Runoff for area B1 will be left unrestricted as per existing conditions (Area A1). The work on site will result a net decrease of flow from this area, 20.04 L/s and 38.78 L/s to 19.53 L/s and 37.86 L/s. As such, this area will be removed from the restriction calculation.

Area B2 will be unrestricted similar to existing conditions for this area. It will be captured and conveyed to the northwestern outlet on the site using a combination of proposed and existing storm infrastructure. The flow will ultimately drain to the existing 525 mm storm sewer within Lycee Place.

Area B3 will be restricted to account for the flow from areas B2 and B3. The required storage will be provided within the parking area before discharging to the existing storm sewer within Riverside Drive at the southwest side of the site. The flow will be controlled by an ICD located within MH9. The quantity and quality control will be further detailed in Sections 7.5 and 7.6.

5.5 Quantity Control

Based on pre-consultation and correspondence with City staff the stormwater management criteria for the site requires the total post-development runoff to match the 5-year pre-development flow rate with a combined maximum C value of 0.5. (See Appendix 'A' for pre-consultation notes). These values create the following allowable release rate and storage volumes for the development site.

Table 3: Allowable Runoff

Drainage Area	Area (ha)	Runoff Coefficient	5-year Peak Flow (L/s)
A2	0.91	0.50	131.99

See Appendix 'D' for calculations. Attenuating site flows will be achieved using flow restrictions and will create the need for onsite storage. Runoff from areas B2 and B3 will be restricted as shown in the table below.

Table 4: Post-Development Restricted Runoff Summary

Drainage Area	Post Development Unrestricted Flow (L/s)		Post Development Restricted Flow (L/s)	
	5-Year	100-Year	5-Year	100-Year
B2	42.01	81.77	42.01	81.77
B3	122.09	235.69	46.76	48.52
Total	164.10	317.46	88.77	130.28

See Appendix 'D' for calculations. Runoff from Area B3 will be restricted at the outlet of CBMH8 through a 148 mm inlet control device that will restrict flow to the specified release rate (Design Head of 1.13m). This orifice plug will restrict the area to 46.76 L/s and 48.52 L/s for the 5 and 100-year storm events respectively. The restriction creates a water surface elevation (WSEL) of 60.63 m for the 5-year storm event and 60.71 m for the 100-year storm event. See below table for details of the required and provided storage volumes.

Note, the 2-year storm event will not create surface ponding as the storage has been captured within the infrastructure (See Appendix 'D' for details).

Table 5: Storage Summary

Drainage Area	Depth of Ponding (m)	Storage Required (m ³)	Storage Available (m ³)	Depth of Ponding (m)	Storage Required (m ³)	Storage Available (m ³)
	5-Year			100-Year		
B3	0.16	46.4	47.3	0.24	132.9	145.1

See Appendix 'D' for calculations.

If there is a rainfall above the 100-year storm event, or a blockage within the storm sewer system, an emergency overland flow route has been provided so that the storm water runoff will be conveyed towards the site's west entrance at Lycee Place for area B1 to B3.

5.6 Quality Control

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.

A quality treatment unit have been sized to provide a TSS removal rate of 80% as per RVCA requirements. The OGS Units will provide a water quality of at least 80% TSS. The OGS unit will be placed downstream of the parking lot restriction. Detailed sizing information for the OGS Units have been requested from the manufacturer but were not available at the time of publication.

6.0 EROSION AND SEDIMENT CONTROL

6.1 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 catchbasins and filter fabric is to be placed under the grates of all existing catchbasins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures is 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.

6.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip rapped area. Additional rip rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / City or Conservation Authority.

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.

7.0 SUMMARY

- A new outdoor playground and parking area will be constructed around the existing school.
- Existing water and sanitary services will remain.
- Two proposed storm sewers, ranging in diameter from 300 mm to 525 mm, will be installed throughout the site and drain to the existing storm sewers on Lycee Place.
- Storage for the 5- through 100-year storm events will be provided within the parking lot area above the proposed storm structures. The 2-year storm will be stored in the storm infrastructure.

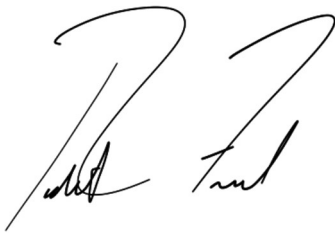
8.0 RECOMMENDATION

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 Sobeys Cross Dock Development.

This report is respectfully being submitted for approval.

Regards,

McIntosh Perry Consulting Engineers Ltd.



Robert D. Freel, P.Eng.
Senior Project Manager
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E: r.freel@mcintoshperry.com



Nicholas Vachon
Engineering Intern, Land Development
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9.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Figurr Architects Collective. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, City of Ottawa and local approval agencies. 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
BACKGROUND DOCUMENTS**

Subject: FW: 1635 Riverside Drive (Lycée Claudel d'Ottawa)

From: Robert Freel <r.freel@mcintoshperry.com>
Sent: January 5, 2022 3:28 PM
To: Nicholas Vachon <n.vachon@mcintoshperry.com>
Subject: FW: 1635 Riverside Drive (Lycée Claudel d'Ottawa)

Hi Nick,

Just and FYI, I don't think the SWM criteria below is different than we previously used but just in case.

Robert Freel, P.Eng.

Senior Project Manager, Land Development

T. 613.714.6174 | C. 613.915.3815

Turning Possibilities Into Reality

From: Timothy Beed <beed@fotenn.com>
Sent: January 4, 2022 11:13 AM
To: Robert Freel <r.freel@mcintoshperry.com>
Cc: Stéphanie Desautels <sdesautels@figurr.ca>
Subject: FW: 1635 Riverside Drive (Lycée Claudel d'Ottawa)

Hi Bobby,

Below is the submission requirement list previously sent from the City:

The submission requirements will be:

- Planning Rationale - **Fotenn**
- Survey - **TBD**
- Site Plan - **Figurr**
- Landscape Plan - **Gino**
- TIA Screening Form - **Fotenn**
- Site Grading Plan – **Mcintosh Perry**
- Erosion and Sediment Control Plan – **Mcintosh Perry**
- Site Stormwater Management Report – **Mcintosh Perry**

Please control post-development runoff from the subject site, up to and including the 100-year storm event, to a 5-year pre-development level. The pre-development runoff coefficient will need to be determined as per existing conditions but in no case more than 0.5. [If 0.5 applies it needs to be clearly demonstrated in the report that the pre-development runoff coefficient is greater than 0.5]. The time of concentration (Tc) used to determine the pre-development condition should be calculated. Tc should not be less than 10 min. since IDF curves become unrealistic at less than 10 min; Tc of 10 minutes shall be used for all post-development calculations].

Any storm events greater than the established 5-year allowable release rate, up to and including the 100-year storm event, shall be detained on-site. The SWM measures required to avoid impact on downstream sewer system will be subject to review.

Please note that as per Technical Bulletin PIEDTB-2016-01 section 8.3.11.1 (p.12 of 14) there shall be no surface ponding on private parking areas during the 5-year storm rainfall event.

Best,
Timothy Beed, MCIP RPP
Senior Planner
Cell: 902-440-3282

T 613.730.5709 ext. 243

OUT OF OFFICE ALERT - COVID-19

Please be advised that Fotenn staff are currently working remotely in accordance with government recommendations for social distancing. Otherwise I am working regularly and am available by email, phone or video conference.

Please use code “ *5709 ” to access Fotenn’s head office building at 396 Cooper Street, Suite 300 in Ottawa.

Conservation Partners Partenaires en conservation



File: 22-OTT-SPC-0232

April 26th, 2022

City of Ottawa
Planning, Infrastructure and Economic Development Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: Steve Gauthier

Subject: Lycee Claudel
Site Plan Control Application D07-12-22-0022
1635 Lycee Place, City of Ottawa

Dear Mr. Gauthier:

The Conservation Partners Planning and Development Review Team has completed a review of the above noted application to construct a new play space and revised parking lot for the school on site. A total of 127 parking spaces and 138 bike racks are proposed, alongside fenced play areas and refurbishment of the outdoor spaces.

We have undertaken our review within the context of Sections 1.6.6 Sewage, Water and Stormwater, 2.1 Natural Heritage, 2.2 Water and 3.1 Natural Hazards of the Provincial Policy Statement, 2020 issued under Section 3 of the *Planning Act*, and from the perspective of the Conservation Authority regulations. The following comments are offered for your consideration.

Natural Heritage

There have been no natural heritage features identified on this property which would preclude this application.

Natural Hazards

There have been no natural hazards identified on the site which would preclude this application.

Stormwater Management

The stormwater management report “*Servicing & Stormwater Management Report – 1633 Lycee Claudel – SPA*” dated January 7th, 2022, prepared by McIntosh Perry Consulting Engineers Ltd. indicates that no water quality control measures are required. The RVCA has reviewed the storm sewer layer for the receiving storm sewer and notes that the downstream outlet to the Rideau River is less than 1 km from the site. When there is no downstream stormwater management facility and the receiving watercourse is less than 1 km from the site, the RVCA typically requires on-site water quality control measures for a water quality target of ‘enhanced’ (80% TSS Removal). Therefore, the stormwater management strategy for this site needs to be amended to provide on-site water quality treatment.

The RVCA did not conduct a technical review of the stormwater management plan for this site. We will rely on the City of Ottawa to ensure that the stormwater management is consistent with the design assumptions of the receiving storm sewers.

Conclusion

In conclusion, the RVCA recommends this application be placed ON HOLD until the stormwater management strategy has incorporated the appropriate water quality measures. The Conservation Authority kindly requests a copy of any decision related to this file. For any questions regarding the information contained in this letter, please feel free to contact me.

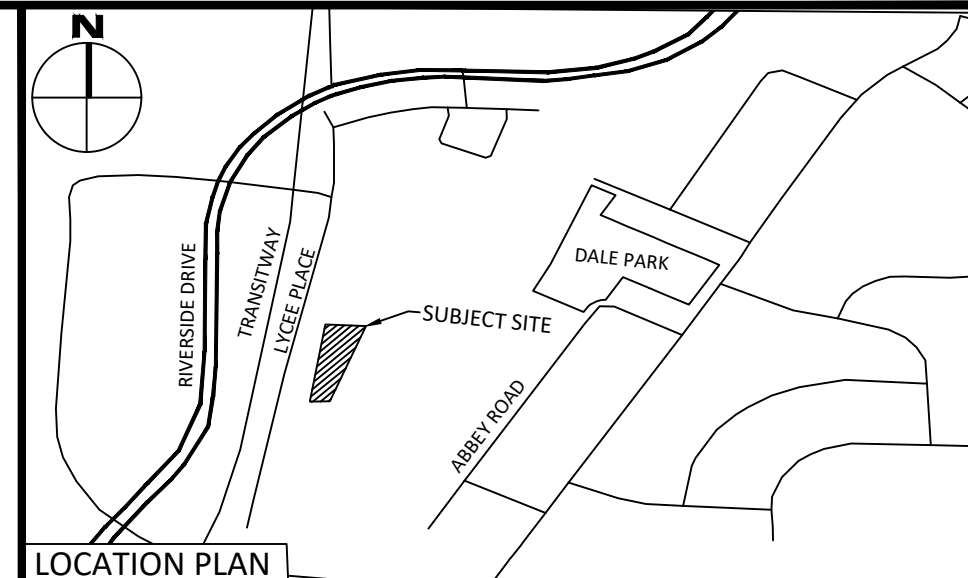
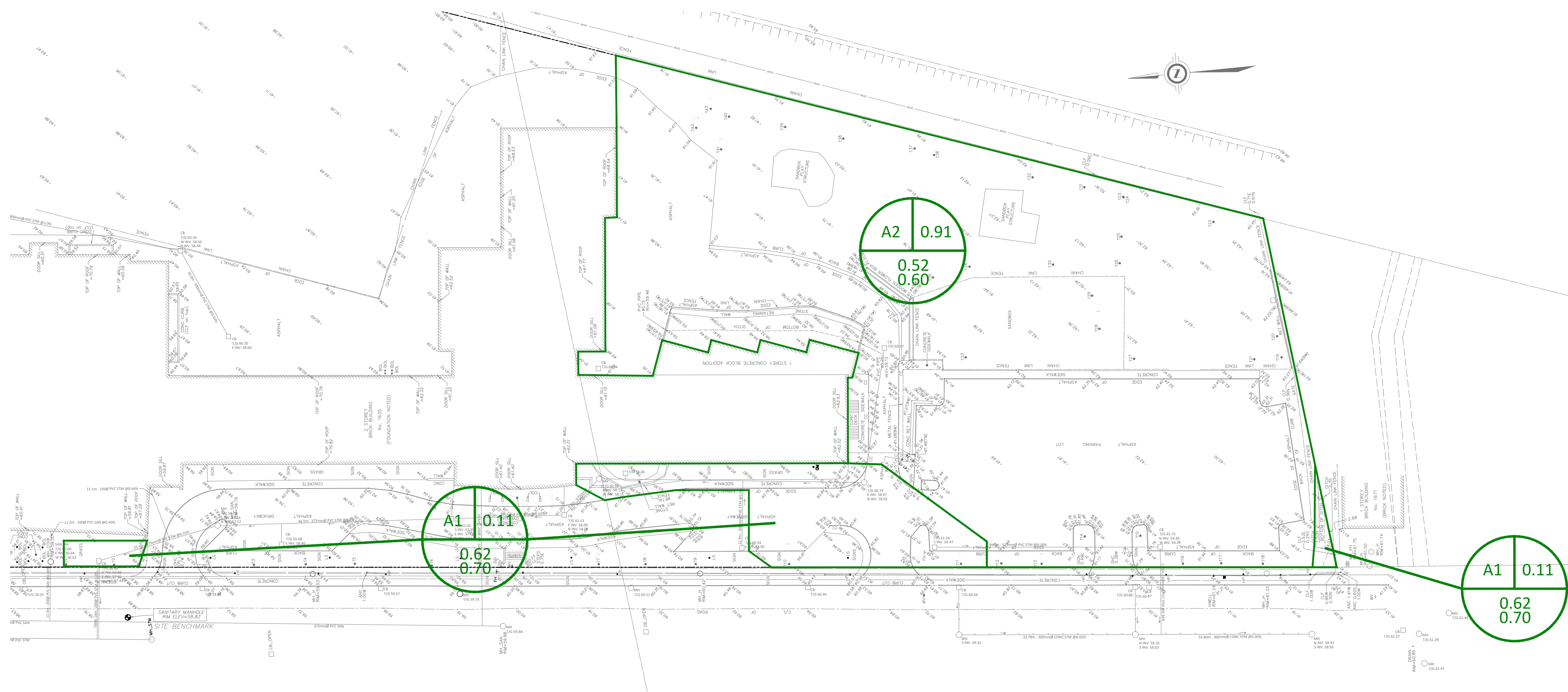
Respectfully,



Jamie Batchelor, MCIP, RPP
Planner, Planning and Watershed Science
Rideau Valley Conservation Authority
613-692-3571 ext. 1191
Jamie.batchelor@rvca.ca

Cc: Timothy Beed: Fotenn

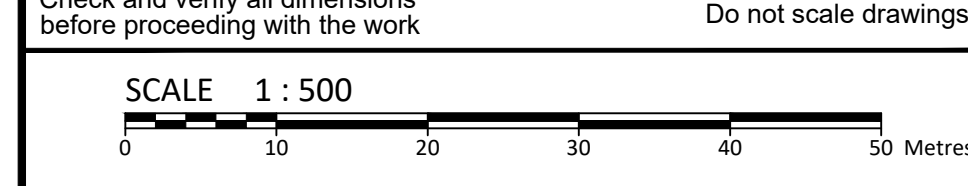
**APPENDIX B
PRE-DEVELOPMENT DRAINAGE PLAN**



LEGEND

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revisions	Date
3	REVISED PER COMMENTS	MAY 10, 2022
2	ISSUED FOR REVIEW	JAN 07, 2022
1	ISSUED FOR REVIEW	OCT. 15, 2021



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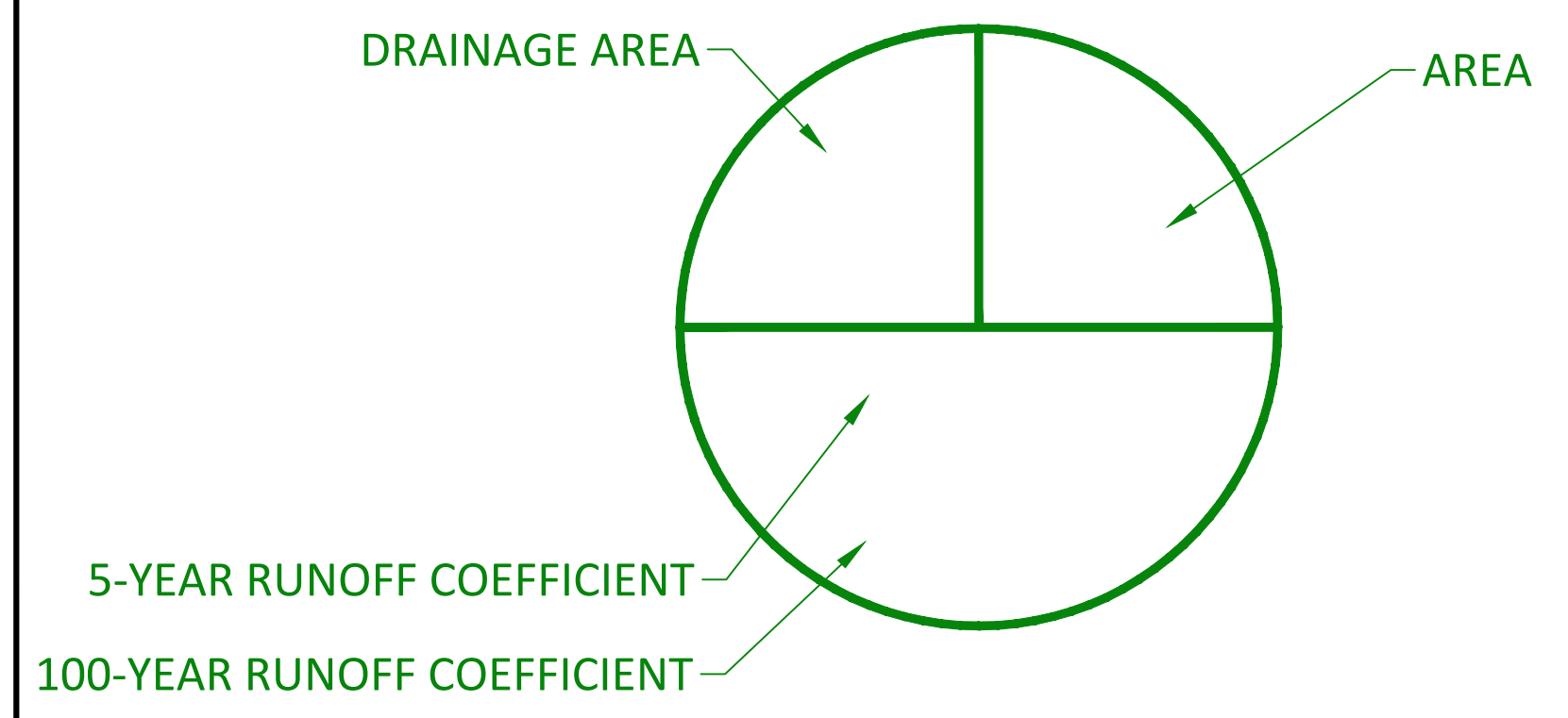
Client: **FIGUR ARCHITECTS COLLECTIVE**
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Project: **1633/1635 LYCEE PLACE**
 OTTAWA, ON K1G 0E5
 613-733-8522

Drawing Title: **PRE-DEVELOPMENT DRAINAGE PLAN**

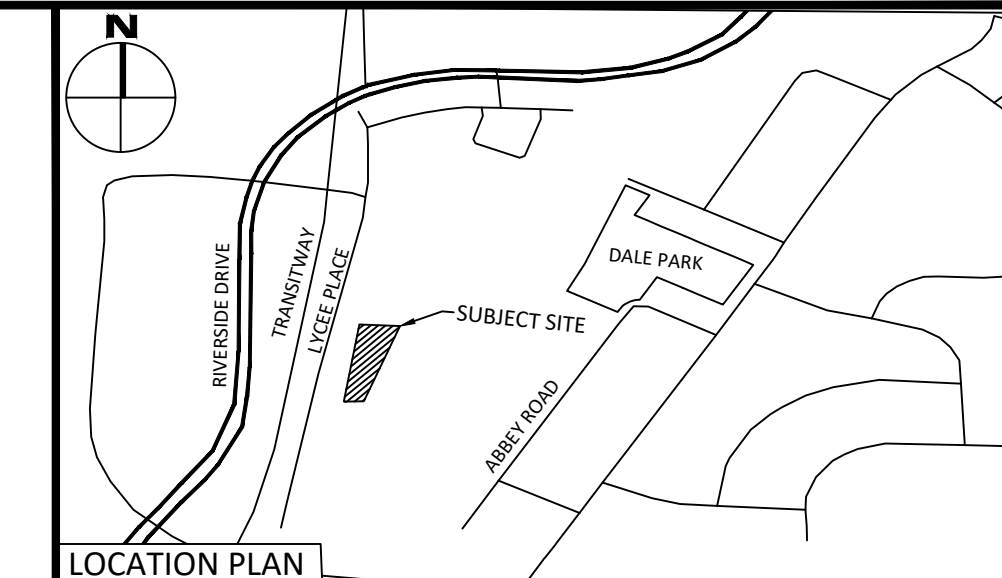
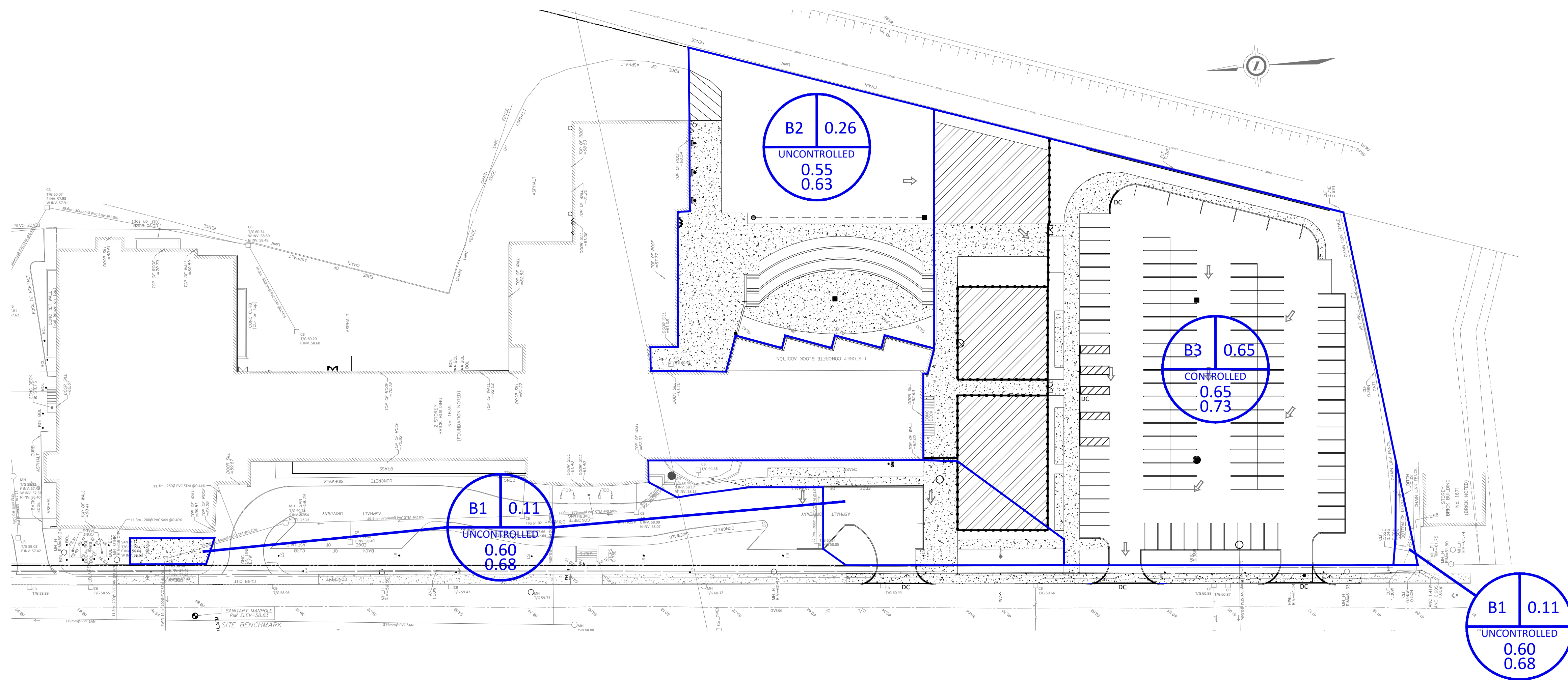
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Checked By: R.F.	Drawing Number:
Designed By: N.V.	PRE

LEGEND:



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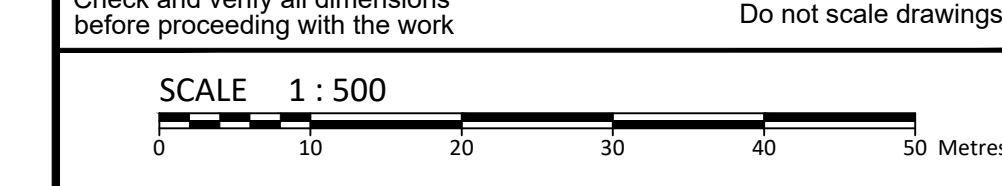
APPENDIX C
POST-DEVELOPMENT DRAINAGE PLAN



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3	REVISED PER CITY COMMENTS	MAY 10, 2022
2	ISSUED FOR REVIEW	JAN 07, 2022
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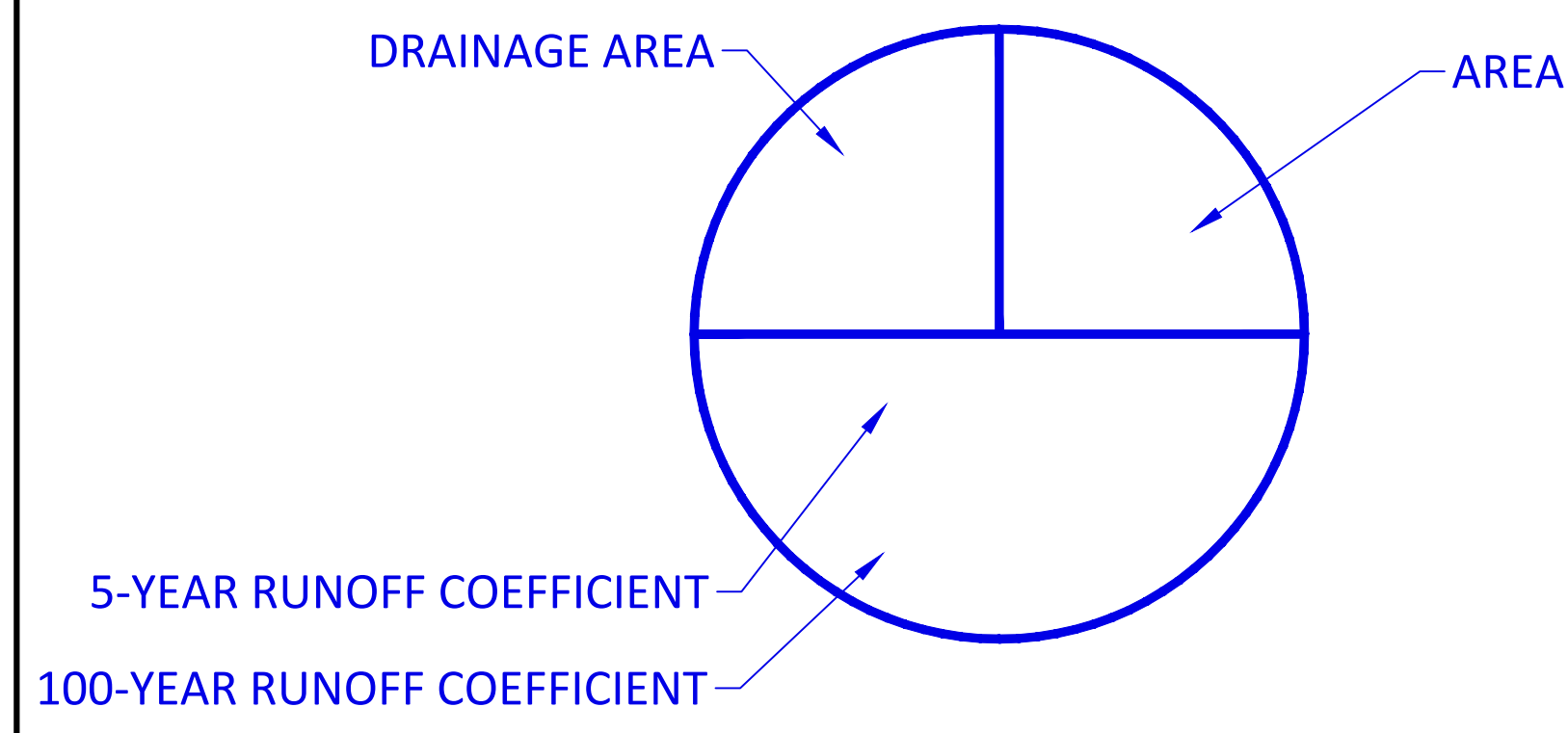
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Project: **1633/1635 LYCEE PLACE**
 OTTAWA, ON K1G 0E5
 613-733-8522

Drawing Title: **POST-DEVELOPMENT DRAINAGE PLAN**

Scale: 1:500	Project Number: CCO-22-1100
Drawn By: N.V.	POST
Checked By: R.F.	
Designed By: N.V.	

LEGEND:



FILENAME: C:\Users\perry\OneDrive - mcintoshperry.com\Documents\2022\CCO-22-1100\FIGUR_ARCHITECTS_COLLECTIVE\CCO-22-1100_PRESENTATION.dwg
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APPENDIX D
STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

CCO-22-1100 - 1633/1635 Lycee Place - SWM Design

1 of 4

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m ²)	C	Gravel Area (m ²)	C	Pervious Area (m ²)	C	C _{AVG} 5-Year	C _{AVG} 100-Year
A1	0.11	667.50	0.90	0.00	0.60	455.20	0.20	0.62	0.70
A2	0.91	4,223.00	0.90	0.00	0.60	4,890.30	0.20	0.52	0.60

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2&5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
A1	0.11	0.62	0.70	10	104.2	178.6	20.04	38.78
A2	0.91	0.52	0.60	10	104.2	178.6	138.42	270.32
Total	1.02						158.46	309.10

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m ²)	C	Gravel Area (m ²)	C	Pervious Area (m ²)	C	C _{AVG} 5-Year	C _{AVG} 100-Year
B1	0.11	642.64	0.90	0.00	0.60	480.06	0.20	0.60	0.68
B2	0.26	1,324.00	0.90	0.00	0.60	1,293.00	0.20	0.55	0.63
B3	0.65	4,165.30	0.90	0.00	0.60	2,331.00	0.20	0.65	0.73
Total	1.02								

Post-Development Runoff Calculations

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
B1	0.11	0.60	0.68	10	104.2	178.6	19.53	37.86
B2	0.26	0.55	0.63	10	104.2	178.6	42.01	81.77
B3	0.65	0.65	0.73	10	104.2	178.6	122.09	235.69
Total	1.02						183.63	355.32

Required Restricted Flow

Drainage Area	Area (ha)	C 5-Year	C 100-Year	Tc (min)	I (mm/hr)		Q (L/s)	
					5-Year	100-Year	5-Year	100-Year
					A1	0.11	0.62	0.70
A2	0.91	0.50	0.50	10	104.2	178.6	131.99	226.19

Existing Unrestricted Area
Remainder of Site to be restricted

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
B1	19.53	37.86	19.53	37.86	X	X	X	X
Total	19.53	37.86	19.53	37.86	0.00	0.00	0.00	0.00
B2	42.01	81.77	42.01	81.77	X	X	X	X
B3	122.09	235.69	46.76	48.52	46.36	132.90	47.26	145.10
Total	164.10	317.46	88.77	130.28	46.36	132.90	47.26	145.10

Existing unrestricted Area, matching A1

Unrestricted
Restricted

Storage Requirements for Area B3

2-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m ³)
10	76.8	90.00	43.04	46.96	28.18
11	73.2	85.73	43.04	42.70	28.18
12	69.9	81.90	43.04	38.86	27.98
13	66.9	78.43	43.04	35.39	27.60
14	64.2	75.27	43.04	32.23	27.07
15	61.8	72.38	43.04	29.34	26.41
16	59.5	69.72	43.04	26.69	25.62
17	57.4	67.28	43.04	24.24	24.73
18	55.5	65.02	43.04	21.98	23.74

Maximum Storage Required 5-Year (m³) = 28.18

5-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m ³)
10	104.2	122.09	46.76	75.33	45.20
11	99.2	116.23	46.76	69.47	45.85
12	94.7	110.96	46.76	64.20	46.22
13	90.6	106.20	46.76	59.44	46.36
14	86.9	101.87	46.76	55.10	46.29
15	83.6	97.91	46.76	51.15	46.03
16	80.5	94.28	46.76	47.52	45.62
17	77.6	90.94	46.76	44.18	45.06
18	75.0	87.85	46.76	41.09	44.37

Maximum Storage Required 5-Year (m³) = 46.36

100-Year Storm Event

Tc (min)	I (mm/hr)	B3 Runoff (L/s)	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m ³)
20	120.0	158.33	48.52	109.81	131.78
21	116.3	153.51	48.52	104.99	132.29
22	112.9	149.00	48.52	100.48	132.64
23	109.7	144.77	48.52	96.26	132.84
24	106.7	140.81	48.52	92.29	132.90
25	103.8	137.07	48.52	88.56	132.84
26	101.2	133.55	48.52	85.04	132.66
27	98.7	130.23	48.52	81.71	132.37
28	96.3	127.08	48.52	78.56	131.99
29	94.0	124.09	48.52	75.58	131.51

Maximum Storage Required 100-Year (m³) = 132.90

CCO-22-1100 - 1633/1635 Lycee Place - Site Storage

2-Year Storm Event

Structure/Pipe	Size (mm)	Depth/Length (m)	Area (m ²)	Volume (m ³)
CB7	600x600	1.080	0.372	0.402
CB7 - CBMH8	525	31.330	0.866	27.124
CBMH8	1200	1.130	1.167	1.319

Storage Available (m³) = 28.8
Storage Required (m³) = 28.2

5-Year Storm Event Storage Summary

T/G = 60.47	Water Elev. (m) =		60.63		
Location	INV. (out)	Area (m ²)	Depth (m)	Head (m)	Volume (m ³)
Parking Lot Ponding	59.42	877.0	0.16	1.05	47.3

Storage Available (m³) = 47.3 *
Storage Required (m³) = 46.4

100-Year Storm Event Storage Summary

T/G = 60.47	Water Elev. (m) =		60.71		
Location	INV. (out)	Area (m ²)	Depth (m)	Head (m)	Volume (m ³)
Parking Lot Ponding	59.42	1621.0	0.24	1.13	145.1

Storage Available (m³) = 145.1 *
Storage Required (m³) = 132.9

*Available Storage calculated from AutoCAD

McINTOSH PERRY

CCO-22-1100 - 1633/1635 Lycee Place - Outlet Control Device

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

4 of 4

	Orifice 1	Orifice 2	Weir 1	Weir 2
invert elevation	59.51	X	x	X
center of crest elevation	59.58	X	X	X
orifice width / weir length	148 mm	X	x	X
weir height				X
orifice area (m ²)	0.017	X	x	X

Elevation Discharge Table - Storm Routing

Elevation	Orifice 1		Orifice 2		Weir 1		Weir 2		Total Q [L/s]	
	H [m]	Q [m ³ /s]	H [m]	Q [m ³ /s]	H [m]	Q [m ³ /s]	H [m]	Q [m ³ /s]		
60.47	0.89	0.043	x	x	x	x	x	x	43.04	
60.48	0.90	0.043	x	x	x	x	x	x	43.28	
60.49	0.91	0.044	x	x	x	x	x	x	43.52	
60.50	0.92	0.044	x	x	x	x	x	x	43.76	
60.51	0.93	0.044	x	x	x	x	x	x	44.00	
60.52	0.94	0.044	x	x	x	x	x	x	44.23	
60.53	0.95	0.044	x	x	x	x	x	x	44.47	
60.54	0.96	0.045	x	x	x	x	x	x	44.70	
60.55	0.97	0.045	x	x	x	x	x	x	44.94	
60.56	0.98	0.045	x	x	x	x	x	x	45.17	
60.57	0.99	0.045	x	x	x	x	x	x	45.40	
60.58	1.00	0.046	x	x	x	x	x	x	45.63	
60.59	1.01	0.046	x	x	x	x	x	x	45.86	
60.60	1.02	0.046	x	x	x	x	x	x	46.09	
60.61	1.03	0.046	x	x	x	x	x	x	46.31	
60.62	1.04	0.047	x	x	x	x	x	x	46.54	
60.63	1.05	0.047	x	x	x	x	x	x	46.76	5-Year
60.64	1.06	0.047	x	x	x	x	x	x	46.98	
60.65	1.07	0.047	x	x	x	x	x	x	47.21	
60.66	1.08	0.047	x	x	x	x	x	x	47.43	
60.67	1.09	0.048	x	x	x	x	x	x	47.65	
60.68	1.10	0.048	x	x	x	x	x	x	47.87	
60.69	1.11	0.048	x	x	x	x	x	x	48.08	
60.70	1.12	0.048	x	x	x	x	x	x	48.30	
60.71	1.13	0.049	x	x	x	x	x	x	48.52	100-Year
60.72	1.14	0.049	x	x	x	x	x	x	48.73	
60.73	1.15	0.049	x	x	x	x	x	x	48.94	
60.74	1.16	0.049	x	x	x	x	x	x	49.16	
60.75	1.17	0.049	x	x	x	x	x	x	49.37	
60.76	1.18	0.050	x	x	x	x	x	x	49.58	
60.77	1.19	0.050	x	x	x	x	x	x	49.79	
60.78	1.20	0.050	x	x	x	x	x	x	50.00	
60.79	1.21	0.050	x	x	x	x	x	x	50.21	
60.80	1.22	0.050	x	x	x	x	x	x	50.42	

- 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 centroid of the orifice.
 6. H for weir equations is depth of water above the weir crest.

STORM SEWER DESIGN SHEET

PROJECT: Lycee Place
LOCATION: 1633/1635 Lycee Place
CLIENT: Figurr Architects



LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	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)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED 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)	(%)
	B2	CB3	MH4	0.90	0.08	0.08	0.08	10.00	0.57	10.57	104.19	122.14	178.56	21.98	33.38	48.80		21.98	55.26	26.09	300			0.30	0.757	33.28	60.23%
	B2	LCB1	LCB2	0.55	0.18	0.10	0.10	10.00	0.46	10.46	104.19	122.14	178.56	28.47	33.38	48.80		28.47	100.88	38.54	300			1.00	1.383	72.41	71.77%
	B2	LCB2	MH4			0.00	0.10	10.46	0.31	10.77	101.80	119.32	174.42	27.82	32.61	47.67		27.82	100.88	25.65	300			1.00	1.383	73.06	72.42%
	B2	MH4	MH5			0.00	0.17	10.57	0.59	11.17	101.25	118.68	173.47	49.03	57.47	84.00		49.03	55.26	26.96	300			0.30	0.757	6.23	11.27%
	B2	MH5	Ex. MH6			0.00	0.17	11.17	1.16	12.32	98.41	115.33	168.55	47.65	55.84	81.61		47.65	55.26	52.53	300			0.30	0.757	7.61	13.77%
	B3	CB7	CBMH8	0.65	0.65	0.42	0.42	10.00	0.37	10.37	104.19	122.14	178.56	122.09	143.12	209.23		48.52	317.25	31.33	525			0.50	1.420	268.73	84.71%
	B3	CBMH8	MH9			0.00	0.42	10.37	0.32	10.69	102.29	119.90	175.27	119.86	140.49	205.37		48.52	71.33	18.62	300			0.50	0.978	22.82	31.99%
	B3	MH9	Ex. Tee			0.00	0.42	10.69	0.36	11.04	100.71	118.04	172.53	118.01	138.31	202.16		48.52	58.82	17.30	300			0.34	0.806	10.31	17.52%
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: NV				No.				Revision				Date							
								Checked: RF				1. Submission 1 2022-01-07				2. REVISED PER CITY COMMENTS 2022-05-10											
								Project No.: CCO-22-1100																			
																				Date: 2022-01-07				Sheet No: 1 of 1			

APPENDIX E
CITY OF OTTAWA DESIGN CHECKLIST

City of Ottawa

4. Development Servicing Study Checklist

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

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

4.1 General Content

Criteria	Location (if applicable)
<input type="checkbox"/> Executive Summary (for larger reports only).	N/A
<input type="checkbox"/> Date and revision number of the report.	On Cover
<input type="checkbox"/> Location map and plan showing municipal address, boundary, and layout of proposed development.	Appendix E
<input type="checkbox"/> Plan showing the site and location of all existing services.	Site Servicing Plan (C102)
<input type="checkbox"/> Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management
<input type="checkbox"/> Summary of pre-consultation meetings with City and other approval agencies.	Appendix A
<input type="checkbox"/> Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defensible design criteria.	1.1 Purpose 1.2 Site Description 6.0 Stormwater Management

<input type="checkbox"/> Statement of objectives and servicing criteria.	3.0 Pre-Consultation Summary
<input type="checkbox"/> Identification of existing and proposed infrastructure available in the immediate area.	N/A
<input type="checkbox"/> Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
<input type="checkbox"/> Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
<input type="checkbox"/> Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A
<input type="checkbox"/> Proposed phasing of the development, if applicable.	N/A
<input type="checkbox"/> Reference to geotechnical studies and recommendations concerning servicing.	Section 2.0 Background Studies
<input type="checkbox"/> All preliminary and formal site plan submissions should have the following information: <ul style="list-style-type: none"> ○ Metric scale ○ North arrow (including construction North) ○ Key plan ○ Name and contact information of applicant and property owner ○ Property limits including bearings and dimensions ○ Existing and proposed structures and parking areas ○ Easements, road widening and rights-of-way ○ Adjacent street names 	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)

4.2 Development Servicing Report: Water

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

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

4.3 Development Servicing Report: Wastewater

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

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

4.4 Development Servicing Report: Stormwater Checklist

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

<input type="checkbox"/> Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Site Grading, Drainage, Sediment & Erosion Control Plan
<input type="checkbox"/> Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Section 6.0 Stormwater Management Appendix F
<input type="checkbox"/> Any proposed diversion of drainage catchment areas from one outlet to another.	Section 6.0 Stormwater Management
<input type="checkbox"/> Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 6.0 Stormwater Management
<input type="checkbox"/> If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	Appendix A
<input type="checkbox"/> Identification of potential impacts to receiving watercourses	N/A
<input type="checkbox"/> Identification of municipal drains and related approval requirements.	N/A
<input type="checkbox"/> Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 6.0 Stormwater Management
<input type="checkbox"/> 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Site Grading, Drainage, Sediment & Erosion Control Plan (C101)
<input type="checkbox"/> Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A

<input type="checkbox"/> Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0 Sediment & Erosion Control
<input type="checkbox"/> Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
<input type="checkbox"/> Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

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

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

4.6 Conclusion Checklist

Criteria	Location (if applicable)
<input type="checkbox"/> Clearly stated conclusions and recommendations	Section 8.0 Summary Section 9.0 Recommendations
<input type="checkbox"/> Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	All are stamped
<input type="checkbox"/> All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped