SERVICING & STORMWATER MANAGEMENT REPORT
24 HAWTHORNE AVENUE, OTTAWA, ON

Project No.: CP-17-0197 – 24 Hawthorne Avenue, Ottawa, ON

Prepared for:

TC United Group Ltd.
800 Industrial Avenue, Unit 9
Ottawa, ON
K1G 4B8

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, ON K0A 1L0

November 27, 2018

McINTOSH PERRY

Developing a site within the City of Ottawa requires meeting a predefined set of requirements outlined in the City of Ottawa Sewer Design Guidelines (SDG) - 2012 along with meeting the local conservation authority requirements (Rideau Valley Conservation Authority - RVCA) and provincial requirements as required (Ministry of the Environment, Conservation and Parks– MECP). Site specific requirements are discussed and outlined in the pre-consultation meeting with the City of Ottawa before the detailed design process is initiated.

This report describes an innovative and cost-efficient design solution for the site servicing (water, sanitary, and storm) and stormwater management (SWM) requirements in order to develop this site. The limited property size and proposed building envelope pose challenges to the development of this site. Furthermore, the proximity of the adjacent driveways and building foundations will limit the grading options on both sides of the development.

A lack of available 'green space' and strict grading setbacks were identified by the regulatory agencies, therefore effective engineering solutions were subsequently designed. Evaluation of the proposed site plan in addition to a review of the site grading and soil characteristics was completed. Our review identified that rooftop flow control is the optimal design solution to meet the SWM requirements. The proposed flow control measures will aid in the thermal protection of the natural environment along with the increased greenspace on the property. The existing site services will also be maintained to reduce the impact on the municipal services and roadway.

The evaluation of the proposed development, existing site characteristics and surrounding municipal infrastructure suggests that the SWM design elements consisting of rooftop storage will not only be a possible design solution to the site constraints but will also contribute to the health of the local watercourse. The existing sanitary and water services will utilize the existing infrastructure surrounding the site to service the development. Therefore, it is our professional opinion that this site located at 24 Hawthorne Avenue is able to be developed and fully serviced to accommodate the future low-rise apartment building.

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1.0 PROJECT DESCRIPTION

1.1 Purpose

This report will address the servicing (water, sanitary, and storm) and stormwater management requirements associated with the proposed development located at 24 Hawthorne Avenue within the City of Ottawa.

1.2 Site Description

The property is located at 24 Hawthorne Avenue; it is described as Part of Lots 5 and 6, Registered Plan 220, City of Ottawa. The land in question covers approximately 0.03 ha and is located east of the intersection of Colonel By Drive and Hawthorne Avenue.

The existing site is currently developed as a two-storey residential dwelling and the site is made up of an asphalt driveway and detached garage at the rear of the property. The existing site is fully serviced from the existing services within Hawthorne Avenue. The existing services will be maintained.

The proposed development consists of a 156 m², four-storey low-rise apartment building. The depressed sidewalk at the existing site entrance will remain and some landscaping will be provided in the front yard.

Figure 1: Key Map: 24 Hawthorne Avenue, Ottawa

2.0 BACKGROUND STUDIES

Background studies that have been completed for the site include review of the City of Ottawa as-built drawings, a topographical survey of the site, a geotechnical report and a Phase I Environmental Site Assessment (ESA).

As-built drawings of the existing services within the vicinity of the site were reviewed in order to determine proper servicing and stormwater management schemes for the site.

A topographic survey of the site was completed by Annis, O'Sullivan, Vollebekk Ltd. dated September 28th, 2016 and can be found under separate cover.

The following reports have previously been completed and are available under separate cover:

- Geotechnical Investigation completed by Paterson Group dated May 2017.
- Phase I ESA completed by McIntosh Perry dated May 2017.

3.0 PRE-CONSULTATION SUMMARY

City of Ottawa Staff have been pre-consulted regarding this proposed development in person on March 13th, 2017 and again via email on April 12th, 2017. 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) of 10 minutes.
- Control 5 through 100-year post-development flows to the 5-year pre-development flows with a combined C value to a maximum of 0.50.
- Ponding of water shall not exceed 0.35 m depth for the 100-year storm event within the asphalt parking areas.

Correspondence with the City can be found in Appendix 'A'.

4.0 EXISTING SERVICES

The existing water, sanitary and storm services are extended from Hawthorne Avenue and will be reused to service the proposed development. A CCTV inspection of the existing services is required prior to construction to confirm their locations and adequacy.

4.1 Hawthorne Avenue

There are two existing 225 mm diameter sanitary mains as well as a 375 mm diameter concrete storm sewer located within Hawthorne Avenue.

There is also a 150 mm PVC diameter watermain within the westbound lane along with a 1,200 mm transmission main. The 150 mm diameter watermain services the fire hydrants located along the north side of Hawthorne Avenue. There is a fire hydrant located east of the site along the north boulevard of Hawthorne Avenue.

Hydro, gas, cable and bell services are also available along Hawthorne Avenue. It should be noted that there is a 600 mm abandoned gas main within the southern portion of Hawthorne Avenue.

5.0 SERVICING PLAN

5.1 Water Servicing

The existing 50 mm water service is connected to the existing 150 mm PVC watermain within Hawthorne Avenue, complete with a water valve located at the property line. A municipal hydrant is located within 61m of the principal entrance.

The proposed building will not be equipped with a sprinkler system for fire protection. The required fire protection from the Ontario Building Code (OBC) is 2,700 L/min (See Appendix 'B' for calculation). The required fire protection from the Fire Underwriters Survey (FUS) is 7,000 L/min (provided for information purposes only). Available flows from the hydrants along Hawthorne Avenue have been requested, however were not available for the submission of this report.

The water demands for the new buildings have been calculated as per the Ottawa Design Guidelines – Water Distribution and are as follows: the average and maximum daily demands are 0.09 L/s and 0.24 L/s respectively. The maximum hourly demand was calculated as 0.52 L/s (Refer to Appendix 'B' for flow details). Boundary conditions have been received from the City of Ottawa and are available within Appendix 'B' of this report. A water model was conducted using Bentley's WaterCAD and three scenarios were tested. The results for the average day and peak hourly scenarios confirmed the adequacy of service for the proposed development. By re-calculating the FUS with the updated procedure from the City of Ottawa technical bulletin ISTB 2018-02, the required fire protection was determined to be 6,545 L/min and rounded to the nearest 1,000 L/min resulting in a required fire protection flow of 7,000 L/min. As shown in the results (see Appendix 'B') the available flow was calculated at 6,969.40 L/min.

5.2 Sanitary Servicing

The existing 135 mm gravity sanitary service is connected to the existing 225 mm diameter sewer within Hawthorne Avenue.

The peak design flow for the proposed site was determined to be 0.103 L/s, however, for design purposes, a more conservative peak design flow of 0.46L/s was used. This flow takes into account the infiltration of the entire area and is also calculated based in 2.3p/p/u for residential area. Using the peak design flow, it was determined that the existing 135 mm diameter lateral has sufficient capacity to convey the flows (See

Appendix 'C' for detailed calculations). It is anticipated that there will be no issues with capacity constraints within the existing lateral or within the existing sanitary main within Hawthorne Avenue as the amount of flow leaving the site is minimal.

5.3 Storm Servicing

As the site's hard surface will decrease with the proposed development, the majority of site runoff within the development area will sheet flow to the existing infrastructure within Hawthorne Avenue. The roof portion will be captured and restricted via a roof drainage system before outletting to the existing storm main along Hawthorne Avenue via the existing 300 storm service. The City of Ottawa requirements state that the total post-development stormwater runoff from the 100-year storm event must be restricted to the pre-development 5-year storm event. Due to site constraints such as, a right-of-way easement, proximity of adjacent structures and using a maximum runoff coefficient of 0.5, the requirement stated above was unable to be achieved. Rationale for the proposed stormwater management scheme and further details will be provided within Section 6.0

The site will be constructed with adequate grading to ensure major overflow to the front west corner of the site. The direction and location of overland sheet flow has been indicated of the Site Grading Plan (C101).

6.0 STORMWATER MANAGEMENT

Stormwater management for this site will be maintained through positive drainage away from the proposed buildings and conveyed by way of sheet flow to the existing infrastructure with Hawthorne Avenue. This SWM plan will implement quantity control strategies. The roof will be equipped with two roof drains where the flows will be restricted and directed to the existing storm sewer within Hawthorne Avenue; similarly, overland flow will be directed towards existing infrastructure within Hawthorne Avenue. The quantitative and qualitative properties of the storm runoff for both the pre- and post-development flows are further detailed below.

6.1 Design Methodology

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

$$Q=2.78\ CIA\ (L/s)$$

C=Runoff coefficient
I=Rainfall intensity in mm/hr.
A=Drainage area in hectares

It is recognized that the rational method tends to overestimate runoff rates. As a by-product of using this extremely conservative prediction method, any facilities that are sized using these results are expected to function as intended in real world conditions.

In conjunction with the City of Ottawa Sewer Design Guidelines the following runoff coefficients were used to develop a balanced 'C' for each drainage area:

Building roofs, Asphalt, Concrete	0.90
Grass, undeveloped areas	0.20
Gravel	0.60

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-development and post-development flows shall be calculated using a time of concentration (Tc) of 10 minutes.

6.2 Site Drainage

6.2.1 *Pre-Development Drainage*

The existing site has been demonstrated as drainage area A1. Drawing CP-17-0197 PRE (Appendix 'D') indicates the limits of these drainage areas.

Table 1: Pre-Development Drainage Summary

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (L/s)	100-Year Flow Rate (L/s)
A1	0.033	0.80	0.89	7.72	14.71
Total	0.033			7.72	14.71

(See Appendix 'F' for Calculations)

6.2.2 *Post-Development Drainage*

The proposed site has been demonstrated as drainage areas B1-B5. Drawing CP-17-0197 Post (Appendix 'E') indicates the limits of these drainage areas.

Table 2: Post-Development Runoff Calculations

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (L/s)	100-Year Flow Rate (L/s)
B1	0.004	0.75	0.84	0.92	1.77
B2	0.016	0.90	1.00	4.07	7.75
B3	0.002	0.90	1.00	0.62	1.18
B4	0.003	0.77	0.86	0.63	1.21
B5	0.008	0.41	0.48	0.98	1.95
Total	0.033			7.23	13.87

(See Appendix 'F' for Calculations)

Runoff from area B2 will be restricted before outletting to the existing storm system within Hawthorne Avenue. The total flow leaving the site will be controlled by flow control drains on the proposed roof. See Appendix 'F' for calculations. This restriction and quality runoff control will be further detailed in Sections 6.3 and 6.4.

6.3 Quantity Control

After discussing the stormwater management criteria for the site with City staff, the total post-development runoff for this site is required to be restricted to match the 5-year pre-development flow rate with a combined C value of 0.5. (See Appendix 'A' for pre-consultation notes). These values generate the following allowable release rates for the development site.

Table 3: Allowable Release Rates

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	5-Year Flow Rate (L/s)
A2	0.03	0.50	4.82

(See Appendix 'F' for Calculations)

Reducing site flows will be achieved using flow restrictions and will create the need for onsite storage. Runoff from area B3 will be restricted as detailed in the table on the following page.

Table 4: Post-Development Restricted Runoff Calculations

Area	Post-Development Unrestricted (L/s)		Post-Development (Restricted) (L/s)		
	5-yr	100-yr	5-yr	100-yr	
B1	0.92	1.77	0.92	1.77	*UNRESTRICTED*
B2	4.07	7.75	0.60	1.20	*RESTRICTED*
B3	0.62	1.18	0.62	1.18	*UNRESTRICTED*
B4	0.63	1.21	0.63	1.21	*UNRESTRICTED*
B5	0.98	1.95	0.98	1.95	*UNRESTRICTED*
Total	7.23	13.87	3.76	7.32	

(See Appendix 'F' for Calculations)

Runoff from Area B2 will be restricted through two roof drains before discharging to the storm sewer. The total flow leaving the roof will be 0.60 L/s and 1.20 L/s during the 5 and 100-year storm events, respectively. This will result in ponding depths of 25 mm and 50 mm for the 5-year and 100-year storm events, respectively. All of the storage required for this area will be located on the proposed roof, and emergency roof scuppers will be installed to ensure ponding does not exceed the proposed ponding limits.

From analysing Tables 1,3 and 4 it can be seen that the post-development runoff for the 100-year storm event has not been restricted to the pre-development runoff rates for the 5-year storm event with a maximum coefficient of 0.5. From Table 1 it can be seen that though the post-development flows for the 100-year storm event do not meet the requirements they are lower than the existing runoff rates determined with a calculated coefficient (c=0.80) for the pre-development 5-year storm event. Existing building foundations, driveways and right-of-way easements have the effect of restricting the grading on both sides of the proposed building. From these limitations and the small allowable release rate (under 6.0 L/s) it was concluded that any restriction proposed for areas other than the flat rooftop would result in a theoretical design that would not be practical during construction or habitation thereafter.

In the event that there is a rainfall above the 100-year storm event, or a blockage within the storm network, an emergency overland flow route has been provided such that the storm water runoff will be conveyed towards the northwest corner of the site away from the building, and into Hawthorne Avenue. An elevation difference of 1.11 m has been provided from the finished floor (68.97) of the building to the overland flow route elevation (67.86).

The table on the following page summarizes the storage requirements and the depth of the water ponding during the 5 and 100-year storm events to meet the required storage volumes.

Table 5: Storage Summary

Area	Depth of ponding (m) for 5-year storm	5-year required storage (m^3)	5-year available storage (m^3)	Depth of ponding (m) for 100-year storm	100-year required storage (m^3)	100-year available storage (m^3)
B2	0.025	2.7	2.9	0.050	5.0	5.1

(See Appendix 'F' for Calculations)

6.4 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.

The increase in roof runoff and decrease in hard surface areas on the site will contribute to the quality improvement of the site runoff. The combination of the above BMP's and the proposed flow control measures will aid in the thermal protection of the natural environment.

7.0 SEDIMENT AND EROSION CONTROL

The site-grading contractor is responsible for ensuring sediment control structures are installed in accordance with the Site Grading and Drainage Plan as indicated. Silt fences shall be installed on site before construction or earth-moving operations begin, as shown on the site plan.

Geosock is to be installed under the grates of all existing structures along the frontage of the site and any new structures immediately upon installation. The Geosock 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. At the discretion of the project manager, municipal staff or conservation authority, additional silt control devices shall be installed at designated locations.

8.0 SUMMARY

- A new 156 m², four-storey low-rise apartment will be constructed centrally on the site located at 24 Hawthorne Avenue.
- The existing 50 mm water lateral extended from the existing 150 mm diameter main within Hawthorne Avenue will remain to service the development.
- The existing 135 mm diameter sanitary service will be maintained and remain connected to the existing 225 mm diameter sewer within Hawthorne Avenue.
- The existing 100 mm diameter storm service will be maintained and remain connected to the existing 375mm diameter sewer within Hawthorne Avenue.
- As discussed with the City of Ottawa staff, the stormwater management design attempted to ensure that the post-development flow rates are restricted to the 5-year pre-development flow rate calculated with a C value of 0.5. Due to site constraints, this was improbable and the scheme proposed shall restrict the 100-year post-development flows to the 5-year pre-development flows with the calculated coefficient of 0.80.
- Storage for the 5- through 100-year storm events will be provided on the proposed flat roof.

9.0 RECOMMENDATION

We respectfully recommend that:

This report, dated November 27th, 2018 and the associated site grading, drainage and servicing plans be approved for engineering details.

The sediment and erosion control plan outlined in Section 7.0 and detailed in the Grading and Drainage Plan notes are to be implemented by the contractor.

This report is respectfully being submitted for approval.

Ryan Kennedy, P. Eng.
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10.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of TC United (TCU). 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 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: CITY OF OTTAWA PRE-CONSULTATION NOTES

Jonathan Jonker

From: Wu, John <John.Wu@ottawa.ca>
Sent: April 12, 2017 9:30 AM
To: Jonathan Jonker
Subject: RE: 24 Hawthorne Avenue - SWM Requirements

Follow Up Flag: Follow up
Flag Status: Flagged

Sorry , please ignore my last email, and use 5 year's c0.5 to control up to 100 year's storm

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From: Jonathan Jonker [mailto:j.jonker@mcintoshperry.com]
Sent: Wednesday, April 12, 2017 9:18 AM
To: Wu, John
Subject: 24 Hawthorne Avenue - SWM Requirements

Good Morning John,

As per my voicemail, we are the civil consultant on this file and are looking to confirm the SWM requirements for this site. The proposed development will demolish the existing 2 storey dwelling and replace it with a 4 storey, 8 unit low rise apartment.

Can you provide the SWM requirements for this site?

Thank you very much,

Jonathan Jonker, C.E.T.
Designer / Inspector | Land Development
115 Walgreen Road, RR 3, Carp, ON K0A 1L0
T. 613.836.2184 (2252) | F. 613.836.3742 | C. 613.868.6484
J.Jonker@mcintoshperry.com | www.mcintoshperry.com

APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

Legend:

The letter **S** indicates that the study or plan is required with application submission.
The letter **A** indicates that the study or plan may be required to satisfy a condition of approval/draft approval.

For information on preparing required studies and plans refer to:

http://ottawa.ca/en/city-hall/planning-and-development/guide-preparing-studies-and-plans

S/A	Number of copies	ENGINEERING		S/A	Number of copies
S	35	1. Site Servicing Plan	2. Assessment of Adequacy of Public Services / Site Servicing Study / Brief	S	6
S	35	3. Grade Control and Drainage Plan	4. Geotechnical Study / Slope Stability Study	S	4
	2	5. Composite Utility Plan	6. Groundwater Impact Study		6
	5	7. Servicing Options Report	8. Wellhead Protection Study		6
	9	9. Community Transportation Study and / or Transportation Impact Study / Brief	10. Erosion and Sediment Control Plan / Brief	S	6
S	6	11. Storm water Management Report / Brief	12. Hydro geological and Terrain Analysis		8
	3	13. Hydraulic Water main Analysis	14. Noise / Vibration Study	S	3
	35/50/55	15. Roadway Modification Design Plan	16. Confederation Line Proximity Study		9

S/A	Number of copies	PLANNING / DESIGN / SURVEY		S/A	Number of copies
	50	17. Draft Plan of Subdivision	18. Plan Showing Layout of Parking Garage		2
	30	19. Draft Plan of Condominium	20. Planning Rationale	**S**	3
S	35	21. Site Plan	22. Minimum Distance Separation (MDS)		3
	20	23. Concept Plan Showing Proposed Land Uses and Landscaping	24. Agrology and Soil Capability Study		5
	3	25. Concept Plan Showing Ultimate Use of Land	26. Cultural Heritage Impact Statement		3
S	35	27. Landscape Plan	28. Archaeological Resource Assessment Requirements: **S** (site plan) **A** (subdivision, condo)		3
S	2	29. Survey Plan	30. Shadow Analysis		3
S	3	31. Architectural Building Elevation Drawings (dimensioned)	32. Design Brief (includes the Design Review Panel Submission Requirements)	**S**	Available online
	6	33. Wind Analysis			

S/A	Number of copies	ENVIRONMENTAL		S/A	Number of copies
S	5	34. Phase 1 Environmental Site Assessment	35. Impact Assessment of Adjacent Waste Disposal/Former Landfill Site		6
A	5	36. Phase 2 Environmental Site Assessment (depends on the outcome of Phase 1)	37. Assessment of Landform Features		7
	4	38. Record of Site Condition	39. Mineral Resource Impact Assessment		4
S	10	40. Tree Conservation Report	41. Environmental Impact Statement / Impact Assessment of Endangered Species		11
	4	42. Mine Hazard Study / Abandoned Pit or Quarry Study			

S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
		43.	44.		

Meeting Date: Monday March 13, 2017

Application Type: Site Plan Control, Mgr Approval, Public Consultation

File Lead: Ann O'Connor

Engineer/Project Manager: John Wu

Site Address: 24 Hawthorne Avenue

*Preliminary Assessment: 1☐ 2☐ 3☐ 4☐ 5☐

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

It is important to note that the need for additional studies and plans may result during application review. If following the submission of your application, it is determined that material that is not identified in this checklist is required to achieve complete application status, in accordance with the Planning Act and Official Plan requirements, City Planning will notify you of outstanding material required within the required 30 day period. Mandatory pre-application consultation will not shorten the City's standard processing timelines, or guarantee that an application will be approved. It is intended to help educate and inform the applicant about submission requirements as well as municipal processes, policies, and key issues in advance of submitting a formal development application. This list is valid for one year following the meeting date. If the application is not submitted within this timeframe the applicant must again pre-consult with the City.

MINUTES
Pre-Consultation Meeting

ADDRESS: 24 Hawthorne Avenue
DATE: March 13, 2017
TIME: 2:00pm – 3:00pm
LOCATION: 110 Laurier Ave West, Room 4105E
CONTACT: Ann O'Connor

City of Ottawa Staff Present:
Ann O'Connor (Planner), John Wu (Engineer), Serene Shahzadeh (Planning Co-op), Diana Salazar (Engineering Co-op)

Invitees Present:
Stephen Pope (Old Ottawa East Community Association Representative), Kris Kilborn (Engineer, Applicant Team), Susan Smith and Thanh Do (Architect/designers, Applicant Team), Billy Triantafilos and Mickael Corneau (Owners, TC United Group, Applicant Team).

1.0 Introductions

2.0 Confirmation that Non-Disclosure Agreement has been signed
The NDA was signed by Stephen Pope of the Old Ottawa East Community Association

3.0 Overview of Proposal
- Thanh provided an overview of the proposal
    - The property is located in a TM zone; both mixed-use and residential options can be pursued.
    - The purpose for this property is residential uses.
    - There will be eight units, mostly three bedroom units with a few four bedroom units. There will be two units per floor.
    - The units are intended to be rentals.
    - There is a shared easement on one side, currently being used as a driveway. It extends to the end of the property.
    - The development aims to meet the performance standards of the current zoning.
    - Five bicycle parking spaces are provided. There is no vehicular parking provided at this point.
    - A handicap unit will be provided with its own entrance.
    - The garbage and recycling are covered.
    - On higher floors, the building extends over the ground floor footprint and goes over the easement.

4.0 Summary of Preliminary Comments from City Staff Represented Disciplines
- Ann O'Connor provided planning comments

- Since the plans are still preliminary and no elevations provided, there is not enough information to invite an urban designer but encourage a second meeting for design review once the plans are developed.
- The Councillor and neighbours should be talked to.
- It should be reflected on the Site Plan that the building extends over the ground floor footprint if that is the intent.
- Currently, the development is considered a low-rise apartment building, and is permitted under the current zoning.
- The Old Ottawa East Secondary Plan will help guide the development, and should be addressed in the Planning Rationale.
- The zoning should be reviewed to address the building envelope.
- This development is subject to public consultation because it is a new development with more than four units.
- There is a protected Right-Of-Way (ROW) requirement of 20m; it should be clearly measured in survey plan. The land for the ROW will be then owned by the City.
- The site is located in a Design Priority Area, but since it is less than nine units it is not subject to presentation in front of the Urban Review Design Panel. Design will remain a priority in the department, and the urban designer will provide feedback on the development's design.
- Having commercial space changes the building from a low-rise apartment building to a mixed-use building, which has different requirements.

- John Wu provided engineering comments
  - Explore the easement and the legal requirements to the other party for work done within the easement.
  - There are two water mains; one is a transmission main.
  - There is an existing fire hydrant nearby.
  - Be careful of the existing building that is encroaching onto the driveway.
  - There is no need for the MOE.
  - The Official Plan gives guidelines about the road widening.

5.0 Summary of Community Association Comments

- Stephen Pope provided comments on behalf of the Ottawa East Community Association
  - The neighbourhood is under renewal and will be changed, including roadway modifications.
  - The Community is expecting a building that follows the policies related to a Traditional Mainstreet.
  - The Community will be happy that this new development isn't too high.
  - The scissor stair option would change the entrance character and give it a stronger presence on Hawthorne.
  - Currently, the sidewalks are too narrow.
  - It would be useful to have more space between the building and sidewalk, or on the inside of the building

6.0 Next Steps

- Ann will send follow up email.
- PDFs of the plans and elevations to be sent to Ann, so they can be forwarded to the urban designer. Another meeting can be set up to discuss things such as the design.

APPENDIX B: EXISTING WATERMAIN FLOW AND FIRE CALCULATIONS

Project:	24 Hawthorn Ave
Project No.:	CP-17-0197
Designed By:	JJ
Checked By:	CM
Date:	August 13, 2018

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

Water Supply for Fire-Fighting - Store/Office & Warhouse Building

Building is classified as Group : C (from table 3.2.2.55)
Building is of noncombustible construction or of heavy timber construction conforming to Article 3.1.4.6. Floor assemblies are fire separations but with no fire-resistance rating. Roof assemblies, mezzanines, loadbearing walls,

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	16	(from Table 1 pg A-31) (Worst case occupancy {E / F2} 'K' value used)
V	1,061	(Total building volume in m³.)
Stot	1.0	(From figure 1 pg A-32)
Q =	16,980.48 L	

From Figure 1 (A-32)

Snorth	70	m	0.0
Seast	26	m	0.0
Ssouth	710	m	0.0
Swest	42	m	0.0

*approximate distances

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

2700 L/min (if Q >270,000 L)
713 gpm

McINTOSH PERRY

CP-17-0197 - 24 HAWTHORNE AVENUE - Fire Underwriters Survey (FUS) Fire Calculations

Project:	24 HAWTHORNE AVENUE
Project No.:	CP-17-0197
Designed By:	S.V.L.
Checked By:	R.P.K.

From the Fire Underwriters Survey (1999)

From Part II – Guide for Determination of Required Fire Flow Copyright I.S.O.:

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.

A. Determine The Coefficient Related To The Type Of Construction

The building is considered to be of ordinary construction type. Therefore,

C = 1.00

B. Determine Ground Floor Area

As provided by the Architect:

Floor Area (One Floor) = 156.37 m²

A = 469.10 m²

This floor area represents the final build-out of the development; as outlined on the Site Plan drawing.

C. Determine Height in Storeys

From Architectural Drawings:

Number of Storeys = 3.00

D. Calculate Required Fire Flow

F = 220 x C x √A

F = 220.00 X 1.00 X √ 469.10

F = 4,764.91 L/min.

F = 5,000.00 L/min.

E. Determine Increase or Decrease Based on Occupancy

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

Limited Combustibility - Apartment

-15%

Occupancy Decrease = 750.00 L/min.

F = 4,250.00 L/min.

F. Determine the Decrease, if any for Sprinkler Protection

From note 3, Page 18 of the Fire Underwriter Survey:

- The flow requirement may be reduced by up to 50% for complete automatic sprinkler protection depending upon adequacy of the system.
- The credit for the system will be a maximum of 30% for an adequately designed system conforming to NFPA 13 and other NFPA sprinkler standards.
- Additional credit of 10% if water supply is standard for both the system and fire department hose lines
- If sprinkler system is fully supervised system, an additional 10% credit is granted
- The entire building will not be installed with a fully automated, standardized with the City of Ottawa Fire Department and fully supervised.
- Therefore the value obtained in Step E is not to be reduced (The building is not sprinklered)

Reduction = 4,250.00 L/min. X 0%

Reduction = 0.00 L/min.

G. Determine the Total Increase for Exposures

From note 4, Page 18 of the Fire Underwriter Survey:

- Exposure distance to the existing buildings to the north & south of the proposed building is approximately 23.6m & 16.305m respectfully.
- Exposure distance to the east & west of the proposed building is approximately 4.157m & 1.11m respectfully.
- Therefore the charge for exposure is 54% of the value obtained in Step E.

Increase = 4,250.00 L/min. X 54%

Increase = 2,295.00 L/min.

H. Determine the Total Fire Demand

- To the answer obtained in E, substract the value obtained in F and add the value obtained in G
- Fire flow should be no less than 2,000L/min. and the maximum value shoul not exceed 45,000L/min.

F = 4,250.00 L/min. - 0.00 L/min. + 2,295.00 L/min.

F = 6,545.00 L/min.

Therefore, after rounding to the nearest 1,000 L/min, the total required fire flow for the development is 7000 L/min (1849 GPM).

24 Hawthorne Avenue - Water Demands

Project:	24 Hawthorn Ave		
Project No.:	CP-17-0197		
Designed By:	JJ		
Checked By:	CM		
Date:	August 13, 2018		
Site Area:	0.30 gross ha	12.00	Units
		23.30	Persons

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*350*	*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 Parks 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	0.09	L/s

MAXIMUM DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.5 x avg. day*	*L/c/d*
Industrial	1.5 x avg. day	L/gross ha/d
Commercial	1.5 x avg. day	L/gross ha/d
Institutional	1.5 x avg. day	L/gross ha/d
MAXIMUM DAILY DEMAND	0.24	L/s

MAXIMUM HOUR DEMAND

DEMAND TYPE	AMOUNT	UNITS
Residential	*2.2 x max. day*	*L/c/d*
Industrial	1.8 x max. day	L/gross ha/d
Commercial	1.8 x max. day	L/gross ha/d
Institutional	1.8 x max. day	L/gross ha/d
MAXIMUM HOUR DEMAND	0.52	L/s

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

From: Wu, John <John.Wu@ottawa.ca>
Sent: August 16, 2018 3:40 PM
To: Sean Leflar
Subject: RE: 24 Hawthorne Avenue: Request for Boundary Conditions
Attachments: 24 Hawthorne Aug 2018.pdf

Here is the result:

****The following information may be passed on to the consultant, but do NOT forward this e-mail directly.****

The following are boundary conditions, HGL, for hydraulic analysis at 24 Hawthorne (zone 1W) assumed to be connected to the 102mm on Hawthorne (see attached PDF for location). The existing watermain is scheduled to be replaced with a 203mm in the near future (tentatively in 2020)

	Existing 102mm	Future 203mm
Minimum HGL	105.9m	105.9m
Maximum HGL	114.7m	114.7m
MaxDay + FireFlow (133L/s)	Available Flow = 80L/s @ 20psi	102.5m

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

John

From: Sean Leflar <s.leflar@mcintoshperry.com>
Sent: Monday, August 13, 2018 9:26 AM
To: Wu, John <John.Wu@ottawa.ca>
Cc: Tyler Ferguson <t.ferguson@mcintoshperry.com>
Subject: 24 Hawthorne Avenue: Request for Boundary Conditions

Good Morning John,

I am working on the civil design for the development located at 24 Hawthorne Avenue and would like to request boundary conditions. The development consists of a 158m^2 four-storey low-rise apartment building. The building will not be sprinklered and will be built with non-combustible materials. The development will be re-using the existing services, which have been inspected by CCTV. I have attached our grading plan showing the approximate water connection, as well as a location map for your reference.

Please find below the calculated water demands to obtain boundary conditions.

Type of Development: Residential
Location of Service: Connection to Hawthorne Avenue.
Amount of Fire Flow Required: 8,000 L/min or 133 L/sec (FUS)
Population: 24 persons
Average Daily Demand: 0.09 L/sec
Maximum Daily Demand: 0.24 L/sec
Maximum Hourly Demand: 0.52 L/sec

If you require any further information, please feel free to contact me.

Thank you,

Sean Leflar
Civil Engineering Technolgist
115 Walgreen Road, R.R. 3, Carp, ON K0A 1L0
T. 613.836.2184 (ext 2252) | **F.** 613.836.3742
s.leflar@mcintoshperry.com | www.mcintoshperry.com
McINTOSH PERRY

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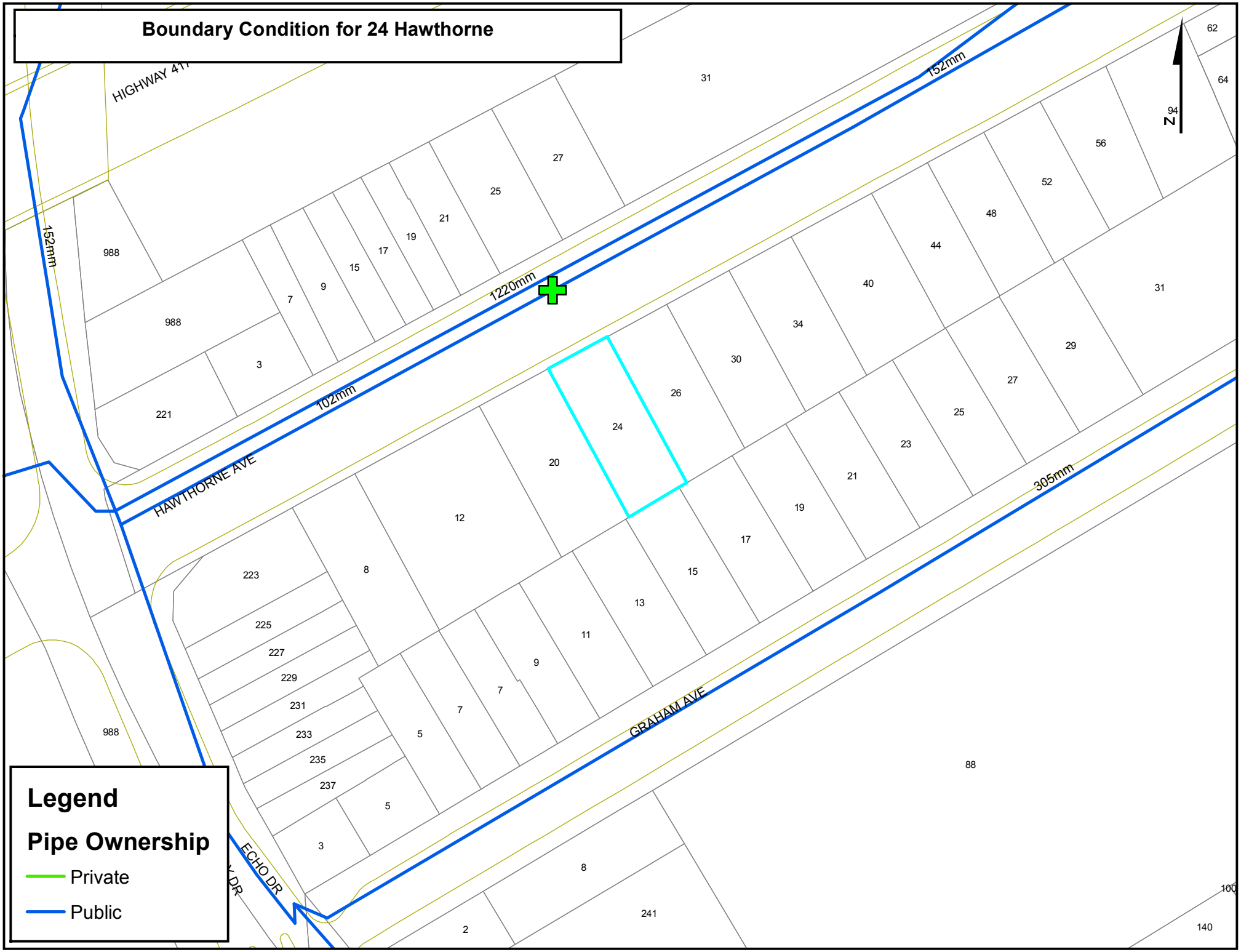

Boundary Condition for 24 Hawthorne
HIGHWAY 417
152mm
152mm
1220mm
102mm
305mm
HAWTHORNE AVE
GRAHAM AVE
ECHO DR
N
988
988
221
223
225
227
229
231
233
235
237
3
5
7
9
15
17
19
21
25
27
31
24
26
30
34
40
44
48
52
56
62
64
94
20
12
8
13
11
9
7
5
3
241
2
88
100
140
Legend
Pipe Ownership
Private
Public

APPENDIX C: SANITARY SEWER CALCULATION

SANITARY SEWER DESIGN SHEET

PROJECT: 24 Hawthorne Ave
LOCATION: Ottawa
CLIENT: TCU

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			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	29	30	31	30	31
STREET	AREA ID	FROM MH	TO MH	UNIT TYPES				AREA	POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (ha)						PEAK FLOW (L/s)	AREA (ha)		FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	FLOW DEPTH (mm)	VELOCITY (actual) (m/s)	AVAILABLE CAPACITY	
				SF	SD	TH	APT	(ha)	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM										L/s	(%)
													IND	CUM	IND	CUM	IND	CUM													
Street No. 1	A-1	BLDG	EX MAIN				12	0.03	27.6	27.6	4.00	0.45		0.00		0.00		0.00	0.00	0.03	0.03	0.01	0.46	8.48	14.01	135	0.50	0.574	22.6	0.309	8.03	94.63

Design Parameters:

Residential			ICI Areas			
						Peak Factor
SF	3.4	p/p/u				
TH/SD	2.7	p/p/u	INST	50,000	L/Ha/day	1.5
APT	2.3	p/p/u	COM	50,000	L/Ha/day	1.5
Other	60	p/p/Ha	IND	35,000	L/Ha/day	MOE Chart

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed: JMJ
Checked: CJM
Project No.: CP-17-0197

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	02/05/2017

Date: 27/07/2018
Sheet No: 1 of 1

Project Name: 24 Hawthorne Avenue
Ottawa, Ontario
CP-17-0197

Sanitary Flow Calculations

---

1. **Building Occupancy**

   The number of units will be 12 as per the floors plans.

2. **Daily Volume in Litres**

   As per the extract of the City of Ottawa Sewer Design Guidelines, Appendix 4-A; Daily Sewage Flow for Dwellings;

   Each Dwelling unit of 1 bedroom

   - = 275 Liters/Dwelling/Day

   Each Dwelling unit of 2 bedrooms

   - = 1100 Liters/Dwelling/Day

   Each Dwelling unit of 3 bedrooms

   - = 1600 Liters/Dwelling/Day

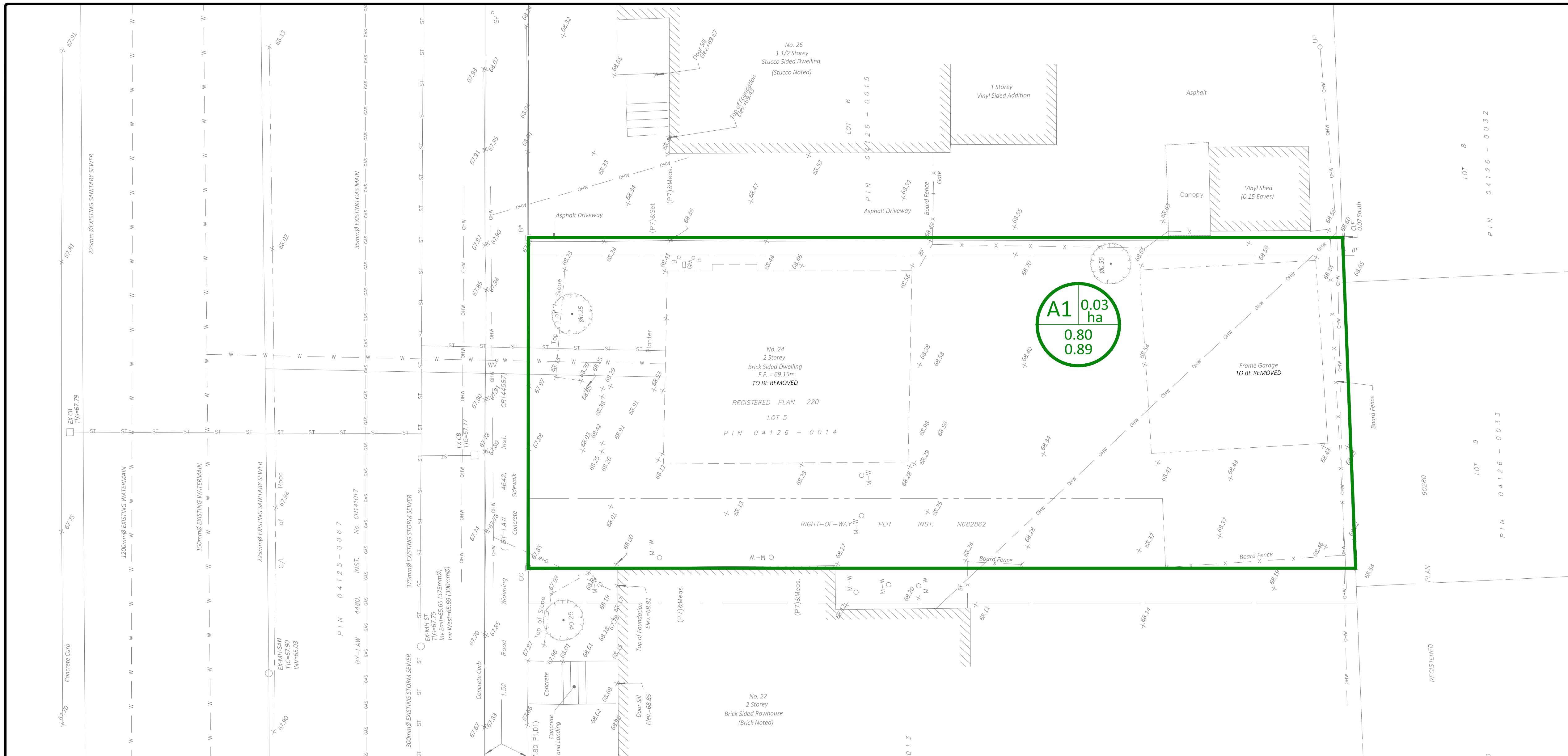
3. **Peak Flow (Q/p)**

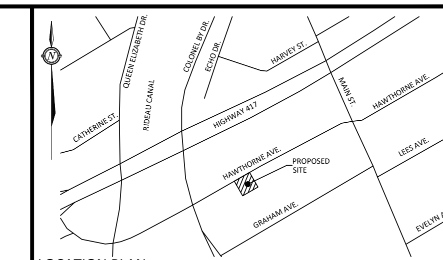
   - $Q_{1\text{-BED}}(p) = F_{1\text{-BED}} \times P_{1\text{-BED}}$ Where:
     $F_{2\text{-BED}}$ = 275 Litres/Dwelling/Day (as per City of Ottawa Sewer Design Guidelines)
     $P_{2\text{-BED}}$ = 7 Units (as per Site Plan)
   - Therefore, $Q_{1\text{-BED}}(p) = (275) \times (7) =$ 1,925 L/Day (0.022 L/sec)
   -
   - $Q_{2\text{-BED}}(p) = F_{2\text{-BED}} \times P_{2\text{-BED}}$ Where:
     $F_{2\text{-BED}}$ = 1100 Litres/Dwelling/Day (as per City of Ottawa Sewer Design Guidelines)
     $P_{2\text{-BED}}$ = 2 Units (as per Site Plan)
   - Therefore, $Q_{2\text{-BED}}(p) = (1{,}100) \times (2) =$ 2,200 L/Day (0.025 L/sec)

   - $Q_{3\text{-BED}}(p) = F_{3\text{-BED}} \times P_{3\text{-BED}}$ Where:
     $F_{3\text{-BED}}$ = 1600 Litres/Dwelling/Day (as per City of Ottawa Sewer Design Guidelines)
     $P_{3\text{-BED}}$ = 3 Units (as per Site Plan)
   - Therefore, $Q_{3\text{-BED}}(p) = (1{,}600) \times (3) =$ 4,800 L/Day (0.056 L/sec)

   - $Q_{TOTAL}(p) = Q_{1\text{-BED}} + Q_{2\text{-BED}} + Q_{3\text{-BED}}$ Where:
     $Q_{1\text{-BED}}$ = 1,925 L/Day
     $Q_{2\text{-BED}}$ = 2,200 L/Day
     $Q_{3\text{-BED}}$ = 4,800 L/Day
   - Therefore, $Q_{TOTAL}(p) = (1{,}925) + (2{,}200) + (4{,}800) =$ **8,925L/Day (0.103 L/sec)**

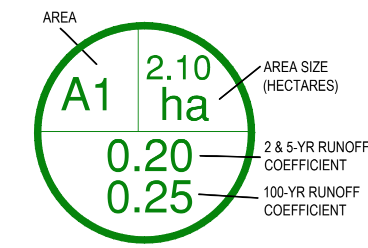
APPENDIX D: PRE-DEVELOPEMENT PLAN





LOCATION PLAN

LEGEND

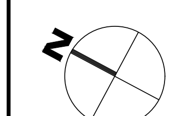


No.	Revision/Issue	Date
01	ISSUED FOR SITE PLAN CONTROL	MAY 02, 2017

Check and verify all dimensions before proceeding with the work

Do not scale drawings

115 Walgreen Road R.R. #3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742



Stamp:

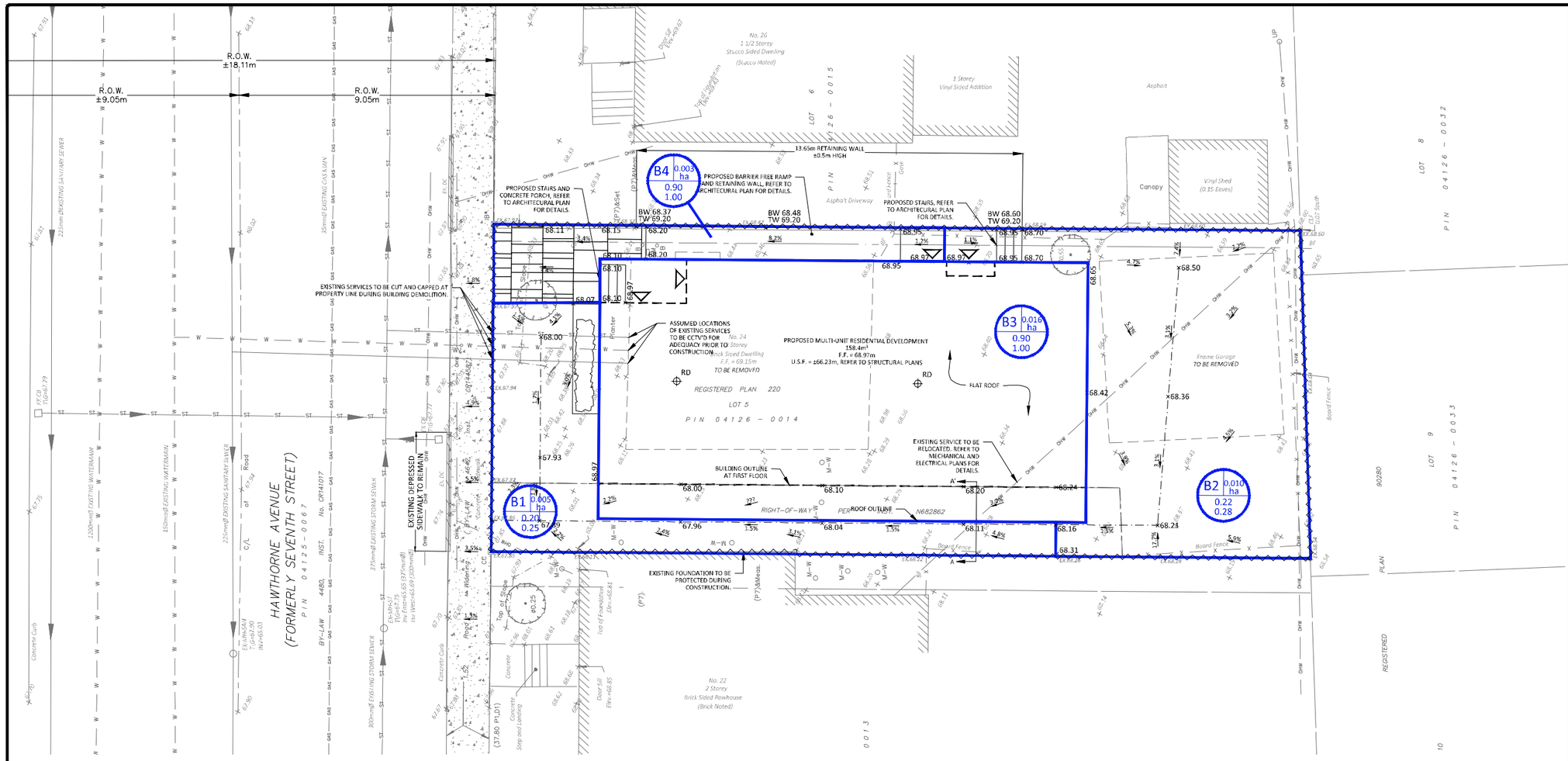
Client:
TC UNITED GROUP
800 INDUSTRIAL AVENUE, UNIT 9
OTTAWA, ON K1G 4B8

Project:
24 HAWTHORNE AVENUE
PROPOSED MULTI-UNIT RESIDENTIAL DEVELOPMENT
OTTAWA ONTARIO

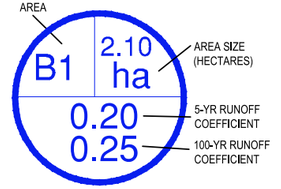
Drawing Title:
PRE-DEVELOPMENT DRAINAGE PLAN

Scale:	N.T.S.	Project Number:	CP-17-0197
Drawn by:	RWF		
Checked By:	RPK	Drawing Number:	PRE
Designed By:	JMJ		
Date:	APRIL 10, 2017	SHEET 1 of 1	

APPENDIX E: POST-DEVELOPMENT PLAN



LEGEND



No.	Revision/Issue	Date
01	ISSUED FOR SITE PLAN CONTROL	JUL 27/2018

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

McINTOSH PERRY
115 Walgreen Road R.R. #3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742

Stamp:

Client:
TC UNITED GROUP
800 INDUSTRIAL AVENUE, UNIT 9
OTTAWA, ON K1G 4B8

Project:
24 HAWTHORNE AVENUE
PROPOSED MULTI-UNIT RESIDENTIAL DEVELOPMENT
OTTAWA ONTARIO

Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

Scale:	N.T.S.
Drawn by:	RWF
Checked By:	RPK
Designed By:	JMJ
Date:	APRIL 10, 2017

Project Number: CP-17-0197

Drawing Number: SHEET 1of 1 — POST

FILENAME: H:\01 Project - Proposals\2017 Jobs\CP\OCP-17-0197_TC United _SPC_24 Hawthorne\Civil\15 - Drawings\OCP-17-0197 - PRESENTATION.dwg
LAST SAVED: Friday, July 27, 2018 LAST SAVED BY: Lhevoe
LAST PLOTTED: Friday, July 27, 2018 SITE PLOT LEVEL:

APPENDIX F: STORMWATER CALCULATIONS

AVERAGE PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area A1	EXISTING SITE - NON-DEVELOPMENT AREA				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	175.8	158.2	175.8
BUILDING	0.90	1.00	103.8	93.4	103.8
PAVERS	0.90	1.00	5.8	5.2	5.8
GRASS	0.20	0.25	47.7	9.5	11.9
Avg C	0.80	0.89			

AVERAGE POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area B1	NORTH WEST PORTION OF SITE				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
CONCRETE	0.90	1.00	0.0	0.0	0.0
GRASS	0.20	0.25	52.7	10.5	13.2
Avg C	0.20	0.25			

Area B2	SOUTH EAST PORTION OF SITE				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
CONCRETE	0.90	1.00	3.3	3.0	3.3
GRASS	0.20	0.25	93.6	18.7	23.4
Avg C	0.22	0.28			

Area B3	PROPOSED BULDING				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
BUILDING	0.90	1.00	158.4	142.6	158.4
Avg C	0.90	1.00			

Area B4	NORTH EAST PORTION OF SITE				
Type	C (5-yr)	C (100-yr)	Area (m²)	Product (5-yr)	Product (100-yr)
ASPHALT	0.90	1.00	25.062	22.6	25.1
GRASS	0.20	0.25	0.000	0.0	0.0
Avg C	0.90	1.00			

Time of concentration (min.)	5-Year (mm/hr)	100-Year (mm/hr)	
10.00	104.2	178.6	PRE-DEVELOPMENT
10.00	104.2	178.6	POST-DEVELOPMENT

PRE-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (L/s)	100-Year Flow Rate (L/s)
A1	0.033	0.80	0.89	7.72	14.71
Total	0.033			7.72	14.71

POST-DEVELOPMENT RUNOFF COEFFICIENT CALCULATIONS

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	Balanced Runoff Coefficient (C) 100-yr	5-Year Flow Rate (L/s)	100-Year Flow Rate (L/s)
B1	0.005	0.20	0.25	0.31	0.65
B2	0.010	0.22	0.28	0.62	1.35
B3	0.016	0.90	1.00	4.13	7.86
B4	0.003	0.90	1.00	0.65	1.24
Total	0.033			5.71	11.11

REQUIRED RESTRICTED FLOW

Area	Drainage Area (ha)	Balanced Runoff Coefficient (C) 5-yr	5-Year Flow Rate (L/s)
A1	0.03	0.50	4.82

ACTUAL STORM WATER RUNOFF FROM SITE (L/s)

Area	Post-Development Unrestricted (L/s)		Post-Development (Restricted) (L/s)		
	5-yr	100-yr	5-yr	100-yr	
B1	0.31	0.65	0.31	0.65	*UNRESTRICTED*
B2	0.62	1.35	0.62	1.35	
B3	4.13	7.86	0.60	1.20	*RESTRICTED*
B4	0.65	1.24	0.65	1.24	*UNRESTRICTED*
Total	5.71	9.86	1.52	4.44	

STORAGE REQUIRMENTS FOR AREA B3

5-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff To Be Stored (L/s)	Storage Required (m^3)
10	104.2	4.1	0.60	3.5	2.1
15	83.6	3.3	0.60	2.7	2.4
20	70.3	2.8	0.60	2.2	2.6
25	60.9	2.4	0.60	1.8	2.7
30	53.9	2.1	0.60	1.5	2.8
35	48.5	1.9	0.60	1.3	2.8
40	44.2	1.8	0.60	1.2	2.8
45	40.6	1.6	0.60	1.0	2.7
50	37.7	1.5	0.60	0.9	2.7
55	35.1	1.4	0.60	0.8	2.6
60	32.9	1.3	0.60	0.7	2.5
65	31.0	1.2	0.60	0.6	2.5

Maximum Storage Required (m^3) =	2.8

100-YEAR STORM EVENT

Tc	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff To Be Stored (L/s)	Storage Required (m^3)
10	178.6	7.9	1.20	6.7	4.0
15	142.9	6.3	1.20	5.1	4.6
20	120.0	5.3	1.20	4.1	4.9
25	103.8	4.6	1.20	3.4	5.1
30	91.9	4.0	1.20	2.8	5.1
35	82.6	3.6	1.20	2.4	5.1
40	75.1	3.3	1.20	2.1	5.1
45	69.1	3.0	1.20	1.8	5.0
50	64.0	2.8	1.20	1.6	4.9
55	59.6	2.6	1.20	1.4	4.7

Maximum Storage Required (m^3) =	5.1

STORAGE OCCUPIED IN AREA B3

5-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) =		N/A	
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	118.82	0.025	2.97
				Total	2.97

Storage Available (m^3) =	3.0
Storage Required (m^3) =	2.8

100-YEAR STORM EVENT

Other Storage Areas on Site		Water Elev. (m) =		N/A	
Location	T/G	INV. (out)	Area (m^2)	Depth (m)	Volume (m^3)
ROOF	N/A	N/A	118.82	0.050	5.94
				Total	5.94

Storage Available (m^3) =	5.9
Storage Required (m^3) =	5.1

ROOF DRAIN FLOW FOR FLAT ROOF (B3)

Flow Rate Vs. Build-Up (One Weir)	
Metric	
Depth (mm)	Flow (L/s)
15	0.18
20	0.24
25	0.30
30	0.36
35	0.42
40	0.48
45	0.54
50	0.60
55	0.66

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

CALCULATING ROOF FLOW EXAMPLES

	Roof Drain Flow		
	Flow (l/s)	Storage Depth (mm)	2 Roof Drains Flow (l/s)
	0.18	15	0.36
	0.24	20	0.48
	0.30	25	0.60
	0.36	30	0.72
5-YR	0.42	35	0.84
	0.48	40	0.96
	0.54	45	1.08
100-YR	0.60	50	1.20
	0.66	55	1.32
	0.72	60	1.44
	0.78	65	1.56
	0.84	70	1.68
	0.90	75	1.80
	0.96	80	1.92
	1.02	85	2.04
	1.08	90	2.16
	1.14	95	2.28
	1.20	100	2.40
	1.26	105	2.52
	1.32	110	2.64
	1.38	115	2.76
	1.44	120	2.88
	1.50	125	3.00
	1.56	130	3.12
	1.62	135	3.24
	1.68	140	3.36
	1.74	145	3.48
	1.80	150	3.60

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

STORM SEWER DESIGN SHEET

PROJECT: 24 Hawthorne Avenue
LOCATION: Ottawa
CLIENT: TCU
PAGE: 5 OF 5

LOCATION				CONTRIBUTING AREA (ha)							RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
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) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
	B5	Roof	Ex Main	0.90		0.02			0.01	0.01	10.00	0.37	10.37	104.19	122.14	178.56	4.13				4.13	3.14	8.56	100			0.34	0.388	-0.99	-31.44%

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: LAL
Checked: RPK
Project No.: CP-17-0197

No.	Revision	Date
1.	ISSUED FOR SITE PLAN CONTROL	2018-08-07

Date: 2018-08-07
Sheet No: 5 of 5

APPENDIX G: 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)
• 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 'E'
• Plan showing the site and location of all existing services.	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
• 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 'A'
• 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).	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
• 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.	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
• 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.	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan
• 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	Lot Grading, Drainage Plan, Sediment and Erosion Control Plan

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	N/A
• 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 'B'
• 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	N/A

• Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	N/A
• Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
• Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Appendix 'B'
• 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.	5.2 Sanitary Servicing

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

4.4 Development Servicing Report: Stormwater Checklist

Criteria	Location (if applicable)
• Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	6.0 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- and Post-Development Plans (Drawing No. PRE and POST)
• 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.	6.0 Stormwater Management
• Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	6.0 Stormwater Management
• Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	6.0 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	Appendix 'F'

conveyance capacity for minor events (1:5-year return period) and major events (1:100-year return period).	
• Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
• Calculate pre-and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	6.0 Stormwater Management, Appendix 'F'
• Any proposed diversion of drainage catchment areas from one outlet to another.	6.0 Stormwater Management
• Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	6.0 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.	6.0 Stormwater Management, Appendix 'F'
• 100-year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Lot Grading, Drainage Plan & sediment Control Plan
• 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.	7.0 Sediment and 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	8.0 Summary 9.0 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.	N/A
• All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	All are stamped