SITE SERVICING & STORMWATER MANAGEMENT REPORT
788 MARCH ROAD, OTTAWA, ON

Rendering Prepared by NEUF Architectes

Project No.: CCO-24-1519

City File No.:

Prepared for:

SINA Construction
3030 Boul. Le Carrefour, Suite 1200,
Laval, Québec
H7T 2P5

Prepared by:

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

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McINTOSH PERRY

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1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by SINA Construction (SINA) to prepare a Servicing and Stormwater Management Report in support of the Site Plan Control application for two (2) proposed 6-storey residential buildings located at 788 March Road within the City of Ottawa. The main purpose of this report is to present a servicing design for the development in accordance with the recommendations and guidelines provided by the City of Ottawa (City), the Rideau Valley Conservation Authority (RVCA), and the Ministry of the Environment, Conservation and Parks (MECP). This report will address the water, sanitary and storm sewer servicing for the development, ensuring that existing and available services will adequately service the proposed development.

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

- CCO-24-1519, C100 – Existing Conditions and Erosion & Sediment Control Plan
- CCO-24-1519, C101 – Site Grading Plan
- CCO-24-1519, C102 – Site Servicing Plan
- CCO-24-1519, PRE – Pre-Development Drainage Area Plan (***Appendix E***)
- CCO-24-1519, POST – Post-Development Drainage Area Plan (***Appendix E***)

1.2 Site Description

The property is located at 788 March Road, Ottawa. It is described as Part of Lot 10, Concession 4, geographic Township of March, City of Ottawa. The existing site covers approximately 1.22ha and is bounded by March Road to the southwest, Klondike Road to the northwest, Shirley's Brook to the northeast, and private residential lots to the southeast. See Site Location Plan in ***Appendix A*** for more details.

Figure 1: Site Map

1.3 Proposed Development and Statistics

The proposed development consists of two (2) 6-storey residential buildings with two levels of underground parking totalling 196 units, complete with an access ramp provided on Klondike Road. The subject property has a total site area of approximately 1.22ha and is designated as General Mixed-Use (GM) under the current City of Ottawa zoning by-law. The northeast half of the property is within the floodplain limits of Shirley's Brook watercourse, and so only the March Road frontage will be used for development, covering approximately 0.62ha, which is outside of the 30m offset from the Brook. Refer to the Site Plan prepared by NEUF Architects included in ***Appendix B*** for details.

1.4 Existing Conditions and Infrastructure

The existing property is currently undeveloped and consists primarily of vegetated lands which generally slopes north-easterly towards Shirley's Brook, tributary to the Ottawa River.

Sewer systems and watermain mapping collected from the City of Ottawa's GIS information indicate that the following services exist across the property frontages within the adjacent municipal rights-of-ways (ROW):

- **March Road**
    - 600mm diameter PVC sanitary sewer;
    - 200mm diameter PVC sanitary sewer (crossing March Road, flowing to Mersey Drive);
    - 675mm & 750mm diameter concrete storm sewer, and;
    - 406mm diameter PVC watermain.
- **Klondike Road**
    - 406mm diameter PVC watermain stub.

1.5 Approvals

The proposed development is subject to the City of Ottawa site plan control process. Site plan control requires the City to review, provided concurrence and approve the engineering design package. Permits to construct can be requested once the City has issued a site plan agreement.

The site is currently located adjacent to Shirley's Brook watercourse, tributary to the Ottawa River. The proposed works is designed to discharge all runoff within the development area to the March Road storm system which is controlled by the Shirley's Brook Stormwater Management facility. Therefore, the approval exemption under O.Reg. 525/98 would apply, and an Environmental Compliance Approval (ECA) through the Ministry of Environment Conservation and Parks (MECP) will not be required.

2.0 BACKROUND STUDIES, STANDARDS, AND REFRENCES

2.1 Background Reports / Reference Information

Background studies that have been reviewed for the proposed site include City of Ottawa record drawings and utility plans, GIS mapping and a topographical survey. Record drawings and utility plans of existing services within the vicinity of the proposed site were provided by the City of Ottawa and were reviewed in order to prepare servicing and stormwater management schemes for the site based on the current available information. The following documents are available under separate cover:

- Topographic Survey (Ref. No.17-10-136-00) completed by J.D. Barnes Limited, dated May 30, 2018.
- Geotechnical Investigation Report, 788 March Road, completed by Geofirma Engineering Ltd., dated December 21, 2018.
- Hydrogeological Study – Estimation of Groundwater Inflow to the Proposed 788 March Road Development, completed by Geofirma Engineering Ltd., dated February 29, 2024.
- Groundwater Management Plan, completed by Geofirma Engineering Ltd., dated March 6, 2024.
- Site Servicing Report, Morgan's Creek – Stage 1 (762 March Road), completed by J.L. Richards & Associates Limited, dated June 12, 2019.

2.2 Applicable Guidelines and Standards

- Ottawa Sewer Design Guidelines, City of Ottawa, SDG002, October 2012.
  (Ottawa Sewer Guidelines)
  - Technical Bulletin ISTB-2014-01 City of Ottawa, February 2014. (ISTB-2014-01)
  - Technical Bulletin PIEDTB-2016-01 City of Ottawa, September 2016. (PIEDTB-2016-01)
  - Technical Bulletin ISTB-2018-01 City of Ottawa, January 2018. (ISTB-2018-01)
  - Technical Bulletin ISTB-2018-03 City of Ottawa, March 2018. (ISTB-2018-03)
  - Technical Bulletin ISTB-2019-01 City of Ottawa, January 2019. (ISTB-2019-01)
  - Technical Bulletin ISTB-2019-02 City of Ottawa, February 2019. (ISTB-2019-02)
- Ottawa Design Guidelines – Water Distribution City of Ottawa, July 2010.
  (Ottawa Water Guidelines)
  - Technical Bulletin ISD-2010-2 City of Ottawa, December 15, 2010. (ISD-2010-2)
  - Technical Bulletin ISDTB-2014-02 City of Ottawa, May 2014. (ISDTB-2014-02)
  - Technical Bulletin ISTB-2018-02 City of Ottawa, March 2018. (ISTB-2018-02)
- Stormwater Planning and Design Manual, Ministry of the Environment, March 2003.
  (MECP Stormwater Design Manual)
- Design Guidelines for Sewage Works, Ministry of the Environment, 2008.
  (MECP Sewer Design Guidelines)
- Water Supply for Public Fire Protection, Fire Underwriters Survey, 2020. (FUS Guidelines)

3.0 PRE-CONSULTATION SUMMARY

A pre-consultation meeting was conducted on April 11, 2022, regarding the proposed site. Meeting notes are included in ***Appendix B***. Specific design parameters to be incorporated within this design include the following:

- Sanitary flows are to be directed to the newly constructed 600mm diameter sanitary sewer fronting the site on March Road. The sanitary design assumed both the subject site and adjacent site were to be developed as high density residential, with a combined total area of 1.76 ha and a total contributing peak flow of 5.9L/s.
- Post-development storms flows directed to Shirley's Brook (2-yr, 5-yr and 100-yr) must be controlled to the pre-development storm flows directed to Shirley's Brook (2-yr, 5-yr and 100-yr). Excess flows must be detained on site.
- All storm flow directed to the March Road municipal storm sewer is tributary to the Shirley's Brook Stormwater Management (SWM) Facility, referred to as Pond No 1 – West, per the Shirley's Brook SWM Design Brief. The pond was designed to accept minor flow at a rate of 70 L/s/ha from the subject site and adjacent site.
- Quality control to be provided to "Normal" level of treatment (70% total suspended solids removal) as provided by the Shirley's Brook Stormwater Management (SWM) Facility, referred to as Pond No 1 – West.

4.0 WATERMAIN

4.1 Existing Watermain

The subject property is located withing the City of Ottawa 2W2C pressure zone. Currently there is an existing 406mm diameter feeder main on March Road, and a 406 diameter watermain stub located on Klondike Road.

4.2 Proposed Watermain

In accordance with Section 4.3.1 of the Ottawa Water Guidelines, service areas with a basic day demand greater than 50m^3/day require a dual connection to the municipal system. As a result, the proposed design includes two separate watermain connections to the existing distribution system, which will be connected and looped inside the building to provide redundancy. As the watermain on March Road is a feeder main, there is only one proposed connection to this main which will be completed via a 200mm diameter tapping valve sleeve (TVS) connection. The second 200mm diameter connection will be located on Klondike which will include a 4.5m extension of the existing watermain stub, and the addition of a new municipal hydrant located in the right of way (ROW). Both services will be separated by existing valve chambers located within March and Klondike. Isolation valves will be installed on each service lateral at the property line prior to entering the water entry room within the first underground level of the building. The elevation of the proposed service laterals will ensure that a minimum of 2.4m of ground cover is provided for the entire length of the pipes. Refer to drawing C102 for a detailed servicing layout.

The Fire Underwriters Survey (FUS) 2020 method was utilized to estimate the required fire flow for the site. Fire flow requirements were calculated per City of Ottawa Technical Bulletin ISTB-2018-02. The following parameters were used to calculate the require fire flows for the site.

- Type of construction – Non-combustible construction (Coefficient of 1.0)
- Occupancy Type – Limited combustibility (15% reduction)
- Sprinkler Protection – Automatic sprinklers with a standard water supply and fire department connection (40% reduction)

The results of the calculations yielded a maximum required fire flow of 14,000 L/min (233 L/s). The detailed calculations for the FUS required fire flows can be found in ***Appendix C***.

The water demands for the proposed building have been calculated to adhere to the Ottawa Water Guidelines and can be found in ***Appendix C***. The results have been summarized below in **Table 1**.

Table 1: Water Supply Design Criteria and Water Demands

Parameter	Total
Site Area	0.62 ha
Total Estimated Population	356 Persons
Residential Demand Rate	280 L/c/d
Residential Maximum Day Peaking Factor (MECP Table 3-3)	3.6
Residential Maximum Hour Peaking Factor (MECP Table 3-3)	5.4
Total Average Daily Demand	**1.15 L/sec**
Total Maximum Daily Demand	**4.18 L/sec**
Total Peak Hour Demand	**6.22 L/sec**
Phase 1 - Required Fire Flows (FUS)	**12,000 L/min (200 L/sec)**
Phase 2 - Required Fire Flows (FUS)	**14,000 L/min (233 L/sec)**

4.3 Boundary Conditions

Boundary conditions for the site were provided by the City of Ottawa for the average day scenario, peak hour scenario and the maximum day plus fire flow scenario using the demands indicated above, and are summarized in **Table 2** below.

Table 2: City of Ottawa Boundary Conditions

Scenario	Total HGL (m)	Head Pressure* (m)	Head Pressure* (psi)
406mm Dia. Watermain Connection on Klondike Road			
Peak Hourly (Minimum HGL)	126.9	50.4	77.8
Average Day (Maximum HGL)	131.2	54.7	71.7
Maximum Day + Fire Flow (200 L/sec)	126.3	49.8	70.9
**Adjusted for an estimated ground elevation of 76.5m above the connection point.*			
406mm Dia. Watermain Connection on March Road			
Peak Hourly (Minimum HGL)	126.9	48.8	69.4
Average Day (Maximum HGL)	131.2	53.1	75.6
Maximum Day + Fire Flow (200 L/sec)	126.3	48.2	68.6
**Adjusted for an estimated ground elevation of 78.1m above the connection point.*			

The boundary conditions were used to ensure the normal operating pressure range is not less than 275kPa (40psi) or more than 552kPa (80psi). The resultant hydraulic grade line (HGL) shows that the minimum pressure limit is satisfied during the average day and peak hour scenario.

In addition to normal operations, the maximum day plus fire flow conditions were reviewed to ensure that there is sufficient fire flow available to meet the required 233 L/sec flow rate, while maintaining a minimum of 20psi (140kPa) within the City's distribution system as per the City of Ottawa Design Guidelines for Water Distribution, 2010. The resulting HGL shows that the minimum pressure is satisfied during a fire scenario.

In addition to the review of the boundary conditions, the available fire flow based on hydrant spacing was analysed as per the City of Ottawa's technical bulletin ISTB 2018-02 Appendix I, Table 1. All municipal hydrants within 150m clear distance to the nearest face of the building were used to find a combined available fire flow to support the site. Hydrants were assumed to be class AA (painted blue) by visual inspection through the latest imagery provided on Google Street View. A total contribution of 5,700 L/min and 3,800 L/min was used for each hydrant within 75m, and between 75m and 150m of the building, respectively. The results are summarized below in ***Table 3***. Please refer to ***Appendix C*** for a hydrant location map.

Table 3: Fire Protection Confirmation

Hydrant I.D.	Location	Municipal or Private	Colour or Class (If Known)	788 March Road	
				[1]Distance (m)	[2]Fire Flow Contribution (L/min)
348023H222	March/Klondike NE	Municipal	Blue (assume class AA)	50	5,700
348023H161	Klondike	Municipal	Blue (assume class AA)	105	3,800
348023HP201	1100 Klondike	Private	Blue (assume class AA)	110	3,800
348023H057	Mersey	Municipal	Blue (assume class AA)	85	3,800
348023HP230	762 March	Private	Blue (assume class AA)	25	5,700
Proposed	March/Klondike SE	Municipal	Blue (assume class AA)	9	5,700
Grand Total (Inc. Private) (L/min)					**28,500**
Total (Municipal Only) (L/min)					**19,000**
FUS RFF in L/min or (L/sec)					14,000 (233)

Notes:
[1]Distance is measured along a road or fire route to nearest face of building.
[2]Fire Flow Contribution based on Table 1 of Appendix I, ISTB-2018-02

5.0 SANITARY DESIGN

5.1 Existing Sanitary Sewer

Currently there is an existing 600mm diameter trunk sanitary sewer main on March Road within the southbound lanes, and a 200mm diameter sanitary sewer which services the adjacent development on Eldorado Private by crossing March Road and connecting to the sanitary system on Mersey Drive. Based on as-built information, there is a 200mm diameter sanitary stub available to service the subject lands, which is connected to the adjacent Eldorado Private sanitary sewer. The stub is located at the south corner of the property outside of the ROW and crosses over the southern property line.

5.2 Proposed Sanitary Sewer

To service the subject lands, a direct connection to the existing 600mm diameter trunk sewer on March Road was considered, but due to the >5m depth of the sewer and the large road crossing that would be necessary for the connection, it was determined that the connection to the adjacent Eldorado Private 200mm diameter sanitary sewer would be most feasible. As a result, the proposed sanitary servicing design includes a single 200mm diameter PVC gravity sanitary service lateral connected directly to the 200mm diameter PVC sewer on Eldorado Private Road within the Morgan's Creek (762 March Road) development. Based on previous correspondence between the owners of 788 and 762 March Road, the costs for the original installation of the 200mm sewer were shared to accommodate the development of the subject property. As the connection is located on private property, it is anticipated that the owners will be required to enter into a servicing agreement for the shared service upon site plan approval. An ECA is not expected to be a requirement as neither site is designated as industrial and the shared sanitary collection system is not part of a private treatment system. ***Table 4***, below, summarizes the wastewater design criteria used to calculate the estimated peak sewage flow rates.

Table 4: Sanitary Design Criteria

Parameter	Total
Total Property Area	0.62 ha
Total Population	356 Persons
Residential Demand Rate	280 L/c/day
Peaking Factor (*Based on Harmon's Equation*)	3.44
Groundwater Infiltration Allowance	0.33 L/sec/ha
Total Infiltration Flow	**0.20 L/sec**
Peak Residential Sewage Flow	**3.96 L/sec**
Total Estimated Peak Wet Weather Flow	**4.20 L/sec**

5.3 Allowable Release Rate

To confirm the adequacy of the existing sanitary sewer, the Site Servicing Report for the Morgan's Creek Stage 1 (762 March Road) development, prepared by J.L. Richards & Associates (JLR), dated June 12, 2019, was reviewed. The report discusses the servicing approach for the private development, which included the reconstruction of the 200mm sanitary sewer which crosses March Road between 762 March Road and Mersey Drive, to service both 762 and 788 March Road. The resulting peak sanitary flows presented in the report accounted for 2.11 L/sec and 4.20 L/sec for 762 and 788 March Road, respectively.

Based on the compiled information and wastewater calculations presented in the JLR report, the Mersey Drive sanitary sewer system was found to have capacity to accommodate the increased flows from 762 and 788 March Road, as the original design of the system considered higher demands based on older and outdated City of Ottawa design guidelines.

Due to the complexity of the downstream network, it is requested that the City advise of any additional downstream constraints not considered in this report that may be impacted by these flows. Please refer to ***Appendix D*** for detailed calculations.

6.0 STORM SEWER DESIGN

6.1 Existing Storm Sewers

Currently there is an existing 675mm diameter stormwater sewer on March Road within the northbound lanes which outlets to Shirley's Brook SWM Facility. It is noted that the existing conditions of the site does not have any existing storm servicing and predominantly sheet flows directly to Shirley's Brook to the northeast.

6.2 Proposed Storm System

There is no internal storm sewer network proposed for this development. In lieu, the site is designed to manage a majority of the stormwater runoff with rooftop collection and overland sheet flow to area drains over top of the underground parking garage foundation. Stormwater will be collected and stored either with rooftop storage, or within an underground cistern located at the rear of the proposed building within the ramp to the parking garage.

The cistern will be responsible for collecting all other stormwater runoff captured by area drains and trench drains overtop of the underground foundation up to the 100-year storm event. The cistern will have a single jockey pump with a redundant standby pump that will be designed to discharge stormwater at a maximum controlled rate of 10.2 L/sec to a maximum elevation of 76.93 which is 0.3m above the maximum HGL in the March Road storm system. The cistern has been designed to include backwater/check valves on all inlets and outlets of the storm piping to ensure neither the HGL nor the Shirley's Brook floodplain will surcharge into the building. Although the building and pump system will have backup power generation, the cistern will also include an overflow structure outside of the footprint of the building which will allow the internal storm system to discharge runoff at an elevation of 74.00 in the event of an emergency power loss or mechanical failure.

The small areas fronting March and Klondike Road are proposed to be a mixture of hard surfaces and landscaping, and any areas not collected by the rooftop or area drains are designed to sheet flow away from the building overland and towards the City right of way and will be conveyed directly to Shirley's Brook as they currently do under existing conditions.

7.0 PROPOSED STORMWATER MANAGEMENT

7.1 Design Criteria and Methodology

The stormwater management design has been completed to meet the following design criteria:

- As per the Shirley's Brook SWMF Design Brief the release of stormwater to the facility is to be restricted to 70 L/sec/ha. The limits of proposed work account for 0.62 ha, therefore the allowable release rate to the SWM facility is 43.5 L/sec for a 100-year event.
- The outlet to Shirley's Brook is not to exceed the flow of the pre-development conditions.

It is assumed that the subject property is not covered by any specific watershed or sub watershed plans and has no existing stormwater management controls currently in place. As such, the subject site will require a

site-specific stormwater management plan using the City of Ottawa Sewer Design Guidelines (2012), and the MECP Stormwater Management Planning and Design (SWMPD) Manual (March 2003). The intent of this stormwater management plan is to provide the necessary stormwater quantity treatments, which will be achieved by means of on-site stormwater management control measures. Please refer to drawing CCO-24-1519 - *POST* included in ***Appendix E*** of this report for more details on the proposed site drainage areas. The Stormwater Management design for the subject property will be outlined in *Section 7.4* of this report.

7.2 Runoff Calculations

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

$$Q = 2.78CIA$$

Where: Q = Flow (L/sec)
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
Landscaped and Grass	0.20

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

7.3 Pre-Development Drainage Conditions

It has been assumed that the existing development contained no stormwater management controls for flow attenuation. The estimated pre-development peak flows for the 2-, 5-, and 100-year events are summarized below in ***Table 5***. Please refer to the detailed calculations and drawing CCO-24-1519 - *PRE* provided in ***Appendix E*** for more information.

Table 5: Pre-Development Runoff Summary

Drainage Area	Area (ha)	Runoff Coefficient, C (2/5-Yr)	Runoff Coefficient, C (100-Yr)	Tc (min)	Peak Flow, Q (L/s)		
					2-Year	5-Year	100-Year
Outlet to Shirley's Brook							
A1	0.6220	0.20	0.25	20	18.0	24.3	51.9
A2	0.5985	0.20	0.25	20	17.3	23.4	49.9
Total	**1.2205**				**35.3**	**47.7**	**101.7**

7.3.1 *Allowable Release Rate*

The allowable release rate that can be discharged to the March Road storm sewer for the subject lands was based on the Shirley's Brook Stormwater Management (SWM) Facility located northwest of Klondike Road. The SWM facility accounted for a total release rate of 70 L/sec/ha for the subject property based over the development area of 0.62 ha, for a total maximum release rate during a 100-year storm of 43.5 L/sec. To be conservative, the 5-year target release rate was calculated based on existing conditions for the same area, which resulted in 24.3 L/sec. The resultant release rates are summarized below in **Table 6**.

Table 6: Allowable Release Rates

Drainage Area	Area (ha)	5-Year Event			100-Year Event (Maximum)	
		Pre-Dev. C	Intensity (mm/hr)	Q (L/s)	Shirley's Brook SWM Restriction (L/sec/ha)	Q (L/s)
A1	0.62	0.20	70.25	**24.3**	70.00	**43.5**

7.4 Post-Development Drainage Conditions

To meet the stormwater requirements noted previously, the development is proposed to collect and store stormwater with a combination of rooftop storage and underground cistern storage. The roof will provide storage up to a maximum ponding depth of 150mm as per Ontario Building Code (OBC) requirements and will discharge directly to the proposed storm service connected to March Road, which will bypass the cistern controls. The cistern will collect surface runoff from the parking lots which will be serviced with submersible trash pumps. The cistern will store stormwater while discharging it to the 300mm diameter PVC gravity storm lateral at a controlled rate, which will then drain directly to the March Road 675mm diameter storm sewer.

Based on the criteria listed in *Section 7.1*, the development portion of the site which will outlet to Shirley's Brook SWM Facility will be required to restrict flow to 70 L/sec/ha. Therefore, the calculated target release rate for the site during the 100-year event will be 43.5 L/s. Furthermore, the northeast portion of the site that will continue to outlet to Shirley's Brook is not to exceed the pre-development conditions, and will therefore be limited to the 5- and 100-year pre-development flow rates of 47.7 L/sec and 101.7 L/sec, respectively. It should be noted that these flow rates were calculated using a time of concentration of 20 minutes to remain conservative.

The proposed site drainage limits are demonstrated on the Post-Development Drainage Area Plan. Refer to CCO-24-1519 - *POST* provided in ***Appendix E*** of this report for more details.

7.4.1 *Post-Development Drainage Areas*

Drainage area B1 consists of the total area captured by the building's trench/area drains, which is conveyed by internal plumbing to the underground cistern. The area is approximately 0.19 ha which includes the main portion of the above ground parking area, drive aisles, and landscaped areas at the rear of the building, as well as the ramp to the underground parking garage. The runoff coefficients for this area were calculated to be 0.69 and 0.77 with total estimated uncontrolled peak flow rates of 27.7 L/sec, 37.6 L/sec and 72.4 L/sec for the 2-, 5- and 100-year storm events, respectively. This area will outlet directly to the March Road storm

sewer via the new 300mm gravity storm lateral at a controlled pumped rate, and conveyed to the Shirley's Brook SWM facility.

Drainage area B2 consists of the small uncontrolled portion of the property which fronts March Road. This area is approximately 0.05 ha and consists of landscaped areas in front of the building with a portion of impervious surface at the main entrance to the facility. The runoff coefficients for this area were calculated to be 0.40 and 0.46 with total estimated uncontrolled peak flow rates of 4.2 L/sec, 5.7 L/sec and 11.4 L/sec for the 2-, 5- and 100-year storm events, respectively. This area will outlet to the March Road municipal storm sewer infrastructure via surface runoff, and conveyed to the Shirley's Brook SWM facility.

Drainage area B3 consists of the entire roof area of the Phase 1 apartment building. This area is approximately 0.16 ha and is serviced by eight (8) flow-controlled roof drains at 75% open position, which will discharge runoff at a controlled rate directly to the March Road storm sewer, bypassing the cistern controls, and will ultimately be conveyed to the Shirley's Brook SWM facility. The runoff coefficients for this area were calculated to be 0.90 and 1.00 with total estimated uncontrolled peak flow rates of 31.0 L/sec, 42.0 L/sec and 80.0 L/sec for the 2-, 5- and 100-year storm events, respectively.

Drainage area B4 consists of the entire roof area of the Phase 2 apartment building. This area is approximately 0.16 ha and is serviced by six (6) flow-controlled roof drains at 75% open position, which will discharge runoff at a controlled rate directly to the March Road storm sewer, bypassing the cistern controls, and will ultimately be conveyed to the Shirley's Brook SWM facility. The runoff coefficients for this area were calculated to be 0.90 and 1.00 with total estimated uncontrolled peak flow rates of 31.6 L/sec, 42.9 L/sec and 81.7 L/sec for the 2-, 5- and 100-year storm events, respectively.

Drainage area B5 consists of the small uncontrolled portion of the property along the southeastern property line between the Phase 2 building and the adjacent development. This area is approximately 0.03 ha and consists of entirely of a landscaped drainage swale which directs a small amount of runoff down the natural grade towards Shirley's Brook. The runoff coefficients for this area were calculated to be 0.20 and 0.25 with total estimated uncontrolled peak flow rates of 1.2 L/sec, 1.7 L/sec and 3.6 L/sec for the 2-, 5- and 100-year storm events, respectively.

Drainage area B6 consists of the small uncontrolled portion of the property which fronts Klondike Road. This area is approximately 0.02 ha and consists of entirely of landscaping along the northwestern side of the building which drains overland towards Klondike Road. The runoff coefficients for this area were calculated to be 0.20 and 0.25 with total estimated uncontrolled peak flow rates of 0.8 L/sec, 1.1 L/sec and 2.4 L/sec for the 2-, 5- and 100-year storm events, respectively. This area will outlet to Klondike Road via surface runoff and ultimately conveyed to Shirley's Brook.

Drainage area B7 consists entirely of the 0.61ha undeveloped portion of the property at the northeastern portion of the site directly adjacent to Shirley's Brook. This area will remain predominantly untouched, apart from a new community stone dust pathway which will be located along the rear limits of the development. The runoff coefficients for this area were calculated to be 0.23 and 0.29 with total estimated uncontrolled peak flow rates of 29.7 L/sec, 40.3 L/sec and 86.3 L/sec for the 2-, 5- and 100-year storm events, respectively. This area will drain via surface runoff directly to Shirley's Brook. It should be noted that the post-development flow rates were calculated using a time of concentration of 10 minutes to remain conservative, but the pre-development drainage characteristics of the area will generally remain the same. A summary of the uncontrolled post-development runoff calculations can be found below in ***Table 7***.

Table 7: Post-Development Uncontrolled Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	Intensity 2-Year (mm/hr)	Intensity 5-Year (mm/hr)	Intensity 100-Year (mm/hr)	Q (L/s)		
								2-Year	5-Year	100-Year
Outlet to Shirley's Brook SWM Facility										
B1	0.1890	0.69	0.77	10	76.8	104.2	178.6	27.7	37.6	72.4
B2	0.0500	0.40	0.46	10	76.8	104.2	178.6	4.2	5.7	11.4
B3	0.1612	0.90	1.00	10	76.8	104.2	178.6	31.0	42.0	80.0
B4	0.1645	0.90	1.00	10	76.8	104.2	178.6	31.6	42.9	81.7
Total	**0.5647**							**94.5**	**128.3**	**245.5**
Outlet to Shirley's Brook										
B5	0.0288	0.20	0.25	10	76.8	104.2	178.6	1.2	1.7	3.6
B6	0.0192	0.20	0.25	10	76.8	104.2	178.6	0.8	1.1	2.4
B7	0.6078	0.23	0.29	10	76.8	104.2	178.6	29.7	40.3	86.3
Total	**0.6558**							**31.7**	**43.1**	**92.2**

7.4.2 *Groundwater & Foundation Drainage*

The Hydrogeological Study prepared by Geofirma, dated February 29, 2024, was reviewed to determine the impacts, if any, to the groundwater table due to foundation drainage. Based on the elevations of the proposed building foundation and water levels taken at the time of the study, the building's mechanical system will be required to provide continuous groundwater pumping to accommodate the minimum estimated flow rate of 346 L/min from inflow around the walls and footings of the foundation. Should additional bedrock be exposed throughout the excavation of the floor slab of the lower basement level, additional inflow is expected and should be accounted for in the design of the mechanical drainage design. The report notes that further testing is recommended if the uncertainty in inflow rates will have a significant impact on the building design or dewatering considerations. Due to the high level of groundwater inflow that is expected, it is proposed to pump this water to grade near the back of the building towards Shirley's Brook, bypassing all stormwater management controls. This is to ensure that the stormwater management cistern and the Shirley's Brook SWM Facility are not overwhelmed during an average day or large rain events, should the groundwater inflow rates vary. Based on the estimated inflow rate, it is expected that the development will be required to apply to the MECP for a permit to take water, as the total daily volume of water pumped from the ground will be over 50,000 L/day.

Based on the Groundwater Management Plan (GWMP) prepared by Geofirma, it is not expected that the dewatering activities will have an effect on the surrounding users or natural systems. As noted in the GWMP, there are no local users of groundwater as the site is within an urban area which is supplied potable water. It is proposed to discharge the groundwater to grade and release it back into the natural environment on site at the ground surface and therefore replenishing the water table.

7.4.3 *Quantity Control*

Under post-development conditions, drainage area B1 which collects all runoff through area drains overtop of foundation will collect and store stormwater within the underground cistern noted previously. Stormwater will be pumped to the March Road storm system at a maximum controlled rate of 10.0 L/sec and will pump up to an elevation of 76.93, which is 300mm higher than the HGL. Exact pump models and capabilities will be

designed and confirmed during detailed design. The maximum required retention volume in the cistern was therefore calculated to be 49.3m^3, and to remain conservative, a working volume of 55m^3 was chosen to be provided. The exact dimensions and layout of the cistern will be design and confirmed during detailed design.

Under post-development drainage conditions, the two rooftop drainage areas B3 and B4 will collect and store water up to a maximum ponding depth of 150mm as per OBC requirements. The flow-controlled roof drains for areas B3 and B4 will restrict runoff down to 6.6 L/sec and 5.0 L/sec for the 5-year event, respectively, with a maximum restriction of 12.6 L/sec and 9.5 L/sec for the 100-year event, respectively. The maximum available ponding volumes for the Phase 1 and Phase 2 building roofs were calculated to be 60.5m^3 and 61.7m^3, respectively, while the required ponding volumes for each roof was calculated to be 51.4m^3 and 59.8m^3, respectively.

Under post-development conditions, drainage area B2 will be graded such that it drains overland towards the March Road ROW and discharge into the municipal storm system which drains to the Shirley's Brook SWM facility. Drainage areas B5, B6 and B7 will be graded to maintain their current drainage characteristics, which will discharge into Shirley's Brook. It should be noted that these areas are predominantly landscaped and vegetated areas with little to no impact from vehicles or regular pedestrian traffic. These areas will all flow offsite without any flow attenuation. A summary of the controlled flows and storages is provided below in ***Table 8***. Please refer to the detailed calculations provided in ***Appendix E*** for the estimated release rates and required storage volumes.

Table 8: Post-Development Controlled Runoff Calculations

Drainage Area	Unrestricted Flow (L/S)			Restricted Flow (L/S)			Storage Required (m^3)		Storage Provided (m^3)
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	5-Year	100-Year	
Outlet to Shirley's Brook SWM Facility									
B1	27.7	37.6	72.4	3.8	5.2	10.0	25.8	49.3	55.0
B2	4.2	5.7	11.4	*4.2*	*5.7*	*11.4*	-	-	-
B3	31.0	42.0	80.0	4.9	6.6	12.6	19.0	51.4	60.5
B4	31.6	42.9	81.7	3.7	5.0	9.5	31.7	59.8	61.7
Total	**94.5**	**128.3**	**245.5**	**16.6**	**22.5**	**43.5**			
Outlet to Shirley's Brook									
B5	1.2	1.7	3.6	*1.2*	*1.7*	*3.6*	-	-	-
B6	0.8	1.1	2.4	*0.8*	*1.1*	*2.4*	-	-	-
B7	29.7	40.3	86.3	*29.7*	*40.3*	*86.3*	-	-	-
Total	**31.7**	**43.1**	**92.2**	**31.7**	**43.1**	**92.2**			

7.4.1 *Quality Control*

The existing Shirley's Brook SWM Pond facility located north of Klondike Road was originally contemplated to provide 70% Total Suspended Solids (TSS) removal for approximately 0.78 ha of the subject property. Based on the current design of the proposed development, the only areas that require treatment are the parking area and the frontage of the property along March Road which total approximately 0.24 ha. Based on the reduction of drainage area, the pond appears to have adequate capacity to maintain the required 70% TSS removal for the site.

8.0 EROSION AND SEDIMENT CONTROL

8.1 Temporary Measures

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

Silt fences will be installed where shown on the final engineering plans, specifically along the downstream property limits. The Contractor, at their discretion or at the instruction of the City, Conservation Authority or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way off site. The rock flow, straw bale & silt fence check dams and barriers shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required. Fibre roll barriers are to be installed at all existing curb inlet catch basins and filter fabric is to be placed under the grates of all existing catch basins and manholes along the frontage of the site and any new structures immediately upon installation. The measures for the existing/proposed structures are to be removed only after all areas have been paved or landscaped. 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 Servicing and Grading Plan* for additional details regarding the temporary measures to be installed and their appropriate OPSD references.

8.2 Permanent Measures

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

9.0 SUMMARY

- Two 6-storey residential buildings are proposed at 788 March Road in Ottawa, Ontario.
- Two new 200mm watermain service laterals are proposed to service the site, connecting to the existing 406mm watermain on Klondike and the existing 406mm watermain on March Road to provide redundancy.
- A new 200mm sanitary service lateral will be connected to the existing sanitary sewer stub located at the southern corner of the property outside of the ROW, which will discharge to the Mersey Drive sanitary sewer system.
- A new 300mm storm service lateral will be installed to service the proposed development and will be connected to the 675mm diameter concrete storm sewer within March Road. Stormwater will be collected by roof drainage and various area drains around the site and will be stored either with rooftop storage or via an underground cistern before discharging to the March Road sewer at a controlled rate via a mechanical pump.
- Storage for the 2-, 5- and 100-year storm events will be provided within the rooftop ponding storage and cistern storage.
- Water quality control will be provided by the existing Shirley's Brook SWM Pond facility located north of Klondike Road which will provide the required 70% TSS removal rate.

10.0 RECOMMENDATION

Based on the information presented in this report, we recommend that City of Ottawa approve this Servicing and Stormwater Management report in support of the proposed development at 788 Mach Road.

This report is respectfully being submitted for approval.

Sincerely,

McIntosh Perry Consulting Engineers Ltd.

James Hewson, P.Eng.
Project Engineer, Land Development
E: j.hewson@mcintoshperry.com

11.0 STATEMENT OF LIMITATIONS

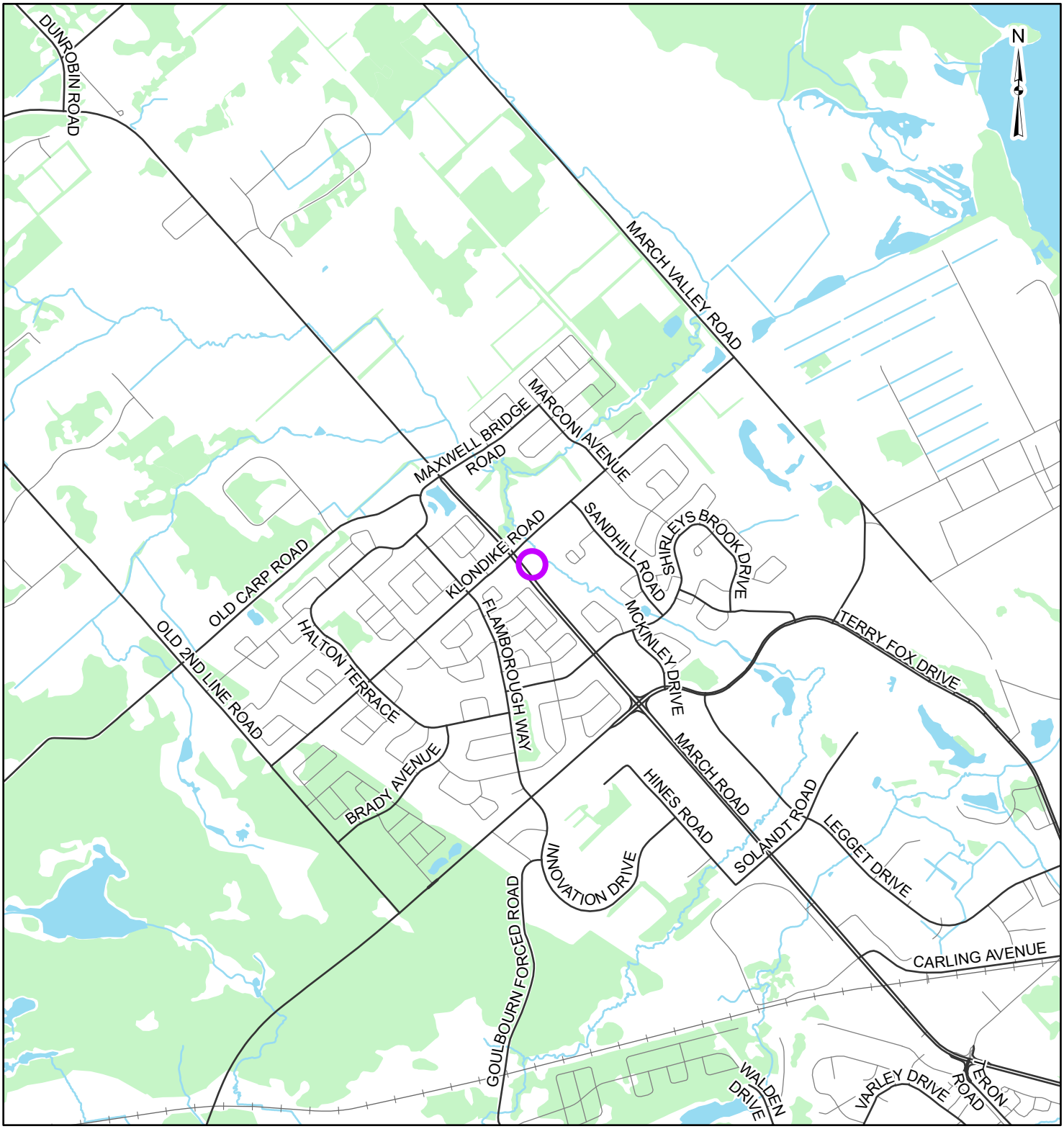
This report was produced for the exclusive use of **788 March Road**. The purpose of the report is to assess the existing stormwater management system and provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Parks and Climate Change, City of Ottawa and local approval agencies. McIntosh Perry reviewed the site information and background documents listed herein. 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
SITE LOCATION PLAN

McINTOSH PERRY



800 400 0 800

Scale 1:25,000

Metres

LEGEND

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

REFERENCE

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

CLIENT: SINA CONSTRUCTION

PROJECT: SITE SERVICING AND STORMWATER MANAGEMENT REPORT

TITLE: SITE LOCATION PLAN

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

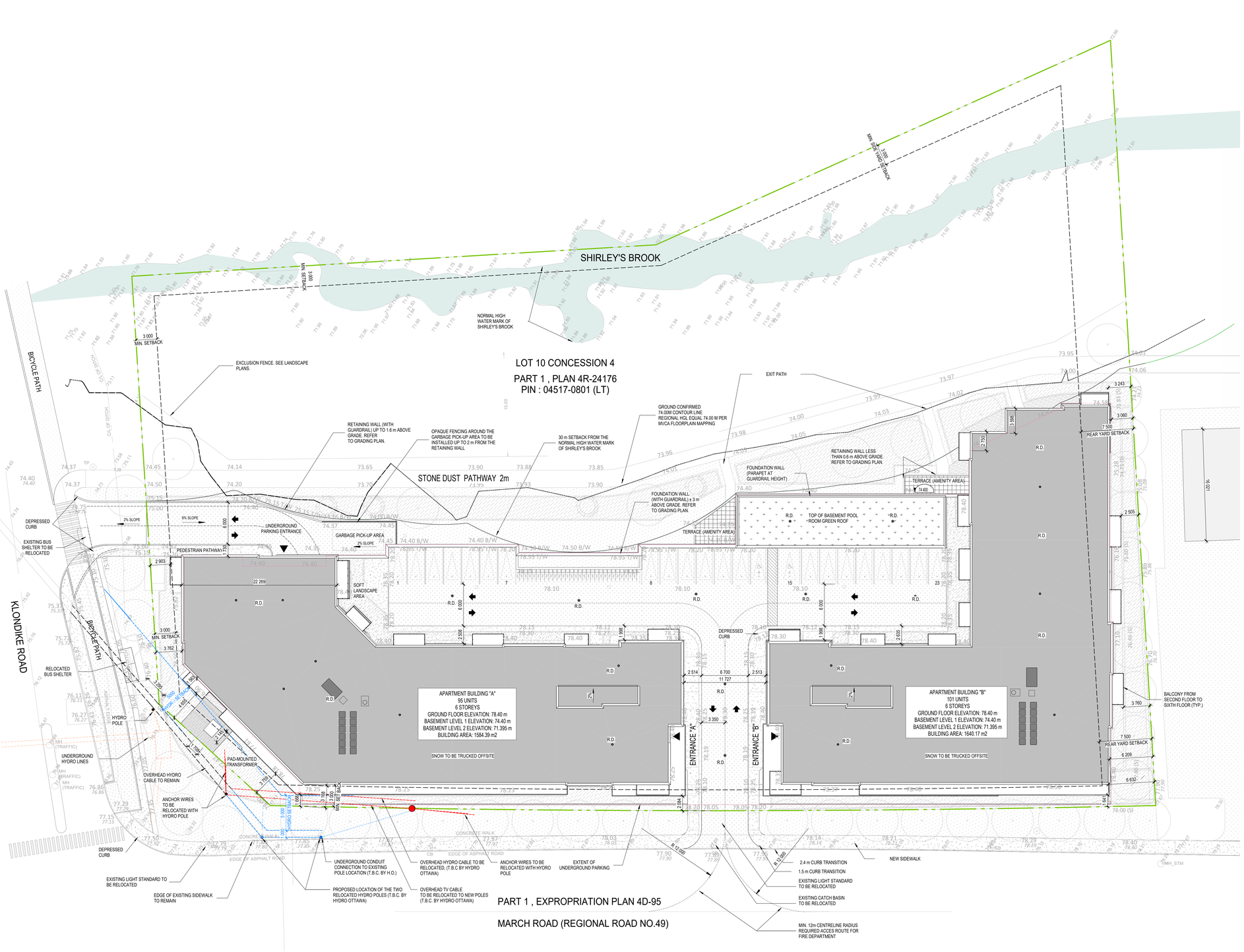
PROJECT NO:	PCO-24-1519
Date	Sep., 21, 2023
GIS	AH
Checked By	JH

FIGURE: A1

C:\Users\a.hamed\McIntosh Perry\GIS - Documents\Projects\2024\PCO\PCO-24-1519 15053552 Canada Kinata 788 March Road\gpr\LandDevelopment\PCO-24-1519_SiteLocationPlan.aprx

APPENDIX B
BACKGROUND INFORMATION

McINTOSH PERRY



PLAN DE SITE

1 : 200 — 1 / A100

LEGAL DESCRIPION :
This property is legally described as Part of Lot 10, Concession 4, Geographic Township of March, City of Ottawa

TOPOGRAPHICAL INFORMATION::
Property boundary has been derived from plan prepared by J.D. Barnes Limited. Topographical information has been prepared by McIntosh Perry

KEY PLAN

Property Area		2024-02-20
Zoning	City of Ottawa zoning By-law No. 2008-250	
Property Area	12210.01 sq. m	131,429 sq. ft

PROJECT STATISTICS	BUILDINGS A & B			
BUILDING HEIGHT (m)	21.2 m			
GROSS FLOOR AREA UNDER GROUND	10 588 m²			
GROSS FLOOR AREA ABOVE GROUND	19 488 m²			
LOT COVERAGE	3 235 m²			

UNIT STATISTICS	BUILDINGS A	GF	2nd to 6th
1 Bedroom	24	4	20
1 Bedroom + Den	13	3	10
2 Bedroom	35	5	30
2 Bedroom + Den	17	2	10
3 Bedroom	6	1	10
TOTAL	95	15	80
	B	GF	2nd to 6th
1 Bedroom	24	4	20
1 Bedroom + Den	36	6	30
2 Bedroom	30	5	25
2 Bedroom + Den	5	0	0
3 Bedroom	6	1	10
TOTAL	101	18	85
GRAND TOTAL	196		

PARKING A & B	REQUIRED		PROVIDED
APARTMENT BUILDING - 196 UNITS	1.20	235	236
VISITORS	0.20	39	39
TOTAL	274		275
Reduced parking stalls (Sec.106 up to 40%)	94		13
Accessible parking (B1)	7 (3 Type A + 4 Type B)		7
Visitor - Accessible parking (GF)	2 (1 Type A + 1 Type B)		2

BICYCLE PARKING A & B	REQUIRED		PROVIDED
APARTMENT BUILDING - 196 UNITS	0.50	98	
TOTAL	98		194
With accessible 1.5m wide aisle			100
Regular			94

LOCKERS A & B	REQUIRED		PROVIDED
APARTMENT BUILDING - 196 UNITS	1.00	196	204
TOTAL	196		2043

GENERAL MIXED USE ZONE - GM ZONE PROVISION	REQUIRED	PROVIDED
MINIMUM LOT AREA	NO MINIMUM	12 210.01 m²
MINIMUM LOT WIDTH	NO MINIMUM	64.62m
MIN. FRONT YARD SETBACK	3m	3.70m
MIN. CORNER YARD SETBACK	3m	3.17m
MINIMUM INTERIOR SIDE YARD SETBACK	3m	38.91m
MINIMUM REAR YARD SETBACK	7.5m	3.06m
MAXIMUM BUILDING HEIGHT	18m	21.5m
MAXIMUM FLOOR SPACE INDEX	2	1.53
MINIMUM WIDTH OF LANSCAPE AREA	3m	3.20m
MINIMUM WIDTH OF DRIVE AISLE FOR PARKING LOT ACCESSORY TO A RESIDENTIAL USE (by-law 2020-299)	6.0m	6.0m
MIN. WIDTH OF DRIVE AISLE FOR PARKING GARAGE	6.0m	6.0m
MAXIMUM PERMITTED PROJECTIONS (BALCONIES)	2.0m	1.5m

PROVISIONS FOR PUD - SECTION 131 ZONE PROVISION	REQUIRED	PROVIDED
MINIMUM WIDTH OF PRIVATE WAY	6m	6m
MINIMUM SETBACK FOR ANY WALL OF RESIDENTIAL USE BUILDING TO A PRIVATE WAY	1.8m	1.73m
MINIMUM SETBACK FOR ANY GARAGE ENTRANCE FROM A PRIVATE WAY	5.2m	32.09m
MINIMUM SEPARATION BETWEEN BUILDINGS	3m	11.73m

AMENITY AREA ZONING BY-LAW SECTION 137	REQUIRED	PROVIDED
MINIMUM FOR APARTMENT DWELLING : 6m²/UNIT	1176 m²	1823 m²
MINIMUM 50% COMMUNAL	588 m²	600 m²
AT LEAST ONE AREA > 54 m²	54 m²	103 m²
Resident Common Amenity Area	-	479 m²
Exterior terrace	-	25 m²
Ground floor: Balconies/ Terraces	-	204 m²
Second to sixth floor: Balconies	-	1018 m²
TOTAL	1176m²	1823 m²

WASTE MANAGEMENT A - 95 UNITS	REQUIRED	PROVIDED
GARBAGE - LOOSE	0.11/ UNIT 10.45y³	2- 4y³ CONT
RECYCLING - FEL GLASS METAL PLASTIC	0.018/ UNIT 1.71y³	1- 2y³ CONT
RECYCLING - FEL FIBER	0.038/ UNIT 3.61y³	1- 4y³ CONT
ORGANICS	240/ 50 UNIT 1.9L	2- 240 L
B - 101 UNITS	REQUIRED	PROVIDED
GARBAGE - LOOSE	0.11/ UNIT 11.11y³	3- 4y³ CONT
RECYCLING - FEL GLASS METAL PLASTIC	0.018/ UNIT 1.819y³	1- 2y³ CONT
RECYCLING - FEL FIBER	0.038/ UNIT 3.838y³	1- 4y³ CONT
ORGANICS	240/ 50 UNIT 2.02L	2- 240L

LEGEND

- PROPERTY LINE
- REQUIRED SETBACKS
- UNDERGROUND PARKING EXTEND
- ROAD IN ASPHALD
- PEDESTRIAN PATH
- SIDEWALK
- ADJACENT BUILDINGS
- BUILDING AREA
- SOFT LANDSCAPING TURF. REFER TO LANDSCAPE
- PLANTING BEDS. REFER TO LANDSCAPE
- RIVERWASH STONE. REFER TO LANDSCAPE
- PATIO SLABS
- TRAFFIC DIRECTION
- MECHANICAL EQUIPEMENTS
- CAR PARKING REGULAR
- V : VISITOR
- CAR PARKING SMALL
- BARRIER FREE PARKING (TYPE A)
- BARRIER FREE PARKING (TYPE B)
- BIKE PARKING REGULAR "ORCUM STANDING BICYCLE RACK" BY HAUSER OR SIM. 2"W x 24" DIA x 33"H
- BIKE PARKING ELEVATION

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PLANIFICATEUR Planner
FOTENN Planning and Urban Design
396 Cooper Street, Suite 300, Ottawa, ON K2P 2H7
T 613 730 5709 fotenn.com

ARCHITECTURE DE PAYSAGE Landscape Architect
GJA Inc. Gino. J. Aiello
110 Didsbury Road, Unit 9, Ottawa, ON K2T 0C2
T 613 286 5130 gjaia.com

INGÉNIERIE TRANSPORT Transportation Engineering
PARSONS
1223 Michael Street, Suite 100, Ottawa, ON K1J 7T2
T 613 738 4160 parsons.com

CIVIL Civil
McINTOSH PERRY
115 Walgreen Road RR 3 Carp, Ottawa, ON K0A 1L0
T 613 836 2184 mcintoshperry.com

STRUCTURE Structure
RJC Engineers
1545 Carling Avenue, Suite 304, Ottawa, ON K1Z 8P9
T 613 714 7000 rjc.ca

ARCHITECTES Architect
NEUF architect(e)s
630 boul. René-Lévesque O. 32e étage, Montréal, QC H3B 1S6
T 514 847 1117 neuf.ca

INGÉNIEUR MÉCANIQUE Mechanical Engineer
BUILDing Consultants
6455 rue Doris-Lussier, Suite 110, Boisbriand, QC J7H 0E8
T 514 718 6841 building-consultants.ca

INGÉNIEUR ÉLECTRIQUE Electrical Engineer
BUILDing Consultants
6455 rue Doris-Lussier, Suite 110, Boisbriand, QC J7H 0E8
T 514 718 6841 building-consultants.ca

SCEAU / Seal

NEUF ARCHITECT(E)S

CLIENT Client
SINA
3030 boul. Le Carrefour, Suite 1200, Laval, QC H7T 2P5
T 514 565 7462 sina.ca

OUVRAGE Project
788 MARCH ROAD RESIDENTIAL

EMPLACEMENT Location
OTTAWA, ON

NO PROJET No.
13109

NO	RÉVISION	DATE (aa-mm-jj)
A	INTERNAL REVIEW - ARCHITECT	24-03-04

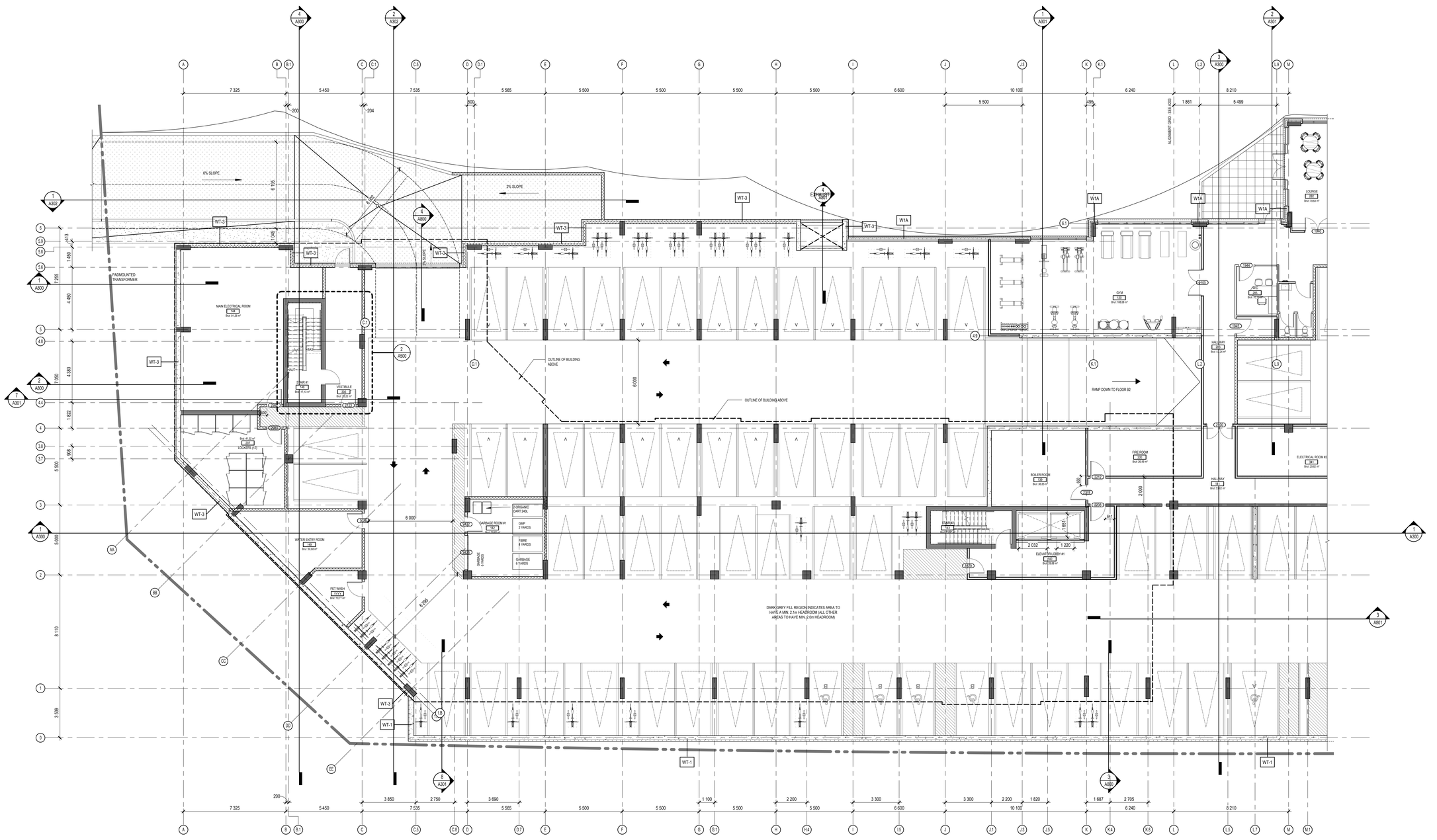
Preliminary DO NOT USE FOR CONSTRUCTION

DESSINÉ PAR Drawn by **N.S.H**
VÉRIFIÉ PAR Checked by **B.R.**

DATE (aa mm jj) **2024-03-07**
ÉCHELLE Scale **As indicated**

TITRE DU DESSIN Drawing Title
SITE PLAN

RÉVISION Revision **A**
NO. DESSIN Dwg Number **A100**



A202 - BUILDING "A" BASEMENT L1

1 : 100

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PLANIFICATEUR Planner
FOTENN Planning and Urban Design
396 Cooper Street, Suite 300, Ottawa, ON K2P 2H7
T 613 730 5709 fotenn.com

ARCHITECTURE DE PAYSAGE Landscape Architect
GJA Inc. Gino. J. Aiello
110 Didsbury Road, Unit 9, Ottawa, ON K2T 0C2
T 613 286 5130 gjala.com

INGÉNIERIE TRANSPORT Transportation Engineering
PARSONS
1223 Michael Street, Suite 100, Ottawa, ON K1J 7T2
T 613 738 4160 parsons.com

CIVIL Civil
McINTOSH PERRY
115 Walgreen Road RR 3 Carp, Ottawa, ON K0A 1L0
T 613 836 2184 mcintoshperry.com

STRUCTURE Structure
RJC Engineers
1545 Carling Avenue, Suite 304, Ottawa, ON K1Z 8P9
T 613 714 7000 rjc.ca

ARCHITECTES Architect
NEUF architect(e)s
630 boul. René-Lévesque O. 32e étage, Montréal, QC H3B 1S6
T 514 847 1117 neuf.ca

INGÉNIEUR MÉCANIQUE Mechanical Engineer
BUILDing Consultants
6455 rue Doris-Lussier, Suite 110, Boisbriand, QC J7H 0E8
T 514 718 6841 building-consultants.ca

INGÉNIEUR ÉLECTRIQUE Electrical Engineer
BUILDing Consultants
6455 rue Doris-Lussier, Suite 110, Boisbriand, QC J7H 0E8
T 514 718 6841 building-consultants.ca

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NEUF ARCHITECT(E)S

CLIENT Client
SINA
3030 boul. Le Carrefour, Suite 1200, Laval, QC H7T 2P5
T 514 565 7462 sina.ca

OUVRAGE Project
MARCH ROAD RESIDENTIAL

EMPLACEMENT Location
OTTAWA, ON

NO PROJET No.
13109

NO	RÉVISION	DATE (aa-mm-jj)

Preliminary DO NOT USE FOR CONSTRUCTION

DESSINÉ PAR Drawn by
N.S.H/B.R.

VÉRIFIÉ PAR Checked by
C.I.

DATE (aa.mm.jj)
2024-01-30

ÉCHELLE Scale
1 : 100

TITRE DU DESSIN Drawing Title
BUILDING "A" BASEMENT LEVEL 1

RÉVISION Revision

NO. DESSIN Dwg Number
A202

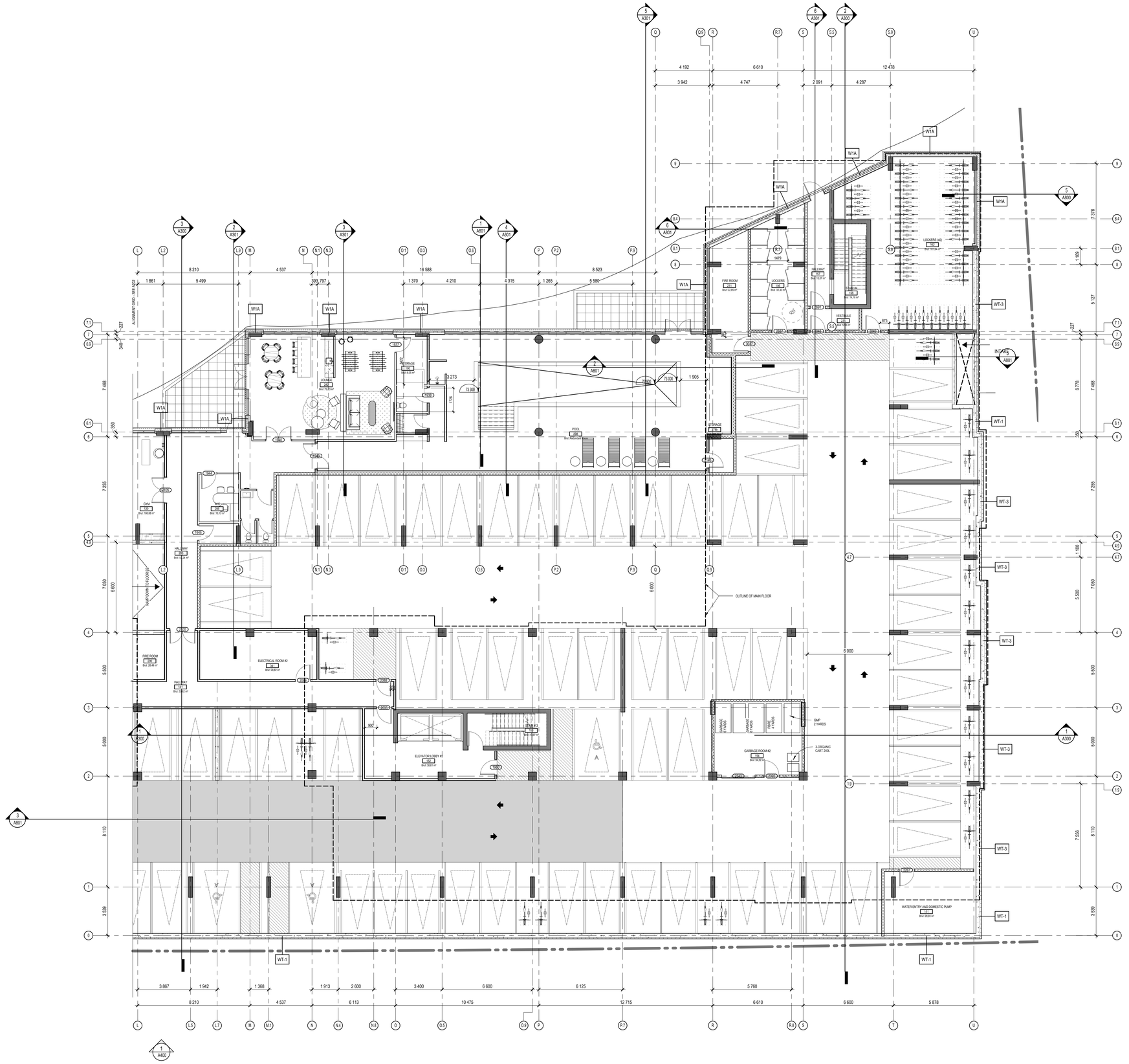

TABLEAU - L1 STATIONNEMENT	
TYPE DE STATIONNEMENT	QTÉ
SMALL 2400mm X 4600mm	5
STANDARD 2600mm X 5200mm	105
HANDICAPÉ 2600mm X 5200mm Type B	4
HANDICAPÉ 3400mm X 5200mm Type A	3

TOTAL: 117

TABLEAU - L1 STATIONNEMENT CASIER	
TYPE DE STATIONNEMENT	QTÉ
CASIER	20

TOTAL: 20

TABLEAU - L1 STATIONNEMENT VÉLO	
TYPE DE STATIONNEMENT	QTÉ
VÉLO AISLE 1.5	40
VÉLO	59

TOTAL: 99

A203 - BUILDING "B" BASEMENT L1
1 : 100

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CIVIL Civil
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115 Walgreen Road RR 3 Carp, Ottawa, ON K0A 1L0
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630 boul. René-Lévesque O. 32e étage, Montréal, QC H3B 1S6
T 514 847 1117 neuf.ca

INGÉNIEUR MÉCANIQUE Mechanical Engineer
BUILDing Consultants
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T 514 718 6841 building-consultants.ca

INGÉNIEUR ÉLECTRIQUE Electrical Engineer
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6455 rue Doris-Lussier, Suite 110, Boisbriand, QC J7H 0E8
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ARCHITECT(E)S

CLIENT Client
SINA
3030 boul. Le Carrefour, Suite 1200, Laval, QC H7T 2P5
T 514 565 7462 sina.ca

OUVRAGE Project
MARCH ROAD RESIDENTIAL

EMPLACEMENT Location
OTTAWA, ON

NO PROJET No.
13109

NO	RÉVISION	DATE (aa-mm-jj)
1	ISSUED FOR COORDINATION	2018-07-19
2	ISSUED FOR SITE PLAN CONTROL	2018-08-15
3	ISSUED FOR COORDINATION	2018-09-12
4	FOR SITE PLAN CONTROL	2018-12-18

Preliminary
DO NOT USE FOR CONSTRUCTION

DESSINÉ PAR Drawn by
N.S.H/B.R.

VÉRIFIÉ PAR Checked by
C.I.

DATE (aa.mm.jj)
2024-01-30

ÉCHELLE Scale
1 : 100

TITRE DU DESSIN Drawing Title
BUILDING "B" BASEMENT LEVEL 1

RÉVISION Revision
4

NO. DESSIN Dwg Number
A203

MEMO

Date: April 11, 2023

To / Destinataire	Sarah Ezzio, Planner
From / Expéditeur	Julie Candow, Project Manager, Infrastructure Approvals
Subject / Objet	**Pre-Application Consultation** **788 March Road**

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans#servicing-study-guidelines-development-applications

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

   - ⇨ Ottawa Sewer Design Guidelines (October 2012)
   - ⇨ Ottawa Design Guidelines – Water Distribution (2010)
   - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007, revised 2008)
   - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
   - ⇨ City of Ottawa Environmental Noise Control Guidelines (January 2016)
   - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
   - ⇨ City of Ottawa Accessibility Design Standards (2012)
   - ⇨ Ottawa Standard Tender Documents (latest version)
   - ⇨ Ontario Provincial Standards for Roads & Public Works (2013)

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

4. Watermain Infrastructure:

   a) There is a 406mm diameter watermain along the entire March Road frontage and along part of the Klondike Road frontage;

   b) Water frontage fees will apply;

   c) Individual residential facilities with a basic day demand greater than 50 m3/day shall be connected with a minimum of two water services, separated by an isolation valve, to avoid the creation of a vulnerable service area (as per Tech Bulletin 2021-03).

   d) Please submit a new boundary condition request for this application.

      Water Boundary condition requests must include the location of the services and the expected loads required by the proposed development. Please provide an email to Julie Candow (Julie.candow@ottawa.ca) with the following information:

      i. Location of services

      ii. Type of development and the amount of fire flow required (as per OBC Section 7.2.11 or FUS for fire flows 9,000 L/min or above – See technical bulletin ISTB 2021-03).

      iii. Average daily demand: ___ l/s.

      iv. Maximum daily demand: ___l/s.

      v. Maximum hourly daily demand: ___ l/s.

5. Sanitary / Storm Infrastructure:

   a) There is a newly constructed 600mm diameter sanitary sewer fronting the site on March Road which was constructed to service the Kanata North urban expansion lands. The subject site, as well as the neighbouring parcel at 760 March Road, were included in the Kanata North Master Servicing Study sanitary design sheet, identified as Drainage Area X-5. The sanitary design sheet assumes both sites were to be developed as high density residential, with a combined total area of 1.76 ha and a total contributing peak flow of 5.9 L/s.

   b) New services must be grouped in a common trench to minimize the number of road cuts.

6. The Stormwater Management Criteria, for the subject site, is to be based on the following, **for all storm flow directed to Shirley's Brook**:

   a) Post-development storms flows directed to Shirley's Brook (2-yr, 5-yr and 100-yr) must be controlled to the pre-development storm flows directed to Shirley's Brook (2-yr, 5-yr and 100-yr). Excess flows must be detained on site.

b) Quality control to be provided to “Enhanced” level of treatment (80% total suspended solids removal.

The Stormwater Management Criteria, for the subject site, is to be based on the following, **for all storm flow directed to the March Road municipal storm sewer:**

a) The site area is tributary to the Shirley’s Brook Stormwater Management (SWM) Facility, referred to as Pond No 1 – West, per the Shirley’s Brook SWM Design Brief. The pond was designed to accept minor flow at a rate of 70 L/s/ha from the subject site and adjacent site.

b) Flows to the storm sewer, in excess of the allocated storm release rate, up to and including the 100-year storm event, must be detained on site.

c) If connecting to the March Road storm sewer, the 100-yr HGL within the March Road sewer must be assessed. It is known that the HGL is very high along this stretch of March Road.

d) Quality control to be provided to “Normal” level of treatment (70% total suspended solids removal) as provided by the Shirley’s Brook Stormwater Management (SWM) Facility, referred to as Pond No 1 – West.

e) Area-Specific Development Charges for Stormwater Management Facilities are applicable to the property at 788 March Road.

7. A Geotechnical Investigation and Slope Stability Report will be required. The reports should consider the meanderbelt setback as well as the hydraulic grade lines due to the underground parking proposed.

8. Please consult with the MVCA to determine the extents of the Shirley’s Brook floodplain and development offsets.

9. An MECP Environmental Compliance Approval will be required for this application if storm flows are to be directed to Shirley’s Brook.

10. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

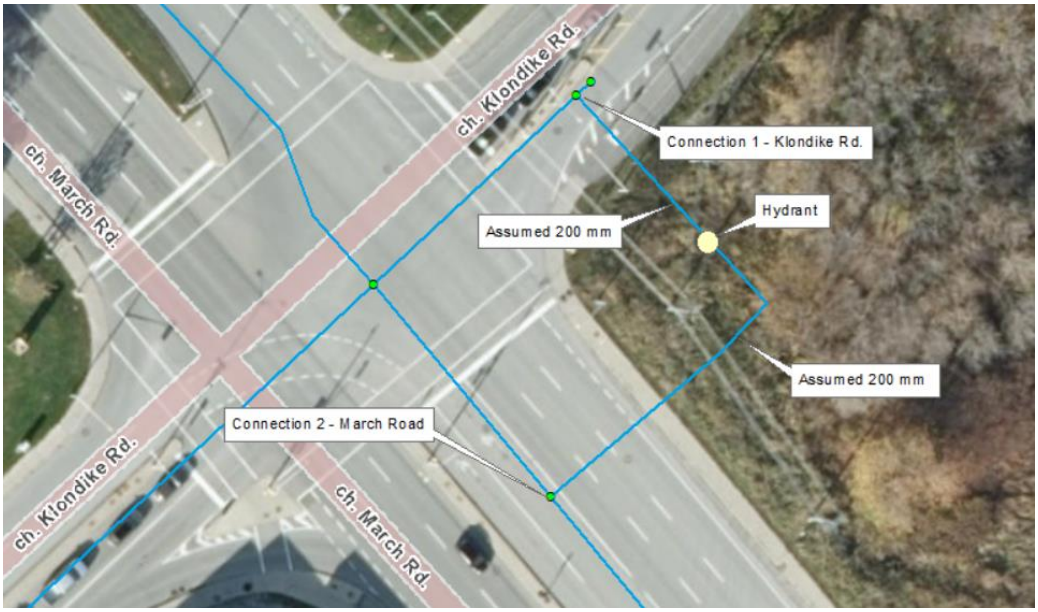
Should you have any questions or require additional information, please contact me directly at Julie.Candow@ottawa.ca.

Boundary Conditions
788 March Road

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	84	1.40
Maximum Daily Demand	204	3.40
Peak Hour	456	7.60
Fire Flow Demand #1	13,980	233.00

Location



Results

Connection 1 - Klondike Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	77.3
Peak Hour	126.1	70.3
Max Day plus Fire Flow #1	121.8	64.2

[1] Ground Elevation = 76.6 m

Connection 2 - March Rd.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	131.0	75.3
Peak Hour	126.1	68.3
Max Day plus Fire Flow #1	121.9	62.4

[1] Ground Elevation = 78.1 m

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

APPENDIX C
WATERMAIN CALCULATIONS

McINTOSH PERRY

WATER DEMAND CALCULATIONS

PROJECT: 788 March Road, Residential Apartment Complex
LOCATION: 788 March Rd., Kanata, ON
CLIENT: SINA Construction

McINTOSH PERRY

LOCATION	INDIVIDUAL								FLOW							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
788 March Road	UNIT TYPES						AREA	POPULATION	PEAKING FACTORS		AVERAGE DAY FLOW Q(a)		MAX DAY FLOW Q(max)		PEAK HOURLY FLOW Q(h)	
	SF	SD	TH	1BR	2BR	3BR	(ha)		MAX DAY	PEAK HOUR	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)
196-Unit Apartment Bld	0	0	0	97	87	12	0.62	355.7	3.60	5.40	1.15	69.16	4.15	248.99	6.22	373.49
TOTALS	0	0	0	97	87	0	0.62	355.7			1.15	69.16	4.15	248.99	6.22	373.49

Design Parameters:

Single Family	3.4	p/p/u
TH/SD	2.7	p/p/u
Apart. (Avg.)	1.8	p/p/u
1 Bedroom	1.4	p/p/u
2 Bedroom	2.1	p/p/u
3 Bedroom	3.1	p/p/u

Notes:

1. Domestic Flow: 280 L/(cap·day)
2. Peaking factors based on 501-3000 population

Q (a) = Average Daily Flow
Q (max) = Maximum Daily Flow
Q (h) = Peak Hour Flow
Q (min) = Night Minimum Hour Flow

Q (max) = Q(a) * Peaking Factor
Q (h) = Q(a) * Peaking Factor
Q (min) = Q(a) * Peaking Factor

REF: CITY OF OTTAWA - WATER DISTRIBUTION GUIDELINES, JULY 2010

Designed: J. Hewson

Checked: J. Hewson

Project No.: PCO-24-1519

McINTOSH PERRY

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 2020

Building No. / Type: Phase 2 Apartment Building (Ordinary Construction)

An estimate of the Fire Flow required for a given fire area may be estimated by:

RFF = 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 Construction Coefficient (C)

Choose the construction type and coefficient to be used in the required fire flow formula:

C = 1.5	**Type V** Wood Frame Construction
= 0.8	**Type IV-A** Mass Timber Construction
= 0.9	**Type IV-B** Mass Timber Construction
= 1.0	**Type IV-C** Mass Timber Construction
= 1.5	**Type IV-D** Mass Timber Construction
= 1.0	**Type III** Ordinary Construction
= 0.8	**Type II** Noncombustible Construction
= 0.6	**Type I** Fire Resistive Construction

Input: C = Type III Ordinary Construction = 1.0

B. Determine Total Effective Floor Area (A)

Input building floor areas:

Floor No.		Area (m^2)	% Used	Area Used (m^2)	Total (m^2)
6	=	**1640**	100%	1640	
5	=	**1640**	100%	1640	
4	=	**1640**	100%	1640	
3	=	**1640**	100%	1640	**9840**
2	=	**1640**	100%	1640	
1	=	**1640**	100%	1640	
B1	=	**0**	0%	0	
B2	=	**0**	0%	0	
		Input:			

C. Determine Required Fire Flow

RFF = **220 x C x √A** = 21823 L/min

= **22000 L/min** *(Rounded to nearest 1,000 L/min)*

115 Walgreen Road, R.R.3. Carp, ON K0A 1L0 | T. 613-836-2184 | F. 613-836-3742
info@mcintoshperry.com | www.mcintoshperry.com

D. Determine Increase or Decrease Based on Occupancy Contents Adjustment Factor

Choose the combusitbility of building contents:

Option		Input:	Factor	Fire Flow Change	Adjusted RFF
Non-Combustible	-25%				
Limited Combustible	-15%	**Limited Combustible**	**-15%**	**-3300 L/min**	**18700 L/min**
Combustible	0%				
Free Burning	15%				
Rapid Burning	25%				

Fire Flow Requirements Based on Fire Underwriters Survey (FUS) 2020

E. Determine the Decrease for Automatic Sprinkler Protection, if Applicable

Choose the sprinkler options that apply:

Option		Applicable?	Factor	Fire Flow Change	Adjusted RFF
Automatic sprinkler conforms to NFPA 13	-30%	**Yes**	**-30%**	**-5610 L/min**	**13090 L/min**
Standard water supply for system and Fire Department hose line	-10%	**Yes**	**-10%**	**-1870 L/min**	**11220 L/min**
Fully supervised system	-10%	**No**	**0%**	**0 L/min**	**11220 L/min**

F. Determine the Total Increase for Exposures

Choose separation distance and wall lengths:

Subject Side	Separation Distance (m)	Exposed Wall Type	Wall Length (m)	No. of Storeys	Length-Height Factor	Charge (%) (See FUS-Table 6)	Total Charge (%)	Fire Flow Change (L/min)	Adjusted RFF (L/min)
North	**NA**	**Type V**	**0**	**0**	**0**	0%			
South	**NA**	**Type V**	**0**	**0**	**0**	0%			
East	**13.5**	**Type V**	**17**	**3**	**51**	12%	**22%**	**2468**	**13688**
West	**12.7**	**Type III**	**21.9**	**6**	**131.4**	10%			
			Input:						

G. Determine the Total Required Fire Flow

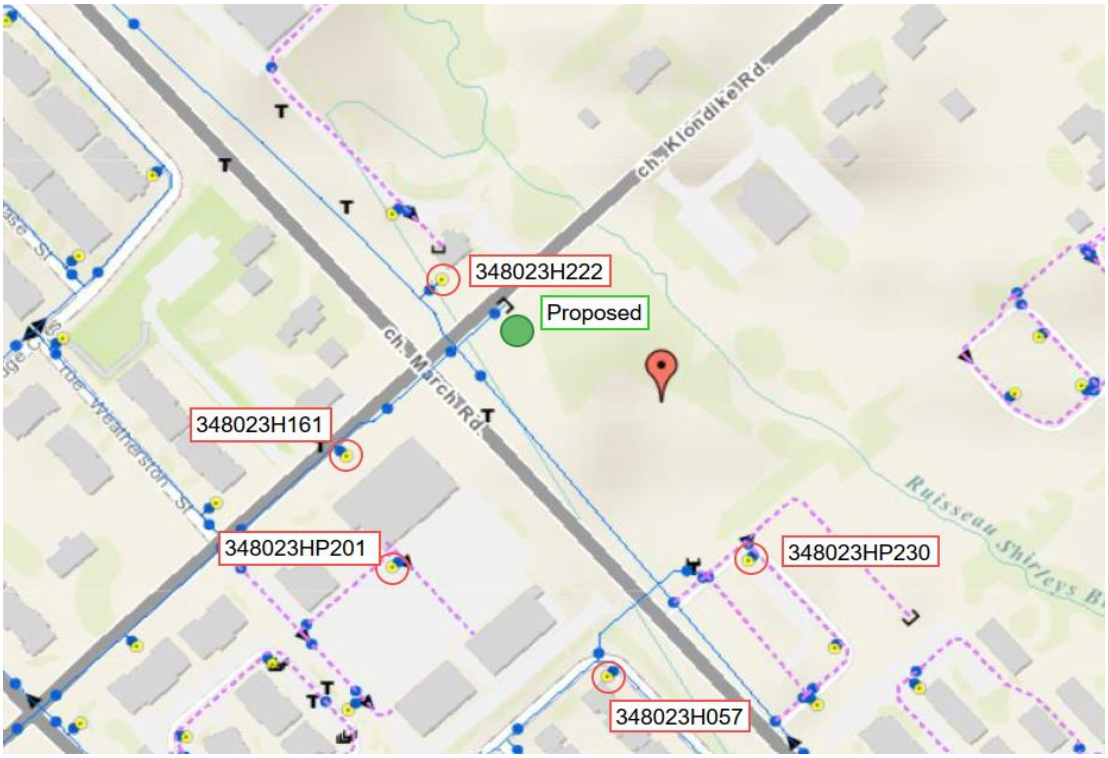
Total Required Fire Flow, Rounded to the Nearest 1,000 L/min =	**14000 L/min**
Total Required Fire Flow (L/sec) =	**233 L/sec**
Does the 10,000 L/min (167 L/sec) RFF limit apply, based on "TECHNICAL BULLITEN ISTB-2018-02"? =	**No**
Resultant Total Required Fire Flow (L/sec) =	**233 L/sec**

AVAILABLE FIRE FLOWS BASED ON HYDRANT SPACING

BASED ON CITY OF OTTAWA TECHNICAL BULLITEN ISTB-2018-02

Hydrant I.D.	Location	Municipal or Private	Colour or Class (If Known)	788 March Road	
				[1]Distance (m)	[2]Fire Flow Contribution (L/min)
348023H222	March/Klondike NE	Municipal	Blue (assume class AA)	50	5,700
348023H161	Klondike	Municipal	Blue (assume class AA)	105	3,800
348023HP201	1100 Klondike	Private	Blue (assume class AA)	110	3,800
348023H057	Mersey	Municipal	Blue (assume class AA)	85	3,800
348023HP230	762 March	Private	Blue (assume class AA)	25	5,700
Proposed	March/Klondike SE	Municipal	Blue (assume class AA)	9	5,700
Total (Inc. Private) (L/min)					**28,500**
Total (Municipal Only) (L/min)					**19,000**
FUS RFF in L/min or (L/sec)					14,000 (233)

Notes:
[1]Distance is measured along a road or fire route to nearest face of building.
[2]Fire Flow Contribution based on Table 1 of Appendix I, ISTB-2018-02



APPENDIX D
SANITARY CALCULATIONS

McINTOSH PERRY

McINTOSH PERRY

CCO-24-1519 - 788 March Road - Sanitary Demands

Project:	788 March Road
Project No.:	CCO-24-1519
Designed By:	R.P.
Checked By:	J.H.
Date:	September 29, 2023

Site Area	0.62	Gross ha	
1 Bedroom	97	1.40	Persons per unit
2 Bedroom	87	2.10	Persons per unit
3 Bedroom	12	3.10	Persons per unit
Total Population	356	Persons	
Commercial Area	0.00	m^2	
Amenity Space	479.00	m^2	

DESIGN PARAMETERS

Institutional/Commercial Peaking Factor	1.5	
Residential Peaking Factor	3.44	** Using Harmon Formula =* 1+(14/(4+P^0.5))*0.8 *where P = population in thousands, Harmon's Correction Factor = 0.8*
Mannings coefficient (n)	0.013	
Demand (per capita)	280	L/day
Infiltration allowance	0.33	L/s/Ha

EXTRANEOUS FLOW ALLOWANCES

Infiltration / Inflow	Flow (L/s)
Dry	0.03
Wet	0.20
Total	**0.20**

AVERAGE DAILY DEMAND

DEMAND TYPE	AMOUNT	UNITS	POPULATION / AREA	Flow (L/s)
Residential	280	L/c/d	356	1.15
Industrial - Light**	35,000	L/gross ha/d		0
Industrial - Heavy**	55,000	L/gross ha/d		0
Commercial / Amenity	2,800	L/(1000m^2 /d)		0
Hospital	900	L/(bed/day)		0
Schools	70	L/(Student/d)		0
Trailer Parks no Hook-Ups	340	L/(space/d)		0
Trailer Park with Hook-Ups	800	L/(space/d)		0
Campgrounds	225	L/(campsite/d)		0
Mobile Home Parks	1,000	L/(Space/d)		0
Motels	150	L/(bed-space/d)		0
Hotels	225	L/(bed-space/d)		0
Office	75	L/7.0m^2/d		0
Tourist Commercial	28,000	L/gross ha/d		0
Other Commercial	28,000	L/gross ha/d		0

AVERAGE RESIDENTIAL FLOW	**1.15**	**L/s**
PEAK RESIDENTIAL FLOW	**3.96**	**L/s**
AVERAGE ICI FLOW	**0.000**	**L/s**
PEAK INSTITUTIONAL/COMMERCIAL FLOW	**0.000**	**L/s**
PEAK INDUSTRIAL FLOW	**0.000**	**L/s**
TOTAL PEAK ICI FLOW	**0.000**	**L/s**

TOTAL SANITARY DEMAND

TOTAL ESTIMATED AVERAGE DRY WEATHER FLOW	**1.18**	**L/s**
TOTAL ESTIMATED PEAK DRY WEATHER FLOW	**4.00**	**L/s**
TOTAL ESTIMATED PEAK WET WEATHER FLOW	**4.20**	**L/s**

** PEAK INDUSTRIAL FLOW PER CITY OF OTTAWA SEWER DESIGN GUIDELINES APPENDIX 4B

SANITARY SEWER DESIGN SHEET

PROJECT: 788 March Road, Kanata Residential Development
LOCATION: 788 March Road, Kanata, ON
CLIENT: SINA Construction

McINTOSH PERRY

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
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)	AVAILABLE CAPACITY	
				1-Bed	2-Bed	3-Bed	TH	(ha)	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM								L/s	(%)
													IND	CUM	IND	CUM	IND	CUM											
MARCH ROAD	788 MARCH ROAD	BLDG	EX.MH (762)	97	87	12	0	1.22	355.7	355.7	3.44	3.96							0.00	1.22	1.22	0.40	4.36	17.11	2.66	200	0.25	0.528	12.74	74.49
	762 MARCH ROAD	EX.MH (762)	MERSEY	0	0	0	60	0.77	162.0	517.7	3.37	5.66							0.00	0.77	1.99	0.66	6.32	24.91	28.30	200	0.53	0.768	18.59	74.65

Design Parameters:

Residential			ICI Areas			
						Peak Factor
1-Bed	1.4	p/p/u				
2-Bed	2.1	p/p/u	INST	28,000	L/Ha/day	1.5
3-Bed	3.1	p/p/u	COM	28,000	L/Ha/day	1.5
TH	2.7	p/p/u	IND	35,000	L/Ha/day	MOE Chart

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5)*0.8)
   where P = population in thousands

Designed: JH

Checked:

Project No.: CCO-24-1519

No.	Revision	Date
1.		

Sheet No: 1 of 1

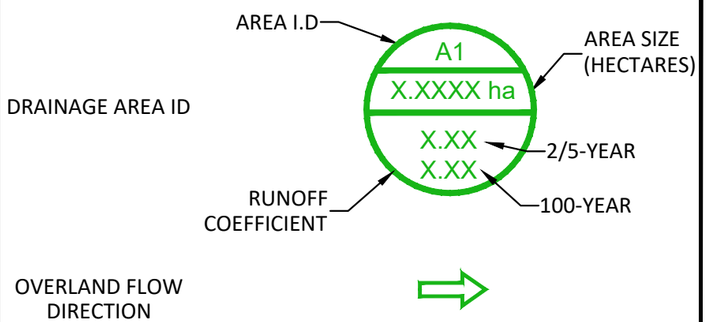
APPENDIX E
DRAINAGE AREA PLANS AND STORMWATER MANAGEMENT CALCULATIONS

McINTOSH PERRY

SCALE 1 : 750

0 25 50 75 Metres

LEGEND



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

Client: SINA
3030 BOUL. LE CARREFOUR, SUITE 1200, LAVAL, QC H7T 2P5

Project: RESIDENTIAL DEVELOPMENT
788 MARCH ROAD, KANATA, ON

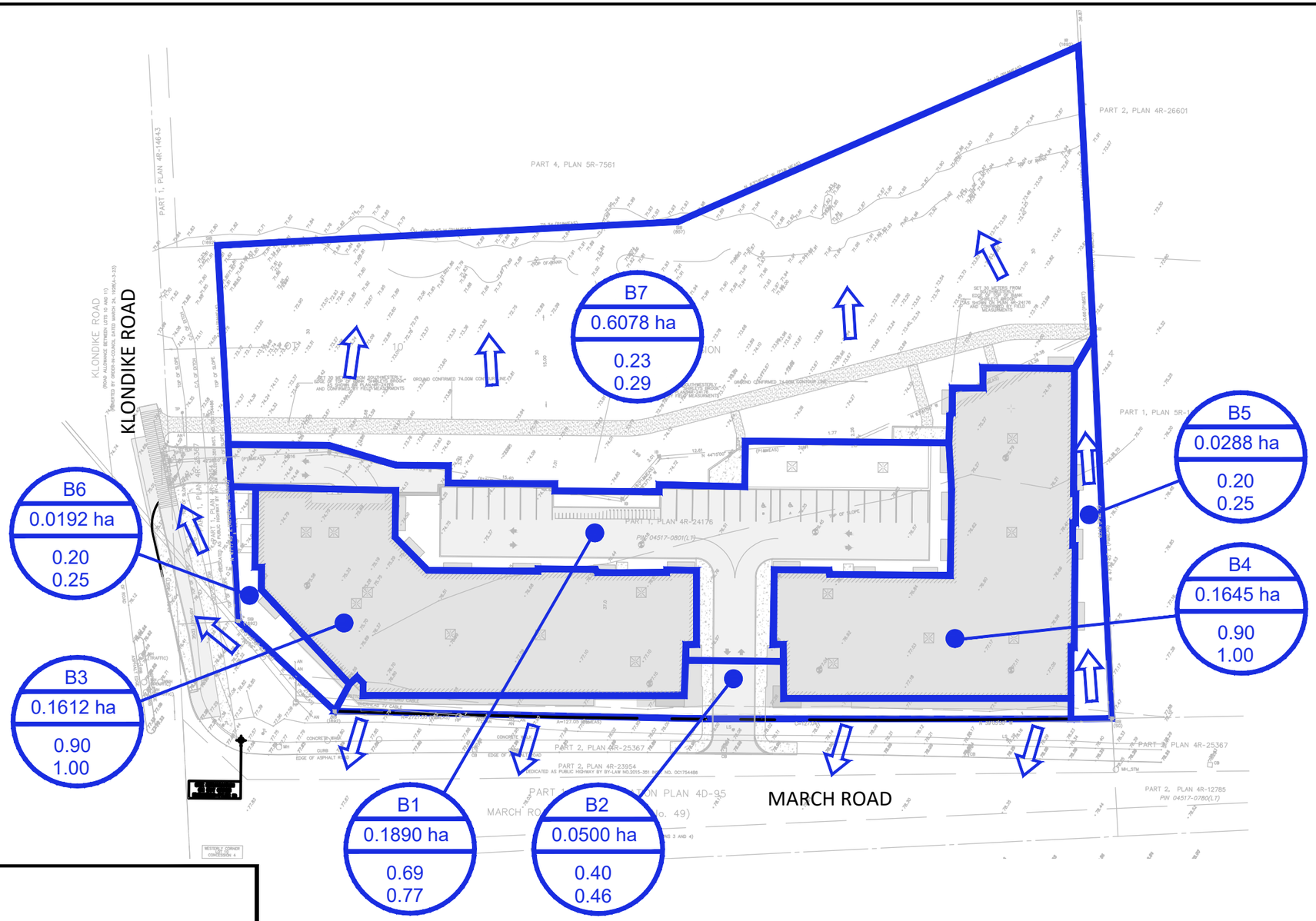
Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:				Drawing Number:
RP	JH				PRE
Scale:	Project Number:				
1:750	CO-24-1519	No.	Revisions	Date	

D07-12-22-0001

#18662

FILENAME: U:\Infrastructure\2024\PJCO-24-1519 15053553 Canada_Kinata_788 March Road\12 - Drawing\CO-24-1519 - SWM.dwg
LAST SAVED: Tuesday, March 05, 2024 LAST SAVED BY: J.Hewson
LAST PLOTTED: Tuesday, March 05, 2024 CTB FILE USED: ----



SCALE 1 : 750

0 25 50 75 Metres

LEGEND

DRAINAGE AREA ID

AREA I.D

B1

X.XXXX ha

AREA SIZE (HECTARES)

X.XX

X.XX

2/5-YEAR

100-YEAR

RUNOFF COEFFICIENT

OVERLAND FLOW DIRECTION

N

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

Client: SINA
3030 BOUL. LE CARREFOUR, SUITE 1200, LAVAL, QC H7T 2P5

Project: RESIDENTIAL DEVELOPMENT
788 MARCH ROAD, KANATA, ON

Drawing Title: POST-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:	No.	Revisions	Date	Drawing Number:
RP	JH				POST
Scale: 1:750	Project Number: CO-24-1519				

D07-12-22-0001

#18662

FILENAME: U:\Infrastructure\2024\PCO-24-1519 16953552 Canada_Kinata_788 March Road\12 - Drawings\CO-24-1519 - SWM.dwg
LAST SAVED: Tuesday, March 05, 2024 LAST SAVED BY: J Hewton
LAST PLOTTED: Tuesday, March 05, 2024 CTB FILE USED: ----

Pre-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2) C = 0.90	Gravel (m^2) C = 0.60	Pervious Area (m^2) C = 0.20	Average C (2/5-year)	Average C (100-year)
Outlet to Shirley's Brook						
A1	0.6220	0	0	6,220	0.20	0.25
A2	0.5985	0	0	5,985	0.20	0.25

Pre-Development Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	Intensity 2-Year (mm/hr)	Intensity 5-Year (mm/hr)	Intensity 100-Year (mm/hr)	Q (L/s)		
								2-Year	5-Year	100-Year
Outlet to Shirley's Brook										
A1	0.6220	0.20	0.25	20	52.0	70.3	120.0	18.0	24.3	51.9
A2	0.5985	0.20	0.25	20	52.0	70.3	120.0	17.3	23.4	49.9
Total	1.2205							35.3	47.7	101.7

Post-Development Runoff Coefficient

Drainage Area	Area (ha)	Impervious Area (m^2)	Gravel (m^2)	Pervious Area (m^2)	Average C (2/5-year)	Average C (100-year)
Outlet to Shirley's Brook SWM Facility						
B1	0.1890	1,315	0	575	0.69	0.77
B2	0.0500	140	0	360	0.40	0.46
B3	0.1612	1,612	0	0	0.90	1.00
B4	0.1645	1,645	0	0	0.90	1.00
Outlet to Shirley's Brook						
B5	0.0288	0	0	288	0.20	0.25
B6	0.0192	0	0	192	0.20	0.25
B7	0.6078	0	437	5,641	0.23	0.29
Total	1.2205					

Post-Development Uncontrolled Runoff Calculations

Drainage Area	Area (ha)	C 2/5-Year	C 100-Year	Tc (min)	Intensity 2-Year (mm/hr)	Intensity 5-Year (mm/hr)	Intensity 100-Year (mm/hr)	Q (L/s)		
								2-Year	5-Year	100-Year
Outlet to Shirley's Brook SWM Facility										
B1	0.1890	0.69	0.77	10	76.8	104.2	178.6	27.7	37.6	72.4
B2	0.0500	0.40	0.46	10	76.8	104.2	178.6	4.2	5.7	11.4
B3	0.1612	0.90	1.00	10	76.8	104.2	178.6	31.0	42.0	80.0
B4	0.1645	0.90	1.00	10	76.8	104.2	178.6	31.6	42.9	81.7
Total	0.5647							94.5	128.3	245.5
Outlet to Shirley's Brook										
B5	0.0288	0.20	0.25	10	76.8	104.2	178.6	1.2	1.7	3.6
B6	0.0192	0.20	0.25	10	76.8	104.2	178.6	0.8	1.1	2.4
B7	0.6078	0.23	0.29	10	76.8	104.2	178.6	29.7	40.3	86.3
Total	0.6558							31.7	43.1	92.2

Allowable Post-Development Realease Rate to Shirley's Brook SWM Facility

Drainage Area	Area (ha)	5-Year Event			100-Year Event (Maximum)	
		Pre-Dev. C	Intensity (mm/hr)	Q (L/s)	Shirley's Brook SWM Restriction (L/sec/ha)	Q (L/s)
A1	0.622	0.20	70.25	24.3	70.00	43.5

Allowable Post-Development Realease Rate to Shirley's Brook

Drainage Area	Area (ha)	Pre-Development Flow Rate		
		2-Year	5-Year	100-Year
A1 & A2	1.221	35.31	47.67	101.75

Post-Development Controlled Runoff Calculations

Drainage Area	Unrestricted Flow			Restricted Flow			Storage Required (m^3)		Storage Provided (m^3)	Comments
	2-Year	5-Year	100-Year	2-Year	5-Year	100-Year	2/5-Year	100-Year		
Outlet to Shirley's Brook SWM Facility										
B1	27.7	37.6	72.4	3.8	5.2	10.0	25.8	49.3	55.0	*Pumped*
B2	4.2	5.7	11.4	*4.2*	*5.7*	*11.4*	-	-	-	-
B3	31.0	42.0	80.0	4.9	6.6	12.6	19.0	51.4	60.5	*Roof Control*
B4	31.6	42.9	81.7	3.7	5.0	9.5	31.7	59.8	61.7	*Roof Control*
Total	94.5	128.3	245.5	16.6	22.5	43.5				
Outlet to Shirley's Brook										
B5	1.2	1.7	3.6	*1.2*	*1.7*	*3.6*	-	-	-	-
B6	0.8	1.1	2.4	*0.8*	*1.1*	*2.4*	-	-	-	-
B7	29.7	40.3	86.3	*29.7*	*40.3*	*86.3*	-	-	-	-
Total	31.7	43.1	92.2	31.7	43.1	92.2				

Storage Requirements for Area B1

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
10	104.2	37.6	5.2	32.4	19.4
20	70.3	25.4	5.2	20.2	24.2
30	53.9	19.5	5.2	14.2	25.6
40	44.2	16.0	5.2	10.7	25.8
50	37.7	13.6	5.2	8.4	25.2
60	32.9	11.9	5.2	6.7	24.0
70	29.4	10.6	5.2	5.4	22.7
80	26.6	9.6	5.2	4.4	21.1
90	24.3	8.8	5.2	3.6	19.2
100	22.4	8.1	5.2	2.9	17.2
110	20.8	7.5	5.2	2.3	15.1
120	19.5	7.0	5.2	1.8	13.1
130	18.3	6.6	5.2	1.4	10.8

Maximum Storage Required 5-year =	25.8 m3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B1	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
5	242.7	98.4	10.0	88.4	26.5
10	178.6	72.4	10.0	62.4	37.4
15	142.9	58.0	10.0	47.9	43.1
20	120.0	48.7	10.0	38.6	46.3
25	103.8	42.1	10.0	32.1	48.1
30	91.9	37.3	10.0	27.2	49.0
35	82.6	33.5	10.0	23.5	49.3
40	75.1	30.5	10.0	20.4	49.0
45	69.1	28.0	10.0	18.0	48.5
50	64.0	26.0	10.0	15.9	47.7
55	59.6	24.2	10.0	14.1	46.6
60	55.9	22.7	10.0	12.6	45.5
65	52.6	21.3	10.0	11.3	44.0

Maximum Storage Required 100-year =	49.3 m3

5-Year Storm Event Storage Summary

Storage Available (m^3) =	55.0 m3
Storage Required (m^3) =	25.8 m3

* Provided by on-site cistern

100-Year Storm Event Storage Summary

Storage Available (m^3) =	55.0 m3
Storage Required (m^3) =	49.3 m3

* Provided by on-site cistern

Storage Requirements for Area B3

5-Year Storm Event

Time (min)	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	93.0	0.2	92.8	0.0
5	141.2	56.9	12.6	44.3	13.3
10	104.2	42.0	12.6	29.4	17.6
15	83.6	33.7	12.6	21.1	19.0
20	70.3	28.4	12.6	15.7	18.9
25	60.9	24.6	12.6	11.9	17.9
30	53.9	21.7	12.6	9.1	16.4
35	48.5	19.6	12.6	6.9	14.6

Maximum Storage Required 5-year =	19.0 m3

100-Year Storm Event

Time (min)	I (mm/hr)	Runoff (L/s) B3	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	398.6	178.6	12.6	166.0	0.0
5	242.7	108.8	12.6	96.1	28.8
10	178.6	80.0	12.6	67.4	40.5
15	142.9	64.0	12.6	51.4	46.3
20	120.0	53.8	12.6	41.2	49.4
25	103.8	46.5	12.6	33.9	50.8
30	91.9	41.2	12.6	28.6	51.4
35	82.6	37.0	12.6	24.4	51.2
40	75.1	33.7	12.6	21.0	50.5
45	69.1	31.0	12.6	18.3	49.5
50	64.0	28.7	12.6	16.1	48.2
55	59.6	26.7	12.6	14.1	46.5
60	55.9	25.1	12.6	12.4	44.8
65	52.6	23.6	12.6	11.0	42.7

Maximum Storage Required 100-year =	51.4 m3

Maximum Rooftop Storage Summary

Maximum Roof Storage			
Location	Area* (m^2)	Depth	Volume (m^3)
Roof	1209	0.150	60.5

*Area is 75% of the total roof area

Storage Available (m^3) =	60.5
Storage Required (m^3) =	51.4

Roof Drain Flow (B3)

Roof Drains Summary	
Type of Control Device	Watts Drainage - Accutrol Weir
Number of Roof Drains	8
Weir Position	3/4 Open
Rooftop Area (m^2)	1612
Effective Roof Area (%)	75%
Storage Depth (m)	0.15
Max. Storage Volume (m^3)	60.45
Flow (Per Roof Drain) (L/s)	1.58
Total Flow (L/s)	12.62

Roof Drain Flow			
Flow per Drain (L/s)	Flow per Drain (GPM)	Storage Depth (mm)	Total Flow (L/s)
0.00	0	0	0.00
0.06	1	5	0.50
0.13	2	10	1.01
0.19	3	15	1.51
0.25	4	20	2.02
0.32	5	25	2.52
0.38	6	30	3.03
0.44	7	35	3.53
0.50	8	40	4.04
0.57	9	45	4.54
0.63	10	50	5.05
0.68	11	55	5.43
0.73	12	60	5.80
0.77	12	65	6.18
0.82	13	70	6.56
0.87	14	75	6.94
0.91	15	80	7.32
0.96	15	85	7.70
1.01	16	90	8.08
1.06	17	95	8.45
1.10	18	100	8.83
1.15	18	105	9.21
1.20	19	110	9.59
1.25	20	115	9.97
1.29	21	120	10.35
1.34	21	125	10.73
1.39	22	130	11.10
1.44	23	135	11.48
1.48	24	140	11.86
1.53	24	145	12.24
1.58	25	150	12.62

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

*Roof Drain Flow information taken from Watts Drainage website

*WATTS ADJUSTABLE ACCUTROL WEIR DATA**
(OR APPROVED EQUIVALENT)

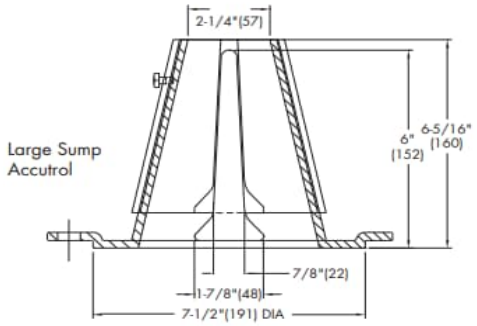


TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

*Roof Drain Flow information taken from Watts Drainage website

Storage Requirements for Area B4

5-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	230.5	94.87	4.97	89.90	0.00
5	141.2	58.11	4.97	53.14	15.94
10	104.2	42.89	4.97	37.92	22.75
15	83.6	34.41	4.97	29.44	26.49
20	70.3	28.93	4.97	23.96	28.76
25	60.9	25.07	4.97	20.10	30.14
30	53.9	22.18	4.97	17.21	30.99
35	48.5	19.96	4.97	14.99	31.48
40	44.2	18.19	4.97	13.22	31.73

Maximum Storage Required 100-year =	31.7 m3

100-Year Storm Event

Tc (min)	I (mm/hr)	Runoff (L/s) B4	Allowable Outflow (L/s)	Runoff to be Stored (L/s)	Storage Required (m^3)
0	398.6	182.28	9.46	172.82	0.00
5	242.7	110.99	9.46	101.53	30.46
10	178.6	81.68	9.46	72.21	43.33
15	142.9	65.35	9.46	55.89	50.30
20	120.0	54.88	9.46	45.41	54.50
25	103.8	47.47	9.46	38.01	57.01
30	91.9	42.03	9.46	32.56	58.61
35	82.6	37.77	9.46	28.31	59.45
40	75.1	34.34	9.46	24.88	59.71
45	69.1	31.60	9.46	22.14	59.77
50	64.0	29.27	9.46	19.80	59.41
55	59.6	27.26	9.46	17.79	58.71
60	55.9	25.56	9.46	16.10	57.96
65	52.6	24.05	9.46	14.59	56.90

Maximum Storage Required 100-year =	59.8 m3

Maximum Rooftop Storage Summary

Maximum Roof Storage			
Location	Area*	Depth	Volume (m^3)
Roof	1234	0.150	61.7

*Area is 75% of the total roof area

Storage Available (m^3) =	61.7
Storage Required (m^3) =	59.8

Roof Drain Flow (B3)

Roof Drains Summary	
Type of Control Device	Watts Drainage - Accutrol Weir
Number of Roof Drains	6
Weir Position	3/4 Open
Rooftop Area (m^2)	1645
Effective Roof Area (%)	75%
Storage Depth (m)	0.15
Max. Storage Volume (m^3)	61.69
Flow (Per Roof Drain) (L/s)	1.58
Total Flow (L/s)	9.46

Roof Drain Flow			
Flow per Drain (L/s)	Flow per Drain (GPM)	Storage Depth (mm)	Total Flow (L/s)
0.00	0	0	0.00
0.06	1	5	0.38
0.13	2	10	0.76
0.19	3	15	1.14
0.25	4	20	1.51
0.32	5	25	1.89
0.38	6	30	2.27
0.44	7	35	2.65
0.50	8	40	3.03
0.57	9	45	3.41
0.63	10	50	3.79
0.68	11	55	4.07
0.73	12	60	4.35
0.77	12	65	4.64
0.82	13	70	4.92
0.87	14	75	5.20
0.91	15	80	5.49
0.96	15	85	5.77
1.01	16	90	6.06
1.06	17	95	6.34
1.10	18	100	6.62
1.15	18	105	6.91
1.20	19	110	7.19
1.25	20	115	7.48
1.29	21	120	7.76
1.34	21	125	8.04
1.39	22	130	8.33
1.44	23	135	8.61
1.48	24	140	8.90
1.53	24	145	9.18
1.58	25	150	9.46

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

*WATTS ADJUSTABLE ACCUTROL WEIR DATA**
(OR APPROVED EQUIVALENT)

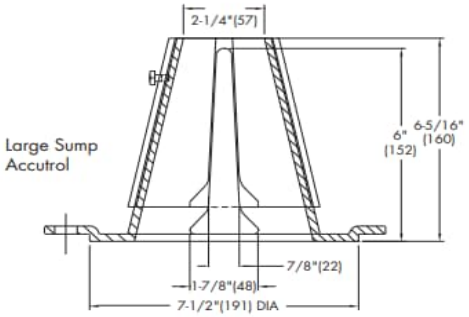


TABLE 1. Adjustable Accutrol Flow Rate Settings

Weir Opening Exposed	1"	2"	3"	4"	5"	6"
	Flow Rate (gallons per minute)					
Fully Exposed	5	10	15	20	25	30
3/4	5	10	13.75	17.5	21.25	25
1/2	5	10	12.5	15	17.5	20
1/4	5	10	11.25	12.5	13.75	15
Closed	5	5	5	5	5	5

*Roof Drain Flow information taken from Watts Drainage website

STORM SEWER DESIGN SHEET

PROJECT: 788 March Road, Kanata Residential Development
LOCATION: 788 March Road, Kanata, ON
CLIENT: SINA Construction

McINTOSH PERRY

LOCATION				CONTRIBUTING AREA (ha)				RATIONAL DESIGN FLOW							SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
STREET	AREA ID	FROM MH	TO MH	C-VALUE	AREA	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (100YR) (mm/hr)	100YR PEAK FLOW (L/s)	*RESTRICTED FLOW (L/s)*	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm)			SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (100YR)	
																	DIA	W	H			(L/s)	(%)
March Road																							
	B1	CISTERN	BLD. OUTLET	0.77	0.1890	0.15	0.15	10.00			178.56	72.24	*10.00*										
	B3	ROOF	BLD. OUTLET	1.00	0.1612	0.16	0.16	10.00			178.56	80.02	*12.60*										
	B4	ROOF	BLD. OUTLET	1.00	0.1645	0.16	0.16	10.00			178.56	81.66	*9.50*										
	TOTAL	BLD. OUTLET	EX. STM MH				0.47	10.00	0.17	10.17	178.56	233.92	*32.10*	*32.10*	100.88	14.50	300	*NA*	*NA*	1.00	1.38	68.78	68.18%

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
2. Refer to SWM Calculations for restrictired flow rates

Designed:
JH

Checked:

Project No.:
CCO-24-1519

No.	Revision	Date

Date: 2024.01.04

Sheet No: 1 of 1