1495 Heron Road

Functional Servicing and Stormwater Management Report

Stantec

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Canada Lands Company

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1 Introduction

Canada Lands Company (CLC) has commissioned Stantec Consulting Ltd. to prepare this Functional Servicing Report for the 1495 Heron Road development lands to support a future Site Plan Control (SPC) Application. 1495 Heron Road is located within the City of Ottawa. The north and northwest sides of the site front on City parkland, institutional uses are located to the southwest, residential development exists along the eastern frontage and the site fronts onto Heron Road to the south.

The land is currently occupied by multiple vacant buildings that most recently formed a federal government training centre. The land is currently zoned NMU[2990] S502, INZ/GRN[2991], CM2[2990] S502 and GRN/INZ. The portion of the site within the INZ zone is being rezoned NMU[2990] to permit a mix of uses including residential, commercial and institutional. A number of the existing buildings will remain and will be repurposed as part of the proposed development.

The development site is approximately 7.45 ha in area. The limits of the site are outlined in **Figure 1.1** below and a preliminary development plan is included in **Appendix A.1**.

It is anticipated that development of the site will proceed starting at the southeast corner with the construction of Building 1, then proceed north following sequencing similar to the building numbering. The functional servicing layout has been designed to accommodate the assumed phasing of construction.

Figure 1.1: Overall Site Area

The preliminary mixed-use attributes for the site are listed in **Table 1.1**.

Table 1.1: Preliminary Site Attributes

Use	Units	Area (m^2)
Townhouse	67	-
Apartment	1,065	-
Commercial/Amenity	-	150
Institutional	-	12,956
Total	**1,132**	**13,106**

2 Objective

The intent of this report is to develop a functional servicing strategy specific to the subject property that uses the existing infrastructure surrounding the site and meets the design criteria obtained from the City of Ottawa and Rideau Valley Conservation Authority. The report will establish the design approach and criteria for upcoming detailed design of the site plan development.

Criteria and constraints provided by the City of Ottawa and background studies have been used as a basis for the adequacy of services for the proposed development.

- **Water Servicing**
    - Estimate water demands for the 1495 Heron functional development. The development is expected to be serviced with a looped connection to the 305 mm cast iron watermain in Heron Road.
    - Watermain servicing for the development is to provide average day, maximum day, and peak hour demands (i.e., non-emergency conditions) at pressures within the acceptable range of 40 to 80 psi (275 to 552 kPa).
    - Under fire flow (emergency) conditions, the water distribution system is to maintain a minimum pressure greater than 20 psi (138 kPa).
- **Wastewater Servicing**
    - Estimate wastewater generation based on the development plan and direct flows to the local sanitary sewer system in Heron Road.
- **Storm Sewer Servicing**
    - Define major and minor conveyance systems in conjunction with the functional grading plan.
    - Determine the functional stormwater management storage requirements to meet the allowable release rate for the site.
    - Provide quantity and quality control meeting the criteria specified in ***Section 5.0***.
- **Grading and Drainage**
    - Prepare a functional grading plan in accordance with the development plan and grading constraints.

The Existing Conditions Plan, ***Drawing EX-1*** details the existing conditions on site. See ***Appendix E***.

3 Background

The following documents were referenced in the preparation of this report:

- *City of Ottawa Sewer Design Guidelines*, 4th Edition, City of Ottawa, November 2025.
- *City of Ottawa Design Guidelines – Water Distribution,* Second Edition, Infrastructure Services Department, City of Ottawa, November 2025
- Environmental Impact Statement – 1495 Heron Road Redevelopment (Final Report), Stantec Consulting Ltd., July 20, 2022.
- Phase Two Environmental Site Assessment – 1495 Heron Road, Ottawa, Ontario, DST File No.: OE-OT-019917, DST Consulting Engineers Inc., March 2015.
- Preliminary Geotechnical Investigation Report – Proposed Development – 1495 Heron Road, Ottawa, Ontario, Project No. 160410368, Stantec Consulting Ltd., November 2023.
- Hydrogeological Memo, 1495 Heron Road, Ottawa, ON, Stantec Consulting Ltd., May 19, 2023.

4 Water Servicing

4.1 Background

The 1495 Heron Road development site is located within the City of Ottawa's 2W2C pressure zone. The existing watermain along the Heron Road frontage is 305 mm cast iron. Two connections to the Heron Road watermain will be required to provide looping and redundancy to the ultimate development. A third connection can be accommodated to allow for redundancy during build-out of the development. Functional watermain servicing is illustrated on ***Drawing WTR-1***. Fire hydrants will be required within the private site to provide required fire flows. Watermain location, sizing and hydrant locations will be refined as part of a future detailed design to support site plan control application for the development.

4.2 Design Criteria

4.2.1 Water Demand and Allowable Pressure

The domestic water demand and allowable water pressure are assessed using the City of Ottawa Water Distribution Guidelines (2025) as amended.

Residential Apartment Population Rate	
Apartment	1.8 persons / unit
Townhouse	2.7 persons / unit
Residential Demand	
Average Daily (AVDY)	280 L/cap/day
Maximum Daily (MXDY)	2.5 × AVDY
Peak Hour (PKHR)	2.2 × MXDY
Commercial and Institutional Demand	
Average Daily (AVDY)	28,000 L/gross ha/day
Maximum Daily (MXDY)	1.5 × AVDY
Peak Hour (PKHR)	1.8 × MXDY
Allowable Water Pressure	
MXDY Flow	345 kPa (50 psi) to 552 kPa (80 psi)
PKHR Flow Minimum	276 kPa (40 psi)
MXDY + Fire Flow	140 kPa (20 psi)
Maximum Allowable for Occupied Area	552 kPa (80 psi)

4.2.2 Fire Flow

Detailed fire flow requirements are assessed using the Fire Underwriters Survey (FUS) methodology (2020). Site specific assumptions are noted in **Section 4.3.2**.

At the detailed design phase, the required number of fire hydrants and layout on site will be finalized and is expected to follow Section 18.5 of the National Fire Protection Agency (NFPA) Fire Code document.

- The aggregate fire flow capacity of all fire hydrants within 305 m of the building cannot be less than the required fire flow (RFF)
- Table 18.5.4.3 provides the maximum fire flow capacity for which an individual fire hydrant can be credited based on the unobstructed distance from the hydrant to the building.

Table 4.1: Table 18.5.4.3 of the NFPA - Maximum Fire Hydrant Fire Flow Capacity

Distance to Building (m)	Maximum Capacity (L/min)
≤76	5,678
>76 and ≤152	3,785
>152 and ≤305	2,839

4.3 Water Demands

4.3.1 Domestic Water Demands

Based on the unit mix presented in Table 1.1, the proposed development is estimated to have a total population of 2,098 persons and 1.3 ha of commercial/institutional area. The associated water demands are summarized in **Table 4.2** and detailed in **Appendix B.1**.

Table 4.2: Water Demands

Population	Commercial and Gross Institutional (m^2)	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
2,098	13,106	7.2	17.6	38.5

4.3.2 Fire Flow Demands

Fire flow requirements were estimated using the 2020 Fire Underwriters Survey (FUS) methodology, based on the measured floor area and number of stories of the proposed buildings, to determine the highest fire

flow requirement for the development plan. Based on the site layout, three building construction types were assumed by building type, as follows:

- Stacked Townhouses: Wood frame construction, non-sprinklered
- 6-storey apartment buildings: Ordinary construction, sprinklered, per OBC Section 3.2.2.60
- 9-storey apartment buildings: Non-combustible construction, sprinklered

The gross floor areas for each of the proposed buildings from the unit statistic table was used to determine the effective floor areas for the fire flow requirements. For the townhouse blocks, given that the total ground floor areas all exceed 600 m^2, fire separation would be required to separate each of the townhouse blocks into areas of 600 m^2 or less to meet OBC requirements. A building area of 600 m^2 was used for the FUS calculations to estimate fire flow requirements. Calculations included in **Appendix B.2** demonstrate that a fire flow requirement of 14,000 L/min (233 L/s) is estimated to be required for the back-to-back stacked units. For a conservative assessment of the pressures on site during emergency conditions, a fire flow of 250 L/s (15,000 L/min) was assumed as part of the updated boundary conditions request to the City.

4.3.3 Boundary Conditions

The updated boundary conditions at the proposed connection locations at Heron Road were provided by the City of Ottawa on August 27, 2026, and are summarized in **Table 4.3** and attached in **Appendix B.3**.

Table 4.3: Water Distribution Boundary Conditions

Location	Connection 1 (m) (Elev. 95.6 m)	Connection 2 (m) (Elev. 95.21 m)	Pressure 1 (psi)	Pressure 2 (psi)
Minimum HGL	125.3 m	125.3	42.2	42.2
Maximum HGL	132.0 m	131.8	51.7	51.5
Max Day +Fire Demand (250 L/s)	123.9 m	122.9	40.2	38.8

4.4 Hydraulic Assessment

4.4.1 Level of Service

A functional watermain network was compiled and modeled on PCSWMM to verify adequacy of watermain pressures to service the proposed site, based on the provided boundary conditions from the City. Through the City of Ottawa Design Guidelines, the normal demand conditions (average day, maximum day and peak hour) should be in the range of 350 kPa to 480 kPa (50 psi to 70 psi) and no less than 275 kPa (40 psi) at the ground elevation on the streets (i.e., at hydrant level).

As per the Ontario Building Code (OBC) & Guide for Plumbing, if pressures greater than 550 kPa (80 psi) are anticipated, pressure relief measures are required. The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi). Under emergency fire flow conditions, the minimum pressure objective in the distribution system is 138 kPa (20 psi).

Hazen-Williams coefficients ("C-Factors") are applied to the simulated watermains in accordance with the City of Ottawa's Water Distribution Design Guidelines and as shown in **Table 4.4**.

Table 4.4: Proposed Watermain C-Factors

Pipe Diameter (mm)	C-Factor
150	100
200 to 250	110
300 to 600	120
> 600	130

Results of the functional watermain hydraulic analysis is available in **Appendix B.4**.

4.4.2 Average Day Demand (AVDY)

The hydraulic modeling results indicate that under the average day demand, the pressure in the proposed watermain ranges from 350 kPa to 356 kPa (50.8 psi to 51.6 psi). These pressures are within the serviceable limit of 276 kPa to 552 kPa (40 psi to 80 psi) as specified in the City of Ottawa Design Guidelines – Water Distribution. Results are shown in **Figure 4.1**.

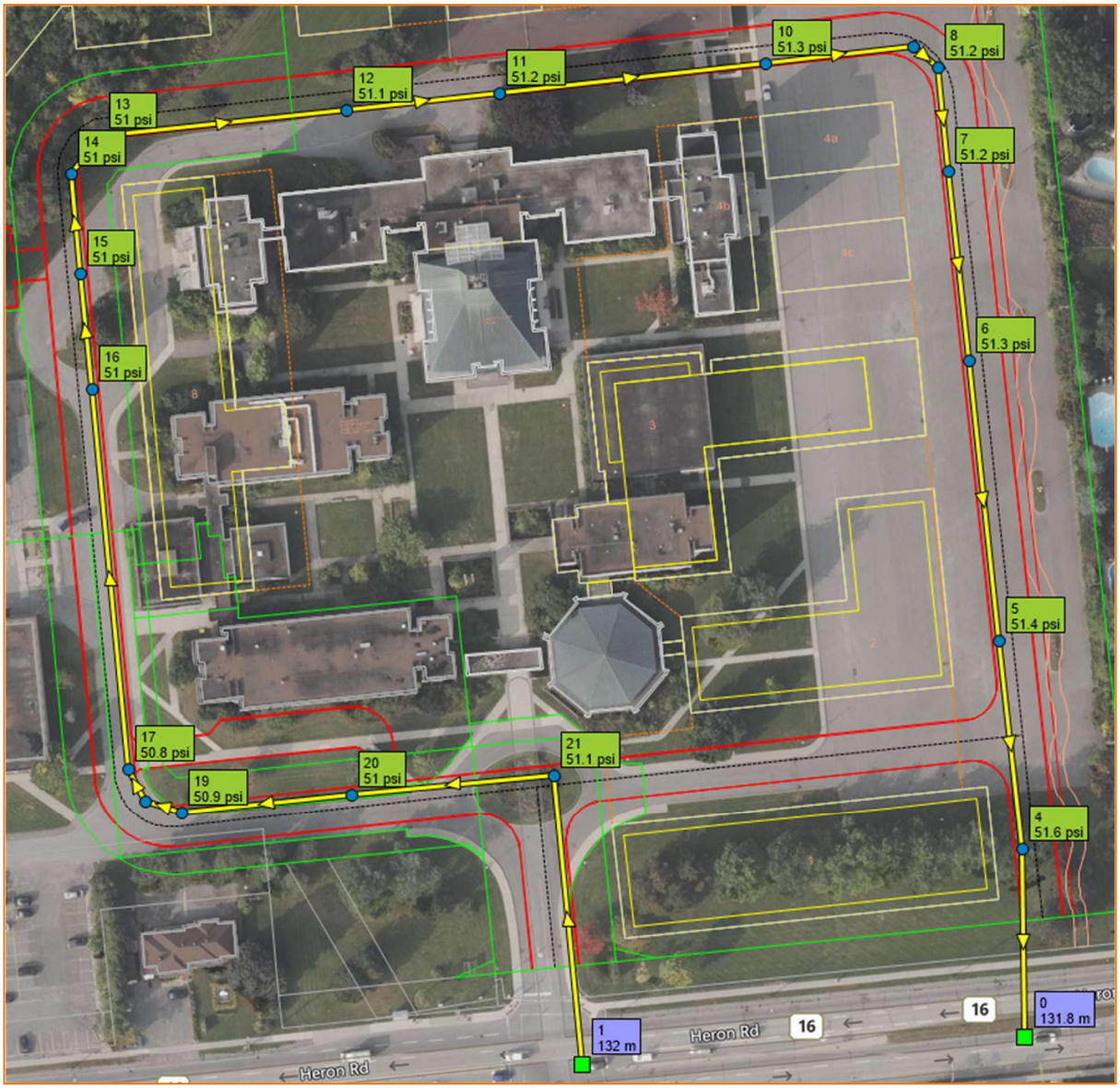


Figure 4.1: AVDY Pressure Results

4.4.3 Peak Hour Demand (PKHR)

The hydraulic modeling results indicate that under the peak hour demands, the pressure in the proposed watermain ranges from 284 kPa to 292 kPa (41.2 psi to 42.3 psi). These pressures are within the serviceable limit of 276 kPa to 552 kPa (40 psi to 80 psi) as specified in the City of Ottawa Design Guidelines – Water Distribution. Results are shown in **Figure 4.2**.

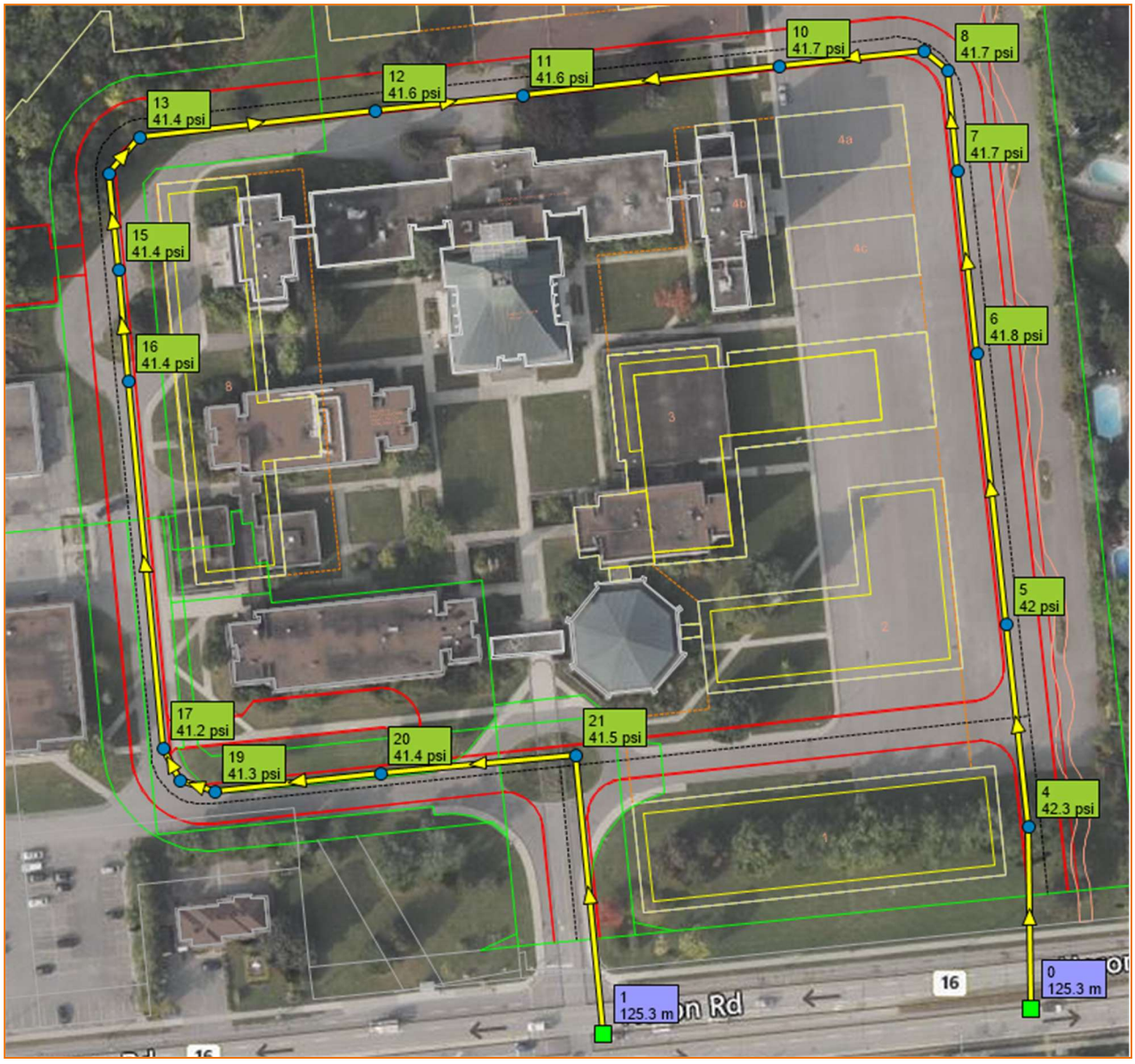


Figure 4.2: PKHR Pressure Results

4.4.4 Maximum Day Demand + Fire Flow (MXDY+FF)

The hydraulic modeling was also used to assess the maximum day and fire flow demands while maintaining a residual pressure of 138 kPa (20 psi), per the City of Ottawa Design Guidelines – Water Distribution. The modeling is conducted using a steady-state maximum day demand scenario along with the automated fire flow simulation feature of PCSWMM. The fire flow demand is set to 250 L/s as per the demands noted in **Section 4.3.2**.

Figure 4.3 illustrates that the proposed networks can deliver flows exceeding 250 L/s while maintaining the required residual pressure of 138 kPa (20 psi).

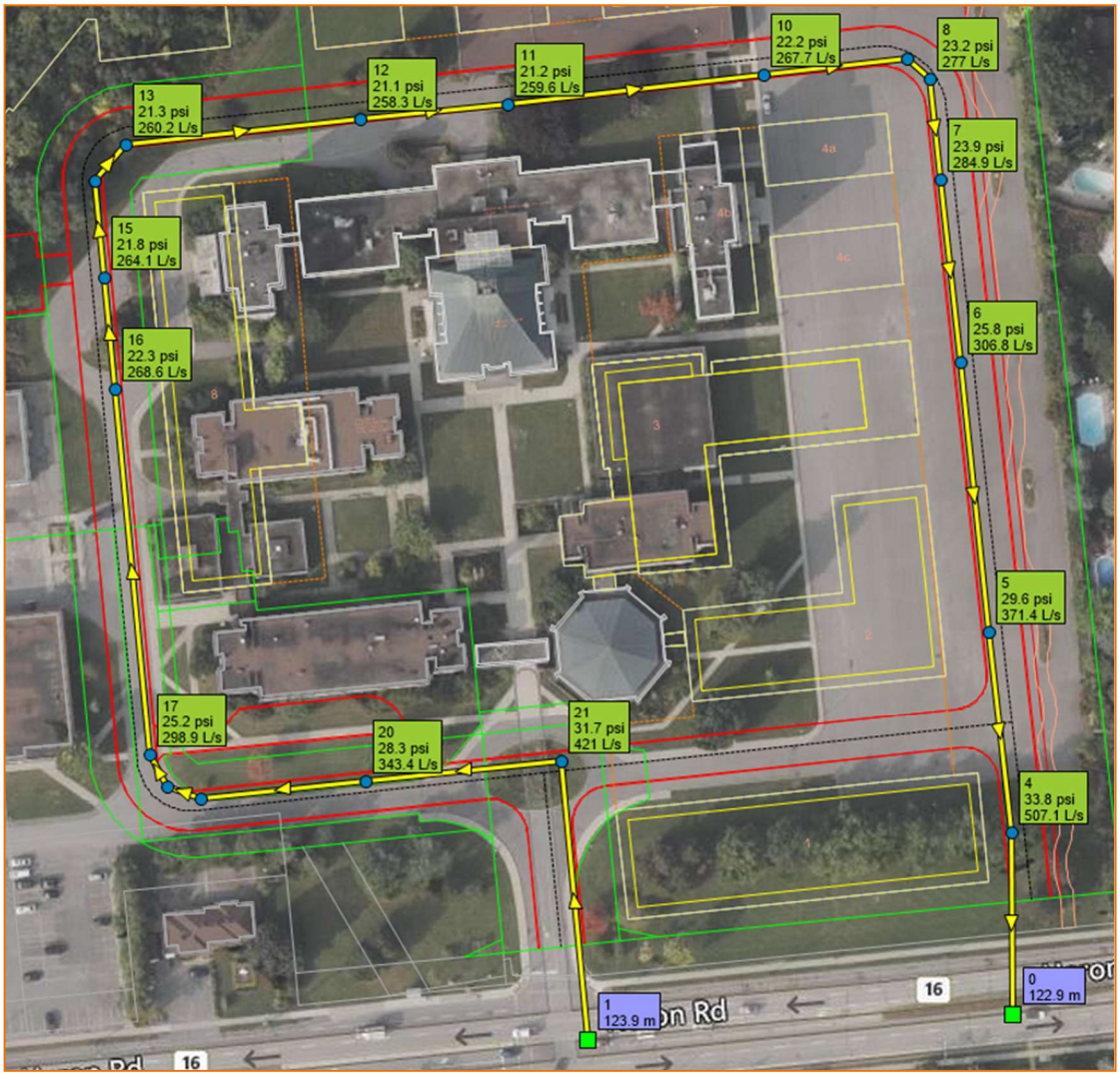


Figure 4.3: Fire Flow Results – Residual Pressure and Available Fire Flows

4.5 Conclusion

The proposed watermain alignment and sizing can achieve the required level of service within the 1495 Heron Road site. Based on the hydraulic analysis, the following conclusions were made:

The proposed water distribution system is recommended to comprise of a looped 250 mm diameter watermain, serviced by a connection at each of the two vehicular entrances to the existing 300 mm diameter municipal watermain in Heron Road.

- The fire flow pressures of the 200 mm diameter watermains recommended at the conceptual stage under the 10,000 L/min fire flow scenario were deemed insufficient (i.e. not meeting the minimum 20 psi residual pressure), necessitating upsizing the proposed watermains (including the existing 200 mm diameter watermain feed at the western vehicular entrance) to 250 mm to meet the fire flow and serviceability requirements.

During peak hour conditions, the proposed system is capable of operating above the minimum required pressure of 275 kPa (40 psi).

Under fire flow conditions, the proposed networks can provide sufficient fire flows (250 L/s and above) while maintaining a residual pressure of 138 kPa (20 psi) in the proposed development.

Watermain sizing and hydrant placement will be confirmed as part of the detailed design of the site. To ensure redundancy throughout the construction of the development, a potential dual connection separated by a line valve can be accommodated at the eastern site entrance.

Each proposed building can be serviced by a dual service connection to the private 250 mm diameter watermain. The construction type and design of the proposed buildings will be provided at detailed design and will be required to conform to the available fire flows to meet serviceability requirements.

It is anticipated that booster pumps will be required to provide adequate pressures at the upper stories for the proposed mid- to high-rise buildings. The mechanical engineering consultant will be responsible for confirming the service lateral sizes and booster pump requirements at the building permit phase. The proposed functional water servicing for the site is shown in **Drawings OSP-1** and **WTR-1**.

5 Wastewater Servicing

5.1 Background

The 250 mm diameter sanitary sewers within Heron Road are the existing municipal sanitary sewers adjacent to the subject site. Within the site, a network of 200 mm diameter private sanitary sewers services the existing institutional buildings. Based on the servicing requirements for the proposed redevelopment, the existing on-site sanitary sewers and the connection to the 250 mm diameter municipal sanitary sewer at SAN 3073 will be decommissioned and removed to facilitate the redevelopment.

5.2 Design Criteria

As outlined in the City of Ottawa Sewer Design Guidelines and the MECP's Design Guidelines for Sewage Works, the following criteria were used to calculate the estimated wastewater flow rates for the site plan development:

- Average residential wastewater generation = 280 L/person/day
- Average commercial wastewater generation = 28,000 L/gross ha/day
- Peak Factor = based on Harmon Equation; maximum of 4.0 (residential)
- Peak factor - 1.5 (commercial and Institutional)
- Harmon Correction Factor = 0.8
- Extraneous flow allowance - 0.33 L/s/ha
- Population density for Townhome - 2.7 persons per unit
- Population for Average Apartment - 1.8 persons per unit

5.3 Estimated Wastewater Peak Flows

The anticipated wastewater peak flow from the proposed development is based on the site plan and site statistics summarized in **Table 1.1**. The design peak flow is provided in **Table 5.1** and detailed in the sanitary sewer design sheet included in **Appendix C.1**. Private sanitary sewers within the development will convey wastewater to the existing 250 mm diameter sanitary sewer within Heron Road as shown on ***Drawing SAN-1***.

Table 5.1: Estimated Total Wastewater Peak Flow

Population	Peak Factor	Residential Peak Flow (L/s)	Commercial and Institutional Peak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)
2,098	3.06	20.8	0.1	2.5	23.3

The estimated peak flow from the development was calculated to be 23.3 L/s. The value was shared with the City of Ottawa to confirm that the downstream sanitary sewers in Heron Road have the capacity to receive the peak flow. In correspondence dated August 24th, 2026, included in **Appendix C.2**, the City of Ottawa confirmed that there are no capacity concerns to receive the proposed peak flow from the development.

5.4 Functional Wastewater Servicing

Each building within the site will be serviced with connections to the proposed 200 mm diameter sanitary sewer. The local sewer network will convey discharge from the site area to the existing 250 mm diameter municipal sanitary sewer in Heron Road.

The proposed functional sanitary servicing is shown in **Drawings OSP-1** and **SAN-1**. A backwater valve is to be installed on each sanitary service to prevent potential surcharge in the downstream sanitary sewer from impacting the properties.

Final sizing of the proposed on-site sanitary sewers is to be confirmed at detailed design. The mechanical consultant will confirm the final sizing for the sanitary service laterals and internal servicing details for the buildings.

6 Stormwater Management and Servicing

The 7.45 ha private development site is to include a centralized stormwater management facility (SWMF) along the north and east property lines. The mixed-use site is comprised of some new-build (infill) development where the drainage and stormwater management can be conveyed to the SWMF, and some existing parcels and buildings that are to be retained and shall continue to drain as per the existing drainage conditions. Parking for the future residential uses is expected to be located primarily underground.

Two municipal storm sewers run along the frontage of the site within the Heron Road right-of-way (ROW). The stormwater from the existing site development is currently directed to the 750mm concrete sewer on the north side of the roadway. This storm connection is expected to be maintained to provide an outlet to the centralized portion of the existing development that will remain. A new storm outlet to the same storm sewer is expected to be required at the eastern limit of the development lands to provide a controlled outlet for the balance of the lands. ***Drawing STM-1*** illustrates the functional layout of the private stormwater infrastructure and connections to the municipal system.

Major system peak flows from the development site will be directed to the SWMF and ultimately to the Heron Road ROW. Emergency overland flow from the proposed private development will be directed to the internal private streets, the stormwater management facility, and ultimately to the Heron Road ROW.

To the north of the development site is a heavily forested park and dog walking trail that does not have a stormwater outlet. Under existing conditions, there is often standing water in the park adjacent to the north property line of this site. It is intended through the future detailed design of this site development that the proposed SWMF can provide a positive outlet for the park to prevent standing water in the park in the immediate vicinity of the works. Approximately half of the park area has been considered as an uncontrolled external drainage area for the purposes of this SWM analysis.

6.1 Stormwater Management Criteria

The criteria used to design the SWM components will ensure that post-development stormwater peak flows from the site do not exceed the allowable target release rate set forth by the stormwater management criteria. The SWM criteria for the proposed development have been determined through consultation with City of Ottawa staff as well as review of background information. ***Appendix D.1*** includes correspondence outlining the SWM criteria to be used. The SWM criteria are summarized as follows:

- Restrict inflows from the redevelopment portion of the site to the receiving storm sewer by controlling post development flows to the 2-year predevelopment event using a runoff coefficient (C) the lesser of 0.5 or existing (City of Ottawa)
- Post development flow shall not exceed the pre-development release rate for the existing development area for up to the 100-year storm event.
- Stormwater runoff in excess of the target release rates to be stored on-site up to and including the 100-year event (City of Ottawa)
- Time of concentration can be calculated but cannot be less than 10 minutes (City of Ottawa).

- A conservative storage assumption of 50 m^3 has been provided for all redevelopment areas.
- No direct water quality control target provided. LID measures and best management practices encouraged in relation to vehicular surfaces (City of Ottawa).

6.2 Stormwater Quantity Control

The Modified Rational Method (MRM) has been used to assess the rate and volume of runoff expected to be generated during post-development and pre-development conditions.

6.2.1 Target Release Rate

The target release rate for the development has been determined based on criteria established by the City of Ottawa using existing conditions and the IDF curves as provided within the City of Ottawa's *Sewer Design Guidelines*. The site consists of existing vacant buildings, parking areas and landscaped areas as illustrated on ***Drawing EX-1***.

The central portion of the site and central entrance to the development is 0.89 ha in area and will continue to discharge to the existing storm outlet. As per the design criteria for the development, post development flow shall not exceed predevelopment flow for this developed area. The development plan for this central portion of the site is to maintain the portion of impervious areas from pre-to post-development conditions to prevent an increase in runoff volume and prevent onsite storage requirements in this parcel.

The balance of the site will be redeveloped and will discharge to a proposed central stormwater management facility with a new outlet to the receiving sewer on Heron Road. As shown in the existing storm drainage plan (**Drawing EX-STM**), the pre-development runoff coefficient (C) for the redevelopment area (6.57 ha of the overall site) has been determined for the existing site conditions based on the portion of existing impervious areas. Calculations shown in **Appendix D.2** found the pre-development value of C=0.44. Given that the pre-development runoff coefficient is less than C=0.5, the pre-development value of C=0.44 will govern the design for the allowable site release rates. A time of concentration of 26.7 minutes for the pre-development area was determined based on Bransby-Williams methodology for calculating overland flow time of concentration, as shown in **Appendix D.3.**

An overall target release rate of **344.0 L/s** from the redevelopment site area (6.57 ha) was obtained based on the rational method equation shown below. Note that the target release rate does not attribute any additional runoff flow from the offsite (external) Park area to the north, which under existing conditions does not outlet to the Heron Road storm sewer. It is anticipated that runoff from the Park area will be managed within the proposed upstream cells of the bioswale features.

$$\boldsymbol{Q} = \mathbf{2.78}\,(\boldsymbol{C})(\boldsymbol{I})(\boldsymbol{A})$$

Where:

$\boldsymbol{Q} = peak\ flow\ rate, L/s$

$\boldsymbol{C} = site\ runoff\ coefficient$

$\boldsymbol{I} = rainfall\ intensity, mm/hr\ (per\ City\ of\ Ottawa\ 2-year\ IDF\ curves)$

$\boldsymbol{A} = drainage\ area, ha$

$$Intensity\ (mm/hr) = \frac{732.951}{(26.7 + 6.199)^{0.81}} = \mathbf{43.3\ mm/hr}$$

$$Q = 2.78(0.43)(43.3mm/hr)(6.57\ ha) = \mathbf{349.3\ L/s}$$

6.2.2 Stormwater Management Approach

Quantity control of the stormwater runoff from the redevelopment area will be achieved with a three-fold approach:

1. Re-development areas are to provide 50m^3/ha onsite storage.
2. Stormwater release rates to the minor system are to be restricted to the 2-year event.
3. Major overland flow is to be directed to the SWMF located along the northern and eastern portion of the development site as shown in **Drawing STM-1** and the blue-green SWMF corridor concept shown in the draft landscape Drawing L100 in **Appendix D.4.**

6.2.2.1 Onsite Storage

On-site storage measures (i.e. rooftop storage, underground storage, etc.) will be required to attenuate peak flows for all redevelopment block areas. All areas within the redevelopment boundary have been assigned a conservative storage value of 50 m^3/ha. Specific onsite storage methods are to be determined at the detailed design phase. For this functional design, we have assumed surface storages within the roadways and redevelopment areas.

Based on the post-development storm drainage areas (shown in **Drawing STM-1**), a storage value of 50m^3/ha, and the 2-year pre-development release rates at C=0.43 (determined using the rational method), we have calculated the storage requirements and maximum allowable release rates for each post-development storm drainage area. Calculations are included in **Appendix D.5** and summarized in **Table 6.1**.

The proposed redevelopment in the L30A area is to consist of slight shifts to the landscaped and impervious area boundaries but result in no significant changes to the overall imperviousness. The intent of the work in L30A is to maintain similar roadway low points. Since there are two catch basins within the L30A area a small storage volume is attributed to the drainage subcatchment L30A for roadway surface storage above the catch basins. No storage volume is attributed to subcatchment L25A at the centre of the site since there are no proposed surface changes within that area.

Table 6.1: Functional Design for Post-Development Onsite Storage and Release Rates

Outlet	Post-Development Area ID	Area (ha)	Post-Development C	Onsite Surface Storage (50m³/ha)	Allowable Discharge (L/s)	Allowable Discharge (cms)
Existing Storm MH 30858	L25A	0.75	0.35	-	-	-
	L30A	0.14	0.57	7	-	-
SWMF (New Storm MH 100)	PARK*	1.25	0.20	-	-	-
	BIO-1	0.64	0.35	-	33.7	0.034
	L102A	0.41	0.8	21	21.5	0.022
	L103A	1.33	0.8	66	69.6	0.070
	L105A	1.04	0.8	52	54.4	0.054
	L106A	0.67	0.8	34	35.2	0.035
	L108A	1.30	0.8	65	67.9	0.068
	L108B	0.67	0.8	34	35.3	0.035
	L110A	0.50	0.8	25	26.4	0.026
Total Controlled Area		**6.57**			**344.0**	**0.344**
Total Site Area		**7.45**				
Total Study Area		**8.70**				

Note: * Park area is an external area that may enter the site, excluded from the total site area and controlled areas.

6.2.2.2 Minor System Flows

On-site redevelopment areas will be designed with a collection system to direct runoff to the minor system, the storm sewers within the private roadways which outlet to the SWM facility, and overland flow routes that direct excess runoff to the major system conveyance channels (roadways and SWMF facility). Post-development peak flows generated onsite (up to the 100-year storm) for each subcatchment are anticipated to be restricted to the 2-year allowable release rate based on the on-site storage requirements and assigned C-value.

Post-development peak flows generated by the private roadway will be restricted to the 2-year event target release rates using inlet control devices (ICDs) with minor flows directed to the storm sewer network and superpipe, and major overland flows to the SWM facility. The ICD designs will be explicated at detailed design.

6.2.2.3 Stormwater Management Facility

The SWMF is to be a blue-green linear corridor, which will include a combination of cascading low impact design (LID) bioswale features with a subsurface superpipe (box pipe) for additional storage and conveyance. The facility will provide storage volume within the bioswale cells while also removing particulate matter. The bioswale cells will allow for some stormwater infiltration, retention, ponding, and excess stormwater will overflow through raised landscape drains and enter the storm sewer system and superpipe. The superpipe provides additional storage to restrict post-development peak flows up to the 100-year storm to the target (allowable) release rate to the municipal storm sewer within Heron Road.

Runoff coefficients between 0.20 and 0.85 were assigned to the post-development drainage areas based on the expected land use for development areas within the proposed site. These C-values were used to determine the runoff generated from each subcatchment within the redevelopment area.

6.3 Modeling Methodology

6.3.1 Modeling Rationale

A hydrologic/hydraulic model was completed with PCSWMM for the sewers, roadways, onsite block storage areas, and SWMF areas within the proposed development, accounting for the estimated major and minor systems to evaluate the storm sewer infrastructure and ensure release rates meet the previously defined target criteria. The use of PCSWMM for modeling the site hydrology and hydraulics allowed for an analysis of the system response during various storm events. The following assumptions were applied to the model:

- Hydrologic parameters as per Ottawa Sewer Design Guidelines 2025, including Horton infiltration, Manning's 'n', and depression storage values.
- 3-hour Chicago distributions and 12-hour SCS Type II distributions for 2-year and 100-year storm events were used to evaluate the urban component of the dual drainage (i.e. minor system capture rates, total overland flow depth, hydraulic grade line (HGL), etc.).
- Only the active storage in the bioswale cells was assessed in the model. Infiltration and detention storage were excluded at this functional level of design. These are to be incorporated into the model at detailed design and when additional geotechnical information becomes available to better understand the long-term groundwater levels and the infiltration rates of the underlying soils.
- The 'climate change' scenario was created by adding 20% of the individual intensity values of the 100-year 3-hour Chicago storm and the 100-year 12-hour SCS Type II storm at their specified time step were used as an analytical tool to establish the function of the system under extreme events.
- Minor system capture rates within the proposed development were restricted to the 2-year peak runoff rate.

6.3.2 SWMM Dual Drainage Methodology

The proposed development is modeled in a PCSWMM model as a dual conduit system, where:

1) The minor system consists of storm sewers, represented by circular conduits, and manholes, represented by storage nodes;

2) The major system consists of overland spills, represented by weirs. The major system component of the model will be further developed at detailed design to include irregular conduits using street-shaped cross-sections to represent the assumed overland road network with streets at varying slopes, and catch basins with surface ponding areas, represented by storage nodes. Representing the major conveyance system with weirs utilizes a conservative modelling approach which directly routes the overland flow from each storage to the SWMF.

Subcatchments are linked to the storage nodes representing onsite storage areas (surface ponding areas) and bioswale storage cells, so that generated hydrographs are directed there first. Onsite and bioswale storage nodes are connected to the minor system by outlet/orifice link objects, which represent inlet control devices (ICDs), or fixed-rate mechanical pumps that connect to storage nodes, typically representing manholes. Sample model input parameters are included in **Appendix 14D.6.1**.

Drawing STM-1 summarizes the discretized subcatchments used in the analysis of the proposed development. All parameters were assigned per the applicable Ottawa Sewer Design Guidelines (OSDG); Ontario Ministry of the Environment, Conservation, and Parks (MECP); and background document requirements.

6.3.2.1 Hydrologic Parameters

Key parameters for the proposed development subcatchment areas are summarized in **Table 6.2**, while example input files are provided for the 100-year, 3-hour Chicago storm in **Appendix 14D.6.1**. which indicate all other parameters. For all other input files and results of storm scenarios, please examine the electronic model files located on the digital media provided with this report. This analysis was performed using PCSWMM, which is a front-end GUI to the EPA-SWMM engine. Model files can be examined in any program which can read EPA-SWMM files version 5.1.014.

Table 6.3 presents the individual parameters that vary for each of the proposed subcatchments in the model. Subcatchment width parameters were determined by multiplying each subcatchment area in hectares by 225. Subcatchment imperviousness was measured directly from the site plan within AutoCAD considering all paved access, sidewalks, and roof areas as entirely impervious areas, and remaining grassed areas as entirely pervious. Weighted runoff ‘C’ coefficients were determined for each subcatchment considering impervious areas as C=0.90, and pervious as C=0.20. Weighted runoff coefficients are also shown in **Table 6.1**.

Table 6.2: General Subcatchment Parameters

Parameter	Value
Infiltration Method	Horton
Max. Infil. Rate (mm/hr)	76.2
Min. Infil. Rate (mm/hr)	13.2
Decay Constant (1/hr)	4.14
N Imperv	0.013
N Perv	0.25
Dstore Imperv (mm)	1.57
Dstore Perv (mm)	4.67
Zero Imperv (%)	0

Table 6.3: Individual Subcatchment Parameters

Subcatchment ID	Area (ha)	Width (m)	Slope (%)	% Impervious
BIO-1	0.643	144.7	2.0	35
L102A	0.411	92.5	2.0	80
L103A	1.329	299.0	2.0	80
L105A	1.039	233.7	2.0	80
L106A	0.672	151.2	2.0	80
L108A	1.296	291.5	2.0	80
L108B	0.673	151.5	2.0	80
L110A	0.504	113.3	2.0	80
L25A	0.745	167.6	2.0	57
L30A	0.141	31.7	2.0	58
PARK	1.246	220.0	0.25	0

6.3.2.2 Surface and Subsurface Storage Parameters

Table 6.4 summarizes the storage node parameters used in the model. Storage node ponding depth at spill elevation represents the maximum allowable surface water ponding at each location. Surface storage was estimated for the bioswale cells based on the 200mm active storage and conceptual geometries as shown in the blue-green SWMF corridor concept in **Appendix D.4**. To simplify the functional model, adjacent bioswale cells were combined in the storage nodes, with invert and spill elevations taken as an average between the grouped cells. Surface storage volumes were selected for the onsite development block storage based on the 50m^3/ha design criteria volumes listed in **Table 6.1** and ponding area was estimated using the end-area volume method. Onsite development block surface storage inverts were set artificially high to ensure routing to the SWMF. Catch basins and associated surface storages will be developed using the AutoCAD surface models for the proposed grading plan at a later phase of detailed

design. Rim elevations of the storage nodes were artificially elevated above the spill elevation to prevent flooding losses in the model. No surface storage is assumed above the manhole structures.

Table 6.4: Surface Storage Parameters

Subcatchment ID	Storage Node ID	Invert Elevation (m)	Rim Elevation (m)	Ponding Depth at Spill (m)	Ponding Area (m^2)	Ponding Volume (m^3)
L102A	S102	96.00	96.50	0.3	68.5	21
L103A	S103	96.00	96.50	0.3	221.5	67
L105A	S105	96.00	96.50	0.3	173.3	52
L106A	S106	96.00	96.50	0.3	112.0	34
L108A	S108A	96.00	96.50	0.3	215.9	65
L108B	S108B	96.00	96.50	0.3	112.2	34
L110A	S110	96.00	96.50	0.3	84	25
L30A	S30	96.00	96.50	0.3	23.4	7
BIO-1, PARK	BGC_A-B-C	95.29	95.90	0.2	549.8	110
-	BGC_D	95.25	95.90	0.2	156.6	31
-	BGC_E-F-G	95.20	95.90	0.2	516.9	104
-	BGC_H-I	95.10	95.30	0.2	284.6	57
-	R_A-B-C	95.45	95.90	0.2	221.4	44

During significant rainfall events, the bioswale cells are anticipated to fill to the 200mm active storage depth, spill into landscape catch basin drains with elevated inlets, entering the minor storm system and ultimately draining into the superpipe. The landscape drains are assumed to be City Standard Drawing S30 structures and grates.

The superpipe (2400mm x 1500mm) has been sized to provide an anticipated storage volume of 1,675m^3 at approximately the full 1.5m depth. The superpipe is to be equipped with a 600mm diameter outlet pipe that is to connect to the 750mm diameter municipal storm sewer in Heron Road through the installation of a new 1200mm diameter storm manhole, as shown in **Drawing STM-1**. The outlet invert of storm manhole STM 101 is to be equipped with an ICD orifice sized to restrict the outflow to the target release rate for the overall development site (344 L/s).

6.3.2.3 Hydraulic Parameters

As per the December 2025 City of Ottawa Sewer Design Guidelines, Manning's roughness values of 0.013 were used for sewer modeling and overland flow corridors representing roadways. Flow over grassed areas were modeled using a Manning's roughness value of 0.25. The storm sewers within the proposed development were modeled to estimate flow capacities and hydraulic grade lines (HGLs) in the post-development condition. The proposed storm sewer design sheet is included in **Appendix D.7**.

Exit losses at manholes were set for all pipe segments based on the flow angle through the structure. Exit losses were assigned as per the 2025 City Guidelines (Appendix 6-B of the Guidelines), see **Table 6.5**.

Table 6.5: Exit Loss Coefficients for Bends at Manholes

Degrees	Coefficient
11	0.060
22	0.140
30	0.210
45	0.390
60	0.640
90	1.320
180	0.020

The proposed development's storm sewers were sized to convey runoff from a 2-year storm using rational method calculations. The rational method design sheet can be found in **Appendix D.7**.

6.4 Model Results and Discussion

The following section summarizes the key hydrologic and hydraulic model results. For detailed model results or inputs please refer to the example input files in **Appendix D.6.1**, output files in **Appendix D.6.2,** and the PCSWMM model in the enclosed digital files.

6.4.1 Hydrology

Table 6.6 identifies the orifice link maximum flow rate and head at the superpipe outlet under the 2-year and 100-year storm scenarios. ICD sizing for the superpipe is conceptual in nature to meet target release rates and will be subject to future detailed design.

Table 6.6 : Preliminary ICD Schedule

Structure	Invert	Preliminary ICD Type and Sizing	100yr Head (m)	100yr Flow (L/s)	2yr Head (m)	2yr Flow (L/s)
STM 101	92.6	Circular Orifice 330mm Diameter	2.36	344	0.90	205

6.4.1.1 Uncontrolled Areas

Drainage subcatchment area L25A is not subject to the 50m^3/ha block storage requirement, since the imperviousness of the area is not changing. Due to grading restrictions, the major system flows from this area and subcatchment L30A can't be routed to the onsite SWMF. Consequently, both L30A and L25A are to be permitted to flow uncontrolled, as per existing conditions through the existing storm sewer pipe to the municipal storm sewer in Heron Road (EX. STM 30858) and to the Heron Road ROW.

6.4.2 Hydraulic Grade Line

A design sheet has been prepared for the proposed storm sewer in **Appendix D.7** demonstrating all on-site sewers remain free-flowing (HGLs within the sewer) using an uncontrolled 2-year rate. The invert of the storage system has been set above the obvert of the receiving storm sewer. Consequently, we do not anticipate impacts from the downstream sewer HGL.

Table 6.7 summarizes the hydraulic grade line (HGL) results for the subject site's proposed minor system using the worst case storm event distribution. Per the City of Ottawa Sewer Design Guidelines (2012), a building's underside of footing (USF) must be a minimum 300 mm above the 100-year HGL in the nearest upstream storm manhole. In addition, the buildings USF must also be above the HGL resulting from the 100-year + 20% stress test event.

For the existing buildings on this site, the existing USF elevations are not explicitly known, but they can be assumed as 1.5m below the existing ground surface, as these buildings typically do not have basements. The proposed underground parking limits are restricted to development blocks where new buildings are proposed, to avoid impacting the existing building foundations. For the HGL analysis, we will consider only the new buildings, as these will tend to have lower USF elevations, and represent conservative assessments.

Table 6.7: Hydraulic Grade Line Results

BLDG #	USF (m)	Adjacent Upstream MH ID	Adjacent Upstream MH T/G (m)	Adjacent 100-Year HGL (m)	100-year Freeboard (m)	Adjacent 100-Year +20% HGL (m)	100+20%-year Freeboard (m)
1	91.80±	STM 102	95.77	94.96	-	95.04	-
2	91.70±	STM 103	96.34	94.95	-	95.04	-
3	91.70±	STM 103	96.34	94.95	-	95.04	-
4 a,b,c	91.70±	STM 103	96.34	94.95	-	95.04	-
5	91.90±	STM 104	96.23	94.96	-	95.04	-
6	91.90±	STM 105	95.55	94.96	-	95.04	-
7	91.90±	STM 105	95.55	94.96	-	95.04	-
8	91.90±	STM 108	96.15	95.95	-	95.97	-
FUT. INST.	94.65±	STM 107	95.98	95.65	-	95.64	-

Model results indicate that there is insufficient clearance between the 100-year and 100-year +20% stress test HGLs and the proposed USFs. It should be noted from **Table 6.7** that the 100-year and 100-year +20% HGLs are high (near-surface) in all the upstream storm sewer legs in the proposed system. At the detailed design phase, the onsite storm sewer system should be upsized and flattened (reduced to minimum pipe sloping), to lower the HGL throughout the site.

Since the proposed storm sewer system results in a high (near-surface) HGL profile, foundation drains and future subsurface stormwater block storage will need to be hydraulically disconnected from the

sewers. No gravity connections to the storm sewer will be permitted. All storm services and will require pumping to the surface. Surface discharge locations will need to direct flows toward the ROW and have a positive, unobstructed drainage path to the major drainage system. For future underground parking ramps, considerations should be made in the design to protect the ramp, building, and underground parking structure from 100-year event flooding. Trench drains for future underground parking ramps should also be hydraulically disconnected from the storm sewer system (pumped to surface) to prevent backup into the building systems or surcharging at the ramp entrance.

6.4.3 Overland Flow

The total surface water depths (static ponding depth + dynamic flow) on the proposed roads/parking areas shall not exceed 0.35m for the 2-year and 100-year design storm distribution and the 100-year +20% climate change storm event. The overland flow will be evaluated at the detailed design phase, when detailed grading and ponding plans are available for modelling.

6.4.4 Peak System Outflows

Peak discharge from the development is summarized in **Table 6.8**:

Table 6.8: Peak Site Outflows (L/s)

Outlet	System	2-Year	100-Year	100-Year + 20%
STM 100	Minor System	205	344	354
	Major System	0	0	127
	Total	**205**	**344**	**481**
	Allowable	**344**	**344**	**-**
EX STM 30858	Minor System	108	286	356
	Major System	0	38	53
	Total	**108**	**324**	**409**

Peak discharge from the development is within the allowable rate for the 2-year and 100-year storm events.

6.5 Water Quality Control

The proposed development site does not include significant sources of contaminants and suspended solids. LID measures and best management practices are encouraged to treat runoff from vehicular surfaces. The residential vehicular parking is principally located in the underground parking levels and the drainage for the underground structures are to be directed to the sanitary sewer system. The functional stormwater management plan for the site has been designed to direct drainage from the proposed roadways and redevelopment portion of the site to the linear blue-green SWMF corridor that will

encourage settlement of suspended solids and provide filtration for captured runoff. Quality treatment of runoff will be partially provided in the bioswale cells which include the following strata:

- maximum 200mm active ponding depth
- minimum 600mm bioretention filter media
- minimum 450mm drainage layer
- In addition, the bioswale cells are interconnected by sloped vegetated swales, which provide further stormwater quality management and polishing. Erosion and sediment control measures will be implemented during the construction phase as noted in **Section 10**.

7 Background Studies

7.1 Geotechnical Investigation

A geotechnical investigation for the development site was completed by Stantec Consulting Ltd. (Stantec) in November 2023. Between June 20, 2022 and July 11, 2022, field testing took place and consisted of advancing a total of twelve (12) boreholes to a maximum depth of 7 m below existing ground surface across the site.

The subsurface profile encountered at the boreholes across the site generally consists of surficial topsoil over till materials overlying bedrock. Asphalt was encountered at ground surface in two boreholes with the thickness ranging from 40 mm to 75 mm. The fill consists of silty sand with gravel and ranges in thickness from 0.4 m to 0.6 m. The glacial till layer, encountered in all boreholes, varies throughout the site and is described as silty sand with gravel, clayey sand with gravel, and sandy lean clay with frequent cobbles and boulders. It is noted that the glacial till present in the Ottawa-Gatineau area is often crowded with cobbles and boulders set in a matrix of finer-grained material (gravel, sand, silt, and clay), with boulders more than 1 meter in diameter commonly present. Bedrock was encountered in eight boreholes with the depth to bedrock ranging from 3.1 m to 6.1 m below the existing ground surface. The bedrock consists of shale and limestone, with the shale belonging to the Carlsbad Formation. The RQD ranged from 0% to 100% indicating a very poor to excellent rock quality.

Groundwater levels were measured on July 6th, 2022 from monitoring wells installed at four of the boreholes and it was determined that the groundwater depth below ground surface varied from approximately 1.0 m to 1.7 m. The long-term groundwater table is subject to seasonal fluctuations and variation in groundwater elevation should be anticipated.

Based on the subsurface conditions described above, conventional spread footing foundations have been recommended to support the proposed buildings within the site. It is anticipated that most foundations will be founded on bedrock, therefore bedrock excavation may be required depending on the founding level of the proposed buildings and/or utilities. In addition, measures may be required to protect the shale bedrock given the potential for heaving when exposed to air and water. A grade raise restriction is not recommended within the site, however, if grade raises greater than 2 m above the existing site grades are proposed then a detailed analysis will be required. The pavement structures presented in the geotechnical report have been recommended in the absence of detailed traffic information for the site and will be reviewed once detailed information is available. The recommended pavement structure is shown in **Table 7.1**.

Table 7.1: Recommended Pavement Structure

Roadway Pavement Structure (mm)	Material Description
40	Wear Course – Superpave SP 12.5 Asphalt (PG 58-34, Traffic Level A)
50	Binder Course – Superpave SP 19 Asphalt (PG 58-34, Traffic Level A)
150	Base - OPSS Granular 'A' crushed stone
500	Subbase - OPSS Granular 'B' Type II

7.1.1 Groundwater Control

It is anticipated that excavations up to 1.5 m below ground surface for utilities and structures may encounter groundwater infiltration and/or surface runoff which should be controlled using open sump and pump methods. Excavations greater than 1.5 m in depth may require special dewatering techniques. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

In advance of construction, a temporary Ministry of the Environment, Conservation, and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum of 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.

For typical ground or surface water volumes being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.

7.2 Hydrogeological Investigation

A hydrogeological assessment for the development land was completed on May 19, 2023 by Stantec which provides a summary of the available hydrogeologic details for the site. The study identifies groundwater elevations within the site at elevations of 92.2 m to 94.2 m.

The stormwater management approach for the site has evolved since the preparation of the Hydrological Investigation and a piped system is now proposed. Groundwater elevations will be referenced as part of the future detailed design of the bioswale.

8 Site Grading and Drainage

The proposed re-development site measures approximately 7.45 ha in area and is occupied by existing buildings previously owned and used by the federal government as a training centre. The subject site has a relatively flat topography that gradually slopes downward from the western property limit along the park land owned by the City to the eastern property limit towards the residential properties fronting Garand Place and Amberdale Crescent. Additionally, the existing grade slopes downward from the northern property limit towards the southern property limit towards the Heron Road ROW. Based on a topographic survey completed by Stantec Geomatics, the grade difference from the southern limit to the northern limit of the site is approximately 0.6 meter, with an elevation of approximately 96.4 meters at the northwest corner of the site and slightly lower elevations at the southeast corner of the site (approx. 95.8 m).

A functional grading plan (see **Drawing GP-1**) has been provided to satisfy the stormwater management requirements, as detailed in **Section 6.0**. The functional grading scheme considers emergency overland flow routes required for stormwater management and anticipated cover requirements over sanitary and storm laterals. It provides preliminary high and low point elevations in critical areas to demonstrate the overall drainage patterns and direct stormwater runoff to the proposed collection system and to the central stormwater management facility along the northern and eastern limits of the site. The functional grading plan has been aligned with the Site Plan and functional SWM concept. The plan ties-in to existing elevations at the property lines and no drainage is directed to the adjacent properties.

Detailed site grading to accommodate flow routes and frost protection will be provided at the detailed design phase. Detailed erosion control measures and construction best management practices will be provided at detailed design.

Underside of footing (USF) elevations and finished floor elevations (FFEs) are to be provided or confirmed at detailed design. The proposed USFs and FFEs will be coordinated with the architect to align with building elevation plans, accommodate accessibility standards, and respect the proposed storm sewer's hydraulic grade lines. The USFs and FFEs shown on **Drawing GP-1** are preliminary for functional assessment of the development only.

9 Utilities

Enbridge gas, communications services (Rogers and Bell), and Hydro Ottawa utilities are available in proximity to the development.

According to the City of Ottawa-provided UCC plans there is an existing 300 mm gas main along Heron Road fronting the site. Bell and Rogers utilities exist near the subject site along Heron Road and Walkley Road and it is anticipated that the future re-development will be serviced by Bell fibre optic cables which will be extended to the site. Hydro Ottawa utilities exist in proximity to the site along Heron and Walkley Road.

Future correspondence with the utilities will determine whether the existing services have the available capacity required to service the future re-development. Detailed design of the utility services will be completed by the respective utility companies as part of the future detailed design to support the site plan development.

10 Erosion Control During Construction

In order to protect downstream water quality and prevent sediment build up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Provide sediment traps and basins during dewatering works.
7. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
8. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

The proposed location of silt fences, straw bales, and other erosion control measures are to be provided at the detailed design stage.

11 Approvals

No additional approvals are required to support the Zoning Bylaw Amendment application.

An Ontario Ministry of Environment, Conservation and Parks (MECP) Environmental Compliance Approval (ECA), under the Ontario Water Resources Act may be required for the private sewers and the central stormwater management facility if there be a future severance of the development land.

An MECP Permit to Take Water (PTTW) or reporting on the Environmental Activity and Sector Registry (EASR) may be required in advance of construction. Recommendations for permitting can be provided by the geotechnical consultant at the detailed design stage.

12 Conclusions

12.1 Water Servicing

Based on the supplied boundary conditions for existing watermain, and the estimated domestic and fire flow demands for the subject site, the 300 mm watermain within Heron Road has sufficient capacity to supply the development site. Domestic demands can be met under normal operating conditions and fire hydrants can be provided within the site to provide the required fire flow. The construction and design of the proposed buildings are to be confirmed at detailed design and will be required to conform to the available fire flows and servicing pressures on site. The proposed private water distribution system will be looped with two connections to Heron Road.

12.2 Wastewater Servicing

The development site will be serviced by a private wastewater collection system directing wastewater to the existing 250 mm diameter concrete sanitary sewer within Heron Road. The existing municipal system has the capacity to receive wastewater peak flows from the development site.

12.3 Stormwater Management and Servicing

A functional design hydrologic/hydraulic model was completed with PCSWMM accounting for the estimated major and minor systems to evaluate the storm sewer infrastructure and ensure release rates meet the previously defined target criteria. The use of PCSWMM for modeling the site hydrology and hydraulics allowed for an analysis of the system response during various storm events to validate the proof-of-concept for the stormwater management approach, demonstrate the functional stormwater management plan meets the design criteria established for the development, and confirm that the site can be adequately serviced.

The existing storm sewer outlet will continue to service the previously developed portions of the site. Should there be an increase in imperviousness in the contributing area, storage will have to be provided to ensure no increase in flow to the collection system.

A central stormwater management facility will service the redevelopment portion of the site. It will provide quantity control to meet the allowable release for the redevelopment portion of the site. The facility has been designed to incorporate some low impact development features as best management practices to allow for some quality control for the development. No target quality control criteria are applicable to the site.

The private stormwater collection system is designed to provide an outlet to the redevelopment areas and direct flow to the central stormwater management facility. The proposed storm sewer network was found to have a high, near-surface HGL profile. Gravity connections of the building storm services and foundations drains will not be permitted. Stormwater services shall be pumped to the surface at a discharge location with an unobstructed positive flow path to the adjacent right of way or major system outlet.

Redevelopment areas are to be designed with 50 m^3/ha of volumetric storage to limit peak inflows to the stormwater management facility and meet the allowable release rate. Quantity control storage for individual development blocks is to be established in future detailed design submissions.

12.4 Geotechnical and Hydrogeological Considerations

A preliminary geotechnical investigation was conducted by Stantec Consulting Ltd. to identify the general subsurface conditions at the site by means of boreholes (twelve (12) boreholes, numbered BH22-1 to BH22-12). Depth of bedrock ranged from approximately 3.1 m to 6.1 m and four groundwater monitoring wells were installed to measure fluctuations in groundwater levels. There is no grade raise restriction for the development however a grade raise in excess of 2.0m shall be subject to detailed analysis.

12.5 Grading

The subject development land has a relatively flat topography that generally slopes downward from the northwest to the southeast.

The functional site grading plan maintains the general drainage pattern of the site and matches all perimeter grades. The functional grading will accommodate surface storage and the stormwater management facility.

12.6 Utilities

Enbridge Gas, Bell, Rogers, and Hydro Ottawa utility services all exist within the vicinity of the proposed development. The development is anticipated to be serviced through connections to these existing services.

Detailed design of the required utility services will be completed by the respective utility companies at the detailed design stage.

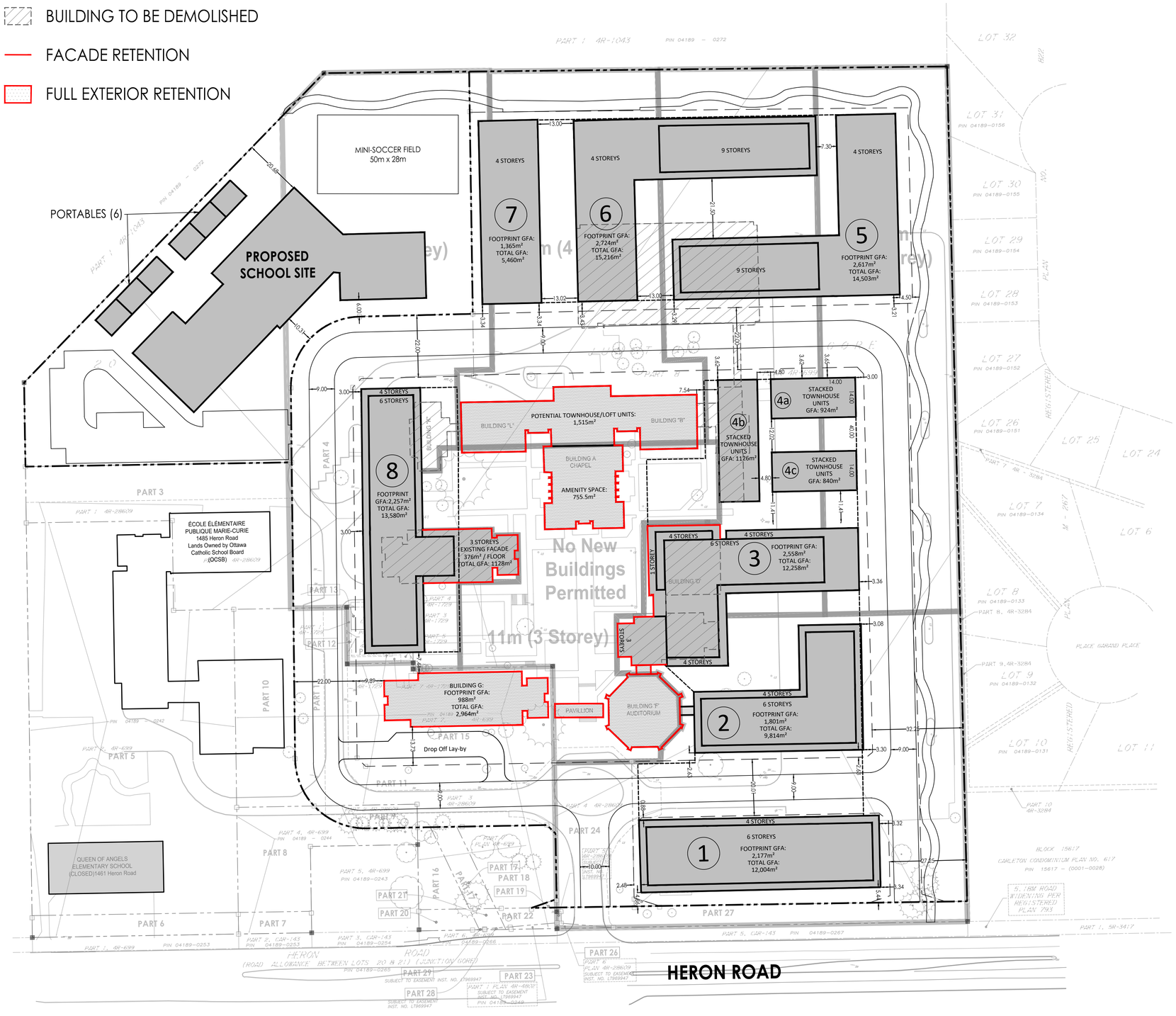
Appendices

Appendix A Functional Site Plan

A.1 Functional Site Plan

LEGEND

- BUILDING TO BE DEMOLISHED
- FACADE RETENTION
- FULL EXTERIOR RETENTION



Neighbourhood Mixed-Use Zone
Min. Lot Area: No minimum
Min. Lot Width: No minimum
Min. Front Yard: 3 m
Min. Exterior Yard: 3 m
Min. Interior Yard
(A residential bldg greater than 11 m in ht): 3 m
Min. Rear Yard:
For a residential use bldg: 7.5 m
Max. Ht: 18 m

Institutional Zone
Min. Lot Area: 400 m2
Min. Lot Width: 15 m
Min. Front Yard: 3
Min. Exterior Yard: 4.5
Min. Interior Yard: 3 m
Min. Rear Yard: 4.5 m

Minor Corridor 2 Zone
Min. Lot Area: No minimum
Min. Lot Width: No minimum
Min. Front Yard: 2
Min. Exterior Yard: 3
Min. Interior Yard: 2
Min. Rear Yard: 7.5
Min. Ht: 6 m
Max. Ht: 20 m

Green Space/Institutional Zone
Min. Lot Area: 400 m2
Min. Lot Width: 15 m
Min. Front Yard: 3
Min. Exterior Yard: 4.5
Min. Interior Yard: 3 m
Min. Rear Yard: 4.5 m
Max. Ht: 15 m

Stantec
400-1305 Riverbend Road
London ON N6K 0J5
Tel. 519-645-2007
www.stantec.com

This zoning review is based on the new Zoning By-law 2026-50 which came in effect on March 11, 2026.

Legal Description
Part of Lot 20,
Junction Gore,
City of Ottawa

Exception 2990
v. All parcels subject to Exception 2990 are considered one lot for zoning purposes.
vi. Maximum building heights are as per Schedule 502.
vii. No new buildings are permitted in Area E on Schedule 502. This provision does not apply to below grade structures or parking.
x. Except for mixed-use buildings within 120m of Heron Road, all non-residential uses are only permitted on the ground floor and second storey of a mixed-use building.
xi. Minimum stepback of 2.5m after the 4th storey.
xii. Maximum building width and length of 60m for mid-rise buildings (5+ storeys).
xiii. Despite Subsection 74(3), buildings connected above the ground by features such as pedways, bridges, or other connections that create additional gross floor or gross leasable floor area, are not considered one building for the purpose of applying maximum building length.
xiv. Minimum setback of 14.25m from a parcel zoned R1.
xv. A building or structure must be at least 3m from any lands zoned O1.
xvi. No maximum Floor Space Index.
xvii) The holding symbol may only be removed from all or part of the lands subject to the 'h' symbol following the completion of the following:a. A heritage impact assessment that demonstrates compliance with the 1495 Heron Road Conservation Design Guidelines is approved, to the satisfaction of the General Manager of Planning, Development and Building Code Services or their designate, together with any required permits under Sections 33 or 34 of the Ontario Heritage Act.b. A functional servicing report is approved confirming that municipal water supply and sanitary sewer capacity is adequate for the proposed development, to the satisfaction of the General Manager of Planning, Development and Building Code Services or their designate.
xviii) Partial removal of the holding symbol may be considered to facilitate phased development. Approval of an application to partially lift the holding provision will be based on satisfying the applicable conditions for that phase of development as determined by the General Manager of Planning, Development, and Building Code Services.

Exception 2991
The holding symbol may only be removed from all or part of the lands subject to the 'h' symbol following the completion of the following conditions:

a. A heritage impact assessment that demonstrates compliance with the 1495 Heron Road Conservation Design Guidelines is approved, to the satisfaction of the General Manager of Planning, Development and Building Code Services or their designate, together with any required permits under Sections 33 or 34 of the Ontario Heritage Act.

b. A minimum 5000m2 park less any deductions applicable by the provision of affordable housing is dedicated to the City in a location and configuration to the satisfaction of the General Manager of Recreation, Cultural and Facilities or their designate.

Note:
Private Driveway to be designed with temporary parking spaces - location and number of spaces to be confirmed at detailed engineering design

Title
Conceptual Site Plan
1495 Heron Road
July 31, 2026

Project No.	Scale	
160410368	HORZ – 1 : 750 (7.5 0 15m)	
Drawing No.	Sheet	Revision
CP2.10	1 of 1	0

A.2 Functional Site Statistics

1495 Heron: Concept Unit Yield Estimate

Updated

Option 1: Stacked Townhomes (Buildings 4A to 4C)

Concept:
Date: 7-Aug-26
Filepath: \\CA0218-PPFSS01\shared_projects\160410368\design\drawing\CAD\concept_plan\table
Prepared by: Eric Bays, Jacob Walker

Average Unit Size (750 sqft) (sqm): 69.7
Gross Up Percentage: 15%

I	IB	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI
Phase	**Buiding**	**Floor**	**GFA (sqm)**	**Subtract Gross Up (sqm)**	**Unit Estimate**	**Unit Estimate (high)**	**Unit Estimate (low)**	**Required Visitor Parking (min.)***	***Resident Parking (0.5/unit)***	***Resident Parking (1.0/unit)***	**Required Short-Term Bicycle Parking (min.)†**	**Required Long-Term Bicycle Parking (min.)**	**Required Horizontal Long-Term Bicycle Parking (min.)****	**Required Inclusive Bicycle Parking (min.)*****	**Required Amenity Area (min.)**	**Required Portion of Amenity Area**
1	1‡	1	2027.0 ‡	1723.0	25	25	24									
		2	2177.0	1850.5	27	27	26									
		3	2177.0	1850.5	27	27	26									
		4	2177.0	1850.5	27	27	26									
		5	1648.0	1400.8	20	21	20									
		6	1648.0	1400.8	20	21	20									
		Total:	11854.0	10075.9	145	148	142	12	*72*	*148*	8	108	74	7	54	5
1	2	1	1801.0	1530.9	22	22	21									
		2	1801.0	1530.9	22	22	21									
		3	1801.0	1530.9	22	22	21									
		4	1801.0	1530.9	22	22	21									
		5	1305.0	1109.3	16	16	15									
		6	1305.0	1109.3	16	16	15									
		Total:	9814.0	8341.9	120	120	114	10	*60*	*120*	7	90	60	6	45	4
1	3	1	2558.0	2174.3	31	32	31									
		2	2396.0	2036.6	29	30	29									
		3	2396.0	2036.6	29	30	29									
		4	2128.0	1808.8	26	26	25									
		5	1390.0	1181.5	17	17	16									
		6	1390.0	1181.5	17	17	16									
		Total:	12258.0	10419.3	149	152	146	13	*75*	*152*	8	112	76	8	56	6
1	4	4A††	897.0	762.5	15	16	15									
		4B††	897.0	762.5	18	18	17									
		4C††	897.0	762.5	13	14	13									
		Total:	2691.0	2287.4	46	48	45	2	*23*	*48*	3	35	24	2	17	2
1	G	1	988.0	839.8	12	13	12									
		2	988.0	839.8	12	13	12									
		3	988.0	839.8	12	13	12									
		Total:	2964.0	2519.4	36	39	36	1	*18*	*39*	3	27	20	2	14	1
	Phase 1 Total:		**39581.0**	**33643.9**	**496**	**507**	**483**	**38**	*248*	*507*	**30**	**372**	**254**	**25**	**186**	**19**
1.5	A, B, L	1	1515.0	1287.8	18	19	18									
	Phase 1.5 Total:		**1515.0**	**1287.8**	**18**	**19**	**18**	**0**	*0*	*0*	**0**	**0**	**0**	**0**	**0**	**0**
2	5	1	2617.0	2224.5	32	32	31									
		2	2617.0	2224.5	32	32	31									
		3	2617.0	2224.5	32	32	31									
		4	2617.0	2224.5	32	32	31									
		5	807.0	686.0	10	10	9									
		6	807.0	686.0	10	10	9									
		7	807.0	686.0	10	10	9									
		8	807.0	686.0	10	10	9									
		9	807.0	686.0	10	10	9									
		Total:	14503.0	12327.6	177	178	169	15	*88*	*178*	10	133	89	9	66	7
2	6	1	2724.0	2315.4	33	34	33									
		2	2724.0	2315.4	33	34	33									
		3	2724.0	2315.4	33	34	33									
		4	2724.0	2315.4	33	34	33									
		5	864.0	734.4	11	11	10									
		6	864.0	734.4	11	11	10									
		7	864.0	734.4	11	11	10									
		8	864.0	734.4	11	11	10									
		9	864.0	734.4	11	11	10									
		Total:	15216.0	12933.6	186	191	182	16	*93*	*191*	10	139	96	10	70	7
2	7	1	1365.0	1160.3	17	17	16									
		2	1365.0	1160.3	17	17	16									
		3	1365.0	1160.3	17	17	16									
		4	1365.0	1160.3	17	17	16									
		Total:	5460.0	4641.0	67	68	64	4	*33*	*68*	4	50	34	3	25	2
	Phase 2 Total:		**35179.0**	**29902.2**	**429**	**437**	**415**	**36**	*215*	*437*	**24**	**322**	**219**	**22**	**161**	**16**
3	8	1	2633.0	2238.1	32	33	32									
		2	2633.0	2238.1	32	33	32									
		3	2633.0	2238.1	32	33	32									
		4	2257.0	1918.5	28	28	27									
		5	1712.0	1455.2	21	21	20									
		6	1712.0	1455.2	21	21	20									
		Total:	13580.0	11543.0	166	169	163	14	*83*	*169*	9	124	85	8	62	6
3	9	1	0.0	0.0	0	0	0									
		2	0.0	0.0	0	0	0									
		3	0.0	0.0	0	0	0									
		4	0.0	0.0	0	0	0									
		5	0.0	0.0	0	0	0									
		6	0.0	0.0	0	0	0									
		Total:	0.0	0.0	0	0	0	-2	*0*	*0*	1	0	0	0	0	0
	Phase 3 Total:		**13580.0**	**11543.0**	**166**	**169**	**163**	**12**	*83*	*169*	**10**	**124**	**85**	**8**	**62**	**6**
	Grand Total:		**89855.0**	**76376.8**	**1109**	**1132**	**1079**	**85**	*545*	*1113*	**65**	**818**	**557**	**56**	**409**	**41**

Notes & Limitations

- Unit Estimate (High) calculated by rounding down product of "GFA/AverageUnitSize" to nearest whole number on each floor
- Unit Estimate (Low) calculated by rounding up product of "GFA/AverageUnitSize" to nearest whole number on each floor
- Zoning By-law 2026-50 does not require minimum vehicle parking for residents; columns IX and X provided for scale

* Headings beginning with "Required" are required in accordance with Zoning By-law 2026-50
** at least 50% of required long-term bicycle parking must be provided as horizontal spaces
*** at least 5% of required long-term bicycle parking must be provided as inclusive spaces
† short-term bicycle parking means parking which is publicly accessible outside of secured building areas
†† stacked townhome unit yeild calculated based on frontage length divided by 4.5 m × 2
‡ A portion of the ground floor of Building 1 near the intersection of Heron-Baycrest to include 150 sqm commercial space

Appendix B Potable Water Servicing

B.1 Water Demands

1495 Heron Road, Ottawa, ON - Domestic Water Demand Estimates

Draft Plan, Stantec Consulting, August 7, 2026 & associated densities

Project No. 160410368 Designed by: MW

Date: 2026-07-31 Checked by:

Revision: 01 City File No. D07-16-23-0005

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:		
Apartment	1.8	ppu
Townhome	2.7	ppu
Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines:		
Residential	280	L/cap/day
Commercial and Institutional	28000	L/gross ha/day

Building ID	Commercial / Institutional (m^2)	No. of Units	Population	Avg Day Demand		Max Day Demand [1 2]		Peak Hour Demand [1 2]	
				(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Building 1									
Apartment		148	266	51.8	0.86	129.5	2.16	284.9	4.75
Building 2									
Apartment		120	216	42.0	0.70	105.0	1.75	231.0	3.85
Building 3									
Apartment		152	274	53.2	0.89	133.0	2.22	292.6	4.88
Building 4									
4A		16	43	8.4	0.14	21.0	0.35	46.2	0.77
4B		18	49	9.5	0.16	23.6	0.39	52.0	0.87
4C		14	38	7.4	0.12	18.4	0.31	40.4	0.67
Building 4 Subtotal		*48*	*130*	*25.2*	*0.42*	*63.0*	*1.05*	*138.6*	*2.31*
Building 5									
Apartment		178	320	62.3	1.04	155.8	2.60	342.7	5.71
Building 6									
Apartment		191	344	66.9	1.11	167.1	2.79	367.7	6.13
Building 7									
Apartment		68	122	23.8	0.40	59.5	0.99	130.9	2.18
Building 8									
Apartment		169	304	59.2	0.99	147.9	2.46	325.3	5.42
Building A, B, L									
Stacked Townhouse		19	51	10.0	0.17	24.9	0.42	54.9	0.91
Building G									
Apartment		39	70	13.7	0.23	34.1	0.57	75.1	1.25
Institutional	12956			25.2	0.42	37.8	0.63	68.0	1.13
Commercial/Amenity	150			0.3	0.00	0.4	0.01	0.8	0.01
Residential Subtotal		*1132*	*2098*	*407.9*	*6.80*	*1019.8*	*17.00*	*2243.6*	*37.39*
Total Site :	**13106**	**1132**	**2098**	**433.4**	**7.22**	**1058.0**	**17.63**	**2312.4**	**38.54**

Notes:

1 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 × average day demand rate
peak hour demand rate = 2.2 × maximum day demand rate

2 Water demand criteria used to estimate peak demand rates for commercial/institutional areas are as follows:
maximum daily demand rate = 1.5 × average day demand rate
peak hour demand rate = 1.8 × maximum day demand rate

B.2 FUS Fire Flow Calculations

Stantec

FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

Stantec Project #: 160410368
Project Name: 1495 Heron Road
Date: 2026-08-04
Fire Flow Calculation #: 1
Description: Building 4B - 3-storey stacked townhouse

Notes: Building information taken from Concept Plan. Stacked townhouse units with fire separation to limit building footprint to a maximum of 600 m².

Step	Task	Notes										Value Used	Req'd Fire Flow (L/min)
1	Determine Type of Construction	Type V - Wood Frame / Type IV-D - Mass Timber Construction										1.5	-
2	Determine Effective Floor Area	Sum of All Floor Areas										NO	-
		600	600	600								1800	-
3	Determine Required Fire Flow	($F = 220 \times C \times A^{1/2}$). Round to nearest 1000 L/min										-	14000
4	Determine Occupancy Charge	Limited Combustible										-15%	11900
5	Determine Sprinkler Reduction	None										0%	0
		Non-Standard Water Supply or N/A										0%	
		Not Fully Supervised or N/A										0%	
		% Coverage of Sprinkler System										0%	
6	Determine Increase for Exposures (Max. 75%)	Direction	Exposure Distance (m)	Exposed Length (m)	Exposed Height (Stories)	Length-Height Factor (m x stories)	Construction of Adjacent Wall	Firewall / Sprinklered ?				-	-
		North	0 to 3	14	3	41-60	Type V	YES				0%	2261
		East	3.1 to 10	28	3	81-100	Type V	NO				19%	
		South	3.1 to 10	14	3	41-60	Type III-IV - Unprotected Openings	YES				0%	
		West	3.1 to 10	19	3	41-60	Type III-IV - Unprotected Openings	YES				0%	
7	Determine Final Required Fire Flow	Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min											14000
		Total Required Fire Flow in L/s											233.3
		Required Duration of Fire Flow (hrs)											3.00
		Required Volume of Fire Flow (m^3)											2520

B.3 Boundary Conditions

Wu, Michael

From: Abou Antoun, Marianne <marianne.abouantoun@ottawa.ca>
Sent: August 27, 2026 09:24
To: Wu, Michael; Mottalib, Abdul
Cc: Gladish, Alyssa; Smadella, Karin; Moroz, Peter
Subject: RE: D07-16-23-0005 - 1495 Heron Road - Updated Boundary Conditions Request
Attachments: 1495 Heron Rd August 2026.pdf

Good morning Michael,

The following are boundary conditions, HGL, for hydraulic analysis at 1495 Heron Rd (zone 2W2C) assumed to be connected at the locations identified below.: (see attached PDF for location).

Connection 1 – 305mm on Heron Rd (West)
Minimum HGL = 125.3 m
Maximum HGL = 132.0 m
Max Day + Fire Flow (250 L/s) = 123.9 m

Connection 2 – 305mm on Heron Rd (East)
Minimum HGL = 125.3 m
Maximum HGL = 131.8 m
Max Day + Fire Flow (250 L/s) = 122.9 m

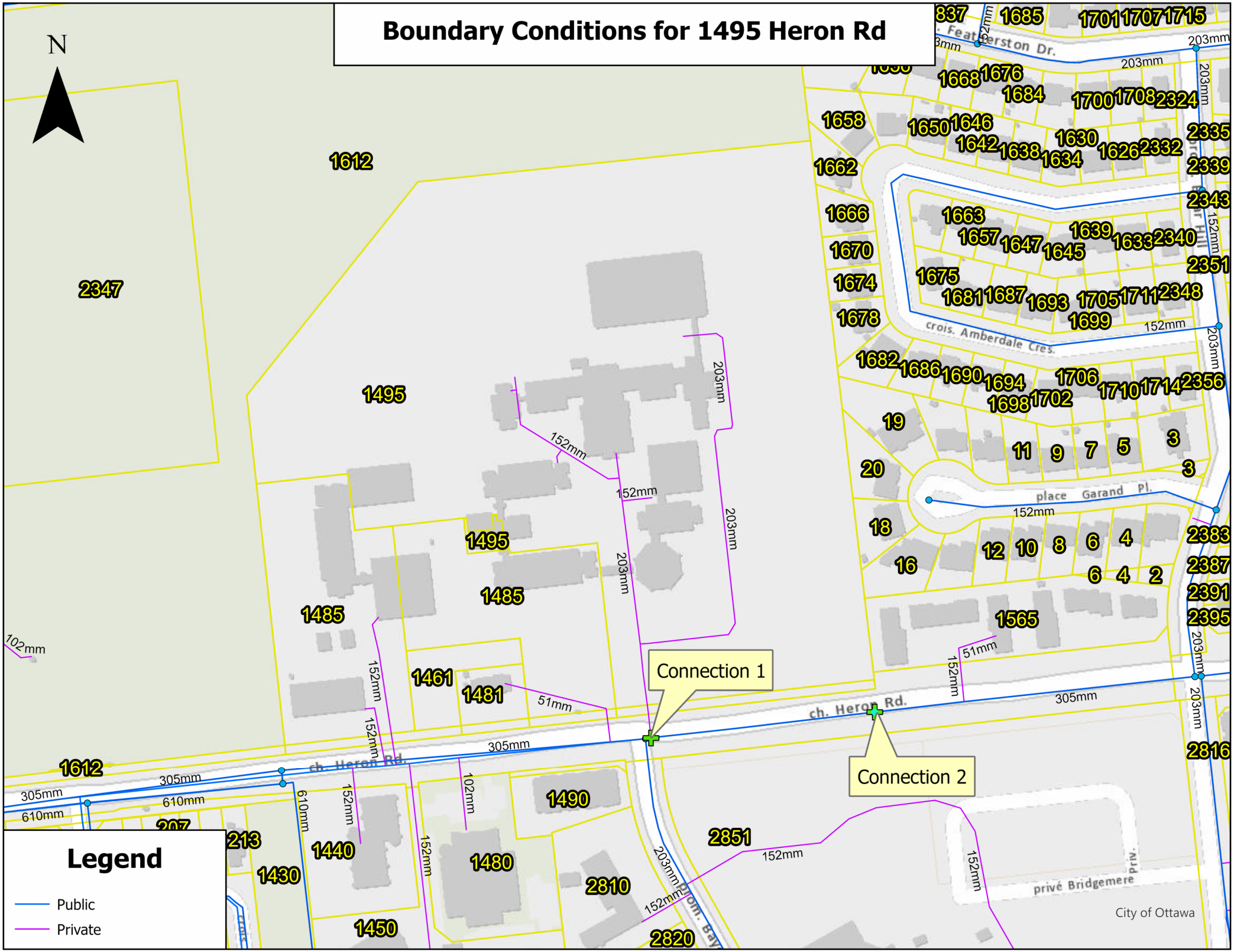
These are for current conditions and are based on computer model simulation.

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.

Kind regards,

Marianne Abou Antoun, P.Eng
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS) | Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West |110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
Tel.|Tél. 613.580.2424 ext.| poste 60695 or 12869

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: August 21, 2026 4:14 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Gladish, Alyssa <alyssa.gladish@stantec.com>; Smadella, Karin <karin.smadella@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>; Abou Antoun, Marianne <marianne.abouantoun@ottawa.ca>


Boundary Conditions for 1495 Heron Rd
N
Connection 1
Connection 2
ch. Heron Rd.
crois. Amberdale Cres.
place Garand Pl.
privé Bridgemere
Legend
Public
Private
City of Ottawa
1612
2347
1495
1485
1461
1481
1490
1480
1440
1430
1450
2851
2810
2820
1565
2816
305mm
203mm
152mm
102mm
51mm
610mm

B.4 Functional Water Model Results

Junction Results - Basic Day

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
17	0.00	96.18	131.93	35.75	50.84	350.50
18	0.00	96.17	131.93	35.76	50.85	350.58
19	0.00	96.15	131.93	35.78	50.88	350.82
16	0.99	96.06	131.89	35.83	50.95	351.31
20	0.23	96.10	131.95	35.85	50.97	351.43
14	0.00	96.02	131.88	35.86	50.98	351.53
15	0.42	96.03	131.88	35.86	50.99	351.57
13	0.00	96.00	131.87	35.88	51.02	351.76
21	0.95	96.03	131.97	35.93	51.10	352.30
12	0.40	95.90	131.86	35.96	51.14	352.57
7	0.42	95.83	131.82	35.99	51.18	352.89
11	1.28	95.85	131.85	36.00	51.19	352.92
8	0.00	95.83	131.83	36.00	51.19	352.94
6	0.89	95.77	131.82	36.05	51.26	353.40
9	0.00	95.77	131.83	36.06	51.27	353.49
10	1.04	95.77	131.83	36.07	51.28	353.59
5	0.70	95.68	131.81	36.13	51.37	354.17
4	0.87	95.48	131.80	36.32	51.65	356.09

Link Results - Basic Day

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	21	69.30	250.00	110.00	12.77	0.26
1002	4	0	43.94	250.00	110.00	4.58	0.09
1003	5	4	47.30	250.00	110.00	5.45	0.11
1004	6	5	63.29	250.00	110.00	6.15	0.13
1005	7	6	42.75	250.00	110.00	7.04	0.14
1006	8	7	23.59	250.00	110.00	7.46	0.15
1007	9	8	7.04	250.00	110.00	7.46	0.15
1008	10	9	33.80	250.00	110.00	7.46	0.15
1009	11	10	60.52	250.00	110.00	8.50	0.17
1010	12	11	34.54	250.00	110.00	9.78	0.20
1011	13	12	55.45	250.00	110.00	10.18	0.21
1012	14	13	11.25	250.00	110.00	10.18	0.21
1013	15	14	22.23	250.00	110.00	10.18	0.21
1014	16	15	26.09	250.00	110.00	10.60	0.22
1015	17	16	86.25	250.00	110.00	11.59	0.24
1016	18	17	8.45	250.00	110.00	11.59	0.24
1017	19	18	8.45	250.00	110.00	11.59	0.24
1018	20	19	38.73	250.00	110.00	11.59	0.24
1019	21	20	46.07	250.00	110.00	11.82	0.24

Junction Results - Peak Hour

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
17	0.00	96.18	125.19	29.01	41.25	284.41
18	0.00	96.17	125.19	29.02	41.26	284.50
19	0.00	96.15	125.19	29.04	41.30	284.75
16	5.42	96.06	125.14	29.08	41.35	285.11
14	0.00	96.02	125.13	29.11	41.39	285.40
15	1.13	96.03	125.14	29.11	41.39	285.40
20	1.25	96.10	125.22	29.11	41.39	285.41
13	0.00	96.00	125.13	29.14	41.43	285.64
21	2.57	96.03	125.24	29.21	41.54	286.38
12	2.18	95.90	125.12	29.23	41.56	286.54
11	7.04	95.85	125.12	29.27	41.62	286.96
8	0.00	95.83	125.13	29.30	41.67	287.28
7	2.31	95.83	125.13	29.31	41.67	287.31
10	5.71	95.77	125.12	29.35	41.74	287.78
9	0.00	95.77	125.13	29.36	41.74	287.80
6	4.88	95.77	125.15	29.38	41.77	288.03
5	3.85	95.68	125.19	29.51	41.96	289.27
4	4.76	95.48	125.24	29.75	42.31	291.69

Link Results - Peak Hour

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	21	69.30	250.00	110.00	17.30	0.35
1002	4	0	43.94	250.00	110.00	-23.80	0.49
1003	5	4	47.30	250.00	110.00	-19.04	0.39
1004	6	5	63.29	250.00	110.00	-15.19	0.31
1005	7	6	42.75	250.00	110.00	-10.31	0.21
1006	8	7	23.59	250.00	110.00	-8.00	0.16
1007	9	8	7.04	250.00	110.00	-8.00	0.16
1008	10	9	33.80	250.00	110.00	-8.00	0.16
1009	11	10	60.52	250.00	110.00	-2.29	0.05
1010	12	11	34.54	250.00	110.00	4.75	0.10
1011	13	12	55.45	250.00	110.00	6.93	0.14
1012	14	13	11.25	250.00	110.00	6.93	0.14
1013	15	14	22.23	250.00	110.00	6.93	0.14
1014	16	15	26.09	250.00	110.00	8.06	0.16
1015	17	16	86.25	250.00	110.00	13.48	0.28
1016	18	17	8.45	250.00	110.00	13.48	0.28
1017	19	18	8.45	250.00	110.00	13.48	0.28
1018	20	19	38.73	250.00	110.00	13.48	0.28
1019	21	20	46.07	250.00	110.00	14.73	0.30

Fire Flow Results - Max Day + 250 L/s

ID	Static Demand (L/s)	Static Pressure (m)	Static Pressure (psi)	Static Pressure (kPa)	Static Head (m)	Fire Flow Demand (L/s)	Residual Pressure (m)	Residual Pressure (psi)	Available Flow (L/s)	Available Pressure (psi)
4	2.17	27.43	39.01	268.95	122.92	250.00	23.77	33.80	507.1	20
5	1.75	27.25	38.75	267.20	122.94	250.00	20.85	29.64	371.4	20
6	2.22	27.21	38.69	266.73	122.98	250.00	18.15	25.81	306.8	20
7	1.05	27.18	38.65	266.49	123.01	250.00	16.84	23.94	284.9	20
8	0.00	27.20	38.68	266.69	123.03	250.00	16.29	23.16	277.0	20
9	0.00	27.26	38.77	267.29	123.04	250.00	16.20	23.03	275.6	20
10	2.60	27.30	38.82	267.62	123.07	250.00	15.60	22.19	267.7	20
11	3.20	27.28	38.80	267.49	123.13	250.00	14.93	21.23	259.6	20
12	0.99	27.29	38.80	267.54	123.18	250.00	14.82	21.08	258.3	20
13	0.00	27.28	38.79	267.43	123.27	250.00	14.98	21.30	260.2	20
14	0.00	27.27	38.77	267.34	123.29	250.00	15.06	21.41	261.1	20
15	0.63	27.30	38.82	267.65	123.33	250.00	15.31	21.77	264.1	20
16	2.46	27.31	38.83	267.74	123.37	250.00	15.67	22.28	268.6	20
17	0.00	27.36	38.91	268.26	123.54	250.00	17.71	25.19	298.9	20
18	0.00	27.38	38.94	268.48	123.56	250.00	18.00	25.59	303.9	20
19	0.00	27.42	38.99	268.86	123.57	250.00	18.32	26.04	309.5	20
20	0.57	27.55	39.17	270.06	123.65	250.00	19.91	28.30	343.4	20
21	1.43	27.71	39.40	271.68	123.74	250.00	22.32	31.74	421.0	20

Appendix C Wastewater Servicing

C.1 Sanitary Sewer Design Sheet

Stantec

SUBDIVISION: **1495 Heron Road**

DATE: 2026-08-21
REVISION: 3
DESIGNED BY: MJS
CHECKED BY: DT

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160410368

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33 l/s/Ha	HARMON CORRECTION FACTOR	0.8
PERSONS / APARTMENT	1.8				

LOCATION			RESIDENTIAL AREA AND POPULATION									COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA	SINGLE	UNITS TOWN	APT	POP.	CUMULATIVE AREA	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)					(ha)			(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
R8A	8	7	0.10	0	0	39	70	0.10	70	3.63	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	0.10	0.0	0.9	42.2	250	PVC	SDR 35	0.65	48.9	**1.76%**	0.98
	7	6	0.00	0	0	0	0	0.10	70	3.63	0.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.10	0.0	0.9	13.0	250	PVC	SDR 35	0.40	38.3	**2.24%**	0.77
R6A, I6A, G6A	6	5	0.28	0	0	169	304	0.38	374	3.43	4.2	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.70	0.70	0.1	1.29	1.39	0.5	4.8	141.3	250	PVC	SDR 35	0.40	38.3	**12.43%**	0.77
	5	4	0.00	0	0	0	0	0.38	374	3.43	4.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.70	0.1	0.00	1.39	0.5	4.8	15.7	250	PVC	SDR 35	0.40	38.3	**12.43%**	0.77
G4C, G4A, R4D, R4A, R4B, R4C, G4B	4	3	0.89	0	19	437	838	1.27	1212	3.20	12.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	2.56	3.26	0.1	3.45	4.84	1.6	14.2	192.1	250	PVC	SDR 35	0.40	38.3	**37.16%**	0.77
R3A, G3A, R3C, R3B	3	2	0.65	0	48	272	619	1.91	1832	3.09	18.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.50	4.76	0.1	2.14	6.98	2.3	20.8	160.7	250	PVC	SDR 35	0.40	38.3	**54.12%**	0.77
G2A, R2A	2	1	0.22	0	0	148	266	2.13	2098	3.06	20.8	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.31	0.25	5.01	0.1	0.49	7.46	2.5	23.3	40.7	250	PVC	SDR 35	0.40	38.3	**60.87%**	0.77
	1	30737	0.00	0	0	0	0	2.13	2098	3.06	20.8	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.31	0.00	5.01	0.1	0.00	7.46	2.5	23.3	22.0	250	PVC	SDR 35	0.40	38.3	**60.87%**	0.77
																												250						

C.2 Confirmation of Downstream Sanitary Sewer Capacity

Wu, Michael

From: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Sent: August 24, 2026 12:31
To: Wu, Michael
Cc: Smadella, Karin; Gladish, Alyssa; Moroz, Peter; Mottalib, Abdul; Abou Antoun, Marianne
Subject: RE: D07-16-23-0005 - 1495 Heron Road - Updated Sanitary Capacity Confirmation Request

Hi Michael,

Please see the response below :

No concerns with the proposed peak flow of 23.3L/s but any changes from this amount need to be checked again.

--

Thanks,

Abdul
Mohammad Abdul Mottalib, P. Eng.
613-580-2424 ext. 27798
Cell:613-668-9506

From: Wu, Michael <Michael.Wu@stantec.com>
Sent: August 21, 2026 4:12 PM
To: Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>
Cc: Smadella, Karin <karin.smadella@stantec.com>; Gladish, Alyssa <alyssa.gladish@stantec.com>; Moroz, Peter <peter.moroz@stantec.com>
Subject: D07-16-23-0005 - 1495 Heron Road - Updated Sanitary Capacity Confirmation Request
Importance: High

Good afternoon, Abdul:

As part of the updated development plan for 1495 Heron Road, could you confirm if the downstream sanitary sewers in Heron Road have the capacity to handle a sanitary peak flow of around 23.3 L/s from the development area?

Attached is the sanitary design sheet for your information.

Please let us know if you have any questions or require further information.

Thanks,

Michael Wu, P.Eng.

Civil Engineering Intern
He, him

Direct: (613) 738 6033
michael.wu@stantec.com

Stantec

With every community, we redefine what's possible.

'

'

Appendix D Stormwater Management

D.1 City of Ottawa Correspondence

From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Tuesday, October 19, 2021 3:36 PM
To: Smadella, Karin <Karin.Smadella@stantec.com>
Cc: Sandanayake, Hiran <hiran.sandanayake@ottawa.ca>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1495 Heron Road

Hi Karin

The analysis in 2019 allocated a normal peak flow of 4.6 L/s to the property and a Critical peak flow (100 year I/I) of 6.9 L/s. These were entered into the XPSWMM model as static flows. I will talk with Hiran to see about using our updated PCSWMM model to do the new flow analysis.

					0.33	0.55		Peak	Peak
	Area ID	Type	Area	DWF	I/I	Peak I/I		Normal	Critical
	1	Institutional	10.3	1.19	3.399	5.665		4.59	6.86
	2	High Den res.	13.3	15.5	4.389	7.315		19.91	22.83

The SWM criteria for a site re-development is to control the 100 year flow to the **2 year** using the lesser of C=0.5 or existing. The TC can be computed but cannot be less than 10 min. Now, if many of the buildings are to remain, this can be adjusted to only be applied to areas of re-development. We can discuss further.

As for spare capacity in the other Direction, I will have to check our flood risk model first, but I think there are also constraints in that direction. I will get back to you on this one.

Eric

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: October 19, 2021 2:53 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>

Cc: Sandanayake, Hiran <Hiran.Sandanayake@ottawa.ca>; Moroz, Peter <peter.moroz@stantec.com>
Subject: RE: 1495 Heron Road

Hi Eric/Hiran

In addition to identifying the sanitary constraints, can you also please advise what the stormwater design criteria will be for this site – both quality and quantity control? It is expected that several of the existing buildings will remain.

Thank you,

Karin

D.2 Existing Conditions Area Summary and Rational Method Calculations

Stormwater Management Calculations

File No: **160410368**
Project: **1495 Heron Road**
Date: **26-Aug-26**

SWM Approach:
Post-development to Pre-development 2-year flows

Pre-Development Conditions for Redevelopment Area:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	ID / Description		Sub-catchment Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Uncontrolled - Tributary	EXT-3	Hard	0.953		0.9	0.858		
		Soft	1.430		0.2	0.286		
		Subtotal		2.382947			1.143815	0.480
Uncontrolled - Tributary	EXT-2	Hard	1.256		0.9	1.130		
		Soft	0.000		0.2	0.000		
		Subtotal		1.256037			1.130433	0.900
Uncontrolled - Tributary	EXT-1	Hard	0.000		0.9	0.000		
		Soft	2.927		0.2	0.585		
		Subtotal		2.927261			0.585452	0.200
Total				**6.566**			**2.860**	
Overall Runoff Coefficient= C:								**0.44**

Total Roof Areas	**0.00 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**6.57 ha**
Total Tributary Area to Outlet	**6.57 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.00 ha**
Total Site	**6.57 ha**

Rational Method Calculations for Allowable Release Rate

2 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

2 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet

Area (ha):	6.57
C:	0.44

Typical Time of Concentration

tc (min)	I (2 yr) (mm/hr)	Qtarget (L/s)
26.7	43.27	**344.0**

D.3 Bransby Williams Time of Concentration

Project # 160410368 - 1495 Heron Road

Date: 27-Aug-26

PRE-DEVELOPMENT CONDITIONS
Calculation of Time of Concentration and Peak Flow

Runoff Coefficient Calculation

	Area (ha)	C	Description	A x C
	6.57	0.44		2.8908
	6.6			2.8908

Composite C-Factor: 0.44

Diff. Elev. 0.19 m
Length 320 m (longest overland flow path)

C- factor from MTO Design Chart 1.07: Runoff Coefficients

Overland Flow Time of Concentration

Bransby Williams (C>0.40)
$tc = 0.057 \times L / (S_w^{0.2} \times A^{0.1})$

L	320	m (longest flow path)
S_w	0.1%	
A	6.5700	ha
t_c	26.7	min
	0.45	hrs

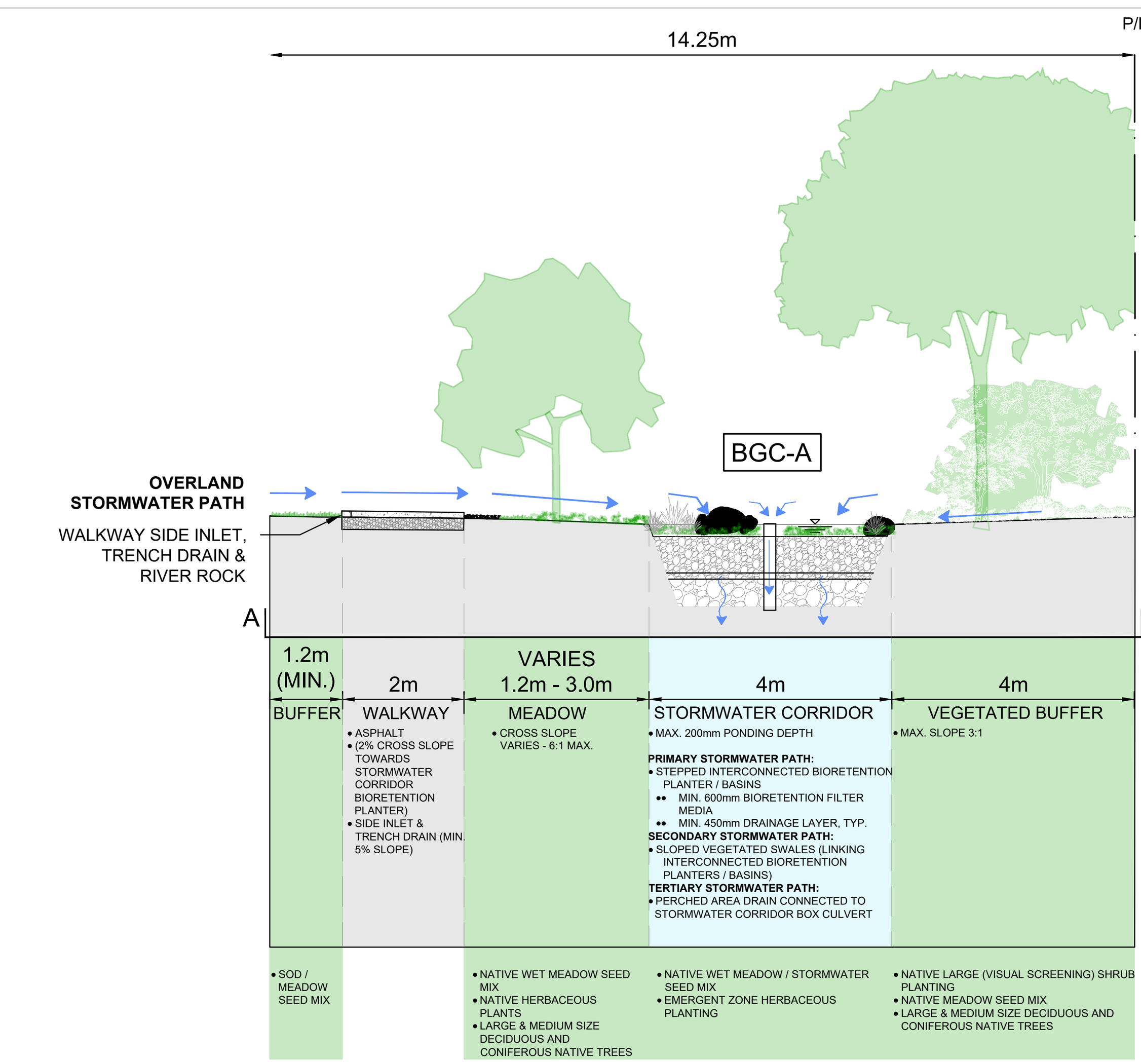
Therefore, T_c = 26.7 min
0.45 hrs

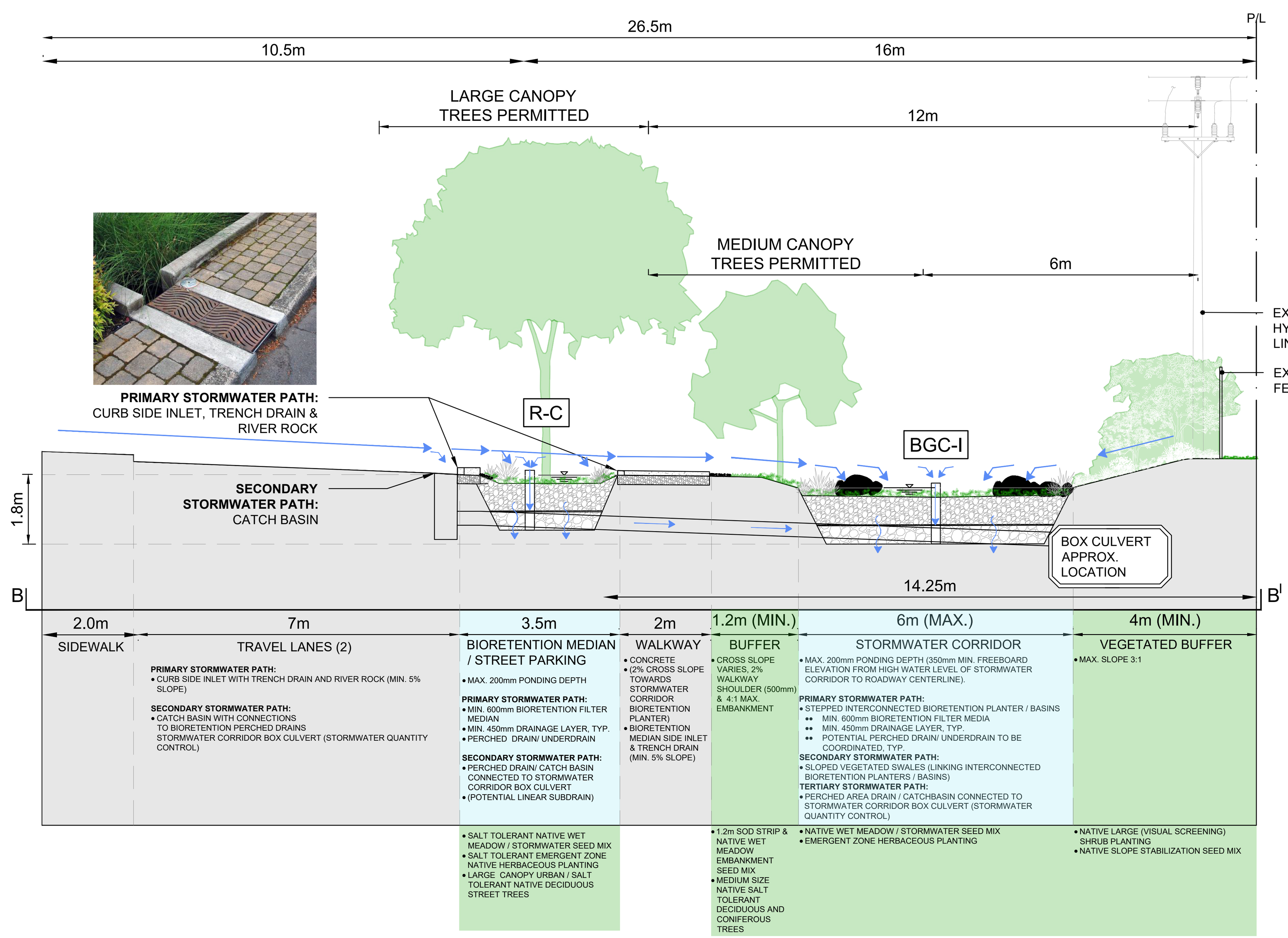
Rational Method Calculation of Catchment Flow Rate

IDF Parameters, City of Ottawa 2004

Return Period	a	b	c	Intensity	Qpeak
100	1735.688	6.014	0.820	99.3	797.8
50	1569.58	6.014	0.820	89.8	721.4
25	1402.884	6.018	0.819	80.6	647.0
10	1174.184	6.014	0.816	68.2	547.3
5	998.071	6.053	0.814	58.3	468.0
2	732.951	6.199	0.810	43.2	347.2

D.4 Blue-Green SWMF Corridor Concept

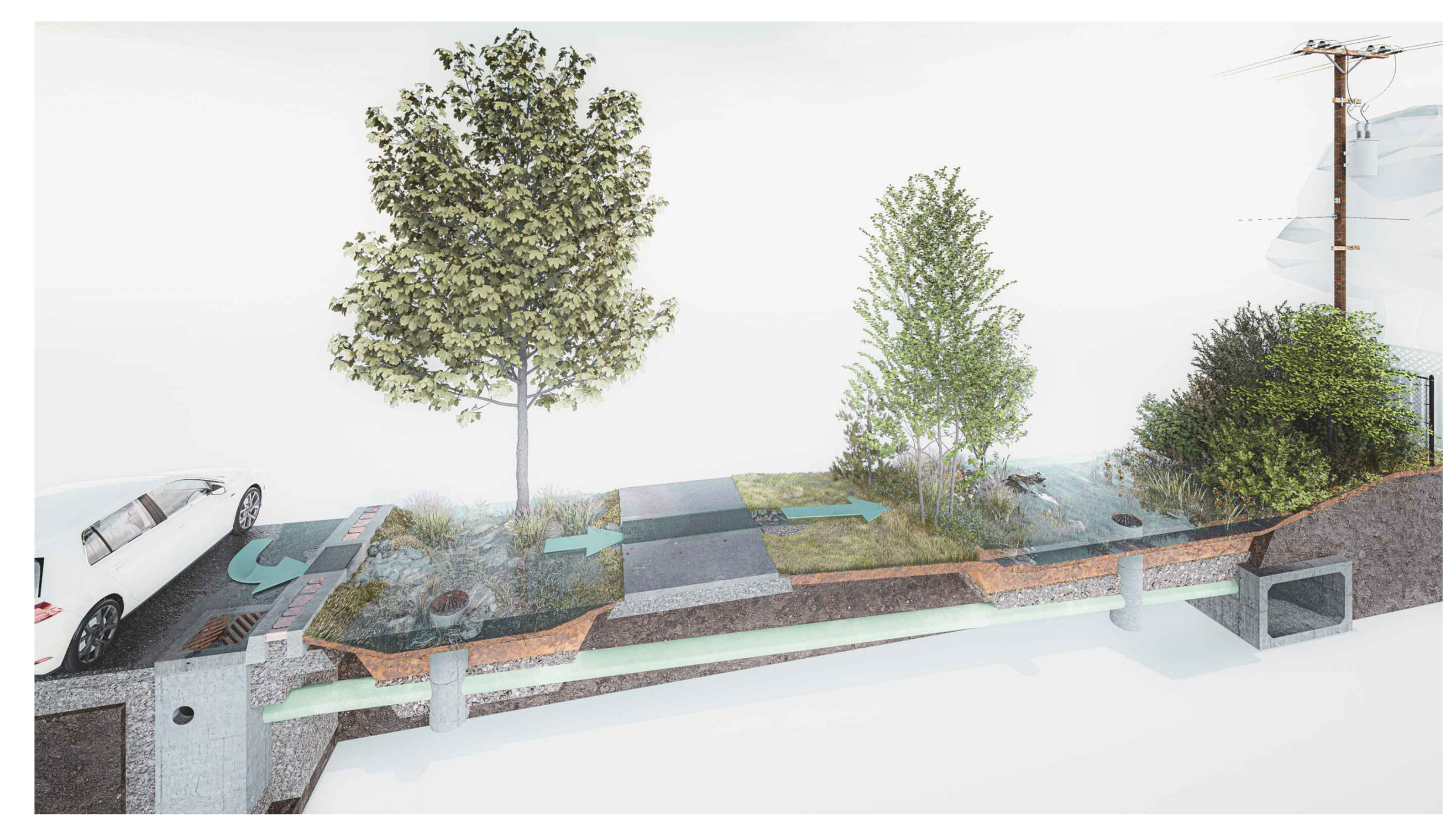


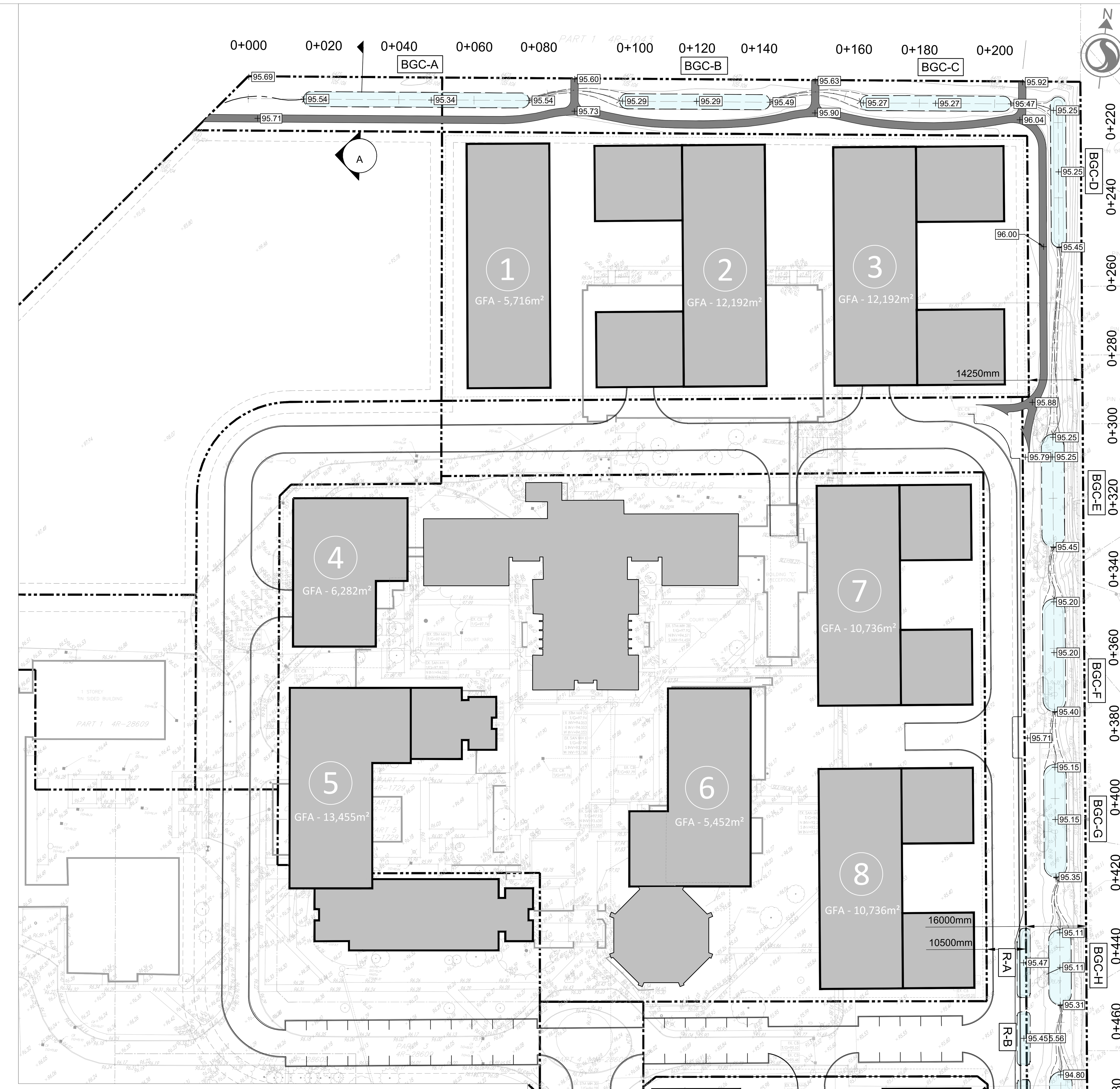


BLUE-GREEN CORRIDOR STORMWATER VOLUMES

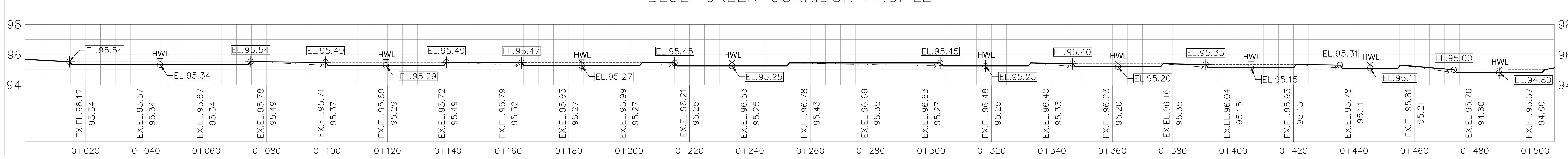
Roadway Bioretention Median	Area (m^2)	Length (m)	Width (m)	Ponding Volume (m^3) *ponding depth (m) 0.2*	Bioretention Filter Media Volume (m^3) *porosity 35.00%*	Choker Layer Volume (m^3) *porosity 40.00%*	Bioretention Drainage Layer Volume (m^3) *porosity 40.00%*	Total Volume (m^3)
R-A	108.9	31.0	3.5	21.8	18.4	3.0	11.3	54.5
R-B	49.9	14.0	3.5	10.0	8.3	1.4	5.1	24.8
R-C	62.6	18.0	3.5	12.5	10.7	1.8	6.5	31.5
				44.3				**110.8**

Blue-Green Corridor Bioretention Planter / Basin	Area (m^2)	Length (m)	Width (m)	Ponding Volume (m^3) *ponding depth (m) 0.2*	Bioretention Filter Media Volume (m^3) *porosity 35.00%*	Choker Layer Volume (m^3) *porosity 40.00%*	Bioretention Drainage Layer Volume (m^3) *porosity 40.00%*	Total Volume (m^3)
BGC-A	236.6	60	4	47.3	47.8	7.9	29.3	132.4
BGC-B	156.6	40	4	31.3	31.9	5.3	19.6	88.0
BGC-C	156.6	40	4	31.3	31.9	5.3	19.6	88.0
BGC-D	156.6	40	4	31.3	31.9	5.3	19.6	88.0
BGC-E	172.3	30.0	6.0	34.5	35.4	6.2	23.8	99.8
BGC-F	172.3	30.0	6.0	34.5	35.4	6.2	23.8	99.8
BGC-G	172.3	30.0	6.0	34.5	35.4	6.2	23.8	99.8
BGC-H	112.3	20.0	6.0	22.5	23.6	4.1	15.9	66.0
BGC-I	172.3	30.0	6.0	34.5	35.4	6.2	23.8	99.8
				301.5				**861.5**
							Total Stormwater Volume (m^3)	**972.3**





BLUE-GREEN CORRIDOR PROFILE



Stantec

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Legend

Notes

Draft Print
05/22/2026 12:55:58 PM

Revision	By	Appd.	YY.MM.DD

File Name: 160402029	GM	BL	BL	2026.05.XX
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
CANADA LANDS COMPANY

1495 HERON ROAD

OTTAWA, ON, CANADA

Title
BLUE-GREEN CORRIDOR
FUNCTIONAL PLAN

Project No.	Scale
1-23-45678	REFER TO DRAWING

Drawing No.	Sheet	Revision
L100	1 of 1	0

ORIGINAL SHEET - ARCH D

D.5 Onsite Storage and Allowable Release Rates

Stantec **1495 Heron Road - Functional Post-Development Onsite Storage and Release Rates**

Stantec Project No.:	160410368	Checked by:	DT
Designed by:	AG	Date Checked:	27-Aug-2026
Date Created:	27-Aug-2026	Revision:	0
		Revised by:	-
		Date Revised:	-

Tributary Area to SWMF	**7.81**	**ha**
Site Allowable Release Rate	**344.0**	**L/s**
Tributary Area to EX MH 30858	**0.89**	**ha**

Outlet	Post-Development Area ID	Area (ha)	Post-Development C	Onsite Surface Storage (50m³/ha)	Allowable Discharge (L/s)	Allowable Discharge (cms)
Existing Storm MH 30858	L25A	0.75	0.35	-	-	-
	L30A	0.14	0.57	7	-	-
SWMF (New Storm MH 100)	PARK*	1.25	0.20	-	-	-
	BIO-1	0.64	0.35	-	33.7	0.034
	L102A	0.41	0.8	21	21.5	0.022
	L103A	1.33	0.8	66	69.6	0.070
	L105A	1.04	0.8	52	54.4	0.054
	L106A	0.67	0.8	34	35.2	0.035
	L108A	1.30	0.8	65	67.9	0.068
	L108B	0.67	0.8	34	35.3	0.035
	L110A	0.50	0.8	25	26.4	0.026
	Total Controlled	**6.57**			**344.0**	**0.344**
	Total Site	**7.45**				
	Total Study Area	**8.70**				

Note: * Park area is an external area that may enter the site, excluded from the total site area and controlled areas.

Rational Method Calculations for Allowable Release Rate

2-yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	732.951
b =	6.199
c =	0.81

t (min)	I (mm/hr)
10	76.81
20	52.03
30	40.04
40	32.86
50	28.04
60	24.56
70	21.91
80	19.83
90	18.14
100	16.75
110	15.57
120	14.56

D.6 Stormwater Analysis

D.6.1 Sample PCSWMM Input (100yr Chicago)

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           CMS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/24/2026
START_TIME           00:00:00
REPORT_START_DATE    08/24/2026
REPORT_START_TIME    00:00:00
END_DATE             08/25/2026
END_TIME             00:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         2
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
```

```
THREADS              8

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
CHI_002          INTENSITY 0:10     1.0      TIMESERIES CHI_002
CHI_100          INTENSITY 0:10     1.0      TIMESERIES CHI_100
CHI_120          INTENSITY 0:10     1.0      TIMESERIES CHI_120

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack

;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
----------------
BIO-1            CHI_100          BGC_A-B-C        0.6429   35       144.652  2        0

L102A            CHI_100          S102             0.4112   80       92.52    2        0

L103A            CHI_100          S103             1.3289   80       299.002  2        0

L105A            CHI_100          S105             1.0388   80       233.73   2        0

L106A            CHI_100          S106             0.6722   80       151.245  2        0

L108A            CHI_100          S108A            1.2956   80       291.51   2        0

L108B            CHI_100          S108B            0.6733   80       151.492  2        0

L110A            CHI_100          S110             0.5037   80       113.333  2        0

L25A             CHI_100          25               0.7451   57       167.648  2        0

L30A             CHI_100          S30              0.1411   58       31.748   2        0
```

```
PARK             CHI_100          BGC_A-B-C        1.2464   0        220      0.25     0


[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
BIO-1            0.013      0.25       1.57       4.67       0          OUTLET
L102A            0.013      0.25       1.57       4.67       0          OUTLET
L103A            0.013      0.25       1.57       4.67       0          OUTLET
L105A            0.013      0.25       1.57       4.67       0          OUTLET
L106A            0.013      0.25       1.57       4.67       0          OUTLET
L108A            0.013      0.25       1.57       4.67       0          OUTLET
L108B            0.013      0.25       1.57       4.67       0          OUTLET
L110A            0.013      0.25       1.57       4.67       0          OUTLET
L25A             0.013      0.25       1.57       4.67       0          OUTLET
L30A             0.013      0.25       1.57       4.67       0          OUTLET
PARK             0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
BIO-1            76.2       13.2       4.14       7          0
L102A            76.2       13.2       4.14       7          0
L103A            76.2       13.2       4.14       7          0
L105A            76.2       13.2       4.14       7          0
L106A            76.2       13.2       4.14       7          0
L108A            76.2       13.2       4.14       7          0
L108B            76.2       13.2       4.14       7          0
L110A            76.2       13.2       4.14       7          0
L25A             76.2       13.2       4.14       7          0
L30A             76.2       13.2       4.14       7          0
PARK             76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
100              92.51      FREE                        NO
30858            93.28      FREE                        NO
```

```
30858_MAJ        95.6       FREE                        NO
J1               95.21      FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params            SurDepth Fevap
Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ----------- ---------------------------- -------- --------
-------- -------- --------
101              92.58    2.888      0          FUNCTIONAL  0         0         5.57     0        0
102              92.68    3.089      0          FUNCTIONAL  0         0         5.57     0        0
103              92.84    3.497      0          FUNCTIONAL  0         0         5.57     0        0
104              92.93    3.303      0          FUNCTIONAL  0         0         11.61    0        0
105              93.1     2.452      0          FUNCTIONAL  0         0         5.57     0        0
106              94.1     1.875      0          FUNCTIONAL  0         0         4.52     0        0
107              94.25    1.897      0          FUNCTIONAL  0         0         1.13     0        0
108              94.79    1.188      0          FUNCTIONAL  0         0         1.13     0        0
109              95.21    0.91       0          FUNCTIONAL  0         0         1.13     0        0
110              95.47    0.685      0          FUNCTIONAL  0         0         1.13     0        0
25               94.05    3.89       0          FUNCTIONAL  0         0         1.13     0        0
30               93.73    2.337      0          FUNCTIONAL  0         0         1.13     0        0
BGC_A-B-C        95.29    1.01       0          TABULAR     Bioswale_A-B-C               0        0
BGC_D            95.25    1.05       0          TABULAR     Bioswale_D                   0        0
BGC_E-F-G        95.2     1          0          TABULAR     Bioswale_E-F-G               0        0
BGC_H-I          95.19    0.26       0          TABULAR     Bioswale_H-I                 0        0
R_A-B-C          95.45    0.45       0          TABULAR     BioswaleR_A-B-C              0        0
S102             96       0.5        0          TABULAR     Storage_L102A                0        0
S103             96       0.5        0          TABULAR     Storage_L103A                0        0
S105             96       0.5        0          TABULAR     Storage_L105A                0        0
S106             96       0.5        0          TABULAR     Storage_L106A                0        0
S108A            96       0.5        0          TABULAR     Storage_L108A                0        0
S108B            96       0.5        0          TABULAR     Storage_L108B                0        0
S110             96       0.5        0          TABULAR     Storage_L110                 0        0
S30              96       0.5        0          TABULAR     Storage_L30                  0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
----------
```

```
C10             110             109             46.648     0.013      95.47      95.24      0          0

C11             30              30858           59.474     0.013      93.73      93.28      0          0

C12             25              30              93.093     0.013      94.05      93.74      0          0

C2              102             101             36.904     0.013      92.68      92.64      0          0

C3              104             103             89.992     0.013      92.93      92.84      0          0

C4              105             104             161.737    0.013      93.1       92.94      0          0

C5              106             103             210.12     0.013      94.1       93.26      0          0

C6              107             106             15.353     0.013      94.25      94.2       0          0

C7              103             102             164.863    0.013      92.84      92.68      0          0

C8              108             107             144.897    0.013      94.79      94.28      0          0

C9              109             108             13.233     0.013      95.21      95.14      0          0


[ORIFICES]
;;Name           From Node       To Node         Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- --------------- --------------- ------------ ---------- ---------- -------- ----------
C1              101             100             SIDE         92.58      0.61       NO       0

[WEIRS]
;;Name           From Node       To Node         Type         CrestHt    Qcoeff     Gated    EndCon
EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- --------------- --------------- ------------ ---------- ---------- -------- --------
---------- ---------- ---------- ---------- ----------------
C14             BGC_A-B-C       BGC_D           TRAPEZOIDAL  95.49      1.67       NO       0        0
       YES
W1              S108A           BGC_A-B-C       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W10             BGC_E-F-G       BGC_H-I         TRAPEZOIDAL  95.4       1.67       NO       0        0
       YES
```

```
W11             R_A-B-C         BGC_H-I         TRANSVERSE   95.65      1.67       NO       0        0
       YES
W12             BGC_H-I         J1              TRANSVERSE   95.45      1.67       NO       0        0
       YES
W2              S103            BGC_E-F-G       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W3              S108B           BGC_E-F-G       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W4              S106            BGC_E-F-G       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W5              S105            BGC_A-B-C       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W6              S110            R_A-B-C         TRANSVERSE   96.3       1.67       NO       0        0
       YES
W7              S30             30858_MAJ       TRANSVERSE   96.3       1.67       NO       0        0
       YES
W8              S102            R_A-B-C         TRANSVERSE   96.3       1.67       NO       0        0
       YES
W9              BGC_D           BGC_E-F-G       TRAPEZOIDAL  95.45      1.37       NO       0        0
       YES

[OUTLETS]
;;Name           From Node       To Node         Offset     Type            QTable/Qcoeff    Qexpon
Gated
;;-------------- --------------- --------------- ---------- --------------- ---------------- ----------
--------
OR_A-B-C        BGC_A-B-C       105             95.34      TABULAR/HEAD    COO_S30_12
NO
OR_D            BGC_D           104             95.3       TABULAR/HEAD    COO_S30_3
NO
OR_E-F-G        BGC_E-F-G       103             95.25      TABULAR/HEAD    COO_S30_6
NO
OR_H-I          BGC_H-I         102             95.21      TABULAR/HEAD    COO_S30_12
NO
OR_R_A-B-C      R_A-B-C         102             95.5       TABULAR/HEAD    COO_S30_3
NO
OR102           S102            102             96         TABULAR/HEAD    OUT_102
NO
OR103           S103            103             96         TABULAR/HEAD    OUT_103
```

```
NO
OR105            S105            105             96         TABULAR/DEPTH    OUT_105
NO
OR106            S106            106             96         TABULAR/HEAD     OUT_106
NO
OR108A           S108A           108             96         TABULAR/HEAD     OUT_108A
NO
OR108B           S108B           108             96         TABULAR/HEAD     OUT_108B
NO
OR110            S110            110             96         TABULAR/HEAD     OUT_110
NO
OR30             S30             30              96         TABULAR/HEAD     OUT_30
NO

[XSECTIONS]
;;Link            Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;--------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
C10              CIRCULAR     0.375            0          0          0          1
C11              CIRCULAR     0.45             0          0          0          1
C12              CIRCULAR     0.45             0          0          0          1
C2               RECT_CLOSED  1.5              2.4        0          0          1
C3               RECT_CLOSED  1.5              2.4        0          0          1
C4               RECT_CLOSED  1.5              2.4        0          0          1
C5               CIRCULAR     0.675            0          0          0          1
C6               CIRCULAR     0.675            0          0          0          1
C7               RECT_CLOSED  1.5              2.4        0          0          1
C8               CIRCULAR     0.675            0          0          0          1
C9               CIRCULAR     0.375            0          0          0          1
C1               CIRCULAR     0.33             0          0          0
C14              TRAPEZOIDAL  0.3              2          3          3
W1               RECT_OPEN    0.2              6          0          0
W10              TRAPEZOIDAL  0.3              1.5        3          3
W11              RECT_OPEN    0.3              20         0          0
W12              RECT_OPEN    0.3              1          0          0
W2               RECT_OPEN    0.2              6          0          0
W3               RECT_OPEN    0.2              6          0          0
W4               RECT_OPEN    0.2              6          0          0
W5               RECT_OPEN    0.2              6          0          0
W6               RECT_OPEN    0.2              6          0          0
```

```
W7               RECT_OPEN    0.2              6          0          0
W8               RECT_OPEN    0.2              6          0          0
W9               TRAPEZOIDAL  0.3              1.5        3          3

[STREETS]
;;Name            Tcrown   Hcurb    Sx       nRoad    a        W        Sides    Tback    Sback    nBack
;;--------------- -------- -------- -------- -------- -------- -------- -------- -------- -------- --------
Street1          4.25     0.15     2        0.013    0        0        2        5.75     2        0.25

[INLETS]
;;Name            Type             Parameters:
;;--------------- ---------------- -----------
CB               GRATE            2        2        GENERIC          0.8      0

[INLET_USAGE]
;;Conduit         Inlet            Node             Number    %Clogged  Qmax      aLocal    wLocal
Placement
;;--------------- ---------------- ---------------- --------- --------- --------- --------- ---------
--------- ---------

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.25     0.25     0.25
X1 Bioswale          4        0.0      0.0      0.0      0.0      0.0      0.0      0.0
GR 0.5      -5.2     0        -2       0        2        1.3      6

[LOSSES]
;;Link            Kentry     Kexit      Kavg       Flap Gate  Seepage
;;--------------- ---------- ---------- ---------- ---------- ----------
C10              0          0.353      0          NO         0
C12              0          0.022      0          NO         0
C2               0          1.344      0          NO         0
C3               0          1.344      0          NO         0
C4               0          1.344      0          NO         0
C5               0          1.344      0          NO         0
C6               0          0.405      0          NO         0
C7               0          1.344      0          NO         0
C8               0          0.405      0          NO         0
```

```
C9               0          0.47       0          NO         0

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
COO_S30_1        Rating     0          0
COO_S30_1                   0.01       0.0073
COO_S30_1                   0.02       0.0103
COO_S30_1                   0.03       0.0126
COO_S30_1                   0.04       0.0145
COO_S30_1                   0.05       0.0162
COO_S30_1                   0.06       0.0178
COO_S30_1                   0.07       0.0192
COO_S30_1                   0.08       0.0205
COO_S30_1                   0.09       0.0218
COO_S30_1                   0.1        0.0229
COO_S30_1                   0.11       0.0241
COO_S30_1                   0.12       0.0251
COO_S30_1                   0.13       0.0262
COO_S30_1                   0.14       0.0271
COO_S30_1                   0.15       0.0281
COO_S30_1                   0.16       0.029
COO_S30_1                   0.17       0.0299
COO_S30_1                   0.18       0.0308
COO_S30_1                   0.19       0.0316
COO_S30_1                   0.2        0.0324
COO_S30_1                   0.21       0.0332
COO_S30_1                   0.22       0.034
COO_S30_1                   0.23       0.0348
COO_S30_1                   0.24       0.0355
COO_S30_1                   0.25       0.0363
COO_S30_1                   0.26       0.037
COO_S30_1                   0.27       0.0377
COO_S30_1                   0.28       0.0384
COO_S30_1                   0.29       0.0391
COO_S30_1                   0.3        0.0397
COO_S30_1                   0.31       0.0404

COO_S30_12       Rating     0          0
```

```
COO_S30_12                  0.01       0.0876
COO_S30_12                  0.02       0.1236
COO_S30_12                  0.03       0.1512
COO_S30_12                  0.04       0.174
COO_S30_12                  0.05       0.1944
COO_S30_12                  0.06       0.2136
COO_S30_12                  0.07       0.2304
COO_S30_12                  0.08       0.246
COO_S30_12                  0.09       0.2616
COO_S30_12                  0.1        0.2748
COO_S30_12                  0.11       0.2892
COO_S30_12                  0.12       0.3012
COO_S30_12                  0.13       0.3144
COO_S30_12                  0.14       0.3252
COO_S30_12                  0.15       0.3372
COO_S30_12                  0.16       0.348
COO_S30_12                  0.17       0.3588
COO_S30_12                  0.18       0.3696
COO_S30_12                  0.19       0.3792
COO_S30_12                  0.2        0.3888
COO_S30_12                  0.21       0.3984
COO_S30_12                  0.22       0.408
COO_S30_12                  0.23       0.4176
COO_S30_12                  0.24       0.426
COO_S30_12                  0.25       0.4356
COO_S30_12                  0.26       0.444
COO_S30_12                  0.27       0.4524
COO_S30_12                  0.28       0.4608
COO_S30_12                  0.29       0.4692
COO_S30_12                  0.3        0.4764
COO_S30_12                  0.31       0.4848
COO_S30_12                  0.32       0.492
COO_S30_12                  0.33       0.5004
COO_S30_12                  0.34       0.5076
COO_S30_12                  0.35       0.5148
COO_S30_12                  0.36       0.522
COO_S30_12                  0.37       0.5292
COO_S30_12                  0.38       0.5364
COO_S30_12                  0.39       0.5436
```

C00_S30_12		0.4	0.5508
C00_S30_12		0.41	0.558
C00_S30_12		0.42	0.564
C00_S30_12		0.43	0.5712
C00_S30_12		0.44	0.5772
C00_S30_12		0.45	0.5844
C00_S30_12		0.46	0.5904
C00_S30_12		0.47	0.5964
C00_S30_2	Rating	0	0
C00_S30_2		0.01	0.0146
C00_S30_2		0.02	0.0206
C00_S30_2		0.03	0.0252
C00_S30_2		0.04	0.029
C00_S30_2		0.05	0.0324
C00_S30_2		0.06	0.0356
C00_S30_2		0.07	0.0384
C00_S30_2		0.08	0.041
C00_S30_2		0.09	0.0436
C00_S30_2		0.1	0.0458
C00_S30_2		0.11	0.0482
C00_S30_2		0.12	0.0502
C00_S30_2		0.13	0.0524
C00_S30_2		0.14	0.0542
C00_S30_2		0.15	0.0562
C00_S30_2		0.16	0.058
C00_S30_2		0.17	0.0598
C00_S30_2		0.18	0.0616
C00_S30_2		0.19	0.0632
C00_S30_2		0.2	0.0648
C00_S30_2		0.21	0.0664
C00_S30_2		0.22	0.068
C00_S30_2		0.23	0.0696
C00_S30_2		0.24	0.071
C00_S30_2		0.25	0.0726
C00_S30_2		0.26	0.074
C00_S30_2		0.27	0.0754
C00_S30_2		0.28	0.0768
C00_S30_2		0.29	0.0782

C00_S30_2		0.3	0.0794
C00_S30_2		0.31	0.0808
C00_S30_3	Rating	0	0
C00_S30_3		0.01	0.0219
C00_S30_3		0.02	0.0309
C00_S30_3		0.03	0.0378
C00_S30_3		0.04	0.0435
C00_S30_3		0.05	0.0486
C00_S30_3		0.06	0.0534
C00_S30_3		0.07	0.0576
C00_S30_3		0.08	0.0615
C00_S30_3		0.09	0.0654
C00_S30_3		0.1	0.0687
C00_S30_3		0.11	0.0723
C00_S30_3		0.12	0.0753
C00_S30_3		0.13	0.0786
C00_S30_3		0.14	0.0813
C00_S30_3		0.15	0.0843
C00_S30_3		0.16	0.087
C00_S30_3		0.17	0.0897
C00_S30_3		0.18	0.0924
C00_S30_3		0.19	0.0948
C00_S30_3		0.2	0.0972
C00_S30_3		0.21	0.0996
C00_S30_3		0.22	0.102
C00_S30_3		0.23	0.1044
C00_S30_3		0.24	0.1065
C00_S30_3		0.25	0.1089
C00_S30_3		0.26	0.111
C00_S30_3		0.27	0.1131
C00_S30_3		0.28	0.1152
C00_S30_3		0.29	0.1173
C00_S30_3		0.3	0.1191
C00_S30_3		0.31	0.1212
C00_S30_4	Rating	0	0
C00_S30_4		0.01	0.0292
C00_S30_4		0.02	0.0412

COO_S30_4		0.03	0.0504
COO_S30_4		0.04	0.058
COO_S30_4		0.05	0.0648
COO_S30_4		0.06	0.0712
COO_S30_4		0.07	0.0768
COO_S30_4		0.08	0.082
COO_S30_4		0.09	0.0872
COO_S30_4		0.1	0.0916
COO_S30_4		0.11	0.0964
COO_S30_4		0.12	0.1004
COO_S30_4		0.13	0.1048
COO_S30_4		0.14	0.1084
COO_S30_4		0.15	0.1124
COO_S30_4		0.16	0.116
COO_S30_4		0.17	0.1196
COO_S30_4		0.18	0.1232
COO_S30_4		0.19	0.1264
COO_S30_4		0.2	0.1296
COO_S30_4		0.21	0.1328
COO_S30_4		0.22	0.136
COO_S30_4		0.23	0.1392
COO_S30_4		0.24	0.142
COO_S30_4		0.25	0.1452
COO_S30_4		0.26	0.148
COO_S30_4		0.27	0.1508
COO_S30_4		0.28	0.1536
COO_S30_4		0.29	0.1564
COO_S30_4		0.3	0.1588
COO_S30_4		0.31	0.1616
COO_S30_4		0.32	0.164
COO_S30_4		0.33	0.1668
COO_S30_4		0.34	0.1692
COO_S30_4		0.35	0.1716
COO_S30_4		0.36	0.174
COO_S30_4		0.37	0.1764
COO_S30_4		0.38	0.1788
COO_S30_4		0.39	0.1812
COO_S30_4		0.4	0.1836
COO_S30_4		0.41	0.186
COO_S30_4		0.42	0.188
COO_S30_4		0.43	0.1904
COO_S30_4		0.44	0.1924
COO_S30_4		0.45	0.1948
COO_S30_4		0.46	0.1968
COO_S30_4		0.47	0.1988
COO_S30_6	Rating	0	0
COO_S30_6		0.01	0.0438
COO_S30_6		0.02	0.0618
COO_S30_6		0.03	0.0756
COO_S30_6		0.04	0.087
COO_S30_6		0.05	0.0972
COO_S30_6		0.06	0.1068
COO_S30_6		0.07	0.1152
COO_S30_6		0.08	0.123
COO_S30_6		0.09	0.1308
COO_S30_6		0.1	0.1374
COO_S30_6		0.11	0.1446
COO_S30_6		0.12	0.1506
COO_S30_6		0.13	0.1572
COO_S30_6		0.14	0.1626
COO_S30_6		0.15	0.1686
COO_S30_6		0.16	0.174
COO_S30_6		0.17	0.1794
COO_S30_6		0.18	0.1848
COO_S30_6		0.19	0.1896
COO_S30_6		0.2	0.1944
COO_S30_6		0.21	0.1992
COO_S30_6		0.22	0.204
COO_S30_6		0.23	0.2088
COO_S30_6		0.24	0.213
COO_S30_6		0.25	0.2178
COO_S30_6		0.26	0.222
COO_S30_6		0.27	0.2262
COO_S30_6		0.28	0.2304
COO_S30_6		0.29	0.2346
COO_S30_6		0.3	0.2382
COO_S30_6		0.31	0.2424

COO_S30_6		0.32	0.246
COO_S30_6		0.33	0.2502
COO_S30_6		0.34	0.2538
COO_S30_6		0.35	0.2574
COO_S30_6		0.36	0.261
COO_S30_6		0.37	0.2646
COO_S30_6		0.38	0.2682
COO_S30_6		0.39	0.2718
COO_S30_6		0.4	0.2754
COO_S30_6		0.41	0.279
COO_S30_6		0.42	0.282
COO_S30_6		0.43	0.2856
COO_S30_6		0.44	0.2886
COO_S30_6		0.45	0.2922
COO_S30_6		0.46	0.2952
COO_S30_6		0.47	0.2982
COO_S30_8	Rating	0.01	0.0584
COO_S30_8		0.02	0.0824
COO_S30_8		0.03	0.1008
COO_S30_8		0.04	0.116
COO_S30_8		0.05	0.1296
COO_S30_8		0.06	0.1424
COO_S30_8		0.07	0.1536
COO_S30_8		0.08	0.164
COO_S30_8		0.09	0.1744
COO_S30_8		0.1	0.1832
COO_S30_8		0.11	0.1928
COO_S30_8		0.12	0.2008
COO_S30_8		0.13	0.2096
COO_S30_8		0.14	0.2168
COO_S30_8		0.15	0.2248
COO_S30_8		0.16	0.232
COO_S30_8		0.17	0.2392
COO_S30_8		0.18	0.2464
COO_S30_8		0.19	0.2528
COO_S30_8		0.2	0.2592
COO_S30_8		0.21	0.2656
COO_S30_8		0.22	0.272

COO_S30_8		0.23	0.2784
COO_S30_8		0.24	0.284
COO_S30_8		0.25	0.2904
COO_S30_8		0.26	0.296
COO_S30_8		0.27	0.3016
COO_S30_8		0.28	0.3072
COO_S30_8		0.29	0.3128
COO_S30_8		0.3	0.3176
COO_S30_8		0.31	0.3232
COO_S30_8		0.32	0.328
COO_S30_8		0.33	0.3336
COO_S30_8		0.34	0.3384
COO_S30_8		0.35	0.3432
COO_S30_8		0.36	0.348
COO_S30_8		0.37	0.3528
COO_S30_8		0.38	0.3576
COO_S30_8		0.39	0.3624
COO_S30_8		0.4	0.3672
COO_S30_8		0.41	0.372
COO_S30_8		0.42	0.376
COO_S30_8		0.43	0.3808
COO_S30_8		0.44	0.3848
COO_S30_8		0.45	0.3896
COO_S30_8		0.46	0.3936
COO_S30_8		0.47	0.3976
OUT_102	Rating	0	0
OUT_102		0.01	0.07
OUT_102		0.3	0.07
OUT_103	Rating	0	0
OUT_103		0.01	0.228
OUT_103		0.3	0.228
OUT_105	Rating	0	0
OUT_105		0.01	0.178
OUT_105		0.3	0.178
OUT_106	Rating	0	0

```
OUT_106                     0.01       0.115
OUT_106                     0.3        0.115

OUT_108A         Rating     0          0
OUT_108A                    0.01       0.22
OUT_108A                    0.3        0.22

OUT_108B         Rating     0          0
OUT_108B                    0.01       0.115
OUT_108B                    0.3        0.115

OUT_110          Rating     0          0
OUT_110                     0.01       0.086
OUT_110                     0.3        0.086

OUT_30           Rating     0          0
OUT_30                      0.01       0.018
OUT_30                      0.3        0.018

Bioswale_A-B-C   Storage    0          549.8
Bioswale_A-B-C              0.2        549.8
Bioswale_A-B-C              0.201      0
Bioswale_A-B-C              1          0

Bioswale_D       Storage    0          156.6
Bioswale_D                  0.2        156.6
Bioswale_D                  0.201      0
Bioswale_D                  1          0

Bioswale_E-F-G   Storage    0          516.9
Bioswale_E-F-G              0.2        516.9
Bioswale_E-F-G              0.201      0
Bioswale_E-F-G              1          0

Bioswale_H-I     Storage    0          284.6
Bioswale_H-I                0.2        284.6
Bioswale_H-I                0.2001     0
Bioswale_H-I                1          0
```

```
BioswaleR_A-B-C  Storage    0          221.4
BioswaleR_A-B-C             0.2        221.4
BioswaleR_A-B-C             0.201      0
BioswaleR_A-B-C             0.5        0

Storage_L102A    Storage    0          68.5
Storage_L102A               0.3        68.5
Storage_L102A               0.301      0
Storage_L102A               0.5        0

Storage_L103A    Storage    0          221.5
Storage_L103A               0.3        221.5
Storage_L103A               0.301      0
Storage_L103A               0.5        0

Storage_L105A    Storage    0          173.3
Storage_L105A               0.3        173.3
Storage_L105A               0.301      0
Storage_L105A               0.5        0

Storage_L106A    Storage    0          112
Storage_L106A               0.3        112
Storage_L106A               0.301      0
Storage_L106A               0.5        0

Storage_L108A    Storage    0          215.9
Storage_L108A               0.3        215.9
Storage_L108A               0.301      0
Storage_L108A               0.5        0

Storage_L108B    Storage    0          112.2
Storage_L108B               0.3        112.2
Storage_L108B               0.301      0
Storage_L108B               0.5        0

Storage_L110     Storage    0          84
Storage_L110                0.3        84
Storage_L110                0.301      0
Storage_L110                0.5        0
```

```
Storage_L30      Storage    0          23.4
Storage_L30                 0.3        23.4
Storage_L30                 0.301      0
Storage_L30                 0.5        0

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
CHI_002                     0:00       0
CHI_002                     0:10       2.81
CHI_002                     0:20       3.5
CHI_002                     0:30       4.69
CHI_002                     0:40       7.3
CHI_002                     0:50       18.21
CHI_002                     1:00       76.81
CHI_002                     1:10       24.08
CHI_002                     1:20       12.36
CHI_002                     1:30       8.32
CHI_002                     1:40       6.3
CHI_002                     1:50       5.09
CHI_002                     2:00       4.29
CHI_002                     2:10       3.72
CHI_002                     2:20       3.29
CHI_002                     2:30       2.95
CHI_002                     2:40       2.68
CHI_002                     2:50       2.46
CHI_002                     3:00       2.28

CHI_100                     0:00       0
CHI_100                     0:10       6.05
CHI_100                     0:20       7.54
CHI_100                     0:30       10.16
CHI_100                     0:40       15.97
CHI_100                     0:50       40.65
CHI_100                     1:00       178.56
CHI_100                     1:10       54.05
CHI_100                     1:20       27.32
CHI_100                     1:30       18.24
```

```
CHI_100                     1:40       13.74
CHI_100                     1:50       11.06
CHI_100                     2:00       9.29
CHI_100                     2:10       8.02
CHI_100                     2:20       7.08
CHI_100                     2:30       6.35
CHI_100                     2:40       5.76
CHI_100                     2:50       5.28
CHI_100                     3:00       4.88

CHI_120                     0:00       0
CHI_120                     0:10       7.26
CHI_120                     0:20       9.048
CHI_120                     0:30       12.192
CHI_120                     0:40       19.164
CHI_120                     0:50       48.78
CHI_120                     1:00       214.272
CHI_120                     1:10       64.86
CHI_120                     1:20       32.784
CHI_120                     1:30       21.888
CHI_120                     1:40       16.488
CHI_120                     1:50       13.272
CHI_120                     2:00       11.148
CHI_120                     2:10       9.624
CHI_120                     2:20       8.496
CHI_120                     2:30       7.62
CHI_120                     2:40       6.912
CHI_120                     2:50       6.336
CHI_120                     3:00       5.856

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

D.6.2 Sample PCSWMM Output (100yr Chicago)

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

****
Element Count
****
Number of rain gages 3
Number of subcatchments ... 11
Number of nodes 29
Number of links 38
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
CHI_002	CHI_002	INTENSITY	10 min.
CHI_100	CHI_100	INTENSITY	10 min.
CHI_120	CHI_120	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
BIO-1	0.64	144.65	35.00	2.0000	CHI_100	BGC_A-B-C
L102A	0.41	92.52	80.00	2.0000	CHI_100	S102
L103A	1.33	299.00	80.00	2.0000	CHI_100	S103
L105A	1.04	233.73	80.00	2.0000	CHI_100	S105
L106A	0.67	151.25	80.00	2.0000	CHI_100	S106
L108A	1.30	291.51	80.00	2.0000	CHI_100	S108A
L108B	0.67	151.49	80.00	2.0000	CHI_100	S108B
L110A	0.50	113.33	80.00	2.0000	CHI_100	S110
L25A	0.75	167.65	57.00	2.0000	CHI_100	25
L30A	0.14	31.75	58.00	2.0000	CHI_100	S30
PARK	1.25	220.00	0.00	0.2500	CHI_100	BGC_A-B-C

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
100	OUTFALL	92.51	0.00	0.0	
30858	OUTFALL	93.28	0.45	0.0	
30858_MAJ	OUTFALL	95.60	0.00	0.0	
J1	OUTFALL	95.21	0.00	0.0	
101	STORAGE	92.58	2.89	0.0	
102	STORAGE	92.68	3.09	0.0	
103	STORAGE	92.84	3.50	0.0	
104	STORAGE	92.93	3.30	0.0	
105	STORAGE	93.10	2.45	0.0	
106	STORAGE	94.10	1.87	0.0	
107	STORAGE	94.25	1.90	0.0	
108	STORAGE	94.79	1.19	0.0	
109	STORAGE	95.21	0.91	0.0	
110	STORAGE	95.47	0.69	0.0	
25	STORAGE	94.05	3.89	0.0	
30	STORAGE	93.73	2.34	0.0	
BGC_A-B-C	STORAGE	95.29	1.01	0.0	
BGC_D	STORAGE	95.25	1.05	0.0	
BGC_E-F-G	STORAGE	95.20	1.00	0.0	
BGC_H-I	STORAGE	95.19	0.26	0.0	
R_A-B-C	STORAGE	95.45	0.45	0.0	
S102	STORAGE	96.00	0.50	0.0	
S103	STORAGE	96.00	0.50	0.0	
S105	STORAGE	96.00	0.50	0.0	
S106	STORAGE	96.00	0.50	0.0	
S108A	STORAGE	96.00	0.50	0.0	

S108B	STORAGE	96.00	0.50	0.0
S110	STORAGE	96.00	0.50	0.0
S30	STORAGE	96.00	0.50	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C10	110	109	CONDUIT	46.6	0.4931	0.0130
C11	30	30858	CONDUIT	59.5	0.7567	0.0130
C12	25	30	CONDUIT	93.1	0.3330	0.0130
C2	102	101	CONDUIT	36.9	0.1084	0.0130
C3	104	103	CONDUIT	90.0	0.1000	0.0130
C4	105	104	CONDUIT	161.7	0.0989	0.0130
C5	106	103	CONDUIT	210.1	0.3998	0.0130
C6	107	106	CONDUIT	15.4	0.3257	0.0130
C7	103	102	CONDUIT	164.9	0.0971	0.0130
C8	108	107	CONDUIT	144.9	0.3520	0.0130
C9	109	108	CONDUIT	13.2	0.5290	0.0130
C1	101	100	ORIFICE			
C14	BGC_A-B-C	BGC_D	WEIR			
W1	S108A	BGC_A-B-C	WEIR			
W10	BGC_E-F-G	BGC_H-I	WEIR			
W11	R_A-B-C	BGC_H-I	WEIR			
W12	BGC_H-I	J1	WEIR			
W2	S103	BGC_E-F-G	WEIR			
W3	S108B	BGC_E-F-G	WEIR			
W4	S106	BGC_E-F-G	WEIR			
W5	S105	BGC_A-B-C	WEIR			
W6	S110	R_A-B-C	WEIR			
W7	S30	30858_MAJ	WEIR			
W8	S102	R_A-B-C	WEIR			
W9	BGC_D	BGC_E-F-G	WEIR			
OR_A-B-C	BGC_A-B-C	105	OUTLET			
OR_D	BGC_D	104	OUTLET			
OR_E-F-G	BGC_E-F-G	103	OUTLET			
OR_H-I	BGC_H-I	102	OUTLET			
OR_R_A-B-C	R_A-B-C	102	OUTLET			
OR102	S102	102	OUTLET			
OR103	S103	103	OUTLET			
OR105	S105	105	OUTLET			
OR106	S106	106	OUTLET			
OR108A	S108A	108	OUTLET			
OR108B	S108B	108	OUTLET			
OR110	S110	110	OUTLET			
OR30	S30	30	OUTLET			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C10	CIRCULAR	0.38	0.11	0.09	0.38	1	0.12
C11	CIRCULAR	0.45	0.16	0.11	0.45	1	0.25
C12	CIRCULAR	0.45	0.16	0.11	0.45	1	0.16
C2	RECT_CLOSED	1.50	3.60	0.46	2.40	1	5.45
C3	RECT_CLOSED	1.50	3.60	0.46	2.40	1	5.23
C4	RECT_CLOSED	1.50	3.60	0.46	2.40	1	5.20
C5	CIRCULAR	0.68	0.36	0.17	0.68	1	0.53
C6	CIRCULAR	0.68	0.36	0.17	0.68	1	0.48
C7	RECT_CLOSED	1.50	3.60	0.46	2.40	1	5.15
C8	CIRCULAR	0.68	0.36	0.17	0.68	1	0.50
C9	CIRCULAR	0.38	0.11	0.09	0.38	1	0.13

****
Transect Summary
****

Transect Bioswale
Area:

0.0096	0.0198	0.0305	0.0419	0.0538
0.0662	0.0793	0.0929	0.1071	0.1219
0.1372	0.1532	0.1697	0.1867	0.2044

```
            0.2226     0.2414     0.2607     0.2807     0.3011
            0.3217     0.3425     0.3634     0.3846     0.4059
            0.4274     0.4492     0.4711     0.4931     0.5154
            0.5379     0.5605     0.5833     0.6064     0.6296
            0.6530     0.6765     0.7003     0.7243     0.7484
            0.7727     0.7972     0.8219     0.8468     0.8719
            0.8971     0.9226     0.9482     0.9740     1.0000
Hrad:
            0.0277     0.0538     0.0786     0.1023     0.1251
            0.1471     0.1683     0.1890     0.2091     0.2287
            0.2479     0.2668     0.2852     0.3034     0.3213
            0.3390     0.3564     0.3736     0.3906     0.4123
            0.4352     0.4577     0.4800     0.5019     0.5236
            0.5451     0.5663     0.5872     0.6080     0.6284
            0.6487     0.6688     0.6886     0.7083     0.7277
            0.7470     0.7661     0.7850     0.8038     0.8223
            0.8408     0.8590     0.8771     0.8951     0.9129
            0.9306     0.9481     0.9656     0.9828     1.0000
Width:
            0.3791     0.4011     0.4231     0.4451     0.4671
            0.4891     0.5111     0.5331     0.5551     0.5771
            0.5991     0.6211     0.6431     0.6651     0.6871
            0.7091     0.7311     0.7531     0.7751     0.7857
            0.7929     0.8000     0.8071     0.8143     0.8214
            0.8286     0.8357     0.8429     0.8500     0.8571
            0.8643     0.8714     0.8786     0.8857     0.8929
            0.9000     0.9071     0.9143     0.9214     0.9286
            0.9357     0.9429     0.9500     0.9571     0.9643
            0.9714     0.9786     0.9857     0.9929     1.0000


**************
Street Summary
**************

Street Street1
Area:
            0.0006     0.0022     0.0050     0.0088     0.0138
            0.0198     0.0270     0.0352     0.0446     0.0550
```

```
            0.0666     0.0792     0.0930     0.1078     0.1238
            0.1409     0.1585     0.1762     0.1938     0.2115
            0.2291     0.2468     0.2644     0.2821     0.2997
            0.3174     0.3350     0.3527     0.3706     0.3895
            0.4096     0.4308     0.4530     0.4764     0.5009
            0.5265     0.5531     0.5809     0.6098     0.6397
            0.6708     0.7030     0.7363     0.7706     0.8061
            0.8427     0.8804     0.9191     0.9590     1.0000
Hrad:
            0.0188     0.0377     0.0565     0.0754     0.0942
            0.1131     0.1319     0.1508     0.1696     0.1885
            0.2073     0.2262     0.2450     0.2639     0.2827
            0.3016     0.3381     0.3753     0.4124     0.4494
            0.4864     0.5232     0.5599     0.5966     0.6332
            0.6696     0.7060     0.7423     0.7784     0.8114
            0.8411     0.8676     0.8911     0.9118     0.9298
            0.9455     0.9589     0.9703     0.9798     0.9877
            0.9941     0.9991     1.0030     1.0058     1.0076
            1.0085     1.0087     1.0083     1.0072     1.0000
Width:
            0.0265     0.0530     0.0795     0.1060     0.1325
            0.1590     0.1855     0.2120     0.2385     0.2650
            0.2915     0.3180     0.3445     0.3710     0.3975
            0.4240     0.4250     0.4250     0.4250     0.4250
            0.4250     0.4250     0.4250     0.4250     0.4250
            0.4250     0.4250     0.4250     0.4435     0.4700
            0.4965     0.5230     0.5495     0.5760     0.6025
            0.6290     0.6555     0.6820     0.7085     0.7350
            0.7615     0.7880     0.8145     0.8410     0.8675
            0.8940     0.9205     0.9470     0.9735     1.0000


****************
Analysis Options
****************
Flow Units ............... CMS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
```

```
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 08/24/2026 00:00:00
Ending Date .............. 08/25/2026 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:01:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 2.00 sec
Variable Time Step ....... NO
Maximum Trials ........... 8
Number of Threads ........ 8
Head Tolerance ........... 0.001500 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.623        71.667
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.156        17.891
Surface Runoff ...........         0.460        52.848
Final Storage ............         0.009         0.988
Continuity Error (%) .....        -0.083


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.460         4.597
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
```

```
External Inflow ..........         0.000         0.000
External Outflow .........         0.451         4.512
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.008         0.078
Continuity Error (%) .....         0.156


*************************
Highest Continuity Errors
*************************
Node R_A-B-C (21.63%)
Node 106 (2.37%)
Node BGC_D (-1.27%)
Node 103 (-1.18%)


*******************************
Highest Flow Instability Indexes
*******************************
Link OR110 (4)
Link OR108A (4)
Link OR103 (3)
Link OR108B (3)
Link OR105 (3)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     2.00 sec
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  Average Time Step           :     2.00 sec
  Maximum Time Step           :     2.00 sec
  % of Time in Steady State   :     0.00
  Average Iterations per Step :     2.02
  % of Steps Not Converging   :     0.16


  **************************
  Subcatchment Runoff Summary
  **************************


-----------------------------------------------------------------------------------------------------------
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                            Total      Total      Total      Total     Imperv       Perv      Total
Total     Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff
Runoff   Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6
ltr      CMS

-----------------------------------------------------------------------------------------------------------
-------------------
  BIO-1                     71.67       0.00       0.00      30.10      24.57      16.49      41.07
0.26     0.20   0.573
  L102A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.25     0.19   0.859
  L103A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.82     0.62   0.859
  L105A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.64     0.49   0.859
  L106A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.41     0.31   0.859
  L108A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.80     0.61   0.859
  L108B                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.41     0.32   0.859
  L110A                     71.67       0.00       0.00       8.91      56.14       5.43      61.57
0.31     0.24   0.859
```

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  L25A                      71.67       0.00       0.00      19.56      40.00      11.27      51.27
0.38     0.29   0.715
  L30A                      71.67       0.00       0.00      19.09      40.71      11.02      51.73
0.07     0.06   0.722
  PARK                      71.67       0.00       0.00      53.13       0.00      18.54      18.54
0.23     0.07   0.259


  ******************
  Node Depth Summary
  ******************

  ------------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ------------------------------------------------------------------------------
  100                  OUTFALL      0.00     0.00    92.51     0  00:00        0.00
  30858                OUTFALL      0.01     0.37    93.65     0  01:10        0.37
  30858_MAJ            OUTFALL      0.00     0.00    95.60     0  00:00        0.00
  J1                   OUTFALL      0.00     0.00    95.21     0  00:00        0.00
  101                  STORAGE      0.27     2.38    94.96     0  01:41        2.38
  102                  STORAGE      0.25     2.28    94.96     0  01:41        2.28
  103                  STORAGE      0.21     2.11    94.95     0  01:40        2.11
  104                  STORAGE      0.20     2.03    94.96     0  01:39        2.02
  105                  STORAGE      0.17     1.86    94.96     0  01:43        1.86
  106                  STORAGE      0.07     1.50    95.60     0  01:28        1.48
  107                  STORAGE      0.06     1.40    95.65     0  01:28        1.39
  108                  STORAGE      0.03     1.18    95.97     0  01:28        1.17
  109                  STORAGE      0.02     0.77    95.98     0  01:28        0.77
  110                  STORAGE      0.02     0.60    96.07     0  01:26        0.59
  25                   STORAGE      0.02     1.06    95.11     0  01:10        1.05
  30                   STORAGE      0.01     0.52    94.25     0  01:10        0.51
  BGC_A-B-C            STORAGE      0.05     0.93    96.22     0  01:09        0.86
  BGC_D                STORAGE      0.05     0.92    96.17     0  01:09        0.88
  BGC_E-F-G            STORAGE      0.05     0.83    96.03     0  01:09        0.82
  BGC_H-I              STORAGE      0.02     0.20    95.39     0  01:10        0.18
  R_A-B-C              STORAGE      0.05     0.21    95.66     0  01:11        0.20
  S102                 STORAGE      0.00     0.36    96.36     0  01:09        0.36
```

S103	STORAGE	0.00	0.43	96.43	0	01:05	0.42
S105	STORAGE	0.00	0.41	96.41	0	01:05	0.40
S106	STORAGE	0.00	0.38	96.38	0	01:05	0.37
S108A	STORAGE	0.01	0.43	96.43	0	01:05	0.41
S108B	STORAGE	0.00	0.39	96.39	0	01:05	0.37
S110	STORAGE	0.00	0.39	96.39	0	01:05	0.36
S30	STORAGE	0.01	0.32	96.32	0	01:10	0.32

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error Percent
100	OUTFALL	0.000	0.344	0 01:41	0	4.06	0.000
30858	OUTFALL	0.000	0.286	0 01:10	0	0.439	0.000
30858_MAJ	OUTFALL	0.000	0.038	0 01:10	0	0.013	0.000
J1	OUTFALL	0.000	0.000	0 00:00	0	0	0.000 ltr
101	STORAGE	0.000	0.403	0 01:23	0	4.06	-0.020
102	STORAGE	0.000	1.049	0 01:10	0	4.06	0.024
103	STORAGE	0.000	1.235	0 01:14	0	3.87	-1.169
104	STORAGE	0.000	0.639	0 01:08	0	1.44	-0.619
105	STORAGE	0.000	0.774	0 01:08	0	1.18	0.793
106	STORAGE	0.000	0.539	0 01:03	0	1.62	2.432
107	STORAGE	0.000	0.425	0 01:13	0	1.26	-0.944
108	STORAGE	0.000	0.421	0 01:03	0	1.27	0.619
109	STORAGE	0.000	0.101	0 01:29	0	0.258	-0.262
110	STORAGE	0.000	0.086	0 01:00	0	0.259	0.420
25	STORAGE	0.294	0.294	0 01:10	0.382	0.382	1.173
30	STORAGE	0.000	0.294	0 01:10	0	0.438	-0.274
BGC_A-B-C	STORAGE	0.258	0.953	0 01:10	0.495	0.734	-0.153
BGC_D	STORAGE	0.000	0.616	0 01:07	0	0.0756	-1.252
BGC_E-F-G	STORAGE	0.000	1.108	0 01:08	0	0.296	-0.251
BGC_H-I	STORAGE	0.000	0.769	0 01:09	0	0.0987	-0.408

R_A-B-C	STORAGE	0.000	0.326	0	01:05	0	0.094	27.596
S102	STORAGE	0.193	0.193	0	01:10	0.253	0.253	-0.073
S103	STORAGE	0.622	0.622	0	01:10	0.818	0.818	-0.056
S105	STORAGE	0.486	0.486	0	01:10	0.64	0.64	-0.051
S106	STORAGE	0.315	0.315	0	01:10	0.414	0.414	-0.027
S108A	STORAGE	0.607	0.607	0	01:10	0.798	0.798	-0.055
S108B	STORAGE	0.315	0.315	0	01:10	0.415	0.415	-0.109
S110	STORAGE	0.236	0.236	0	01:10	0.31	0.31	-0.115
S30	STORAGE	0.056	0.056	0	01:10	0.073	0.073	-0.067

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Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
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Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CMS
101	0.001	9.3	0.0	0.0	0.013	82.5	0 01:41	0.344
102	0.001	7.9	0.0	0.0	0.013	73.9	0 01:41	0.403
103	0.001	6.1	0.0	0.0	0.012	60.4	0 01:40	0.810
104	0.002	5.9	0.0	0.0	0.024	61.4	0 01:39	0.392
105	0.001	6.8	0.0	0.0	0.010	76.0	0 01:43	0.544

106	0.000	3.7	0.0	0.0	0.007	79.7	0	01:28	0.541
107	0.000	3.0	0.0	0.0	0.002	73.9	0	01:28	0.424
108	0.000	2.8	0.0	0.0	0.001	99.1	0	01:28	0.425
109	0.000	1.9	0.0	0.0	0.001	85.1	0	01:28	0.114
110	0.000	2.3	0.0	0.0	0.001	86.9	0	01:26	0.101
25	0.000	0.5	0.0	0.0	0.001	27.3	0	01:10	0.276
30	0.000	0.6	0.0	0.0	0.001	22.1	0	01:10	0.286
BGC_A-B-C	0.028	25.0	0.0	0.0	0.110	100.0	0	01:07	1.210
BGC_D	0.008	24.1	0.0	0.0	0.031	100.0	0	01:08	0.454
BGC_E-F-G	0.025	24.4	0.0	0.0	0.104	100.0	0	01:07	1.034
BGC_H-I	0.006	9.7	0.0	0.0	0.056	98.2	0	01:10	0.366
R_A-B-C	0.011	24.3	0.0	0.0	0.044	100.0	0	01:11	0.143
S102	0.000	1.5	0.0	0.0	0.021	100.0	0	01:05	0.217
S103	0.001	1.5	0.0	0.0	0.067	100.0	0	01:05	0.745
S105	0.001	1.5	0.0	0.0	0.052	100.0	0	01:05	0.572
S106	0.001	1.5	0.0	0.0	0.034	100.0	0	01:05	0.361
S108A	0.001	1.5	0.0	0.0	0.065	100.0	0	01:05	0.725
S108B	0.001	1.5	0.0	0.0	0.034	100.0	0	01:05	0.341
S110	0.000	1.5	0.0	0.0	0.025	100.0	0	01:05	0.265
S30	0.000	1.9	0.0	0.0	0.007	100.0	0	01:06	0.056

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Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CMS	Max Flow CMS	Total Volume 10^6 ltr
100	54.46	0.086	0.344	4.060
30858	17.39	0.029	0.286	0.439
30858_MAJ	1.02	0.015	0.038	0.013
J1	0.00	0.000	0.000	0.000
System	18.22	0.130	0.554	4.512

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Link Flow Summary
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Link	Type	Maximum |Flow| CMS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C10	CONDUIT	0.101	0 01:29	1.23	0.82	1.00
C11	CONDUIT	0.286	0 01:10	1.88	1.15	0.92
C12	CONDUIT	0.276	0 01:10	1.74	1.68	1.00
C2	CONDUIT	0.403	0 01:23	0.31	0.07	1.00
C3	CONDUIT	0.483	0 01:12	0.18	0.09	1.00
C4	CONDUIT	0.544	0 01:14	0.45	0.10	1.00
C5	CONDUIT	0.541	0 01:11	1.63	1.02	1.00
C6	CONDUIT	0.424	0 01:03	1.65	0.88	1.00
C7	CONDUIT	0.810	0 01:15	0.49	0.16	1.00
C8	CONDUIT	0.425	0 01:13	1.56	0.85	1.00
C9	CONDUIT	0.114	0 01:29	1.21	0.89	1.00
C1	ORIFICE	0.344	0 01:41			1.00
C14	WEIR	0.614	0 01:09			1.00
W1	WEIR	0.505	0 01:05			0.68
W10	WEIR	0.736	0 01:09			1.00
W11	WEIR	0.067	0 01:10			0.04
W12	WEIR	0.000	0 00:00			0.00
W2	WEIR	0.517	0 01:05			0.69
W3	WEIR	0.226	0 01:05			0.39
W4	WEIR	0.246	0 01:05			0.43
W5	WEIR	0.394	0 01:05			0.58
W6	WEIR	0.179	0 01:05			0.54
W7	WEIR	0.038	0 01:10			0.12
W8	WEIR	0.147	0 01:05			0.28
W9	WEIR	0.333	0 01:08			1.00
OR_A-B-C	DUMMY	0.596	0 01:08			
OR_D	DUMMY	0.121	0 01:08			
OR_E-F-G	DUMMY	0.298	0 01:08			
OR_H-I	DUMMY	0.366	0 01:10			

OR_R_A-B-C	DUMMY	0.087	0	01:11
OR102	DUMMY	0.070	0	01:00
OR103	DUMMY	0.228	0	01:00
OR105	DUMMY	0.178	0	01:00
OR106	DUMMY	0.115	0	01:00
OR108A	DUMMY	0.220	0	01:00
OR108B	DUMMY	0.115	0	01:00
OR110	DUMMY	0.086	0	01:00
OR30	DUMMY	0.018	0	01:00

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Flow Classification Summary
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	Adjusted	Fraction of Time in Flow Class								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C10	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.00
C11	1.00	0.02	0.00	0.00	0.79	0.20	0.00	0.00	0.04	0.00
C12	1.00	0.02	0.00	0.00	0.01	0.00	0.00	0.97	0.00	0.00
C2	1.00	0.02	0.00	0.00	0.22	0.00	0.00	0.76	0.00	0.00
C3	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.80	0.00
C4	1.00	0.02	0.00	0.00	0.20	0.00	0.00	0.79	0.03	0.00
C5	1.00	0.02	0.00	0.00	0.14	0.00	0.00	0.84	0.06	0.00
C6	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.00	0.00
C7	1.00	0.02	0.00	0.00	0.98	0.00	0.00	0.00	0.78	0.00
C8	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.04	0.00
C9	1.00	0.02	0.00	0.00	0.01	0.00	0.00	0.97	0.00	0.00

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Conduit Surcharge Summary
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	Hours	Hours

	Hours Full			Above Full	Capacity
Conduit	Both Ends	Upstream	Dnstream	Normal Flow	Limited
C10	0.12	0.12	0.17	0.01	0.01
C11	0.01	0.05	0.01	0.10	0.01
C12	0.04	0.14	0.04	0.17	0.04
C2	1.95	1.95	2.01	0.01	0.01
C3	1.47	1.47	1.65	0.01	0.01
C4	1.13	1.13	1.45	0.01	0.01
C5	1.03	1.03	2.33	0.02	0.01
C6	0.69	0.69	0.80	0.01	0.24
C7	1.65	1.65	1.95	0.01	0.01
C8	0.21	0.21	0.63	0.01	0.01
C9	0.18	0.18	0.19	0.01	0.01

Analysis begun on: Fri Aug 28 05:15:01 2026
Analysis ended on: Fri Aug 28 05:15:06 2026
Total elapsed time: 00:00:05

D.7 Storm Sewer Design Sheet

Stantec

1495 Heron Road

DATE: 2026-08-27
REVISION: 3
DESIGNED BY: MJS
CHECKED BY: DT

STORM SEWER DESIGN SHEET
(City of Ottawa)

FILE NUMBER: 160410368

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr
a =	732.951	998.071	1174.184	1735.688
b =	6.199	6.053	6.014	6.014
c =	0.810	0.814	0.816	0.820

MANNING'S n = 0.013
MINIMUM COVER: 2.00 m
TIME OF ENTRY 10 min
BEDDING CLASS = B

LOCATION			DRAINAGE AREA																						PIPE SELECTION									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM. AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)
L25A	25	30	0.75	0.00	0.00	0.00	0.00	0.57	0.00	0.00	0.00	0.425	0.425	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	90.6	93.1	450	450	CIRCULAR	CONCRETE	-	0.34	173.4	**52.24%**	1.06
L30A	30	30858	0.14	0.00	0.00	0.00	0.00	0.58	0.00	0.00	0.00	0.082	0.507	0.000	0.000	0.000	0.000	0.000	0.000	11.70	70.84	95.99	112.48	164.37	0.0	0.0	99.7	59.5	450	450	CIRCULAR	CONCRETE	-	0.76	259.9	**38.35%**	1.58
													12.50																450	450							
L105A, BIO-1	105	104	1.68	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.00	1.056	1.056	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	225.3	161.7	2400	1500	RECTANGULAR	CONCRETE	-	0.10	5273.7	**4.27%**	1.46
	104	103	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	1.056	0.000	0.000	0.000	0.000	0.000	0.000	14.48	63.03	85.29	99.89	145.89	0.0	0.0	184.9	90.0	2400	1500	RECTANGULAR	CONCRETE	-	0.10	5228.9	**3.54%**	1.45
													17.09																								
L110A	110	109	0.50	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.403	0.403	0.000	0.000	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	86.0	46.6	375	375	CIRCULAR	PVC	-	0.50	116.6	**73.76%**	1.11
	109	108	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.403	0.000	0.000	0.000	0.000	0.000	0.000	10.73	74.11	100.48	117.77	172.14	0.0	0.0	82.9	13.2	375	375	CIRCULAR	PVC	-	0.50	116.6	**71.17%**	1.11
L108B, L108A	108	107	1.97	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	1.575	1.978	0.000	0.000	0.000	0.000	0.000	0.000	10.94	73.37	99.47	116.58	170.39	0.0	0.0	403.1	144.9	675	675	CIRCULAR	CONCRETE	-	0.35	518.8	**77.71%**	1.40
	107	106	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	1.978	0.000	0.000	0.000	0.000	0.000	0.000	12.71	67.77	91.78	107.53	157.09	0.0	0.0	372.4	15.4	675	675	CIRCULAR	CONCRETE	-	0.35	518.8	**71.77%**	1.40
L106A	106	103	0.67	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.538	2.516	0.000	0.000	0.000	0.000	0.000	0.000	12.90	67.22	91.03	106.64	155.79	0.0	0.0	469.8	210.1	675	675	CIRCULAR	CONCRETE	-	0.40	554.6	**84.70%**	1.50
													15.23																								
L103A	103	102	1.33	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	1.063	4.635	0.000	0.000	0.000	0.000	0.000	0.000	17.09	57.25	77.37	90.58	132.23	0.0	0.0	737.0	164.9	2400	1500	RECTANGULAR	CONCRETE	-	0.10	5230.0	**14.09%**	1.45
L102A	102	101	0.41	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.329	4.964	0.000	0.000	0.000	0.000	0.000	0.000	20.34	51.50	69.52	81.35	118.69	0.0	0.0	710.0	36.9	2400	1500	RECTANGULAR	CONCRETE	-	0.10	5231.6	**13.57%**	1.45
	101	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	4.964	0.000	0.000	0.000	0.000	0.000	0.000	21.06	50.38	68.00	79.57	116.07	0.0	0.0	694.7	22.8	600	600	CIRCULAR	CONCRETE	-	0.30	349.6	**198.69%**	1.20
													21.38																	600	600							

With every community, we redefine what's possible.

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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