FUNCTIONAL SERVICING REPORT

130 HUNTMAR DRIVE

Prepared for:

LIONESS DEVELOPMENT INC.

PROJECT No: 191002

CITY OF OTTAWA

SEPTEMBER 2021

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

REVISION 2

FUNCTIONAL SERVICING REPORT
130 HUNTMAR DRIVE

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1.0 BACKGROUND

1.1 General

Atrel Engineering Ltd. has been retained by Lioness Development Inc. to complete an Functional Servicing Report (FSR) in support of a Major Zoning By-Law Amendment and a Plan of Subdivision Application for 130 Huntmar Drive. The development consists of approximately 26 ha. of vacant land and is located within the City of Ottawa's urban boundary.

The proposed development is located north of Maple Grove Road and east of Huntmar Drive, as illustrated in ***Figure 1***. The proposed site, known as 130 Huntmar Drive, wraps around an existing school located at 180 Huntmar Drive, known as Kanata Academy Private School. The subject property is currently zoned as a Development Reserve (DR) Zone. A detailed sketch SK-1 is provided in Appendix "A" which shows the streets to which the development will be connected.

Figure 1 – Location Map

The proposed Draft Plan of Subdivision (see Appendix A) allows for residential mid-density (apartments), residential low density (singles / townhouses), a school site, a commercial block and a park. A concept plan is attached in Appendix "A" showing the different types of developments within the site. The proposed Draft Plan demonstrates the road network layout within the subject land and particularly the North-South Arterial road in a perpendicular alignment with a proposed round-about. The purpose of this Functional Servicing Report is to demonstrate that there is sufficient capacity in the watermain, the wastewater and stormwater systems to accommodate the proposed development and to show that the proposed draft plan can accommodate all the proposed roads, lots and blocks and can accommodate all proposed infrastructures. The SWM Pond 4 will need to be upsized and designed for this development.

1.2 Existing Studies and Reports

The following studies and reports have been used to prepare this Functional Servicing Report for 130 Huntmar Drive:

- Kanata West Master Servicing Study (KWMSS), by Stantec, CCL, IBI, dated June 2006.
- Infrastructure Master Plan (IMP), dated November 2013.
- Design Brief for Pond 4 Kanata West, by DSEL, JFSA, revised August 25, 2014, 3rd submission.
- Functional Servicing and Stormwater Management Report for 173 Huntmar Road, City of Ottawa, by DSEL, dated March 2015, Revision 2,.
- Functional Servicing Report for 2325483 Ontario Inc. 195 Huntmar Drive, City of Ottawa, by DSEL, dated May 2019.

1.3 Existing Services

The site can be physically connected at the following locations (please refer to Appendix "A" – Location Map for existing street locations):

- there is an existing 300 mm diameter watermain on Maple Grove Road
- there is an existing 400mm diameter watermain stub on Huntmar Drive, just north of Maple Grove Road
- there is an existing 400mm diameter watermain within the development along the future Robert Grant Avenue (Street No. 1)
- there is an existing 825mm diameter sanitary sewer on Maple Grove Road
- there is an existing 500mm and 600mm diameter sanitary sewer within the development along the future Robert Grant Avenue (Street No. 1)
- there is an existing pumping station on Maple Grove Road known as the Kanata West Pumping Station (KWPS)
- there is an existing 2400mm storm sewer on Maple Grove Road
- there is an existing pond east of the site known as Pond 4
- road connections are available on Huntmar Drive and Maple Grove Road
- Hydro, Bell Cable and Gas was not part of this Functional Servicing Report; it will be verified during the design process.

1.4 Required Permits/Approvals

Development of the site will be subject to the City of Ottawa planning and development approval process. The City of Ottawa and the Mississippi Valley Conservation Authority (MVCA) must approve the detailed engineering design drawings and reports prepared to support the proposed development prior to construction. Environment Compliance Approvals (ECA) from the Ministry of Environment, Conservation and Parks (MOECP) will need to be obtained in order to construct the sanitary sewers, storm sewers and watermain. Also, an amendment to the existing pond ECA will be required prior to the pond expansion.

1.5 Pre-consultation

A pre-consultation meeting was carried out on July 19, 2019 with the City of Ottawa. The Pre-Consultation Meeting Minutes and concept plan can be found in Appendix "A".

1.6 Proposed Streets

As previously mentioned, the proposed development is located north of Maple Grove Road and east of Huntmar Drive which are both arterials. Within the proposed 130 Huntmar development, a proposed arterial is proposed from Huntmar Drive to Maple Grove Road along Street No. 1 (Robert Grant Avenue) and is known as the North-South arterial. Furthermore, all other proposed roads within the proposed development will be local roads.

2.0 PROPOSED SERVICES

2.1 Grading Plan - Geotechnical Investigation

A geotechnical investigation was carried out in order to assess the possible design constraints. Maximum grade raises are tabulated in the report by Golder Associates.

These maximum grade raises were respected in the preparation of a macro grading plan (See Appendix "B" – 191002-GRM). As per Golder Associates, no unusual problems are anticipated during the site servicing with excavating the overburden using conventional hydraulic excavating equipment. The impact of raising the grades along neighbouring properties' boundaries will need to be looked at during detailed design. The grading around the existing school will be done by respecting the existing conditions, drainage and ensuring the grading does not impede the existing major flow route.

2.1.1 Major Flow Route and LRT

The proposed draft plan was design in conjunction with the LRT preliminary design. The future LRT is proposed to run along the east boundary of the development with an overpass at the Maple Grove Station (see Appendix A for LRT detail). The draft plan features the North-South arterial which runs from Huntmar Drive and connects to Maple Grove Road. The major flow route is proposed to cross under the future elevated LRT structure.

The overflow will then be conveyed via a temporary ditch to the SWM facility, known as Pond 4, for quantity and quality treatment. It is expected that the major

flow will be conveyed via pathways, road systems or parking lots to reach pond 4 through the City own land.

2.2 Sediment and Erosion Control

Straw bales will be placed on-site at every definable swale in order to control runoff. These controls will be cleaned and maintained during the course of the construction. Before construction, silt fence barriers will be installed, where necessary, along the perimeter of the site as well as along the perimeter of the existing stormwater pond (see Appendix "B" – 191002-ESCM).

2.3 Watermain

The watermain analysis was conducted using the H2ONET v.5.0 program as a design aid. Water supply to the 130 Huntmar Drive development will be provided through the installation of watermains.

As per the Kanata West Master Servicing Study Watermain Sizing -2013 Watermain Master Plan Update, dated December 16, 2013 by Stantec, (refer to Appendix C for excerpt) a 600mm diameter watermain along Campeau Drive from Terry Fox Drive to Palladium Drive is planned to service the Kanata West area. The 600mm diameter feedermain was installed in 2014 and extends on Huntmar Drive from Campeau Drive to Cyclone Taylor Boulevard. A 400mm diameter watermain is planned to extend from Cyclone Taylor Boulevard to Maple Grove Road.

Since the 400mm diamater watermain is not yet installed on Huntmar Drive between Cyclone Taylor Boulevard and Maple Grove, the analysis was carried out with connections available only on Maple Grove Road. It is also understood that the 400mm watermain link between Palladium Drive and Maple Grove Road is for redundancy purposes. It is also not desirable, nor ideal, at this time to be working within the Huntmar ROW. It is understood that the City is currently initiating a MECA for the Huntmar widening, which will provide an opportunity for future underground infrastructure works which at that time could be paired with the watermain. It is in the opinion of the applicant that the watermain on Huntmar is not necessary for the 130 Huntmar development or the 195 Huntamar development as per the reasons stated above and should be installed with the future Huntmar widening.

This preliminary analysis was carried out with the use of hydraulic grade line elevations at various known connection points located at the boundaries of the proposed site. Hydraulic grade line elevations for the aforementioned connection points were provided by the City (see E-mail Correspondence with the City of Ottawa in Appendix "C").

The existing private school located at 180 Huntmar Drive is included in the analysis to be serviced through the proposed 130 Huntmar development with a service from Street No. 10.

The site will connect onto the Maple Grove Road watermain at 3 different locations. Refer to Table 1 in Appendix "C" for the Boundary Condition Data at connection points No.1, No.2 and No.3 supplied by the City of Ottawa.

It is to be noted that the 400mm watermain is installed along Robert Grant Avenue and

is connected to point No. 3 on Maple Grove Road and connected to the 195 Huntmar Drive development, west of Huntmar Drive.

In this analysis, no connections to Huntmar Drive were used. The analysis makes use of three connections on Maple Grove Road as mentioned above, the future connection will only improve the overall system, thus, this analysis provides conservative results in comparison to the ultimate built out scenario of the local region.

Typical values for average daily water consumption were taken from the City of Ottawa's Water Distribution Guidelines. The following table summarizes the average daily consumption rates, maximum daily rates as well as peak hourly factors for each type of land use.

Water Supply Design Criteria

Type of development	**Average daily demand**	**Maximum daily**	**Peak hourly**
Residential	350 l/c·d	2.5 x avg. day	2.2 x max day
Commercial	28,000 l/ha./d	1.5 x avg. day	1.8 x max day
Institutional	28,000 l/ha./d	1.5 x avg. day	1.8 x max day

Total demands for the three different demand scenarios were calculated using the aforementioned consumption rates as well as population densities of 3.4 persons per unit for single family dwellings, 2.7 persons per unit for townhouses and 2.1 persons per unit for apartments or stacked residences.

The following table summarizes the anticipated water demand for the proposed development.

Average daily demand	Maximum daily	Peak hourly
8.6143 l/s	20.1882 l/s	42.6883 l/s

The studied water supply network was verified under the average day demand and the peak hourly demand with a minimum pressure of 276 kPa (See Tables 2 to 4 in Appendix "C" for details). Fire flows of 167 l/s (single dwellings), 167 l/s (townhouses), 283 l/s (apartments) and 300 l/s (back to backs) were also analyzed during maximum day conditions with a required minimum residual pressure of 140 kPa.

It is to be noted that pressure reducing valves will be required for all services as static pressures within the system are higher than 552 kPa.

2.3.1 Fire Underwriters Survey

Section 4.2.11 of the City of Ottawa Guidelines for water distribution offers guidance for the calculation of fire demand.

Furthermore, the Ontario Building Code (OBC) provides minimum requirements for fire protection on private properties. In particular, Section 7.2.11 of the OBC provides detailed steps for the installation of water service pipes and fire service mains. Part 3 of the OBC offers requirements for fire protection, sub-section A3.2.5.7 provides standards for firefighting.

Table 5 (Appendix "C") provides the detailed fire flow calculations as per the Fire Underwriters Survey (FUS) for each typical unit. Table 6 (Appendix "C") provides the fire flow analysis results during maximum day demand for each node within the system. During the analysis each node is verified with the highest fire flow in its surrounding.

The analysis was carried out to ensure the water quantity would be sufficient for firefighting purposes.

As mentioned above, preliminary calculations under the FUS show that the required fire flows are 167 l/s (single dwellings), 167 l/s (townhouses), 283 l/s (apartments) and 300 l/s (back to backs).

At the time of the analysis, boundary conditions for fire flows of 167 l/s and 283 l/s were provided. Under current conditions, some fire flows may not be met by the proposed system, in such cases, concessions might be required in the form of firewalls for example. The system will be further analyzed with updated boundary conditions during the detailed design process.

Furthermore, as per the Technical Bulletin ISTB-2018-02, 10m setback separation between back walls of units to either other back wall to sidewall of unit or back wall to back wall for lots which are backing onto the back or side of another lot shall be verified at the detailed design.

2.4 Sanitary Sewer

The 130 Huntmar Drive site is located in close proximity to the Kanata West Pumping Station (KWPS), which is located on Maple Grove Road. The Kanata West Master Servicing Study (KWMSS), dated June 2006, includes the 130 Huntmar Drive site to be serviced by the KWPS. It proposes that the southeast portion of the development (shown in green) be serviced by the existing Maple Grove Road sanitary trunk sewer, while the northwest portion (shown in yellow) be serviced by a future 675mm diameter trunk sewer (refer to Appendix "D" for the "Preferred Waste Water Option – Drawing S-1" from the KWMSS). The KWMSS is also in agreement with the IMP (2013) which identifies a trunk sewer running along the north side of the property (refer to an excerpt from the IMP in Appendix "D"). The future 675mm diameter trunk sewer in the KWPSS was intended to service the land west of Huntmar Drive (shown in blue), which includes the development of 195 Huntmar Drive.

It is proposed to direct the entire sanitary runoff of 130 Huntmar, 195 Huntmar and a few adjacent external areas to the Maple Grove trunk at sanitary maintenance hole 96 at the intersection of Maple Grove Road and Robert Grant Avenue. In addition, the system downstream of MH 96 has been designed and accounts for the lands west of Huntmar.

The school block at the corner of Hutnmar Drive and Maple Grove is proposed to drain to the existing sanitary sewer on Maple Grove Road. Furthermore, the existing private school located at 180 Huntmar Drive is proposed to be serviced through the proposed 130 Huntmar development. A service is proposed on street No. 10 to service the property of the existing private school.

The upstream flows west of the 130 Huntmar development can be directed to the proposed system via two entrances; one at the intersection of Huntmar Drive and Street No. 6, and, the other, at the intersection of Huntmar Drive and Robert Grant Avenue (refer to the drawing 191002-SANM - Macro Sanitary Drainage Plan in Appendix "D").

2.4.1 Upstream Flow to Huntmar Drive and Street No. 6 (MH 215A)

Upstream of MH 215A are tributary areas that are designed to drain to MH 215A. Those areas are shown on the sanitary drainage plan from 195 Huntmar Drive, Drawing Sheet No. 92, located in Appendix D. A summary of the tributary areas and populations is shown below:

Location	Type	Area (ha)	Population
To MH 215A	Infiltration	2.07	0
	Commercial	6.95	695
	Institutional	0	0
	Green Space	5.89	196

DSEL's sewer computation sheets (attached in Appendix "D") which correlate with drawing No.92 show the total tributary areas and population listed above.

2.4.2 Upstream Flow to Huntmar Drive and Robert Grant Avenue (MH 217A)

Again, upstream of MH 217A are tributary areas that are designed to drain to MH 217A. Those areas are shown on the sanitary drainage plan from 195 Huntmar Drive, Drawing Sheet No. 87 to 93, located in Appendix D. A summary of the tributary areas and populations is shown below:

Location	Type	Area (ha)	Population
To MH 217A	Residential	104.77	7061
	Commercial	39.64	3964
	Institutional	7.46	746
	Green Space	0.53	17.6

DSEL's sewer computation sheets (attached in Appendix "D") which correlate with drawing No.87 to 93 show the total tributary areas and population listed above.

2.4.3 Outlet on Maple Grove Road

The sanitary sewers within 130 Huntmar Drive development are sized to accommodate the runoff from the areas mentioned above and outlet to ex. SAN MH 96 on Maple Grove Road (refer to drawing 191002-SANM in Appendix "D"). The proposed sewer alignment corresponds, in part, with Figure 1 from the "Proposed Alignments for Kanata West Development North-South Sanitary Collector Sewers Functional Design Study" by IBI Group.

The preliminary sanitary system was designed using the City of Ottawa Sewer Design Guidelines dated October 2012. Section 4.3 provides standards for population densities in Ottawa. The following table shows the "Per Unit Populations" used:

Per Unit Populations

Unit Type	**Persons per unit**
Single Family	3.4
Townhouses	2.7
Apartments: 2 bedroom	2.1

City of Ottawa has provided a technical bulletin (ISTB-2018-01) with updated sanitary design parameters for flows and overflow criteria. The design parameters used for this analysis are tabulated below:

Design Parameters

Parameter	Design
Residential Flow Rate (l/d/cap)	280
Commercial Flow Rate (l/d/gross ha.)	28,000
Institutional Flow Rate (l/d/gross ha.)	28,000
Industrial Flow Rate (l/d/gross ha.)	35,000
Green Space Flow Rate (l/d/gross ha.)	9,300
Infiltration Rate – Dry Weather (l/s/ha.)	0.05
Infiltration Rate – Wet Weather (l/s/ha.)	0.28
Total Infiltration Rate (l/s/ha.)	0.33
Harmon Correction Factor	0.8
Institutional / Commercial / Industrial Peak Factor	1.5/1*

*Peak factor = 1.5 if contributing area >20%, 1.0 if contributing area <20%

Sanitary flows and peaking factors were calculated using the above values during this analysis.

The proposed sanitary system within 130 Huntmar has been designed to accommodate runoff from 195 Huntmar Drive, the Mion land and other surrounding lands as described in the previous sections.

Using the Maple Grove Sanitary Sewer Capacity Analysis (10/MH91-SANMH 3)(DSEL, May 2019) which is a modified version of IBI's drawing S-1 mentioned in the previous section and the corresponding Sanitary Sewer Calculation Sheet, tributary areas and populations were taken and used to analyze the capacity of the existing Maple Grove trunk sewer (refer to Appendix "D" for both excerpts of plans and calculation sheets).

It was determined that a 500mm and 600mm diameter trunk sewer along Robert Grant Avenue is adequate to service the subject land. The 500mm and 600mm diameter trunk sewer along Robert Grant Avenue was recently installed (summer 2021).

Using the current recommended wastewater parameters, the total peak flow to ex. MH 96 is 532.13 l/s (refer to the Sanitary Sewer Computation Form, Table 7A in Appendix "D"). The downstream sewers on Maple Grove road are all 900mm diameter sewers down to the existing 1200mm diameter sewer, and the slightest sewer slope is 0.38%, refer to the as-built drawings in Appendix "E" . The sewer from Ex. MH 96 to Ex. MH 97 is shown with a slope of 0.38%, while its actual pipe slope is 0.44%, to show the remaining capacity in the sewer of 54%.

2.4.4 Sanitary HGL Analysis

In the event of a failure at the KWPS during the annual event, the sanitary HGL is required to stay at least 0.3m below the underside of footings. As per the email sent by Eric Surprenant, (refer to correspondence in Appendix "D") the HGL along Maple Grove during the annual event and at catastrophic failure at the KWPS is 94.40m. The HGL slope was assumed in the 1200mm diameter sanitary sewer on Maple Grove Road to be 0.32% and the 900mm diameter from the KWPS was calculated to 0.05% which brings the HGL to 95.54m at the connection of existing MH 96. A column shows the approximate USF elevation based on being approximately 2.00m below the proposed grade. It was found that a minimum of 0.3m freeboard is maintained throughout the proposed development. The sanitary HGL during the annual event, the USF and the freeboard are shown in Table 7B in Appendix "D".

2.5 Storm Sewer and Stormwater Management

The 130 Huntmar Drive storm water servicing was designed in relation to the KWMSS and the Pond 4 study to be directed to the Pond 4, located north of the site. A portion of the site was designed to be directed to the Maple Grove Road existing storm trunk sewer while the remaining of the site was designed to outlet to a future trunk that ultimately connects to the north forebay of the pond. Refer to an excerpt Storm Drainage plan from the Pond 4 study by DSEL/JFSA for the previous concept.

The "Design Brief for Pond 4 Kanata West" report by DSEL/JFSA dated August 25, 2014, recommends that the storm water of 130 Huntmar Drive be conveyed to the existing Storm Water Management Pond 4 located northeast of the proposed site (See Appendix "E" – 191002-STMM for the site's proposed storm sewer system). This existing SWM facility controls both the quantity and quality of the storm water for more than 278ha of land which includes the proposed site.

With the development of 130 and 195 Huntmar, Pond 4 needs to be expanded to control both the quantity and quality. Once the pond is expanded and the new inlet is constructed in the new forebay, the portion of the site to be directed to the new trunk and the areas to the west, including the east side of 195 Huntmar Drive, can be developed.

The attenuated flow is then discharged to Poole Creek, which ultimately reaches the Carp River. According to JFSA's memorandum the maximum pond level for the 100 year storm event will be at 94.68 m.

Drawing 191002-STMM shows the overall system layout, runoff coefficient, drainage areas and obvert elevations. Using zoning setbacks of the surrounding neighbourhood, the runoff coefficient for singles was calculated at ±0.65 and at ±0.70 for townhouses; sample runoff coefficient calculations are shown in Appendix "E". As a conservative approach the C value was taken at 0.70 for all the residential areas. The C values will be revised during the detailed design with the revised drainage areas. In order to analyze the minor system, the tributary areas from 195 Huntmar Drive have been taken from the 195 Huntmar Drive Storm Sewer Calculation Sheet and the Storm Drainage Area to Pond 4 Figure 1 provided by DSEL (refer to excerpt in Appendix "E"). Additionally, Table 8 provide details of the minor system.

The south portion of the site is surrounded by arterial roads and is proposed with a minor system capture rate of 340 l/s/ha for residential areas, 220 l/s/ha for the proposed school and 250 l/s/ha for the medium density residential and commercial while providing above ground storage on site. The north portion of the site is proposed with a capture rate of 220 l/s/ha for both residential area, 220 l/s/ha for medium density residential and 115 l/s/ha for the park. The existing private school located at 180 Huntmar Drive is proposed to be serviced through Street No. 9 and designed for a release rate of 220 L/s/ha. The City own land east of 130 Huntmar Drive and west of Pond 4 and the land north of the proposed site was designed assuming a runoff coefficient of 0.80 and at minor system capture rate of 220 l/s/ha. The parcel of land surrounded by Maple Grove Road, Huntmar Drive and the North-South arterial shall provide on-site storage for the 100 year storm event, an overland route is proposed for events exceeding the 100 year storm event.

During the detailed design, surface storage will be utilized in order to store the necessary volumes as per JFSA's memorendum and release what is necessary in the minor system to respect all City of Ottawa guidelines.
The main storm drainage design constraints can be summarized as follows:

a) Minor System
    1) Inflow rates into the minor system is detailed in JFSA's memorandum and are as follows:
        i. Park = 115 L/s/ha
        ii. School = 220 L/s/ha
        iii. Site Plans = 250 L/s/ha
        iv. Residential north of the North-South arterial = 220 L/s/ha
        v. Residential south of the North-South arterial = 340 L/s/ha
    2) Inflow rate into the existing south trunk minor system (Maple Grove Road) should be limited to 1,723 L/s as per the KWMSS.
    3) All inlets will be equipped with inlet control devices. The term "inlet" means "a single catch basin" or "a group of interconnected catchbasins" connected by a single lead into the minor system.
    4) The hydraulic grade line shall be computed, and the maximum permitted hydraulic grade line elevation is to be 0.30m below the underside of footing.
b) Major System
    1) Grading design is to be based on split lot drainage.
    2) On site detention storage may be provided in the following areas:

i. Road low points (Sawtoothing design)
ii. Parking Areas on private sites
iii. In parks and schools.

c) Street and Rear Yard Emergency Overflow
   1) On street routing to emergency storage area must be provided and illustrated on the grade control plan. This routing must incorporate a maximum 0.35m flow depth on street under either static or dynamic conditions. An overall positive slope of 0.10% will be required across consecutive high points for routing purposes.
   2) A maximum ponding depth of 0.30m will be allowed in the rear yards.
   3) A ponding area plan that includes an identification number, the area, the depth, the volume and an elevation will be provided.

d) Water Quality
   1) A Normal Level of Protection (70 % removal of Total Suspended Solids) needs to be achieved in the stormwater management wet pond. The Best Management Practices should also be implemented within the subdivision design and during construction.

The storm flows will be captured into the minor system using road catch basins at road sags and releasing the control rate as indicated in JFSA's memorandum. During the detailed design single or twin catch basins will be chosen depending on the designed release rate and the ICDs orifice will need to be designed accordingly.

The City of Ottawa provides requirements for minor system capture depending on the road's and development's type ranging from an equivalent 2 year, 5 year and 10 year storm event. Table 8 in Appendix "E" shows the proposed minor system under such conditions.

Additionally, Table 9 shows the calculations for the minor system under various restricted flows and includes the hydraulic grade line calculation results to ensure that a freeboard of 0.30 m is provided with the calculated underside of footings.

The minor system will be modeled during the detailed design stage to ensure adequate freeboard is provided throughout the development.

JFSA was retained to complete a preliminary stormwater analysis for 130 Huntmar Drive and to assess the existing Pond 4. It was determined that the pond needs to be upsized by 25,600m^3 for a total storage volume of 72,100m^3, refer to JFSA's memorandum in Appendix "E" of this report.

The pond expansion was assessed at a high level and the proposed pond expansion can be found on the Storm Drainage Area Plan. The pond expansion will be further assessed during the detailed design.

2.5.1 Storm to Maple Grove Road

As mentioned previously, it was determined that inflow rate into the existing storm trunk on Maple Grove Road shall be limited to 1,723 L/s as per the KWMSS. An excerpt drawing from the KWMSS, ST-PS located in Appendix "E", shows the 4 drainage areas that were designed to drain into the Maple Grove storm trunk sewer. A portion of area A-8 is within the proposed development and was calculated at 0.53ha. Area A-22 was allocated for the future LRT but that area is now proposed to drain into the proposed north storm trunk sewer since the grades of the LRT and the adjacent North-South arterial are sloping down towards the north. The proposed entry points on Maple Grove are not the same as the KWMSS but the allowable flow into the storm sewer is the same. JFSA has modeled the trunk sewer on Maple Grove Road with the proposed flows and found that the existing sewer is adequately sized to take the proposed flows.

2.5.2 Carp River

The SWM Pond 4 discharges into the Carp River located east of the pond. JFSA as modelled the Carp River at 4 key locations on the Carp River downstream of Pond 4. It was found the proposed Pond 4 upgrade results in water levels on the Carp River to be either equal to or slightly less then that set by the City's Ultimate condition model. The proposed discharge peak flows of the 2 year to the 100 year storm event can be found in Appendix "E', refer to JFSA's memorandum Model Results Carp River for more details.

2.5.3 Low Impact Development (LIDs)

As per the KWMSS the proposed development is considered to be in an area of moderate groundwater recharge and will need to meet the proposed infiltration rates of 104 mm/Year. It is proposed to use an infiltration system using the road catchbasins and infiltration trenches on both sides to infiltrate the 104mm/year requirement. The proposed LID measure is proposed to have perforated pipes connected to the road catchbasins. The perforated pipes obvert will be set to the invert of the catchbasin outlet lead pipes connected to the main storm sewer. The perforated pipe will be surrounded by 25 mm clear stone infiltration trench. Refer to Infiltration Detail sketch SK2 in Appendix E for details. Refer to JFSA's memorandum in Appendix E for detail calculation of the pre and post-development water balance.

3.0 CONCLUSION

This report has demonstrated that the proposed 130 Huntmar Drive site can be serviced by extending the existing sanitary sewers and watermain adjacent to the proposed development. The storm sewer system will be designed in conformance with the City of Ottawa standards and outlet to the Pond 4 SWM Facility. The Pond 4 SWM Facility can be expanded to service the site and satisfy the required water quality and water quantity criteria.

Based on the information provided in this report, the 130 Huntmar Drive site can be serviced to meet the City of Ottawa requirements.

Prepared by:

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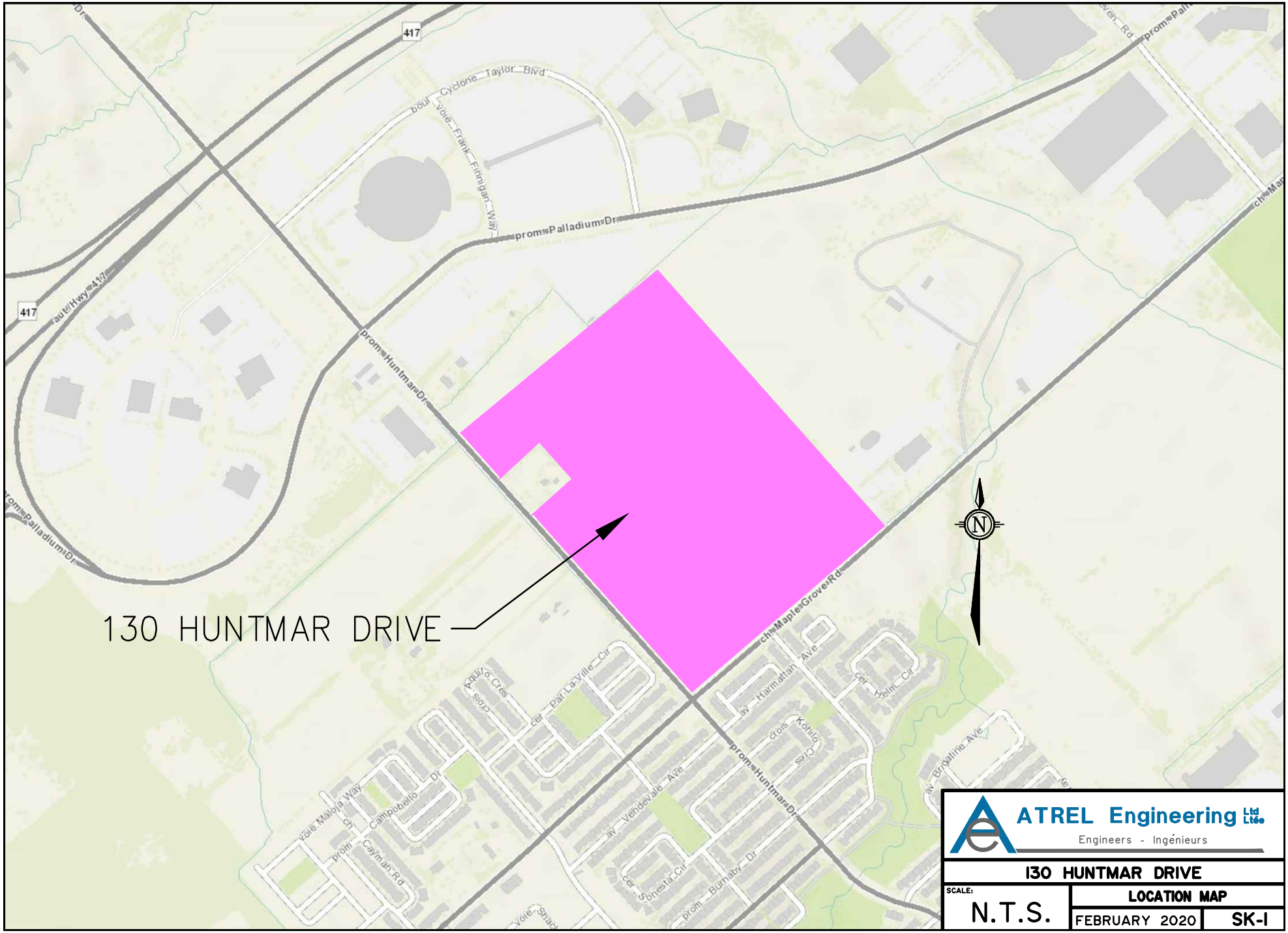
APPENDIX "A"

- SK-1 Location Map
- 130 Huntmar Drive – Draftplan of Subdivision
- 130 Huntmar Drive – Pre-Consultation Meeting Minutes
- 130 Huntmar Drive – Concept Plan
- LRT Extension – Plan and Profile (Parsons)



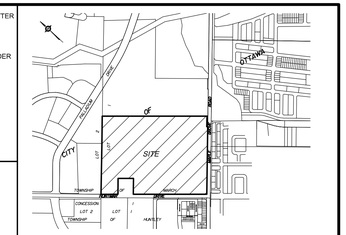
ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs

130 HUNTMAR DRIVE		
SCALE: N.T.S.	LOCATION MAP	
	FEBRUARY 2020	SK-1

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____.

THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS ____ DAY OF _____, 20__.

_____
DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW-WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC
DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 1
CONCESSION 1
Geographic Township of March
CITY OF OTTAWA

Prepared by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 1000

40 30 20 10 0 20 40 Metres

Metric
DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :
The boundaries of the lands to be subdivided and their relationship to adjoining lands have been accurately and correctly shown.

_____ Date

_____ T. Hartwick
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

This is to certify that I am the owner / agent of the lands to be subdivided and that this plan was prepared in accordance with my instructions.

_____ Date

_____
Marcel Denomme
Urbandale Corporation
I have authority to bind the corporation

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see plan
(b) see plan
(c) see plan
(d) single family, multi-family residential housing, institutional, park land and commercial
(e) see plan
(f) see plan
(g) see plan
(h) City of Ottawa
(i) see soils report
(j) see plan
(k) sanitary, storm sewers, municipal water, bell, hydro, cable and gas to be available
(l) see plan

REVISION SCHEDULE			
NO.	REVISION	DATE	
II	Revised Street 1	MAR.19, 2021	DG
10	Revised part of Street 2 width	Sept. 23, 2020	N
9	Revised Centreline St. No 1	AUG. 28, 2020	N
8	for discussion	AUG. 12, 2020	N
7	.....	.....	..
4	revise lots	July 29, 2020	ST
3	for discussion	Feb. 6, 2020	N
2	for discussion	Oct. 9, 2019	N
1	PLAN PREPARED	, 2019	N

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com

Ontario Land Surveyors

Job No. 20131-19 Urbandale Pt Lt 1 Cl MA DPS DIG N

130 Huntmar
Pre-Consultation Meeting Minutes

Location: Room 4103E, City Hall
Date: July 8, 10 to 11am

Attendee	Role	Organization
Stream Shen	Planner	City of Ottawa
Eric Surprenant	Project Manager (Engineer)	
Melanie Knight	Urban Designer	
Rosanna Baggs	Project Manager (Transportation)	
Neeti Paudel	Project Manager (Transportation)	
Mike Russett	Parks Planner	
Samantha Gatchene	Planning Assistant	
Miguel Tremblay	Planner	Fotenn Consultants
Matt McElligott	Planner	
Jacob Bolduc	Planner	
Marcel Denomme	Developer	Urbandale
Jean Decoeur	Engineer	Atrel

Comments from Applicant

1. The applicant is proposing a residential subdivision with 188 singles, 488 towns and 580 apartment units. Also included in the subdivision is a French public elementary school block, a neighbourhood park, and a commercial block.
2. Applicant explained the project history and indicated that the long dormant period is to wait for the completion of the Kanata LRT EA project to clarify the LRT alignment.
3. Proposing to realign the NS Arterial (Robert Grant) into a perpendicular alignment to provide better developable blocks. The applicant is proposing a round-about at the bend similar to the geometry of the road within the Cavanagh/Shenkman subdivision at 195 Huntmar.
4. The applicant indicate that all the local roads will be 18m right-of-way and all local access to Huntmar Drive will be right-in right-out.

Planning Comments

1. This is a pre-consultation for a Major Zoning By-law Amendment and Plan of Subdivision Application. Application form, timeline and fees can be found here.

2. Commercial and higher density residential uses should be located beside the Huntmar/NS Arterial intersection and the NS Arterial/Maple Grove intersection.
3. The site is designated as Mixed-Use Centre within the Official Plan. Section 3.6.2 Policy 10 (e) require residential uses in the form of apartments and other multiples at a medium or high density. As a result, single-detached homes is not permitted in this subdivision.
4. The Kanata West Secondary Plan's height schedule indicate that this parcel has a maximum height limit of 4 stories.
5. The development of window streets along the future arterial road is encouraged.
6. Please consider a further mix of different residential housing types within the subdivision.
7. There is a requirement for a minimum of 5,000 jobs within a Mixed-Use Centre, the applicant will need to demonstrate how this subdivision contributes to the minimum requirement in the planning rationale.
8. Section 3.6.2 (MUC) Policy 14(e) relating to an intensification/redevelopment plan is not required for this subdivision.
9. This project is not subject to UDRP.
10. Please consult with the Ward Councillor prior to submission.

Engineering Comments

1. Please coordinate the installation of trunk sewers with adjacent property owners.
2. Given the redirection of some stormwater flow within the Cavanagh/Shenkman subdivision to pond 7, the interim condition of pond 4 may be sufficient to accommodate this proposed development. This requires further investigation by the applicant.

Transportation Comments

1. Follow Traffic Impact Assessment Guidelines
    a. Traffic Impact Assessment will be required.
    b. Start this process asap.
    c. Applicant advised that their application will not be deemed complete until the submission of the draft step 1-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).
2. Geometric Road Design (GRD) drawings will be required with the first submission of underground infrastructure and grading drawings. These drawings should include such items as, but is not limited to:
    a. Road Signage and Pavement Marking for the subdivision;

   b. Intersection control measure at new internal intersections; and
   c. Location of depressed curbs and TWSIs;
   d. More details can be provided upon request

3. A pedestrian and traffic calming plan will be required prior to the submission of the GRD.
4. Include traffic calming measures on roads within the limits of their subdivision to limit vehicular speed and improve pedestrian safety. Traffic calming measures shall reference best management practices from the Canadian Guide to Neighbourhood Traffic Calming, published by the Transportation Association of Canada, and/or Ontario Traffic Manual, and/or the City of Ottawa's Draft Traffic Calming Design Guidelines. These measures may include either vertical or horizontal features (such measures shall not interfere with stormwater management and overland flow routing), including but not limited to:
   a. intersection or mid block narrowings, chicanes, medians;
   b. speed humps, speed tables, raised intersections, raised pedestrian crossings;
   c. road surface alterations (for example, use of pavers or other alternate materials, provided these are consistent with the City's Official Plan polices related to Design Priority Areas);
   d. pavement markings/signage; and
   e. temporary/seasonal installations such as flexi posts or removable bollards.
5. Refer to the Kanata West CDP and supporting TMP for guidance on the above.
6. Cross-sections shown in the TMP are dated and the City may require that these be revised to align with current design trends and practices, ie on-street cycle facilities vs off road facilities.
7. N-S Arterial (aka Robert Grant Extension between Huntmar and Maple Grove is to have a ROW of 37.5m for a four-lane divided arterial (4-UAD) cross-section.
8. The Major collector between Huntmar and Palladium will not be constructed.
9. Maple Grove Road (Terry Fox Drive to Huntmar Drive) proposed to be widened equally on both sides of the existing centerline; 37.5m ROW required.
10. Huntmar ROW protection of 37.5m.
11. Reduce the number of local road connections to the arterials.
12. Reconfigure the house orientation to reduce the number and need of noise barriers.
13. Ensure to pair driveways where possible; consideration for fire hydrant placement should be included in this exercise.
14. Corner triangles as per OP Annex 1 - Road Classification and Rights-of-Way at the following locations on the final plan will be required:

a. Local Road to Local Road: 3 metre x 3 metres
b. Local Road to Collector Road: 5 metre x 5 metres
c. Collector Road to Collector Road: 5 metre x 5 metres
d. Collector Road to Arterial Road: 5 metre x 5 metres

15. Noise Impact Studies required:
    i. Feasibility before draft approval
    ii. Detailed before registration
    b. Road
    c. LRT

Park Comments

1. 50/50 target split in accordance with KWCP for parkland dedication v.s. CIL contribution to Kanata West District Park is still applicable, however, only a guideline. Proposed park block is in keeping with this target.
2. Orientation of proposed park block is suitable for development.
3. Park block co-location with school block not preferred
4. Given that one of the park frontages is along the future north-south arterial road, question on how to allow for safe/controlled pedestrian movement to the park from the southern portion of the future community across the future north-south arterial. Controlled/safe crossing required in the future north-south arterial design.

CEPEO Comments

1. Please shift the school block towards the east so that it has frontage along Maple Grove and a local road.
2. Please consider the integration of a bus lay-by in the City easement along this site. We typically request a bus drop-off area sized for 6 to 8 buses along the frontage of all new school sites.

MVCA Comments

The attached mapping indicates that the subject lands are not subject to our regulation – we do not identify any natural hazards or natural heritage features within the scope of our review being associated with these lands.

We note that the lands are within the boundary of the Carp River Watershed/Subwatershed Study (CRWSS) and the Kanata West Implementation Plan.

The required targets as per the CRWSS are:

- Infiltration requirement based on moderate recharge area: 104mm/yr

- Water quality might be taken care of by the SWMF: 10% normal level of WQ, 10l/s (7day) low flow augmentation.
- Max temperature in Carp river: 30^0C, Carp river has moderately tolerant warm water fisheries community.

We understand that runoff from these lands would be directed towards Pond 4, which outlets to the Carp River. We understand that Phase 1 of this pond has been constructed. Confirmation should be provided on whether the existing pond has capacity for the subject lands, or whether this development would trigger an expansion to the pond. Should an expansion to the pond be required, a permit from us under O.Reg 153/06 will be required.

Forestry Comments

1. a Tree Conservation Report (TCR) must be supplied for review along with the various other plans/reports required by the City; an approved TCR is a requirement for Site Plan approval
2. any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
3. the removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
4. the TCR must list all trees on site by species, diameter and health condition; similar groupings (stands) of trees can combined using averages by species, diameter class
5. the TCR must address all trees with a critical root zone that extends into the developable area – all trees that could be impacted by the construction that are outside the developable area need to be addressed.
6. Trees with a trunk that crosses/touches a property line are considered co-owned by both property owners; permission from the adjoining property owner must be obtained prior to the removal of co-owned trees
7. If trees are to be removed, the TCR must clearly show where they are, and document the reason they can not be retained – please provide a plan showing retained and removed treed areas
8. All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines listed on Ottawa.ca
9. Please ensure newly planted trees have an adequate soil volume for their size at maturity. The following is a table of recommended minimum soil volumes:

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

10. The City requests that all efforts are made to retain trees – trees should be healthy, and of a size and species that can grow into the site and contribute to Ottawa's urban forest canopy
11. For more information on the TCR process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

Please contact me at stream.shen@ottawa.ca or at 613-580-2424 extension 24488 if you have any questions.

Sincerely,

Stream Shen MCIP RPP
Planner II
Development Review - West

130 HUNTMAR DR OTTAWA

CONCEPT BLOCK PLAN

LEGEND

- RESIDENTIAL MID-DENSITY (~ 300 to 350 units)
- RESIDENTIAL LOW DENSITY (TOWNHOUSES)
- RESIDENTIAL LOW DENSITY (SINGLE DETACHED)
- SCHOOL SITE - 6ac
- COMMERCIAL
- PARKLAND DEDICATION
- EASEMENT
- PROPERTY BOUNDARY
- SETBACKS

0 25m 50m 150m

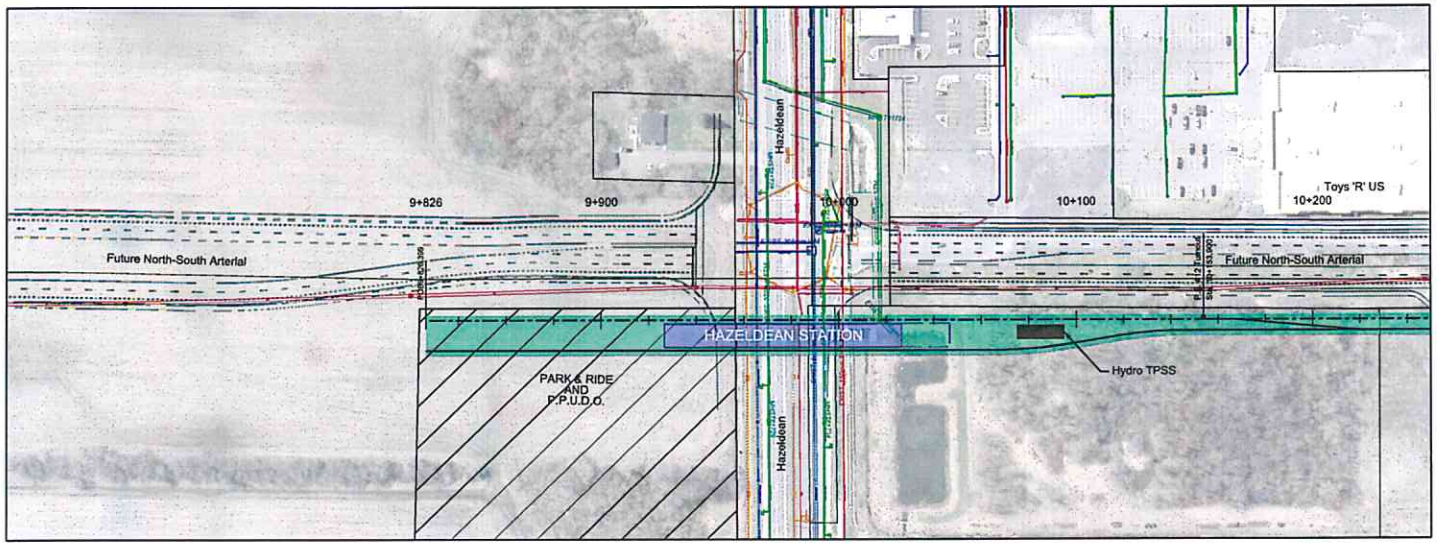
No.	REVISION	DATE	BY
12	UPDATE CONCEPT	2021.03.18	EL
11	UPDATE CONCEPT	2021.03.15	EL
10	REVISE CONCEPT	2021.03.04	EL
9	UPDATE CONCEPT	2020.10.22	EL
8	REMOVE 10m BUFFER	2020.09.25	RP
7	UPDATE CONCEPT	2020.09.17	RP
6	REVISE SIDEWALKS	2020.09.02	RP
5	FOR 1ST RESUBMISSION	2020.08.24	RP
4	FOR OPA SUBMISSION	2020.02.19	RP
3	OPTION 4	2019.03.14	RP
2	FOR CLIENT REVIEW	2019.01.22	EL
1	DRAFT	2018.12.20	RP

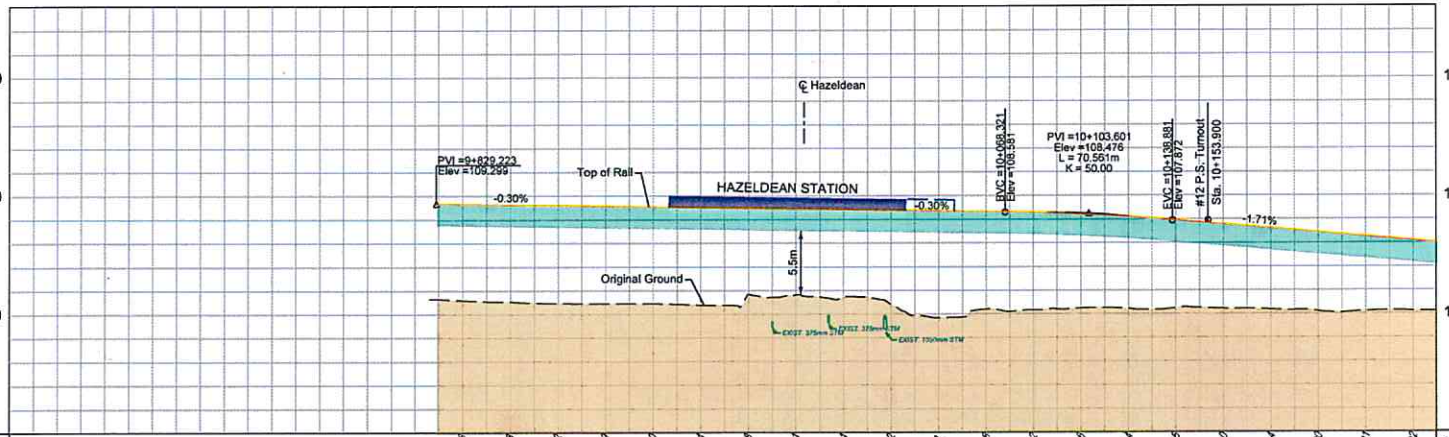
CLIENT
URBANDALE

FOTENN
Planning + Design
223 McLeod Street, Ottawa ON K2P 0Z8
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	MT
DATE	2018.12.20

P1





Station	9+820	9+900	10+000	10+100	10+200
Top of Rail	109.27	109.21	109.15	109.09	109.03	108.97	108.91	108.85	108.79	108.73	108.67	108.61	108.53	108.39	108.16	107.85	107.51	107.17	106.83	106.48	106.14
Original Ground																					

Note:
Pathways are conceptual and are subject to change.

Legend:
- Hydro
- Sanitary Sewer
- Storm Sewer
- Watermain
- ℄ Track 1-Alignment
- ℄ Track 2
- Underground Structure
- Open Trench Structure
- Top of Rail
- Original Ground
- Platform
- Property Line
- Turnout
- Ballasted Track
- Existing Ground Material
- Fill Material
- Direct Fixation on Concrete Slab
- Portal
- Rail Tunnel Allowance
- Aboveground Allowance
- Elevated Structure Allowance

DRAFT
FOR INFORMATION ONLY
March 13, 2018

March 13, 2018

Key Plan:

Confederation Line Kanata LRT Extension

Hazeldean Road to Moodie Drive

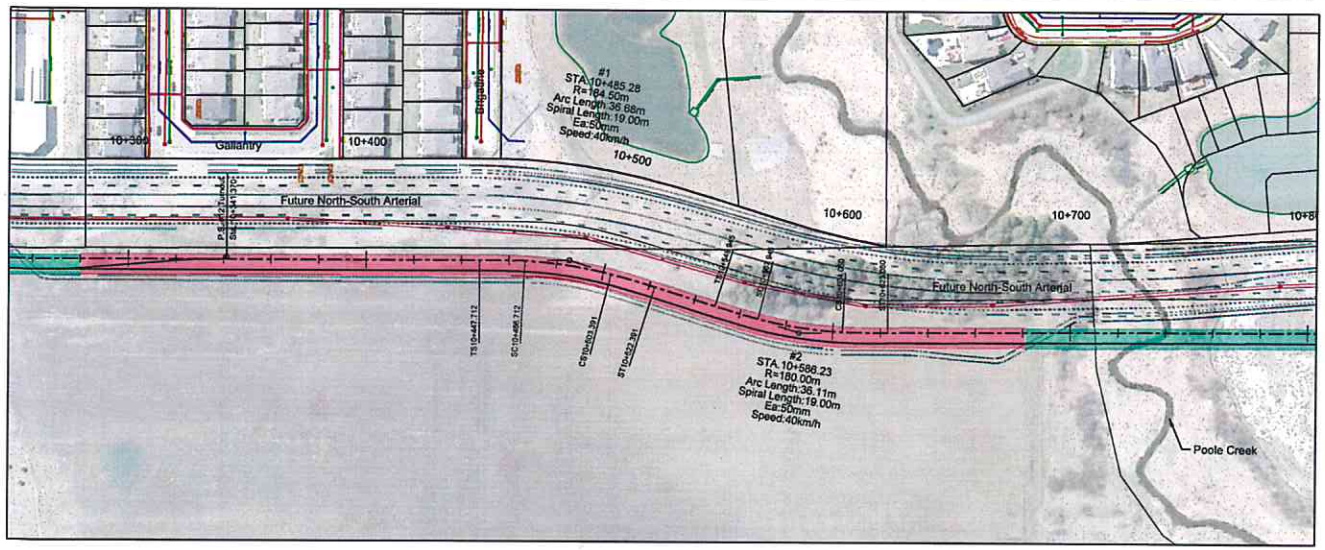
HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa PARSONS

Plan and Profile

Hazeldean Station
Limit of Kanata
LRT to 10+250

Revision:
Sheet: 1



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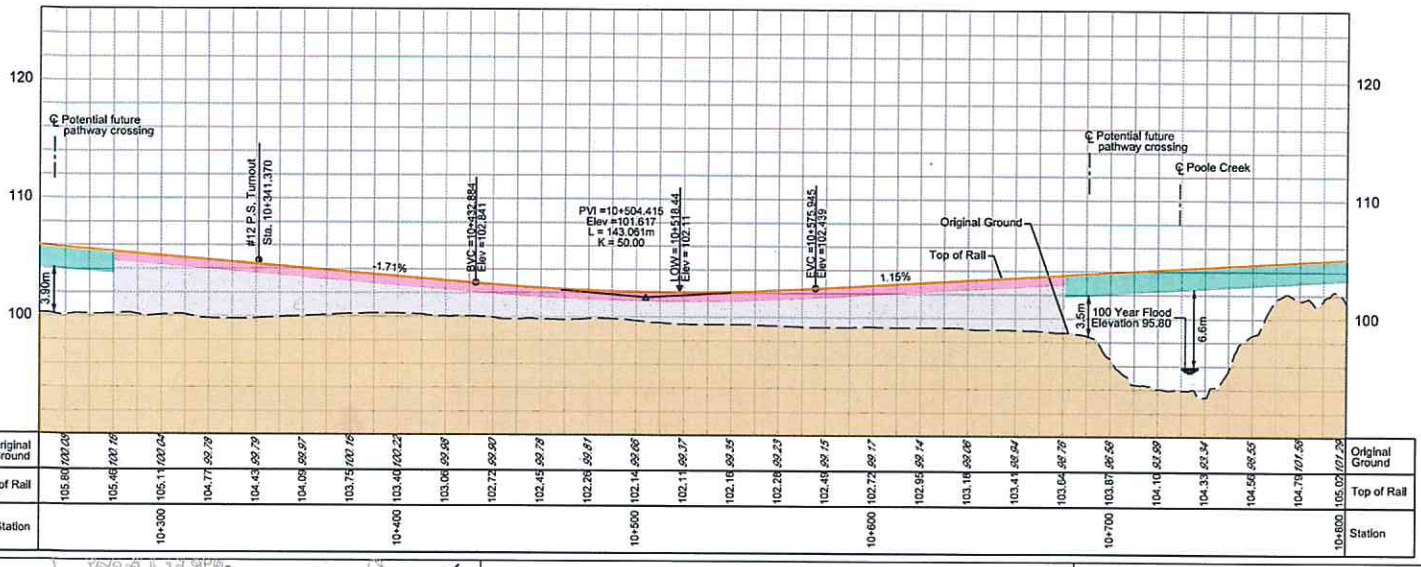

Legend:

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- ℄ Track 1-Alignment
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DRAFT
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March 13, 2018

Confederation Line Kanata LRT Extension

Hazeldean Road to Moodie Drive

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

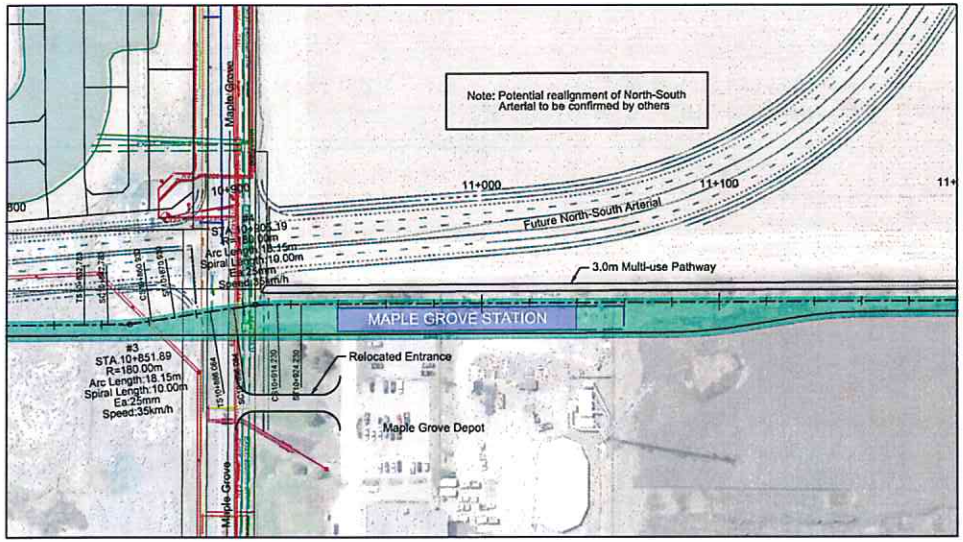
Ottawa PARSONS

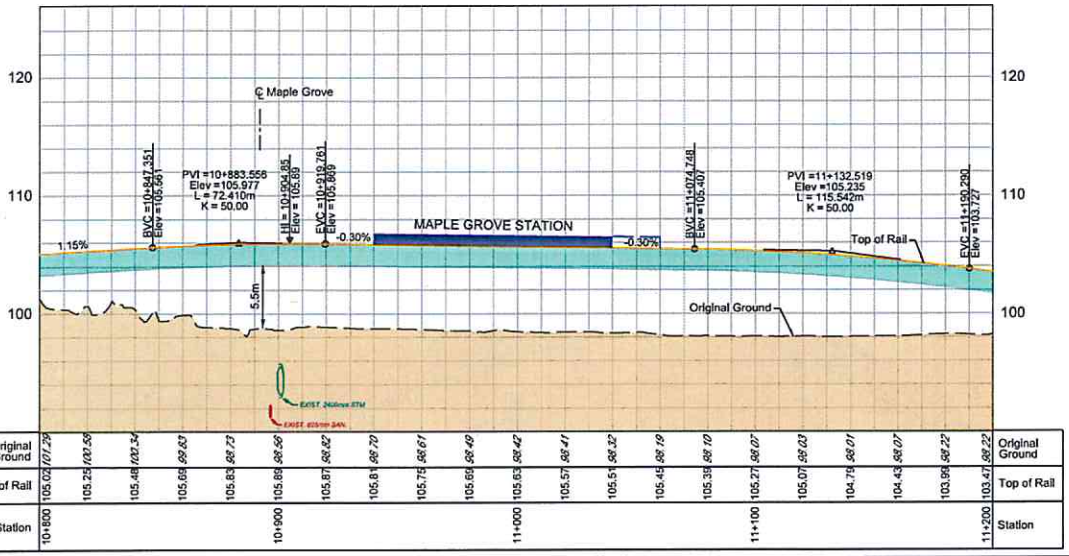
Section:
Plan and Profile

10+250 to 10+800

Revision:

Sheet: 2





Station	10+800					10+900					11+000					11+100					11+200	Station
Original Ground	105.02	105.29	105.48	105.69	105.83	105.89	105.87	105.81	105.75	105.69	105.63	105.57	105.51	105.45	105.39	105.27	105.07	104.79	104.43	103.99	103.47	Original Ground
Top of Rail	107.29	107.59	107.54	107.63	107.73	107.66	107.82	107.70	107.61	107.49	107.42	107.41	107.32	107.19	107.10	107.07	107.03	107.01	107.07	107.22	107.22	Top of Rail

Note:
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FOR INFORMATION ONLY
March 13, 2018

March 13, 2018

Confederation Line Kanata LRT Extension
Hazeldean Road to Moodie Drive

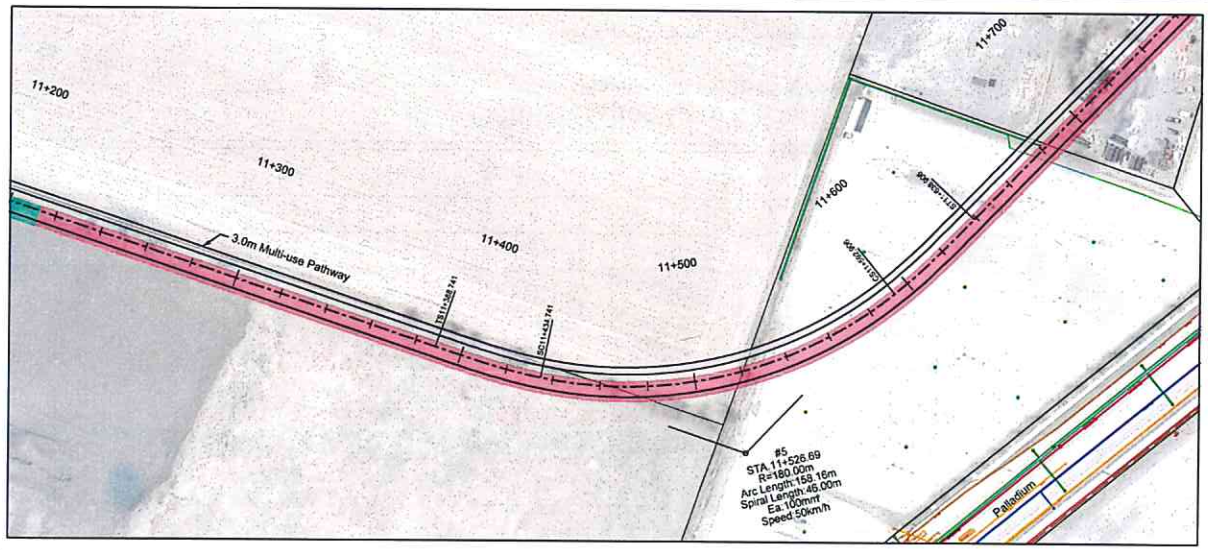
HORIZONTAL
0m 20 40 80 120 160
VERTICAL
0m 4 8 16 24 32

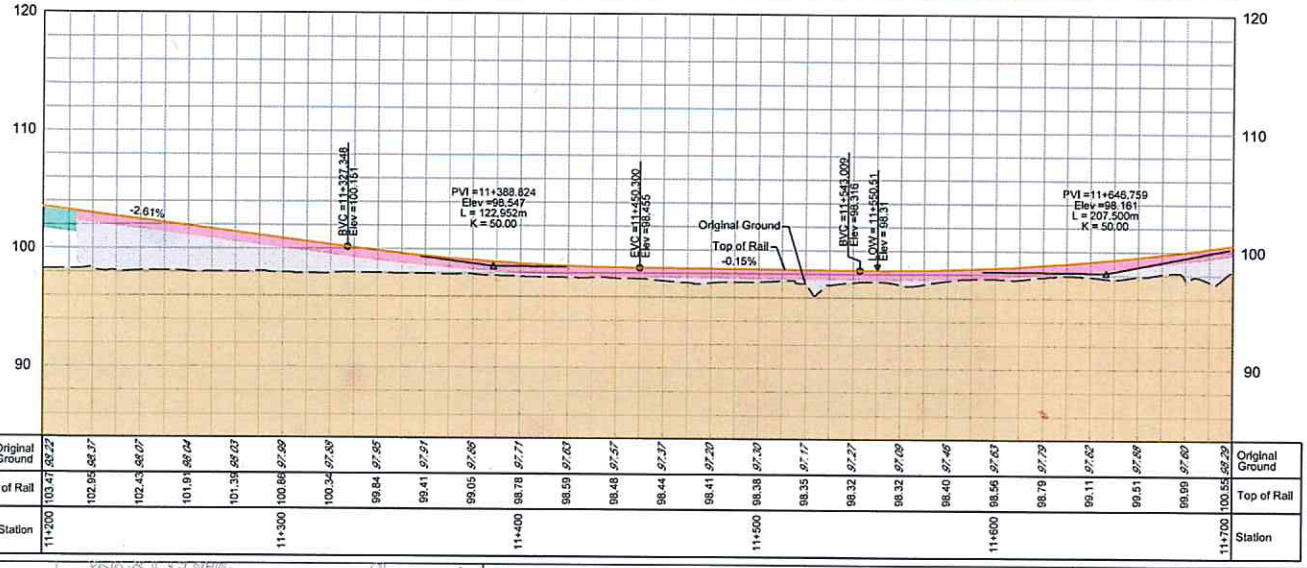
Ottawa PARSONS

Plan and Profile

Maple Grove Station
10+800 to 11+200

Revision:
Sheet: 3





Original Ground	98.22	98.37	98.07	98.04	98.03	97.99	97.89	97.85	97.91	97.86	97.71	97.63	97.57	97.37	97.20	97.30	97.17	97.27	97.09	97.46	97.53	97.79	97.62	97.58	97.60	98.29	Original Ground
Top of Rail	103.47	102.95	102.43	101.91	101.39	100.86	100.34	99.84	99.41	99.05	98.78	98.59	98.48	98.44	98.41	98.38	98.35	98.32	98.32	98.40	98.56	98.79	99.11	99.51	99.99	100.55	Top of Rail
Station	11+200					11+300					11+400					11+500					11+600					11+700	Station

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March 13, 2018

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Confederation Line Kanata LRT Extension
Hazeldean Road to Moodie Drive

HORIZONTAL 0m 20 40 80 120 160
VERTICAL 0m 4 8 16 24 32

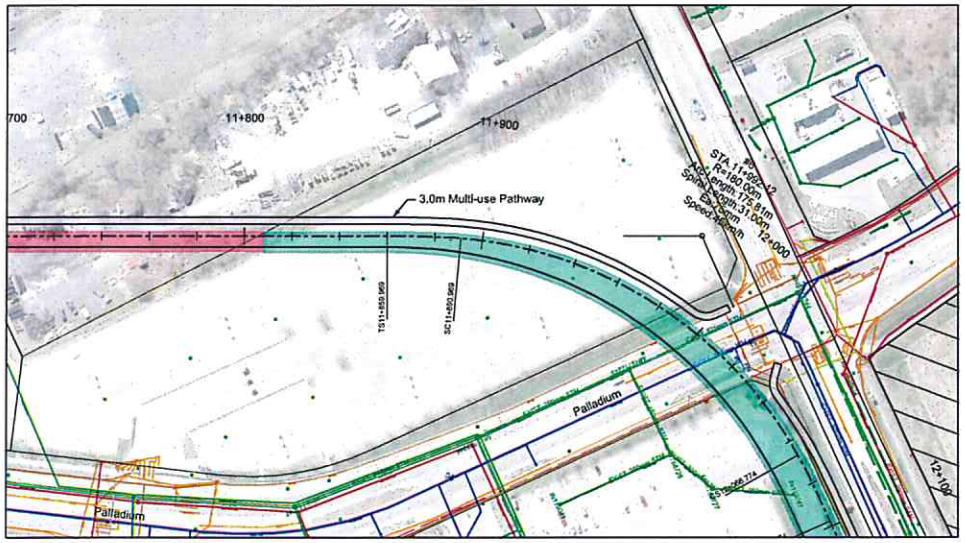
Ottawa PARSONS

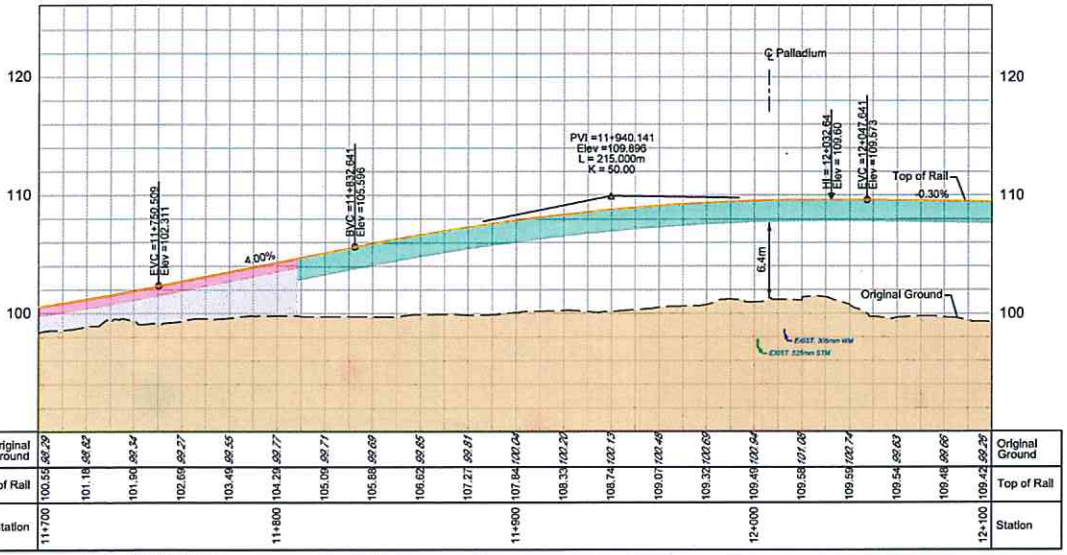
Plan and Profile

11+200 to 11+700

Revision:

Sheet: 4





Original Ground	100.55	101.18	101.90	102.68	103.49	104.29	105.06	105.88	106.62	107.27	107.84	108.33	108.74	109.07	109.32	109.49	109.58	109.59	109.54	109.48	109.42	Original Ground
Top of Rail	100.55	101.18	101.90	102.68	103.49	104.29	105.06	105.88	106.62	107.27	107.84	108.33	108.74	109.07	109.32	109.49	109.58	109.59	109.54	109.48	109.42	Top of Rail
Station	11+700					11+800					11+900					12+000					12+100	Station

Note:
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Legend:
- Hydro
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DRAFT
FOR INFORMATION ONLY
March 13, 2018

March 13, 2018

Confederation Line Kanata LRT Extension
Hazeldean Road to Moodie Drive

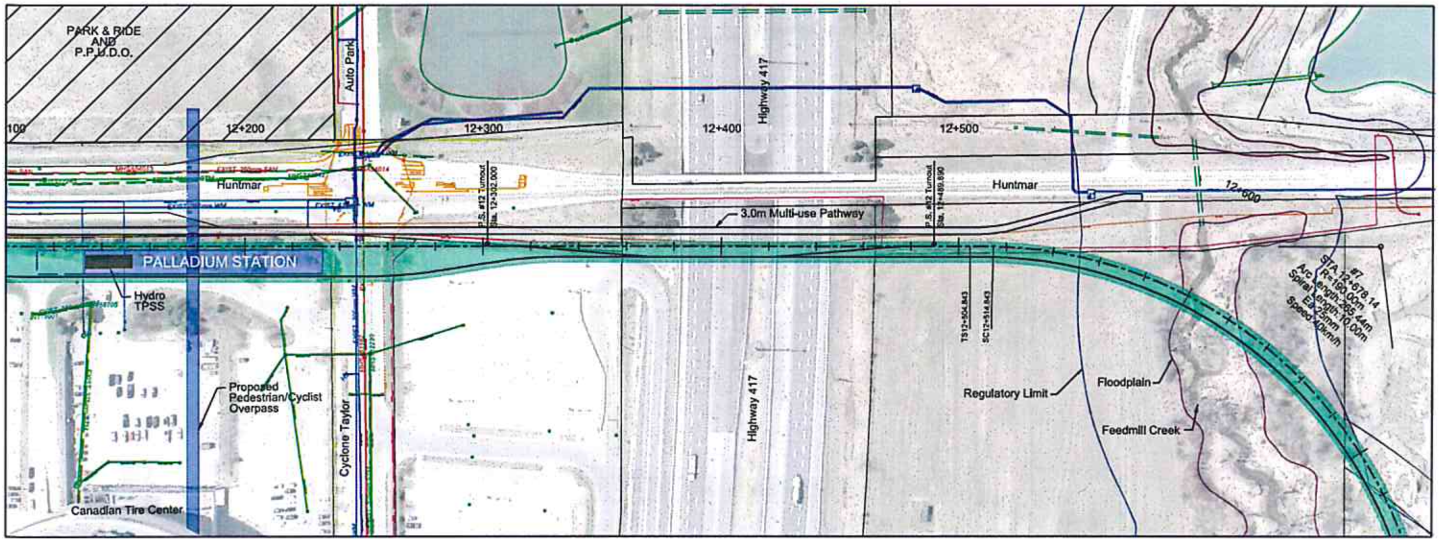
HORIZONTAL
0m 20 40 80 120 160
0m 4 8 16 24 32
VERTICAL

Ottawa PARSONS

Plan and Profile

11+700 to 12+100

Revision:
Sheet: 5



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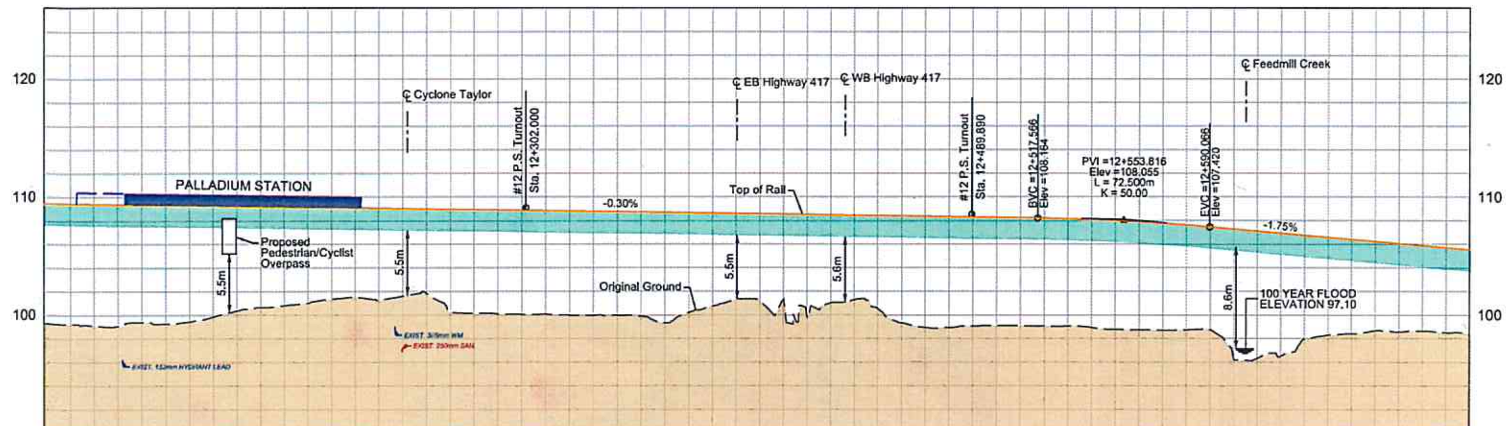

Station	Original Ground	Top of Rail
12+100	99.26	109.42
	99.06	109.36
	99.32	109.30
	99.39	109.24
	100.29	109.18
12+200	100.74	109.12
	101.29	109.06
	101.21	109.00
	101.64	108.94
	100.11	108.88
12+300	100.07	108.82
	99.95	108.76
	99.94	108.70
	99.30	108.64
	100.73	108.58
12+400	101.19	108.52
	100.43	108.46
	101.23	108.40
	99.31	108.34
	98.90	108.28
12+500	99.08	108.22
	99.04	108.16
	98.91	108.05
	98.73	107.86
	98.73	107.59
12+600	96.48	107.25
	96.44	106.90
	98.27	106.55
	98.63	106.20
	98.62	105.85
12+700	98.29	105.50

Legend:
- Hydro
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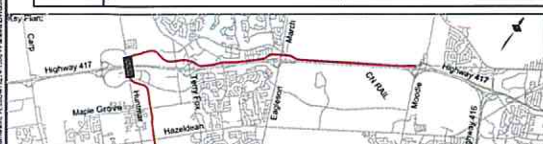
- Underground Structure
- Open Trench Structure
- Top of Rail
- Original Ground
- Platform
- Property Line
- Turnout
- Ballasted Track
- Existing Ground Material
- Fill Material
- Direct Fixation on Concrete Slab
- Portal
- Rail Tunnel Allowance
- Aboveground Allowance
- Elevated Structure Allowance

DRAFT
FOR INFORMATION ONLY
March 13, 2018

March 13, 2018

Key Plan:



Confederation Line Kanata LRT Extension

Hazeldean Road to Moodie Drive

HORIZONTAL 0 20 40 80 120 160
VERTICAL 0 4 8 16 24 32

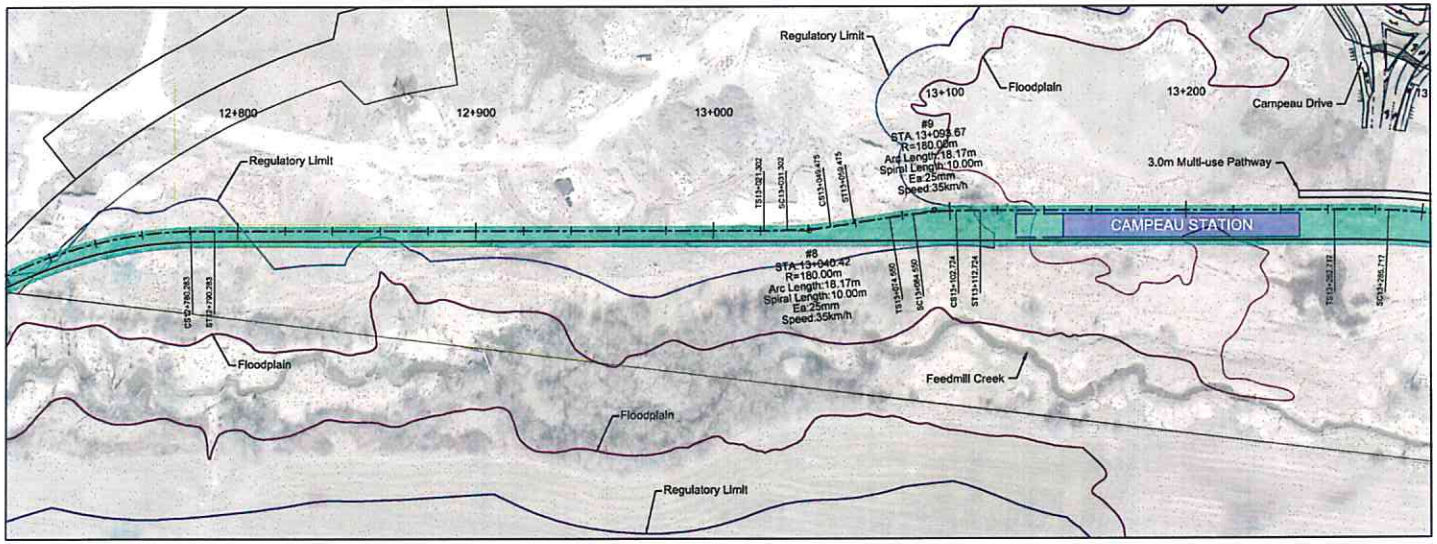
Ottawa PARSONS

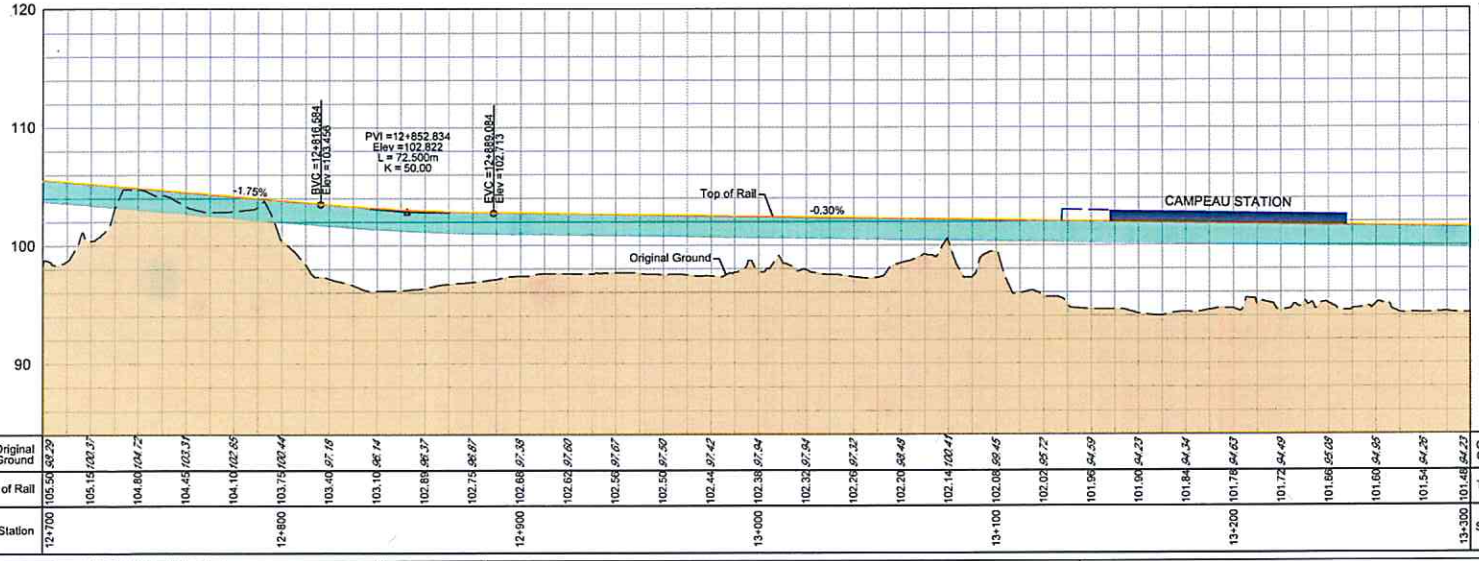
Plan and Profile

Palladium Station
12+100 to 12+700

Revision:

Sheet: 6





Station	Original Ground	Top of Rail
12+700	105.50	105.29
	105.15	105.17
	104.80	104.72
	104.45	104.31
	104.10	103.85
12+800	103.75	103.44
	103.40	103.18
	103.10	102.94
	102.89	102.87
	102.75	102.67
12+900	102.68	102.58
	102.62	102.60
	102.56	102.67
	102.50	102.50
	102.44	102.42
13+000	102.38	102.54
	102.32	102.54
	102.26	102.32
	102.20	102.48
	102.14	102.41
13+100	102.08	102.46
	102.03	102.72
	101.96	102.59
	101.90	102.23
	101.84	102.34
13+200	101.78	102.63
	101.72	102.49
	101.66	102.08
	101.60	102.05
	101.54	102.26
13+300	101.48	102.23

Note:
Pathways are conceptual and are subject to change.

Legend:
- Hydro
- Sanitary Sewer
- Storm Sewer
- Watermain
- ℄ Track 1-Alignment
- ℄ Track 2
- Underground Structure
- Open Trench Structure
- Top of Rail
- Original Ground
- Platform
- Property Line
- Turnout
- Ballasted Track
- Existing Ground Material
- Fill Material
- Direct Fixation on Concrete Slab
- Portal
- Rail Tunnel Allowance
- Aboveground Allowance
- Elevated Structure Allowance

DRAFT
FOR INFORMATION ONLY
March 13, 2018

March 13, 2018

Confederation Line Kanata LRT Extension

Hazeldean Road to Moodie Drive

HORIZONTAL 1in 20 40 80 120 160
VERTICAL 1in 4 8 16 24 32

Ottawa PARSONS

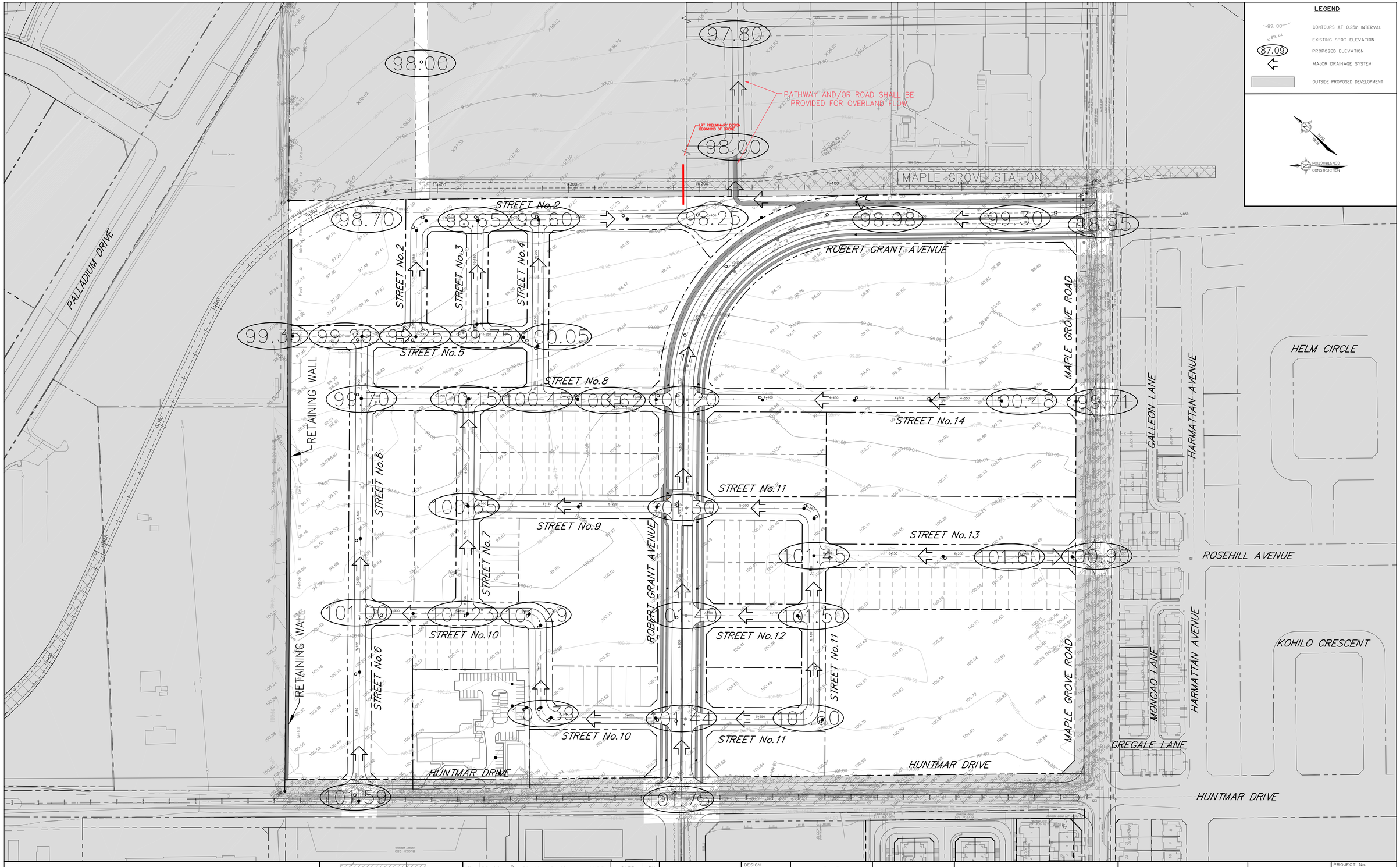
Plan and Profile

Campeau Station
12+700 to 13+300

Revision:
Sheet: 7

APPENDIX "B"

- 191002-GRM - Macro Grading Plan
- 191002-ESCM - Macro Erosion and Sediment Control Plan



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STREET MAP

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	JULY 6/20	AGS
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4	REVISED AS PER NEW ROAD ALIGNMENT	MAR. 4/21	AGS
5	REVISED AS PER CITY COMMENTS	MAR. 30/21	AGS
6	RECORD DRAWING	AUG 25/21	AGS
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE
1 : 1 250
10m 0 10 20 30 40m
HORIZONTAL

DESIGN AGS
CHECKED JMD
DRAWN CED
CHECKED AGS
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept 20, 2021
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J.M. LEDECOEUR
Sept 20, 2021
PROVINCE OF ONTARIO

ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-GRM

PLAN
MACRO GRADING PLAN

STRAW BALE FLOW CHECK DAM

LIGHT-DUTY SILT FENCE BARRIER

LIGHT-DUTY SILT FENCE BARRIER

LIGHT-DUTY SILT FENCE BARRIER

STREET No.2

STREET No.2

STREET No.3

STREET No.4

STREET No.5

STREET No.8

STREET No.14

STREET No.7

STREET No.6

STREET No.9

STREET No.11

STREET No.13

STREET No.10

STREET No.12

STREET No.11

STREET No.10

ROBERT GRANT AVENUE

MAPLE GROVE ROAD

GALLEON LANE

HARMATTAN AVENUE

HELM CIRC

ROSEHILL AVENUE

MORGAC LANE

HARMATTAN AVENUE

KOHILO CRES

GREGALE LANE

HUNTMAR DRIVE

HUNTMAR DRIVE

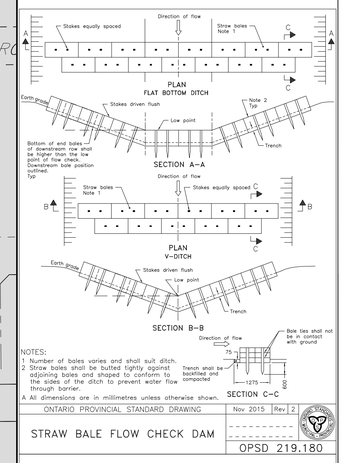
LEGEND

- EXISTING DECIDUOUS TREE (DEC 300mm)
- EXISTING TREE LINE
- STRAW BALES AS PER OPSD 219.180
- SILT FENCE BARRIER AS PER OPSD 219.110
- 80 — EXISTING ELEVATION CONTOUR
- 95.67 × — EXISTING SPOT ELEVATION
- OUTSIDE PROPOSED DEVELOPMENT

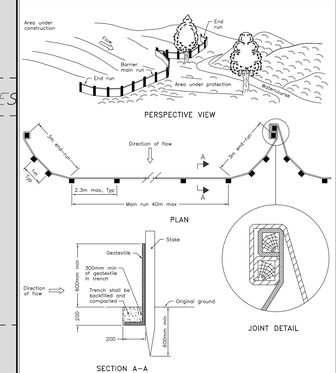
SILT FENCE CONSTRUCTION

NOTES

1) ADDITIONAL TO THIS PLAN, THE CONTRACTOR SHALL IMPLEMENT THE "BEST MANAGEMENT PRACTICE" ALL ALONG CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE TO INSTALL, INSPECT, REPAIR AND REMOVE THE SEDIMENT AND EROSION CONTROL METHODS
2) A SUMP OF 600mm IN DEPTH WILL BE PROVIDED IN ALL CATCHBASINS IN ORDER TO MINIMIZE THE AMOUNT OF SUSPENDED SOLIDS FROM ENTERING THE SEWER SYSTEM.
3) DURING CONSTRUCTION, FILTER CLOTH WILL BE PLACED UNDER ALL CATCHBASIN AND MANHOLE FRAMES AND COVERS AND STRAW BALES WILL BE PLACED WHERE WATER RUNOFF CAN CARRY EXCESSIVE SEDIMENTS INTO THE SEWER SYSTEM.
4) STRAW BALES SHALL BE INSTALLED ALONG THE VARIOUS SWALES (MAN MADE OR EXISTING) WHERE JUDGED NECESSARY BY THE ENGINEER AND/OR THE CITY OF OTTAWA'S INSPECTOR.
5) STRAW BALES SHOULD BE INSTALLED AS PER OPSD 219.100 AND OPSD 219.180 AS APPROPRIATE.
6) STRAW BALES SHALL BE INSTALLED AT EVERY MAJOR POINT OF WATER ENTRY INCLUDING DITCH INLET CATCHBASINS AND CULVERTS.
7) ALL SEDIMENT CONTROL LOCATIONS MUST BE INSPECTED ON A REGULAR BASIS ESPECIALLY FOLLOWING A RAINFALL EVENT. SEDIMENTS SHALL BE REMOVED AND CONTROLS REINSTALLED AS NECESSARY.
8) SHOULD IT BE IMPOSSIBLE TO PREVENT OVERLAND SHEET FLOW TO AN EXTERNAL AREA DURING THE CONSTRUCTION PHASE; SUCH AREA SHALL BE PROTECTED WITH A SILT FENCE AS PER OPSD 219.110 AND/OR FILTER CLOTH IN CATCHBASINS.
9) FILTER CLOTH IN CBs SHOULD BE INSTALLED WITH GENEROUS EXCESS OF MATERIAL AROUND PERIMETER TO FACILITATE REMOVAL. FOR CBs POTENTIALLY SUBJECTED TO HEAVING SEDIMENT LOADING, A GRANULAR "PRE-FILTERED" SHOULD BE PROVIDED AROUND PERIMETER OF CB OR AT INTERVALS ALONG THE CURB.
10) ANY MATERIAL STOCKPILES SHOULD BE LOCATED ON FLAT AREAS WELL AWAY FROM ANY DRAINAGE INLETS.
11) NO SEDIMENT CONTROL STRUCTURES SHALL BE REMOVED UNLESS FOUND UNNECESSARY OR ANOTHER SEDIMENT CONTROL POINT IS INSTALLED ELSEWHERE TO REPLACE THE LATTER.
12) THE SEDIMENT AND EROSION CONTROL MEASURES MAY BE MODIFIED IN THE FIELD AT THE DISCRETION OF THE CITY OF OTTAWA SITE INSPECTOR OR CONSERVATION AUTHORITY.
13) THIS PLAN IS A "LIVING DOCUMENT" AND THAT ANY MODIFICATION TO THE PLAN SHALL BE SUBMITTED TO THE SATISFACTION OF MVCA AND MAY BE MODIFIED BY MVCA STAFF.



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
STRAW BALE FLOW CHECK DAM		OPSD 219.180



ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
LIGHT–DUTY SILT FENCE BARRIER		OPSD 219.110

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6	*RECORD DRAWING*	*AUG 25/21*	*AGS*
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE
1 : 1 250
10m 0 10 20 30 40m
HORIZONTAL

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept 20, 2021
PROVINCE OF ONTARIO

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J.M. DECOEUR
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TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002

DATE JANUARY 2020

PLAN MACRO EROSION AND SEDIMENT CONTROL PLAN

DRAWING No. 191002-ESCM

APPENDIX "C"

- Excerpt from Infrastructure Master Plan (2013), Kanata West Feedermain
- City of Ottawa – Boundary Conditions for 130 Huntmar Drive
- 191002-WM1 - Watermain Layout and Demand
- Table 1: Boundary Condition Data
- Table 2: Node Data
- Table 3: Pipe Data
- Table 4: Average Day and Peak Hour Demand Results
- Table 5: Fire Flow Calculations
- Table 6: Maximum Day plus Fire Flow Results

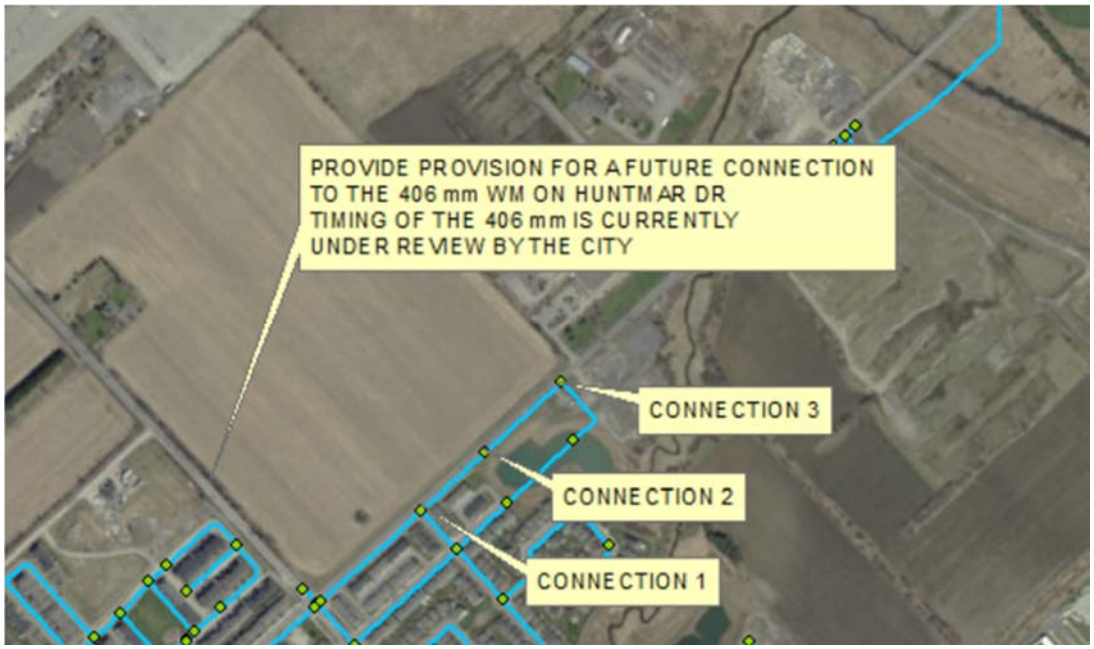
Boundary Conditions for 130 Huntmar Drive

Provided Information:

Date Provided December-19

Scenario	Demand	
	L/min	L/s
Average Daily Demand	469	7.81
Maximum Daily Demand	1,172	19.54
Peak Hour	2,580	43.00
Fire Flow Demand #1	10,020	167.00
Fire Flow Demand #2	16,980	283.00

Location:



Results:

Connection 1 - Maple Grove Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.0	85.5
Peak Hour	156.3	78.7
Max Day plus Fire 1	153.2	74.3
Max Day plus Fire 2	150.8	70.9

[1] Ground Elevation = 100.9m

Connection 2 - Maple Grove Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.0	86.9
Peak Hour	156.3	80.1
Max Day plus Fire 1	151.8	73.9
Max Day plus Fire 2	147.5	67.7

[1] Ground Elevation = 99.9m

Connection 3 - Maple Grove Road

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	161.0	88.7
Peak Hour	156.3	81.9
Max Day plus Fire 1	150.6	73.9
Max Day plus Fire 2	144.3	65.0

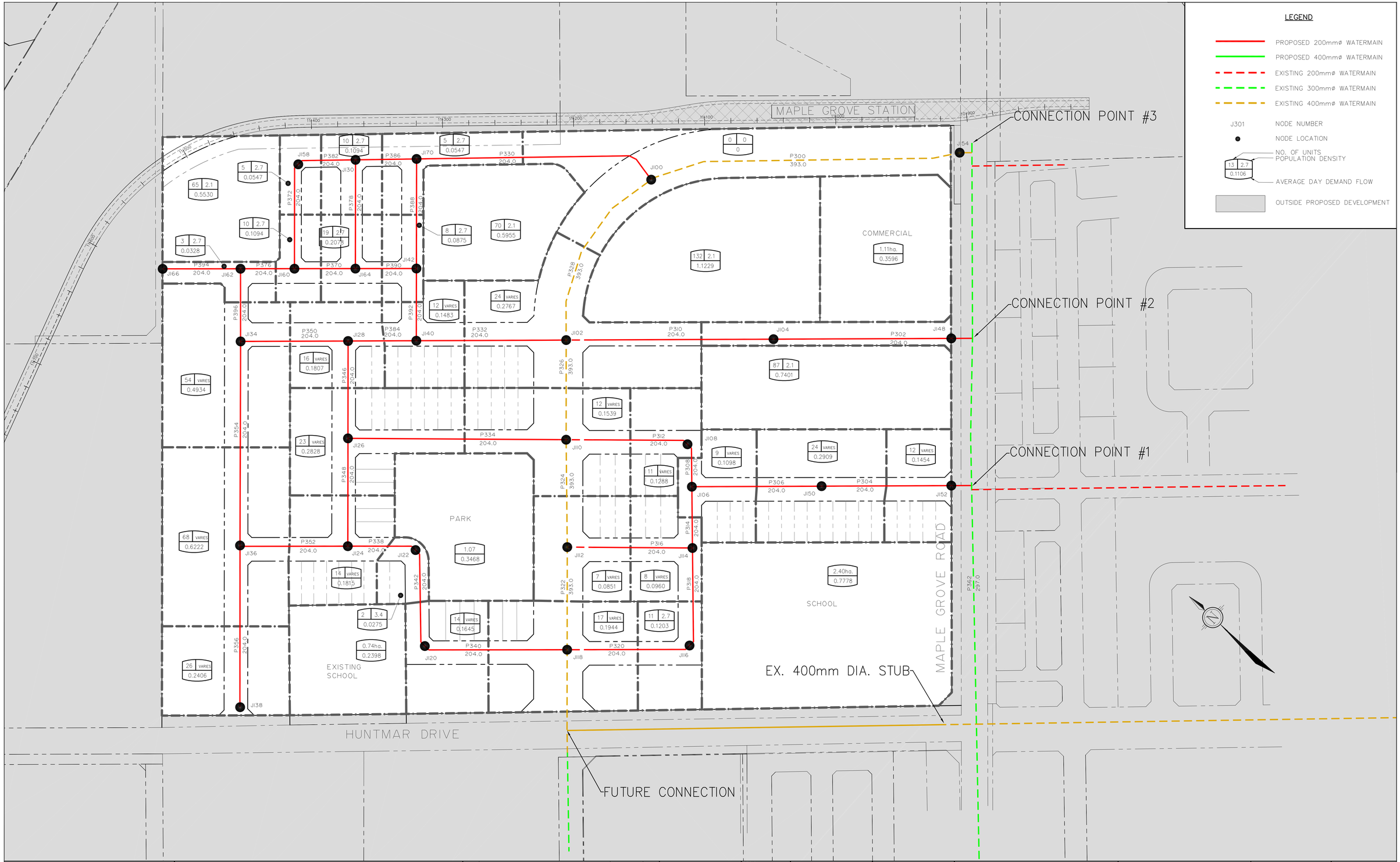
[1] Ground Elevation = 98.6m

Notes:

1. Pressure reducing valves are required since pressures are greater than 80 psi.
2. Looping of the watermain is required to decrease vulnerability of the water system in case of breaks.
3. Provide provision for a future connection to the 406mm watermain on Huntmar Drive. Timing of the 406mm watermain is currently under review by the City.

Disclaimer

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



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6	*RECORD DRAWING*	*AUG 25/21*	*AGS*
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE 1 : 1 250 (10m 0 10 20 30 40m)

DESIGN AGS
CHECKED JMD
DRAWN CED
CHECKED AGS
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER A. G. Y. SAUVE 100142393 PROVINCE OF ONTARIO Sept 20, 2021

LICENSED PROFESSIONAL ENGINEER J.M. JDEGOEUR PROVINCE OF ONTARIO Sept 20, 2021

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Engineers - Ingénieurs
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TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DRIVE

LIONESS DEVELOPMENT INC.

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-WMI

PLAN WATERMAIN LAYOUT AND DEMAND

TABLE 1: Boundary Condition Data

DATE: **September 2021**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **130 Huntmar Drive**
CLIENT: Urbandale Corporation
PROJECT #: 191002
BY: Atrel Engineering Ltd

Connection	X COORDINATE (m)	Y COORDINATE (m)	HEAD				LOCATION
			AVERAGE DAY (m)	MAX. DAY + 167 l/s (m)	MAX. DAY + 283 l/s (m)	PEAK HOUR (m)	
1	350409.33	4016841.56	161.00	153.20	150.80	156.30	Rosehill Ave
2	350495.71	5016913.83	161.00	151.80	147.50	156.30	120m East of Rosehill Ave
3	350597.88	5017004.74	161.00	150.60	144.30	156.30	250m East of Rosehill Ave

TABLE 2: NODE DATA

PROJECT: **130 Huntmar Drive**

DATE: **September 2021**

CLIENT: Urbandale Corporation

DESIGNED BY: AGS

PROJECT #: 191002

CHECKED BY: AGS

BY: Atrel Engineering Ltd

NODE. NO.	AVERAGE DAY DEMAND (l/s)	ELEVATION (m)	X COORDINATE (m)	Y COORDINATE (m)
J100	0.0000	98.25	350425.07	5017187.20
J102	0.2767	100.20	350285.80	5017143.79
J104	1.8630	100.40	350390.47	5017026.64
J106	0.1098	101.45	350265.64	5016998.93
J108	0.1288	101.40	350291.86	5017022.75
J110	0.1539	101.30	350229.14	5017093.34
J112	0.0851	101.40	350167.90	5017038.81
J114	0.0960	101.50	350231.04	5016967.49
J116	0.8981	101.60	350173.74	5016915.43
J118	0.1944	101.44	350108.91	5016986.27
J120	0.4043	101.39	350032.73	5017068.84
J122	0.2544	101.29	350093.36	5017122.24
J124	0.1815	101.23	350056.19	5017163.84
J126	0.2828	100.65	350117.48	5017218.32
J128	0.1807	100.15	350174.19	5017268.71
J130	0.1094	98.65	350277.79	5017358.18
J134	0.4934	99.70	350118.34	5017332.16
J136	0.5432	101.00	350001.56	5017224.99
J138	0.2406	101.59	349909.39	5017142.94
J140	0.1483	100.45	350208.24	5017230.60
J142	0.0875	100.05	350244.65	5017265.69
J148	0.3596	99.71	350483.55	5016927.66
J150	0.2909	101.60	350331.80	5016925.33
J152	0.1454	100.90	350397.96	5016851.72
J154	0.0000	98.95	350585.39	5017018.96
J158	0.0547	98.70	350249.55	5017394.03
J160	0.0328	99.29	350157.34	5017366.29
J162	0.1094	99.25	350185.18	5017335.39
J164	0.2078	99.75	350213.65	5017303.78
J166	0.5530	99.35	350121.06	5017408.01
J170	0.6502	98.60	350309.78	5017321.52

TABLE 3: AVERAGE DAY AND PEAK HOUR DEMAND RESULTS

PROJECT: **130 Huntmar Drive**
DATE: **September 2021**
CLIENT: Urbandale Corporation
DESIGNED BY: AGS
PROJECT #: 191002
CHECKED BY: AGS
BY: Atrel Engineering Ltd

NODE NO.	Elevation (m)	AVERAGE DAY DEMAND			PEAK HOUR DEMAND		
		Demand (l/s)	HGL (m)	Pressure (kPa)	Demand (l/s)	HGL (m)	Pressure (kPa)
J100	98.25	0.0000	160.90	613.90	0.0000	157.50	580.60
J102	100.20	0.2767	160.90	594.77	1.5219	157.49	561.39
J104	100.40	1.8630	160.89	592.73	10.2464	157.49	559.43
J106	101.45	0.1098	160.89	582.51	0.6039	157.50	549.25
J108	101.40	0.1288	160.89	583.00	0.7084	157.50	549.70
J110	101.30	0.1539	160.89	583.98	0.8465	157.49	550.60
J112	101.40	0.0851	160.89	583.00	0.4681	157.49	549.61
J114	101.50	0.0960	160.89	582.02	0.5280	157.49	548.67
J116	101.60	0.8981	160.89	581.04	2.0617	157.49	547.64
J118	101.44	0.1944	160.89	582.61	1.0692	157.49	549.21
J120	101.39	0.4043	160.89	583.09	1.3364	157.46	549.40
J122	101.29	0.2544	160.89	584.06	1.3992	157.44	550.26
J124	101.23	0.1815	160.89	584.65	0.9983	157.44	550.80
J126	100.65	0.2828	160.89	590.34	1.5554	157.44	556.52
J128	100.15	0.1807	160.89	595.24	0.9939	157.44	561.38
J130	98.65	0.1094	160.89	609.94	0.6017	157.44	576.07
J134	99.70	0.4934	160.89	599.64	2.7137	157.43	565.70
J136	101.00	0.5432	160.89	586.90	2.9876	157.43	552.96
J138	101.59	0.2406	160.89	581.12	1.3233	157.43	547.15
J140	100.45	0.1483	160.89	592.30	0.8157	157.44	558.49
J142	100.05	0.0875	160.89	596.22	0.4813	157.44	562.38
J148	99.71	0.3596	160.89	599.49	0.9709	157.61	567.40
J150	101.60	0.2909	160.89	581.04	1.6000	157.57	548.43
J152	100.90	0.1454	160.89	587.90	0.7997	157.66	556.17
J154	98.95	0.0000	160.90	607.09	0.0000	157.53	574.03
J158	98.70	0.0547	160.89	609.45	0.3009	157.44	575.57
J160	99.29	0.0328	160.89	603.66	0.6017	157.43	569.72
J162	99.25	0.1094	160.89	604.05	0.1804	157.43	570.17
J164	99.75	0.2078	160.89	599.16	1.1429	157.44	565.29
J166	99.35	0.5530	160.89	603.07	3.0415	157.42	569.09
J170	98.60	0.6502	160.89	610.43	3.5761	157.44	576.59
	Total =	9.1357	l/s		Total =	45.4747	l/s

TABLE 4: PIPE DATA

DATE: **September 2021**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **130 Huntmar Drive**
CLIENT: Urbandale Corporation
PROJECT #: 191002
BY: Atrel Engineering Ltd

PIPE NO.	FROM	TO	LENGTH (m)	INSIDE DIAMETER (mm)	ROUGHNESS	AVERAGE DAY DEMAND				PEAK HOUR DEMAND			
						FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)	FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)
P300	J100	J154	232.39	393	120	-9.1313	0.0753	0.0055	0.0238	-22.3629	0.1844	0.0290	0.1248
P302	J104	J148	135.87	204	110	0.3597	0.0110	0.0002	0.0016	-10.6627	0.3262	0.1233	0.9074
P304	J152	J150	98.97	204	110	-0.1455	0.0045	0.0000	0.0002	10.6737	0.3266	0.0900	0.9092
P306	J106	J150	98.97	204	110	0.4364	0.0134	0.0002	0.0024	-9.0738	0.2776	0.0666	0.6730
P308	J106	J108	35.42	204	110	-0.4564	0.0140	0.0001	0.0026	3.6823	0.1127	0.0045	0.1266
P310	J104	J102	157.10	204	110	-2.2226	0.0680	0.0078	0.0497	0.4163	0.0127	0.0004	0.0023
P312	J108	J110	94.43	204	110	-0.5852	0.0179	0.0004	0.0043	2.9739	0.0910	0.0081	0.0853
P314	J114	J106	46.76	204	110	0.0898	0.0027	0.0000	0.0004	-4.7876	0.1465	0.0096	0.2057
P316	J114	J112	95.25	204	110	-0.5279	0.0162	0.0003	0.0033	1.8914	0.0579	0.0035	0.0369
P318	J114	J116	77.42	204	110	0.3421	0.0105	0.0001	0.0017	2.3681	0.0725	0.0043	0.0560
P320	J116	J118	96.03	204	110	-0.5560	0.0170	0.0004	0.0039	0.3064	0.0094	0.0001	0.0014
P322	J118	J112	79.00	393	120	-1.7047	0.0141	0.0001	0.0009	-6.2782	0.0518	0.0009	0.0120
P324	J112	J110	82.00	393	120	-2.3176	0.0191	0.0002	0.0020	-4.8549	0.0400	0.0006	0.0073
P326	J110	J102	75.86	393	120	-3.9630	0.0327	0.0004	0.0049	-8.3094	0.0685	0.0015	0.0201
P328	J102	J100	152.83	393	120	-7.6247	0.0629	0.0026	0.0170	-16.1871	0.1334	0.0105	0.0687
P330	J170	J100	180.08	204	110	-1.5065	0.0461	0.0044	0.0242	-6.1758	0.1889	0.0594	0.3301
P332	J102	J140	116.41	204	110	1.1624	0.0356	0.0017	0.0149	6.7721	0.2072	0.0456	0.3915
P334	J110	J126	167.59	204	110	0.9063	0.0277	0.0016	0.0094	5.5819	0.1708	0.0459	0.2736
P338	J122	J124	55.79	204	110	0.3000	0.0092	0.0001	0.0010	2.7844	0.0852	0.0042	0.0754
P340	J118	J120	112.34	204	110	0.9587	0.0293	0.0012	0.0104	5.5200	0.1689	0.0301	0.2679
P342	J120	J122	80.80	204	110	0.5544	0.0170	0.0003	0.0039	4.1836	0.1280	0.0130	0.1605
P344	J128	J164	52.79	204	110	0.0349	0.0011	0.0000	0.0000	1.1665	0.0357	0.0008	0.0152
P346	J128	J126	75.86	204	110	-0.1784	0.0055	0.0000	0.0005	-2.1545	0.0659	0.0036	0.0468
P348	J126	J124	82.00	204	110	0.4451	0.0136	0.0002	0.0025	1.8720	0.0573	0.0030	0.0361
P350	J128	J134	84.52	204	110	0.6110	0.0187	0.0004	0.0046	3.3229	0.1017	0.0089	0.1048
P352	J124	J136	82.00	204	110	0.5636	0.0172	0.0003	0.0041	3.6581	0.1119	0.0103	0.1252
P354	J134	J136	158.51	204	110	0.2201	0.0067	0.0001	0.0007	0.6527	0.0200	0.0008	0.0052
P356	J136	J138	123.40	204	110	0.2406	0.0074	0.0001	0.0008	1.3233	0.0405	0.0023	0.0190
P370	J164	J162	42.55	204	110	0.5107	0.0156	0.0001	0.0035	2.5732	0.0787	0.0028	0.0652
P372	J162	J158	87.08	204	110	-0.2870	0.0088	0.0001	0.0013	-1.2939	0.0396	0.0016	0.0182
P376	J160	J162	41.59	204	110	-0.6883	0.0211	0.0002	0.0054	-3.6867	0.1128	0.0053	0.1270
P378	J164	J130	84.11	204	110	-0.1537	0.0047	0.0000	0.0002	-0.1860	0.0057	0.0000	0.0004
P382	J158	J130	45.64	204	110	-0.3417	0.0105	0.0001	0.0012	-1.5948	0.0488	0.0012	0.0269
P384	J140	J128	51.10	204	110	0.6482	0.0198	0.0003	0.0051	3.3288	0.1018	0.0054	0.1048
P386	J170	J130	48.66	204	110	0.6049	0.0185	0.0002	0.0046	2.3825	0.0729	0.0028	0.0566
P388	J170	J142	85.79	204	110	0.2515	0.0077	0.0001	0.0009	0.2172	0.0066	0.0001	0.0007
P390	J164	J142	49.11	204	110	-0.5298	0.0162	0.0002	0.0034	-2.3635	0.0723	0.0027	0.0557
P392	J142	J140	50.56	204	110	-0.3659	0.0112	0.0001	0.0018	-2.6276	0.0804	0.0034	0.0677
P394	J166	J160	55.29	204	110	-0.5530	0.0169	0.0002	0.0040	-3.0415	0.0931	0.0049	0.0888
P396	J134	J160	51.82	204	110	-0.1025	0.0031	0.0000	0.0004	-0.0435	0.0013	0.0000	0.0000

FIRE FLOW CALCULATIONS **Table 5**

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: September 20, 2021

CLIENT: Urbandale Corporation
191002
PROJECT NAME: 130 Huntmar Drive

C = Coefficient related to type of construction

· wood frame	1.5	X
· ordinary construction	1.0	
· non-combustible construction	0.8	
· fire resistive construction (<2 hrs.)	0.7	
· fire resistive construction (>2 hrs.)	0.6	
· Interpolation		

A = Area of structure considered (m²)

Building No.	Singles	Townhouses	Back to Backs	Apartments		
Location No.						
Combined ground floor area	2850	535	510	730		
Number of storeys	2	2	3	2		
Total floor area	5700	1070	1530	1460		

(1) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	24914	10795	12908	12609	0	0

(2) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%						
· limited combustible	- 15%						
· combustible	- 0%	-15	-15	-15	-15		
· free burning	+ 15%						
· rapid burning	+ 25%						
Required Flow (L/min)		21177	9176	10972	10718	0	0

(3) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0	0	0		
Reduction (L/min)	0	0	0	0		

(4) Exposure surcharge (% of 2, L/min)

· PW(Unpierced boundary party wall)	10%	North	24.0	10	2118	22.0	10	918	3.1	20	2194	25.0	10	1072			0			0
· 0 to 3.0 m	25 %																		
· 3.1 to 10.0 m	20 %	East	30.0	10	2118	3.1	20	1835	22.0	10	1097	5.0	20	2144			0			0
· 10.1 to 20.0 m	15 %																		
· 20.1 to 30.0 m	10 %	South	>45	0	0	15.0	15	1376	3.1	20	2194	25.0	10	1072			0			0
· 30.1 to 45.0 m	5 %																		
Maximum	75 %	West	>45	0	0	3.1	20	1835	PW	10	1097	5.0	20	2144			0			0
Exposure surcharge total			4235			5964			6583			6431			0			0		

(5) Fire Flow

= (2) - (3) + (4)	25412	15140	17555	17149	0	0

(6) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min if less than 10,000 L/min.	25000	15000	18000	17000	0	0
	(417 l/s)	(250 l/s)	(300 l/s)	(283 l/s)	(0 l/s)	(0 l/s)
Fire Flow Required	(167 l/s)	(167 l/s)	(300 l/s)	(283 l/s)	(0 l/s)	(0 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", the single detached dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min (167 l/s)

TABLE 6: MAXIMUM DAY PLUS FIRE-FLOW RESULTS

DATE: **September 2021**
DESIGNED BY: AGS
CHECKED BY: AGS

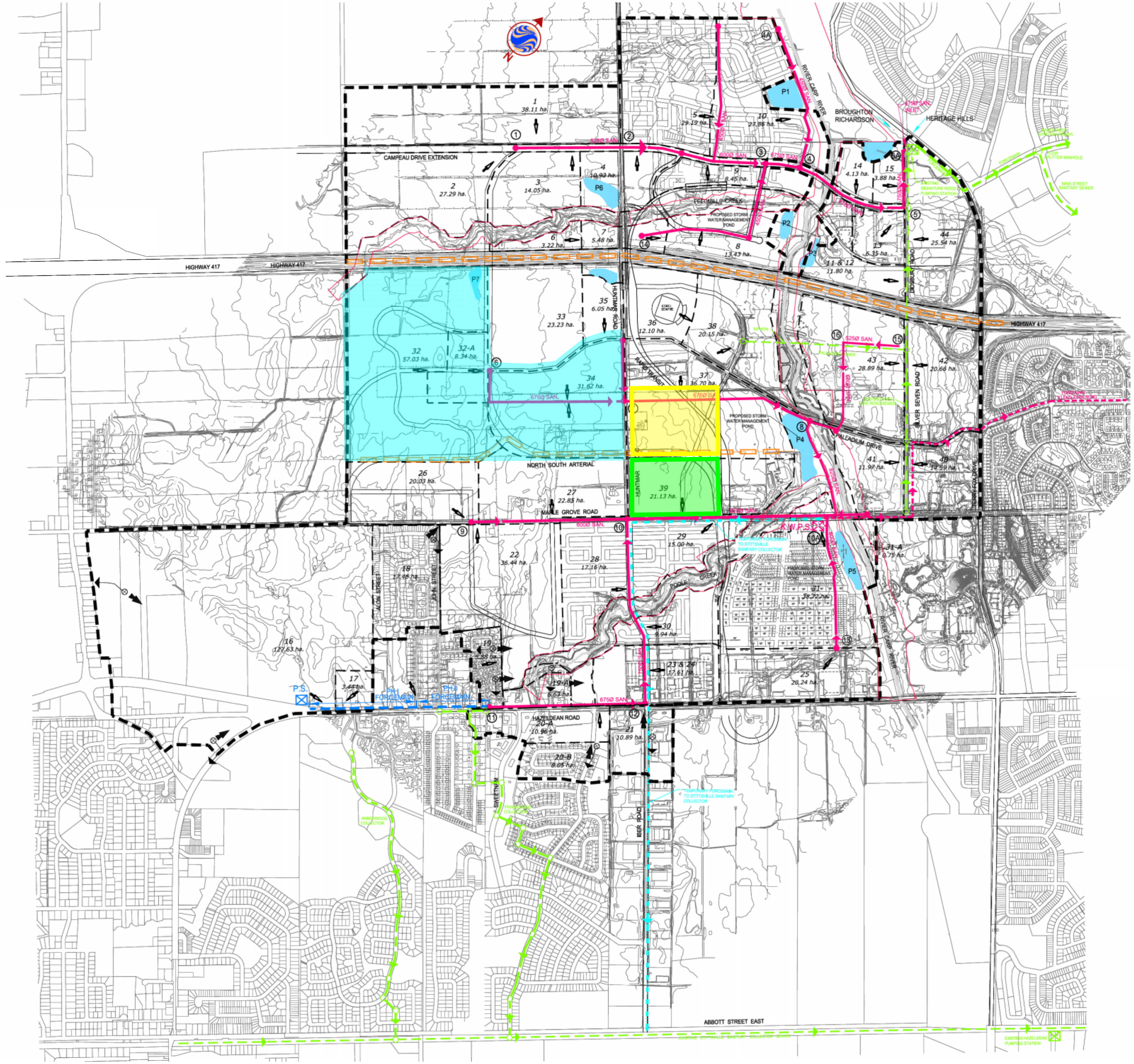
PROJECT: **130 Huntmar Drive**
CLIENT: Urbandale Corporation
PROJECT #: 191002
BY: Atrel Engineering Ltd

NODE NO.	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Available Flow @ Hydrant (L/s)	Available Flow Pressure (kPa)	Total Demand (L/s)	Available Flow @ Hydrant (L/s)	Critical NODE ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
J100	0.0000	596.79	159.15	283.00	376.24	518.12	140.0	282.9980	518.1202	J138	109.86	112.80	600.61	600.59
J102	0.6918	577.62	159.15	283.00	350.37	482.42	140.0	283.6898	482.4246	J150	126.25	114.48	573.13	573.12
J104	4.6575	575.67	159.15	283.00	263.33	359.14	140.0	287.6555	359.1406	J104	139.96	114.68	420.74	420.74
J106	0.2745	565.33	159.14	167.00	397.42	326.36	140.0	167.2733	326.3561	J150	138.48	115.73	386.17	385.98
J108	0.3220	565.82	159.14	167.00	397.02	324.87	140.0	167.3208	324.8661	J108	139.96	115.68	384.89	384.71
J110	0.3848	566.82	159.14	167.00	441.26	455.14	140.0	167.3836	455.1449	J150	137.02	115.58	549.68	549.62
J112	0.2128	565.83	159.14	167.00	437.26	439.47	140.0	167.2116	439.4701	J112	139.96	115.68	531.59	531.55
J114	0.2400	564.84	159.14	167.00	410.82	354.80	140.0	167.2388	354.8008	J114	139.96	115.78	422.66	422.66
J116	1.4675	563.85	159.14	167.00	393.52	322.46	140.0	168.4663	322.4637	J116	139.96	115.88	382.01	381.84
J118	0.4860	565.43	159.14	167.00	434.34	428.13	140.0	167.4848	428.1322	J118	139.96	115.72	516.72	516.69
J120	0.7710	565.86	159.14	167.00	380.75	300.09	140.0	167.7698	300.0929	J120	139.96	115.67	354.20	354.12
J122	0.6360	566.82	159.13	167.00	381.73	300.78	140.0	167.6348	300.7834	J122	139.96	115.57	355.02	354.94
J124	0.4538	567.40	159.13	167.00	398.53	327.14	140.0	167.4526	327.1422	J124	139.96	115.51	387.74	387.53
J126	0.7070	573.09	159.13	167.00	415.83	353.86	140.0	167.7058	353.8623	J126	139.96	114.93	419.97	419.58
J128	0.4518	577.99	159.13	300.00	248.97	369.50	140.0	300.4497	369.4985	J128	139.96	114.43	438.84	438.80
J130	0.2735	592.68	159.13	300.00	222.44	345.54	140.0	300.2714	345.5448	J130	139.96	112.93	406.25	406.24
J134	1.2335	582.37	159.13	300.00	201.56	334.20	140.0	301.2314	334.1961	J134	139.96	113.98	393.82	393.81
J136	1.3580	569.64	159.13	283.00	142.18	285.34	140.0	284.3560	285.3361	J138	134.18	115.28	333.33	333.16
J138	0.6015	563.85	159.13	283.00	-341.23	179.43	140.0	283.5995	179.4347	J138	139.96	115.87	208.93	208.80
J140	0.3708	575.06	159.13	300.00	243.59	365.42	140.0	300.3687	365.4167	J140	139.96	114.73	434.23	434.20
J142	0.2188	578.97	159.13	300.00	230.41	353.71	140.0	300.2167	353.7068	J142	139.96	114.33	418.86	418.84
J148	0.5394	582.76	159.18	283.00	375.03	519.69	140.0	283.5374	519.6944	J148	139.96	113.99	622.47	622.47
J150	0.7273	563.84	159.14	167.00	250.55	202.90	140.0	167.7261	202.9016	J150	139.96	115.88	236.77	236.77
J152	0.3635	570.70	159.14	167.00	113.18	161.37	140.0	167.3623	161.3727	J152	139.96	115.18	187.07	187.06
J154	0.0000	590.08	159.17	283.00	383.21	562.72	140.0	282.9980	562.7247	J138	122.94	114.14	679.03	678.89
J158	0.1368	592.19	159.13	300.00	174.14	316.56	140.0	300.1347	316.5627	J158	139.96	112.98	370.75	370.75
J160	0.2735	586.39	159.13	300.00	185.41	323.21	140.0	300.2714	323.2132	J166	139.36	113.57	379.57	379.57
J162	0.0820	586.80	159.13	300.00	217.43	342.85	140.0	300.0799	342.8531	J162	139.96	113.53	404.01	404.00
J164	0.5195	581.90	159.13	300.00	241.42	362.15	140.0	300.5174	362.1476	J164	139.96	114.03	428.82	428.79
J166	1.3825	585.80	159.13	283.00	2.14	239.88	140.0	284.3805	239.8792	J166	139.96	113.63	278.89	278.89
J170	1.6255	593.18	159.13	300.00	238.04	358.05	140.0	301.6234	358.0524	J170	139.96	112.88	421.32	421.30

Total = 21.4626 l/s

APPENDIX "D"

- KWMSS – Preferred Waste-Water Option – Drawing S-1
- Infrastructure Master Plan – Kanata West Sewers Page 200 (2013)
- 195 Huntmar - External San Drainage Plan – Sheet No. 87 (DSEL) (Nov 9, 2020)
- 195 Huntmar - Sanitary Drainage Plan – Sheet No. 88 to 93 (DSEL) (Nov 9, 2020)
- 195 Huntmar - Sanitary Sewer Calculation Sheet (DSEL) (Nov 9, 2020)
- 191002-SANM - Macro Sanitary Drainage Area Plan
- Proposed Alignments for Kanata West Development North-South Sanitary Collector Sewers Functional Design Study (IBI Group)
- Maple Grove San Sewer Capacity Analysis (10/MH91 – SAMH3) (DSEL)
- Maple Grove Sanitary Sewer Capacity Analysis Calculation Sheets
- Table 7A - Sanitary Sewer Computation Form
- Correspondence annual event and at catastrophic failure HGL at the KWPS
- Table 7B - Sanitary Sewer Computation Form – Annual Event



Stantec Consulting Ltd.
1505 Laperriere Avenue
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Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225–1311

Legend

(thick black dashed line)	ULTIMATE MAJOR DRAINAGE LIMIT
(thin black dashed line)	SUBCATCHMENT AREAS
(solid magenta line)	PROPOSED TRUNK SEWER
(magenta dashed line)	PROPOSED FORCEMAIN
(cyan dash-dot line)	TEMPORARY FORCEMAIN
(blue dashed line)	PROPOSED STITTSVILLE PUMPING STATION AND FORCEMAIN
(green dashed line)	EXISTING TRUNK SEWER
(orange boxes)	MAJOR DRAINAGE SPLIT
①	NODES
⊗→	EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
44 25.54 ha.	INPUT POINT AND AREA IN HECTARES
(double arrow)	EXISTING PUMPING STATION GRAVITY OUTLET

	Revision	By	Appd.	Date
5	REVISED FOR DEC.21/05 SUBMISSION	G.B.U.	S.J.P.	05:12:21
4	REVISED TRUNK SEWER FROM 16 TO KWPS	R.W.W.	R.W.W.	05:10:05
3	ARROWS FOR EXIST. PUMP STATIONS ADDED	R.W.W.	R.W.W.	05:08:09
2	REPORT JUNE 2005	R.W.W.	R.W.W.	05:06:07
1	REPORT APR. 2005	R.W.W.	R.W.W.	05:04:20

File Name: | Dwn. | Chkd. | Dsgn. | Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Preferred Waste-Water Option

Project No. 60400406

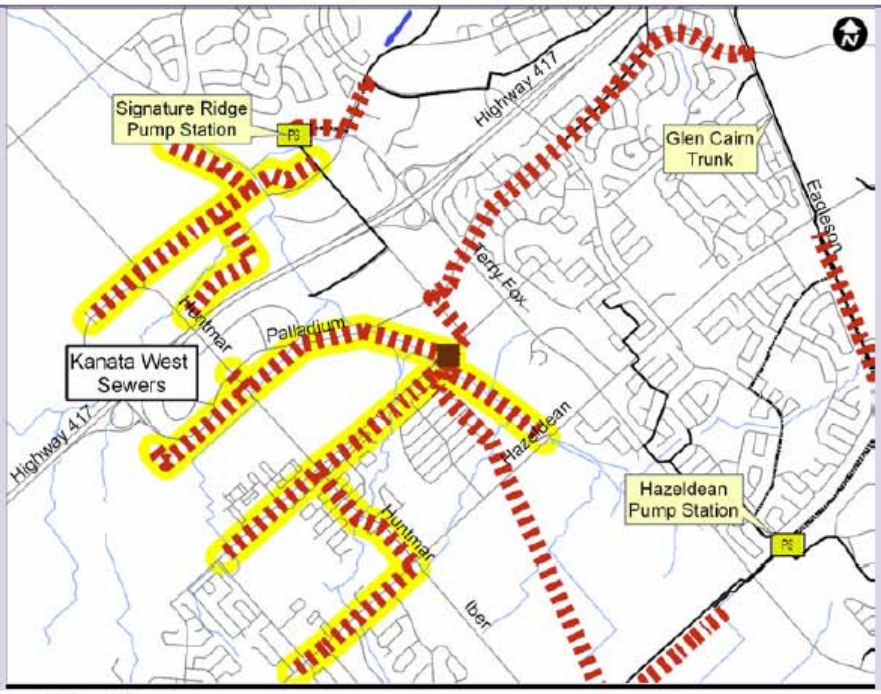
Scale 1:7500 (0 75 225 375m)

Drawing No. S-I

Sheet 7 of 7

Revision 5

Kanata West Sewers



Scope and Justification

To service new development in Kanata West area, construct new collector sewers to provide outlet for new subdivisions. These collectors were identified in the Kanata West Master Servicing Study (Stantec 2006). The construction of collector sanitary sewers servicing the Kanata West development area will, for the most part, occur as part of the construction of local subdivisions. This budget item accounts for the cost of over-sizing local sewers which will be recovered by local developers.

Timing

2013 - 2024: Construction of collector sewers.
(Rate of development will determine the exact timing).

Action Item Funding

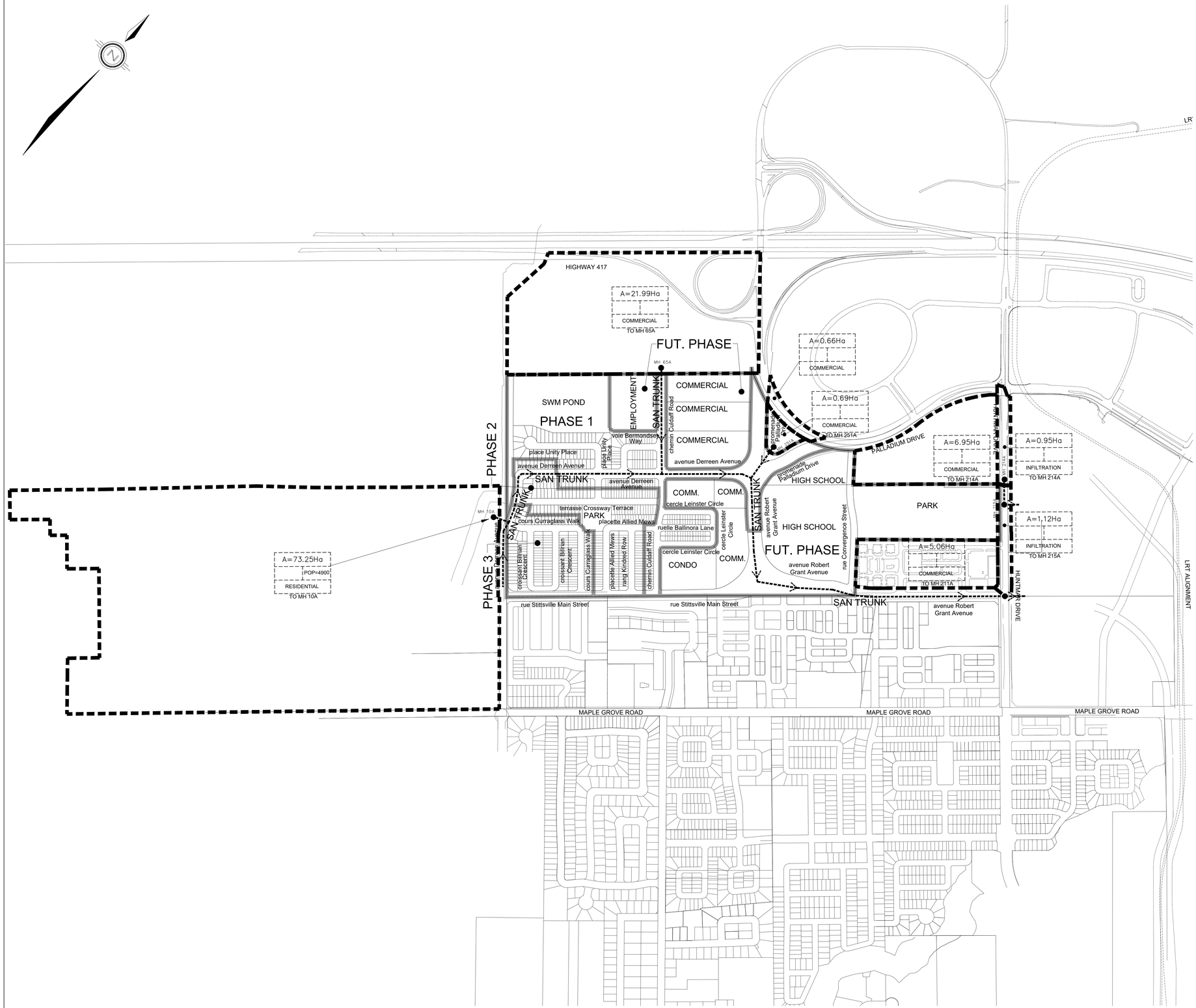
Construction Cost Estimate = $7.1 M
Capital Cost Estimate* = $11.3 M (100% Development Charges, 0% Rate)
**Including construction cost, engineering, city internal costs and contingency allowance.*

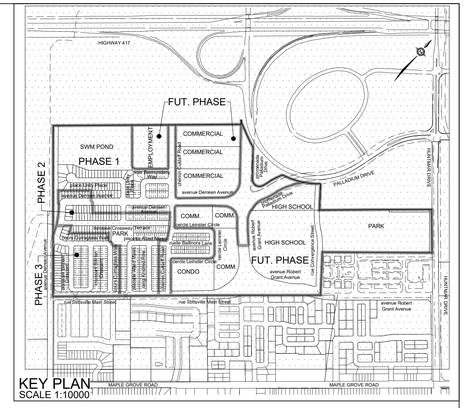
EA Requirements and Consultation

Schedule B Class EA has been completed and the project is approved.

Follow Up Actions

Coordinate design and construction with local subdivision development.





KEY PLAN
SCALE 1:10000

LEGEND

SANITARY DRAINAGE BOUNDARY

EXTERNAL AREA IN HECTARES → A=53.63

EXTERNAL POPULATION

DENSITY (PERSONS/HECTARE) → 107 POP=5739

EXTERNAL LAND USE → RESIDENTIAL

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016, FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.

4th SUBMISSION 20-11-09

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
4	W.L.	20-11-09	4th SUBMISSION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 2020-09 PROVINCE OF ONTARIO

EXTERNAL SAN DRAINAGE PLAN

2325483 ONTARIO LTD.

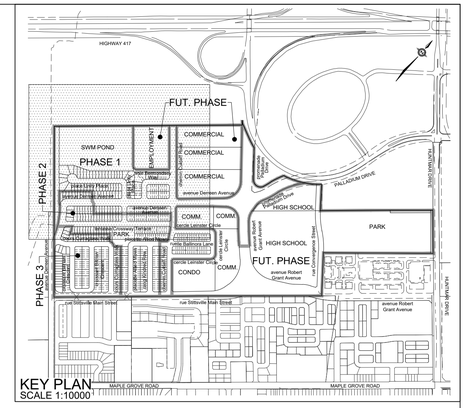
195 HUNTMAR DRIVE

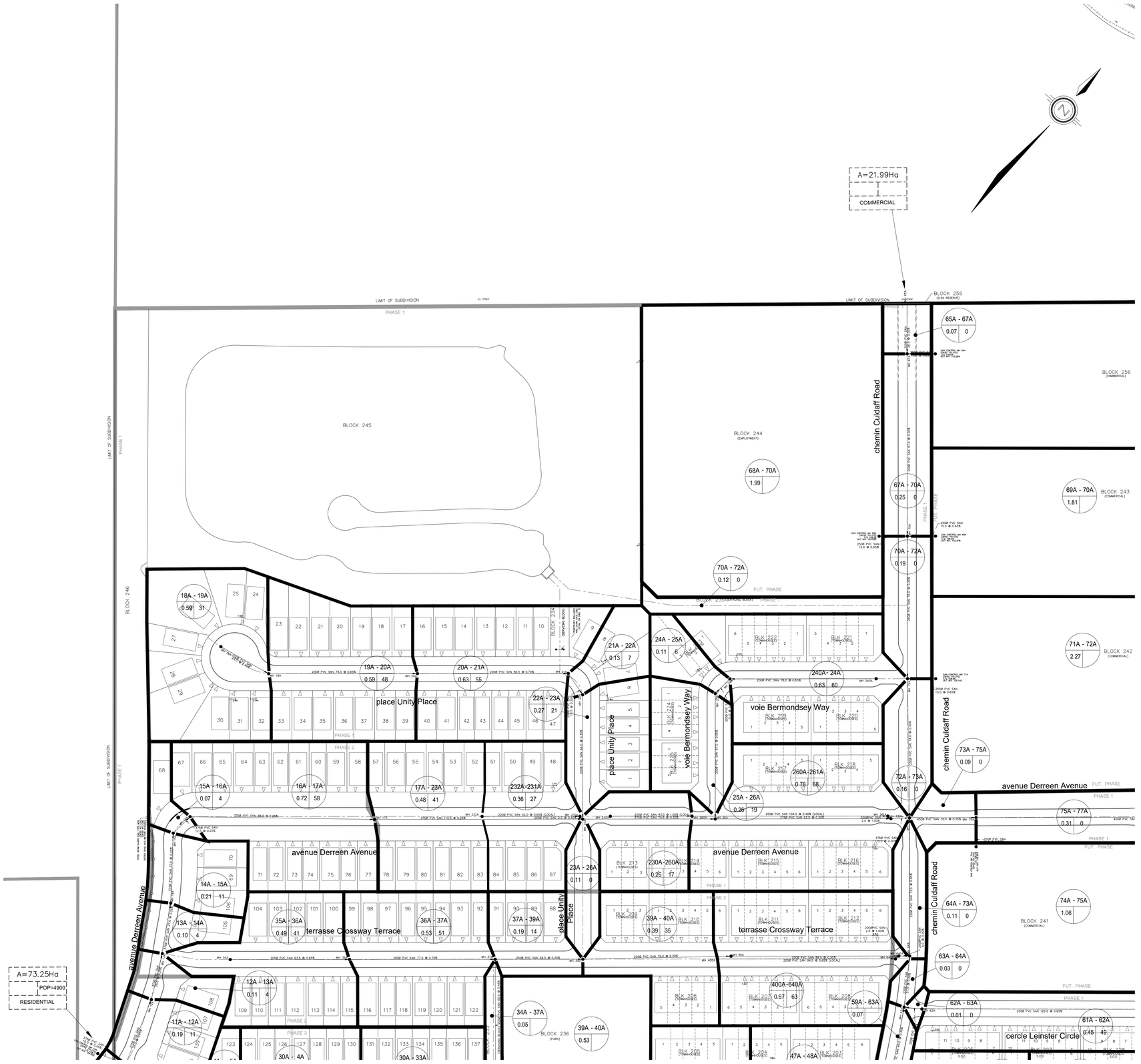
DSEL david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	87
SCALE: 1:5000	DATE: DECEMBER 2019	

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — POP=5739
- DENSITY (PERSONS/HECTARE) — 107
- EXTERNAL LAND USE — RESIDENTIAL
- SANITARY SEWER
- MAINTENANCE HOLE — MH202A
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
4	W.L.	20-11-09	4th SUBMISSION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEERS — W. LIU — 100167932 — 20-11-09 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

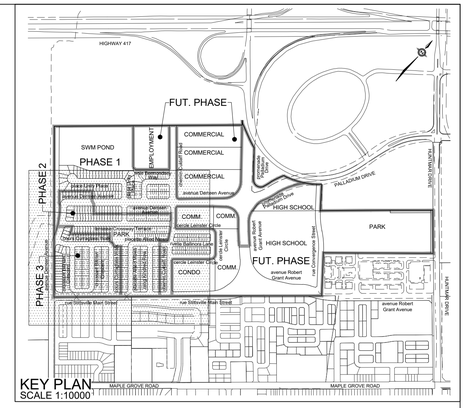
195 HUNTMAR DRIVE

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	88
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059

KEY PLAN
SCALE 1:10000



LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION
- DENSITY (PERSONS/HECTARE) — 107 POP=5739
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — MH202A
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
4	W.L.	20-11-09	4th SUBMISSION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-11-09
PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

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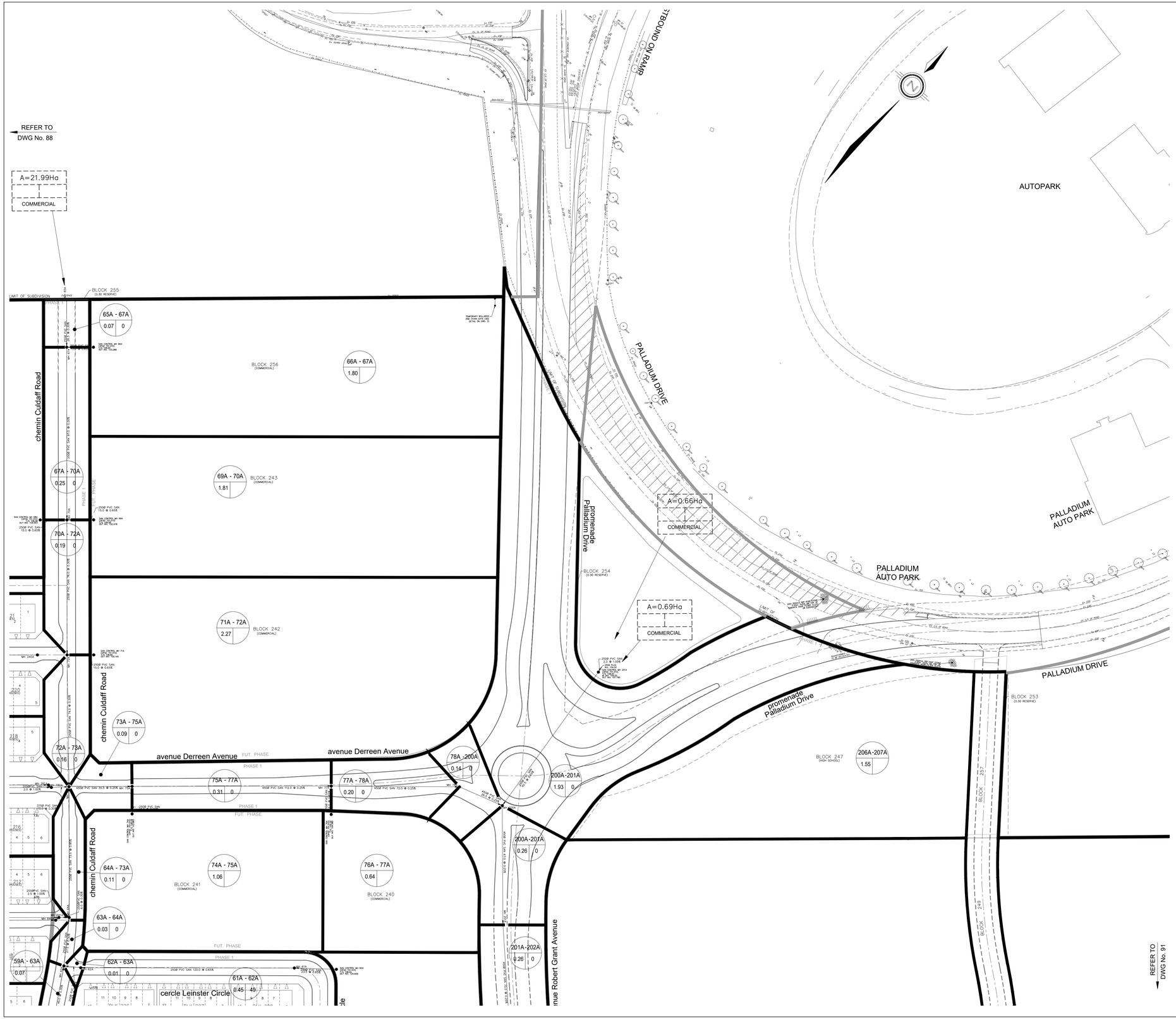
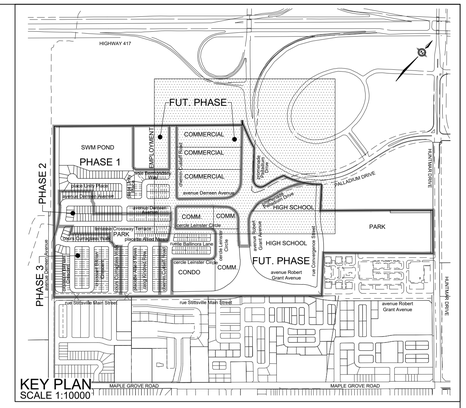
DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	89
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — AREA IN HECTARES — POPULATION (43A - 44A / 0.78 / 61)
- UPSTREAM MH TO DOWNSTREAM MH — AREA IN OTHER PHASES IN HECTARES — POPULATION (43A-44A / 0.78 / 61)
- EXTERNAL AREA IN HECTARES (A=53.63)
- EXTERNAL POPULATION
- DENSITY (PERSONS/HECTARE) (107 / POP=5739)
- EXTERNAL LAND USE (RESIDENTIAL)
- MAINTENANCE HOLE (MH202A)
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
4	W.L.	20-11-09	4th SUBMISSION
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER — W. LIU — 100167932 — 20-11-09 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

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Stittsville, ON K2S 1E9
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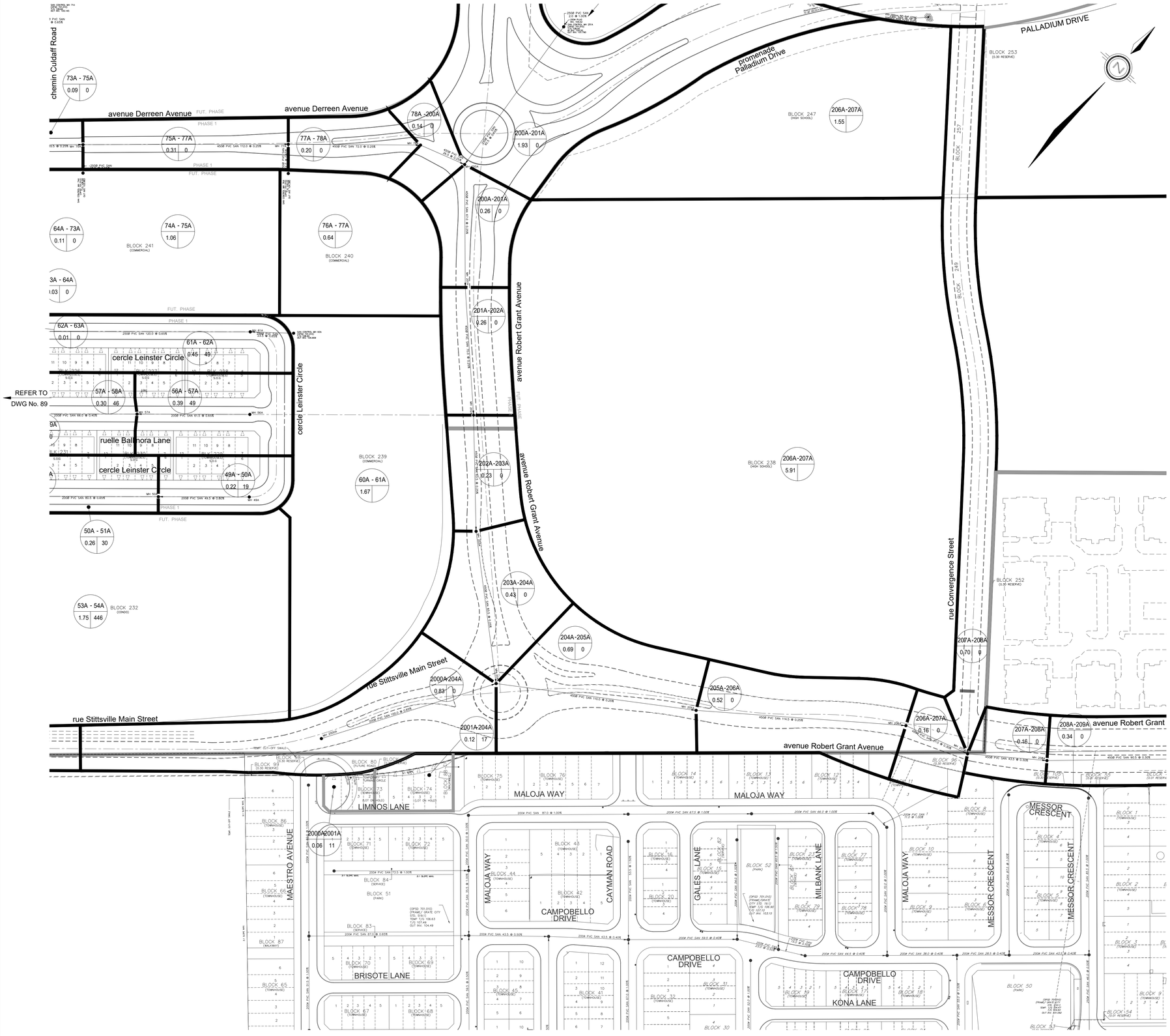
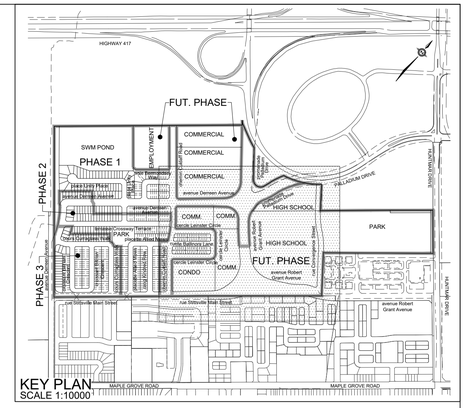
DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	90
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — 107
- DENSITY (PERSONS/HECTARE) — POP=5739
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — 200mmø SAN MH202A
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

ELEVATIONS SHOWN HEREON ARE GEODETIC (CGVD-1928:1978) AND ARE DERIVED FROM THE CAN-NET VRS NETWORK MONUMENT: OTTAWA

ELEVATION = 95.205m

No.	BY	DATE	DESCRIPTION
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1	W.L.	19-12-23	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER — W. LIU — 100167932 — 20-11-09 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

2325483 ONTARIO LTD.

195 HUNTMAR DRIVE

DSEL david schaeffer engineering ltd
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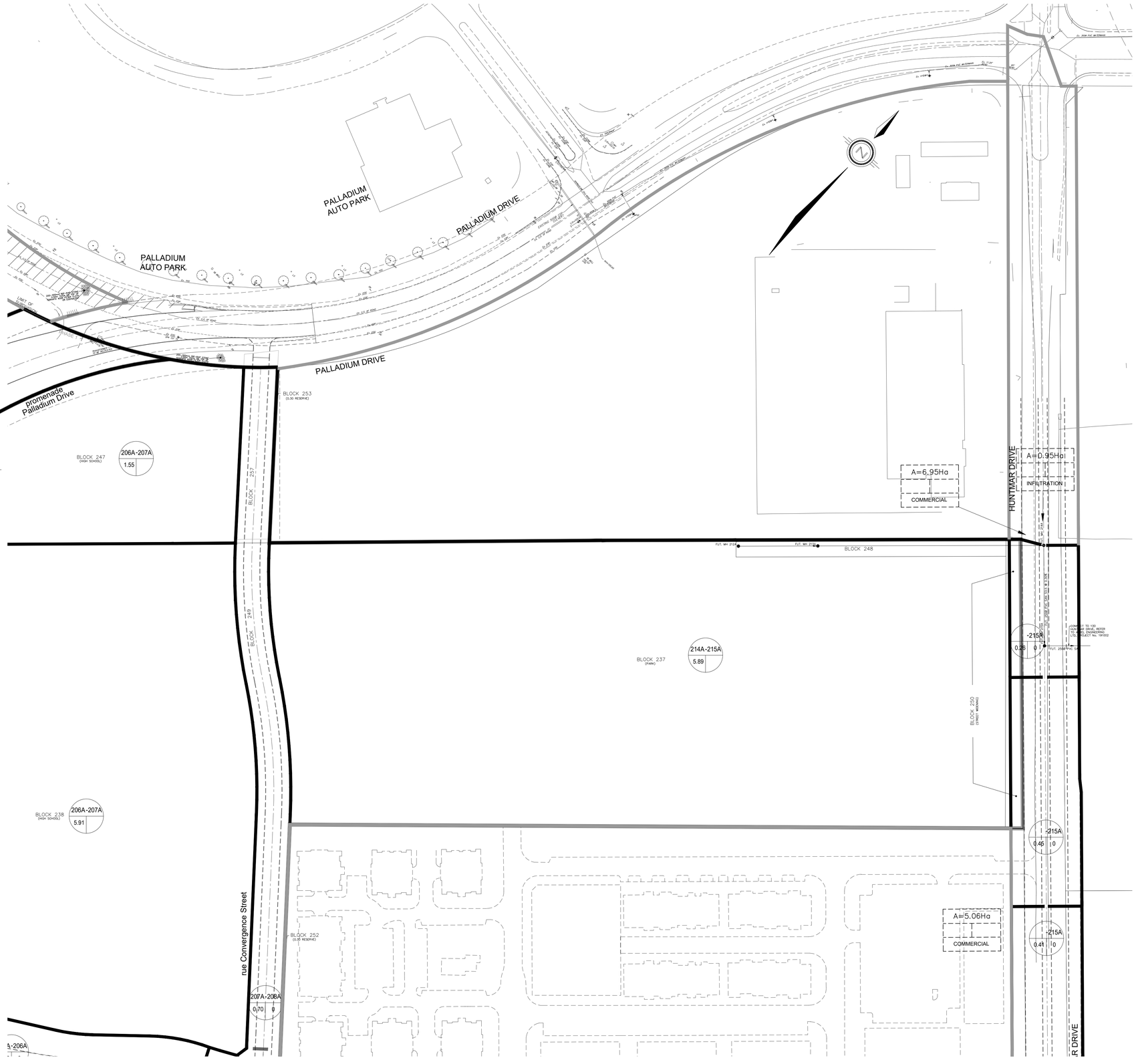
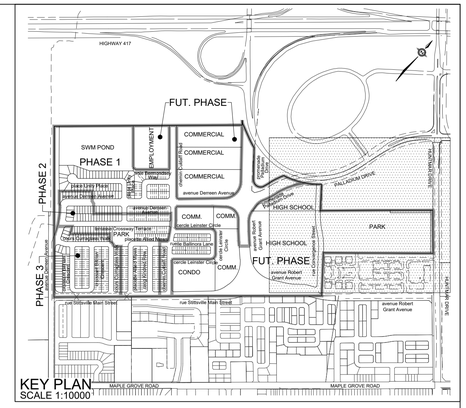
DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	91
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY PLAN No. 18059
CITY FILE No. D07-16-16-0011





KEY PLAN
SCALE 1:10000

LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
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- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — 107
- DENSITY (PERSONS/HECTARE) — POP=5739
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — 300mmø SAN MH202A
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

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1	W.L.	19-12-23	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-11-09
PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

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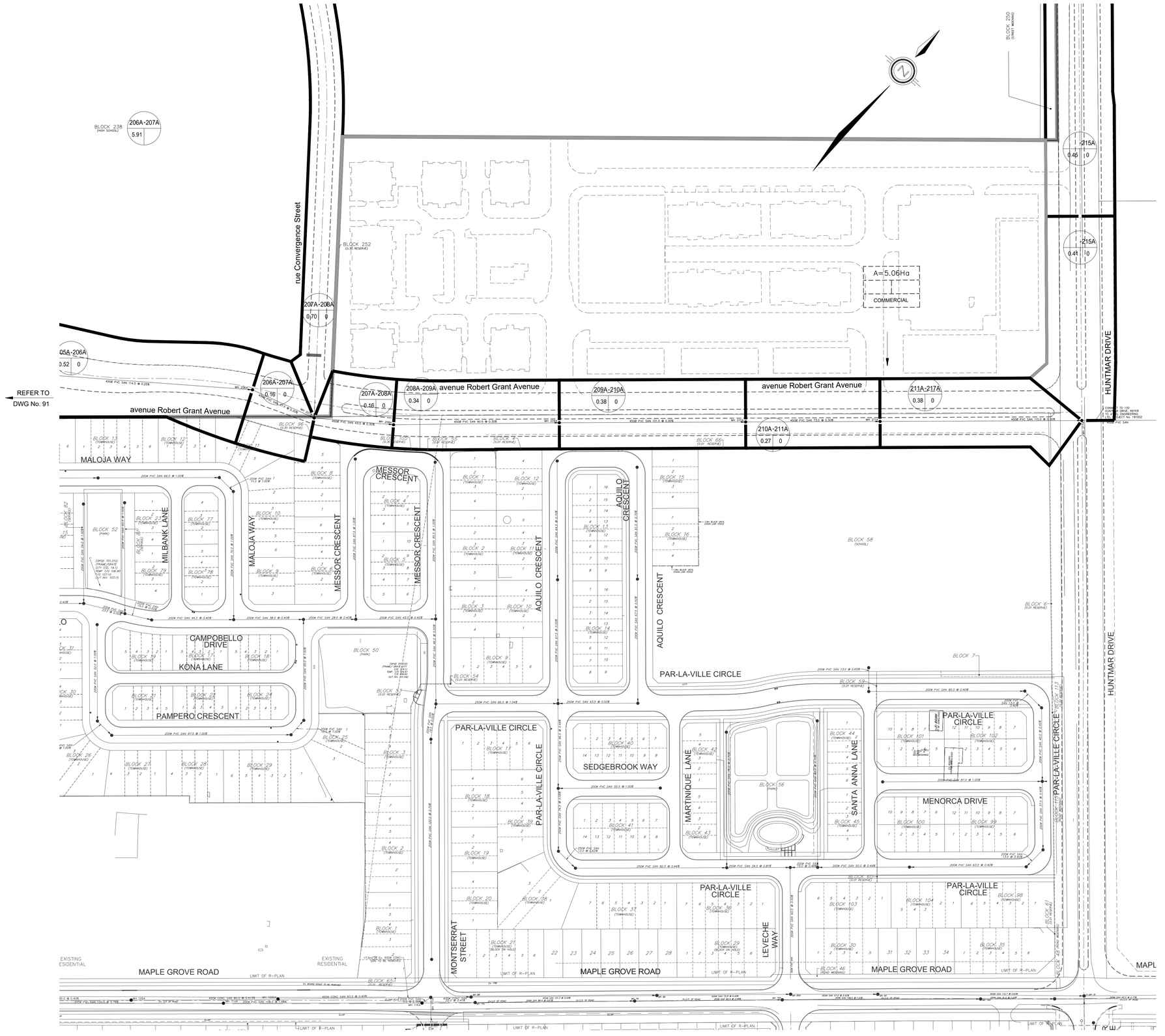
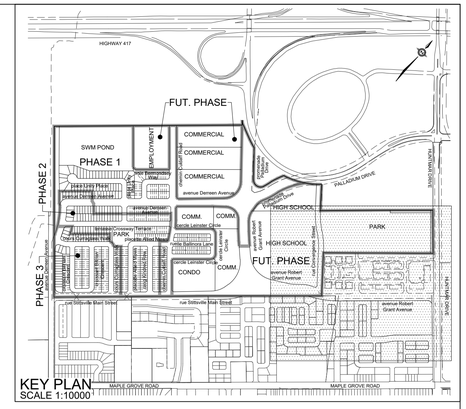
DESIGNED BY: W.L.	CHECKED BY: C.M.	92
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY FILE No. D07-16-16-0011
CITY PLAN No. 18059





LEGEND

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- SANITARY SUB-DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
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- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION
- DENSITY (PERSONS/HECTARE) — 107 POP=5739
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — MH202A
- CAP

TOPOGRAPHIC INFORMATION

CITY OF OTTAWA 1K MAPPING, RECEIVED ON OCTOBER 4, 2016. FEEDMILL CREEK TOPOGRAPHIC SURVEY (JULY 26, 2019) AND PALLADIUM DRIVE TOPOGRAPHIC SURVEY (JUNE 23, 2020) PROVIDED BY STANTEC (PROJECT No. 161613545-111)

LEGAL INFORMATION

M-PLAN PROVIDED BY STANTEC GEOMATICS LTD., PROJECT No. 16-16-135-45 (195 HUNTMAR ROAD), RECEIVED ON OCTOBER 16, 2020.
4th SUBMISSION 20-11-09

ELEVATION NOTE

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No.	BY	DATE	DESCRIPTION
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1	W.L.	19-12-23	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
20-11-09
PROVINCE OF ONTARIO

© DSEL

SANITARY DRAINAGE PLAN

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DRAWN BY: R.A./A.K.	CHECKED BY: W.L.	SHEET NO.
DESIGNED BY: W.L.	CHECKED BY: C.M.	93
SCALE: 1:1000	DATE: DECEMBER 2019	

CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Block 240 (Commercial)																													
	76A	77A						0.00				0.64	0.64		0.00		0.00	0.31	0.64	0.64	0.21	0.52	16.0	250	0.65	47.94	0.01	0.98	0.31
To avenue Derreen Avenue, Pipe 77A - 78A								0.00	0				0.64		0.00		0.00			0.64									
Block 241 (Commercial)																													
	74A	75A						0.00				1.06	1.06		0.00		0.00	0.52	1.06	1.06	0.35	0.87	15.5	250	0.65	47.94	0.02	0.98	0.37
To avenue Derreen Avenue, Pipe 75A - 77A								0.00	0				1.06		0.00		0.00			1.06									
Block 244 (Employment)																													
	68A	70A						0.00				1.99	1.99		0.00		0.00	0.97	1.99	1.99	0.66	1.62	15.0	250	0.65	47.94	0.03	0.98	0.45
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.99		0.00		0.00			1.99									
Block 243 (Commercial)																													
	69A	70A						0.00				1.81	1.81		0.00		0.00	0.88	1.81	1.81	0.60	1.48	15.0	250	0.65	47.94	0.03	0.98	0.44
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.81		0.00		0.00			1.81									
Block 256 (Commercial)																													
	66A	67A						0.00				1.80	1.80		0.00		0.00	0.88	1.80	1.80	0.59	1.47	15.0	250	0.65	47.94	0.03	0.98	0.44
To chemin Culdaff Road, Pipe 67A - 70A								0.00	0				1.80		0.00		0.00			1.80									
Block 233 (Servicing Block)																													
Contribution From cours Curraglass Walk, Pipe 30A - 33A								1.42	139				0.00		0.00		0.00		1.42	1.42									
Contribution From cours Curraglass Walk, Pipe 32A - 33A								1.15	120				0.00		0.00		0.00		1.15	1.15									
	33A	34A	0.01				0	2.58	259	3.48	2.92		0.00		0.00		0.00	0.00	0.01	2.58	0.85	3.78	12.0	200	0.40	20.74	0.18	0.66	0.50
	34A	37A	0.05				0	2.63	259	3.48	2.92		0.00		0.00		0.00	0.00	0.05	2.63	0.87	3.79	60.5	200	0.45	22.00	0.17	0.70	0.52
To terrasse Crossway Terrace, Pipe 37A - 39A								2.63	259				0.00		0.00		0.00			2.63									
terrasse Crossway Terrace																													
	35A	36A	0.49	12	12		41	0.49	41	3.67	0.49		0.00		0.00		0.00	0.00	0.49	0.49	0.16	0.65	63.5	200	0.65	26.44	0.02	0.84	0.35
	36A	37A	0.53	15	15		51	1.02	92	3.60	1.07		0.00		0.00		0.00	0.00	0.53	1.02	0.34	1.41	77.5	200	0.70	27.44	0.05	0.87	0.45
Contribution From Block 223, Pipe 34A - 37A								2.63	259				0.00		0.00		0.00		2.63	2.63									
	37A	39A	0.19	4	4		14	3.84	365	3.43	4.06		0.00		0.00		0.00	0.00	0.19	3.84	1.27	5.33	46.5	250	0.30	32.57	0.16	0.66	0.49
Contribution From Block 236 (Park)								0.00	0				0.00		0.00		0.53		0.53	0.53	0.17	0.17							
	400A	640A	0.67	23		23	63	0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.96	94.5	200	0.65	26.44	0.04	0.84	0.40
	640A	641A						0.67	63	3.63	0.74		0.00		0.00		0.00	0.00	0.00	0.67	0.22	0.96	2.5	200	1.00	32.80	0.03	1.04	0.46
	39A	40A	0.39	13		13	35	4.23	400	3.42	4.43		0.00		0.00		0.53	0.09	0.39	4.76	1.57	6.09	79.0	250	0.30	32.57	0.19	0.66	0.51
	40A	641A						4.23	400	3.42	4.43		0.00		0.00		0.53	0.00	0.00	4.76	1.57	6.00	89.5	250	0.30	32.57	0.18	0.66	0.51
	641A	64A						4.90	463	3.39	5.09		0.00		0.00		0.53	0.00	0.00	5.43	1.79	6.88	6.0	250	0.30	32.57	0.21	0.66	0.52
To chemin Culdaff Road, Pipe 64A - 73A								4.90	463				0.00		0.00		0.53			5.43									
rang Kindred Row																													
	45A	46A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	78.5	200	0.65	26.44	0.04	0.84	0.39
	46A	47A	0.58	22		22	60	1.29	120	3.58	1.39		0.00		0.00		0.00	0.00	0.58	1.29	0.43	1.82	90.5	200	0.65	26.44	0.07	0.84	0.48
To placette Allied Mews, Pipe 47A - 48A								1.29	120				0.00		0.00		0.00			1.29									
ruelle Ballinora Lane																													
	56A	57A	0.39	18		18	49	0.39	49	3.65	0.58		0.00		0.00		0.00	0.00	0.39	0.39	0.13	0.71	61.5	200	0.65	26.44	0.03	0.84	0.36
	57A	58A	0.30			17	46	0.69	95	3.60	1.11		0.00		0.00		0.00	0.00	0.30	0.69	0.23	1.34	66.0	200	0.40	20.74	0.06	0.66	0.37
	58A	59A	0.01					0.70	95	3.60	1.11		0.00		0.00		0.00	0.00	0.01	0.70	0.23	1.34	10.5	200	0.40	20.74	0.06	0.66	0.37
To chemin Culdaff Road, Pipe 59A - 63A								0.70	95				0.00		0.00		0.00			0.70									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.50			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =	0.330	L/s/ha		
Minimum Velocity =	0.600	m/s		
Manning's n =	(Conc) 0.013	(Pvc) 0.013		
Townhouse coeff=	2.7			
Single house coeff=	3.4			

Designed: R.A.	PROJECT: **195 Huntmar Drive**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93	File Ref: 12-624	Date: **November 2020**	Sheet No. 1 of 5

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
placette Allied Mews																													
	41A	42A	0.71	22		22	60	0.71	60	3.64	0.71		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.94	79.0	200	0.80	29.34	0.03	0.93	0.42
	42A	43A	0.57	22		22	60	1.28	120	3.58	1.39		0.00		0.00		0.00	0.00	0.57	1.28	0.42	1.81	83.0	200	0.40	20.74	0.09	0.66	0.40
	43A	44A	0.03				0	1.31	120	3.58	1.39		0.00		0.00		0.00	0.00	0.03	1.31	0.43	1.82	11.0	200	0.40	20.74	0.09	0.66	0.41
	44A	47A	0.24	7		7	19	1.55	139	3.56	1.60		0.00		0.00		0.00	0.00	0.24	1.55	0.51	2.12	61.0	200	0.40	20.74	0.10	0.66	0.42
Contribution From rang Kindred Row, Pipe 46A - 47A								1.29	120				0.00		0.00		0.00		1.29	1.29									
	47A	48A	0.30	9		9	25	3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.30	3.14	1.04	4.23	62.0	200	0.40	20.74	0.20	0.66	0.52
	48A	59A						3.14	284	3.47	3.19		0.00		0.00		0.00	0.00	0.00	3.14	1.04	4.23	10.0	200	0.40	20.74	0.20	0.66	0.52
To chemin Culdaff Road, Pipe 59A - 63A								3.14	284				0.00		0.00		0.00			3.14									
cercle Leinster Circle																													
	49A	50A	0.22	7		7	19	0.22	19	3.71	0.23		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.30	49.5	200	0.80	29.34	0.01	0.93	0.30
	50A	51A	0.26	11		11	30	0.48	49	3.65	0.58		0.00		0.00		0.00	0.00	0.26	0.48	0.16	0.74	80.5	200	0.65	26.44	0.03	0.84	0.36
	51A	55A	0.01					0.49	49	3.65	0.58		0.00		0.00		0.00	0.00	0.01	0.49	0.16	0.74	10.5	200	0.40	20.74	0.04	0.66	0.30
To chemin Culdaff Road, Pipe 55A - 59A								0.49	49				0.00		0.00		0.00			0.49									
	60A	61A						0.00				1.67	1.67		0.00		0.00	0.81	1.67	1.67	0.55	1.36	23.5	250	0.65	47.94	0.03	0.98	0.43
	61A	62A	0.45	18		18	49	0.45	49	3.65	0.58		1.67		0.00		0.00	0.81	0.45	2.12	0.70	2.09	120.0	250	0.65	47.94	0.04	0.98	0.48
	62A	63A	0.01				0	0.46	49	3.65	0.58		1.67		0.00		0.00	0.81	0.01	2.13	0.70	2.09	9.5	250	0.65	47.94	0.04	0.98	0.48
To chemin Culdaff Road, Pipe 63A - 64A								0.46	49				1.67		0.00		0.00			2.13									
Block 232 (Condo)																													
	53A	54A	1.75				446	1.75	446	3.40	4.91		0.00		0.00		0.00	0.00	1.75	1.75	0.58	5.49	11.0	250	0.65	47.94	0.11	0.98	0.64
To chemin Culdaff Road, Pipe 54A - 55A								1.75	446				0.00		0.00		0.00			1.75									
chemin Culdaff Road																													
	65A	67A	0.07				0	0.07	0			21.99	21.99		0.00		0.00	10.69	22.06	22.06	7.28	17.97	26.5	250	0.30	32.57	0.55	0.66	0.68
Contribution From Block 256, Pipe 66A - 67A								0.00	0				1.80		0.00		0.00		1.80	1.80									
	67A	70A	0.25				0	0.32	0				23.79		0.00		0.00	11.56	0.25	24.11	7.96	19.52	97.0	250	0.30	32.57	0.60	0.66	0.69
Contribution From Block 244, Pipe 68A - 70A								0.00	0				1.99		0.00		0.00		1.99	1.99									
Contribution From Block 243, Pipe 69A - 70A								0.00	0				1.81		0.00		0.00		1.81	1.81									
			0.12				0	0.44	0				27.59		0.00		0.00		0.12	28.03									
	70A	72A	0.19				0	0.63	0				27.59		0.00		0.00	13.41	0.19	28.22	9.31	22.72	76.0	250	0.30	32.57	0.70	0.66	0.72
Contribution From Block 242, Pipe 71A - 72A								0.00	0				2.27		0.00		0.00		2.27	2.27									
	72A	73A	0.16				0	0.79	0				29.86		0.00		0.00	14.52	0.16	30.65	10.11	24.63	74.0	250	0.30	32.57	0.76	0.66	0.73
To avenue Derreen Avenue, Pipe 73A - 75A								0.79	0				29.86		0.00		0.00			30.65									
chemin Culdaff Road																													
	52A	54A	0.74	15		15	41	0.74	41	3.67	0.49		0.00		0.00		0.00	0.00	0.74	0.74	0.24	0.73	102.5	200	0.65	26.44	0.03	0.84	0.36
Contribution From Block 232, Pipe 53A - 54A								1.75	446				0.00		0.00		0.00		1.75	1.75									
	54A	55A	0.09	3		3	9	2.58	496	3.38	5.43		0.00		0.00		0.00	0.00	0.09	2.58	0.85	6.29	21.0	250	0.30	32.57	0.19	0.66	0.51
Contribution From cercle Leinster Circle, Pipe 51A - 55A								0.49	49				0.00		0.00		0.00		0.49	0.49									
	55A	59A	0.15	4		4	11	3.22	556	3.36	6.05		0.00		0.00		0.00	0.00	0.15	3.22	1.06	7.12	45.0	250	0.30	32.57	0.22	0.66	0.53
Contribution From placette Allied Mews, Pipe 48A - 59A								3.14	284				0.00		0.00		0.00		3.14	3.14									
Contribution From ruelle Ballinora Lane, Pipe 58A - 59A								0.70	95				0.00		0.00		0.00		0.70	0.70									
	59A	63A	0.07				0	7.13	935	3.25	9.86		0.00		0.00		0.00	0.00	0.07	7.13	2.35	12.22	45.0	250	0.30	32.57	0.38	0.66	0.61
Contribution From cercle Leinster Circle, Pipe 62A - 63A								0.46	49				1.67		0.00		0.00		2.13	9.26									
	63A	64A	0.03				0	7.62	984	3.24	10.34		1.67		0.00		0.00	0.81	0.03	9.29	3.07	14.22	27.5	250	0.30	32.57	0.44	0.66	0.64

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.50			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph
Extraneous Flow = 0.330 L/s/ha
Minimum Velocity = 0.600 m/s
Manning's n = (Conc) 0.013 (Pvc) 0.013
Townhouse coeff= 2.7
Single house coeff= 3.4

Designed: R.A.
Checked: W.L.
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**
LOCATION: **City of Ottawa**
File Ref: 12-624
Date: **November 2020**
Sheet No. 2 of 5

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION									COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Contribution From terrasse Crossway Terrace, Pipe 641A - 64A								4.90	463				0.00		0.00		0.53		5.43	5.43									
	64A	73A	0.11				0	12.63	1447	3.15	14.78		1.67		0.00		0.53	0.90	0.11	14.83	4.89	20.58	73.5	250	0.85	54.83	0.38	1.12	1.03
To avenue Derreen Avenue, Pipe 73A - 75A								12.63	1447				1.67		0.00		0.53			14.83									
Block 242 (Commercial)																													
	71A	72A						0.00				2.27	2.27		0.00		0.00	1.10	2.27	2.27	0.75	1.85	15.0	250	0.65	47.94	0.04	0.98	0.46
To chemin Culdaff Road, Pipe 72A - 73A								0.00	0				2.27		0.00		0.00			2.27									
voie Bermondsey Way																													
	240A	24A	0.63	22		22	60	0.63	60	3.64	0.71		0.00		0.00		0.00	0.00	0.63	0.63	0.21	0.92	78.0	200	0.65	26.44	0.03	0.84	0.39
	24A	25A	0.11	2		2	6	0.74	66	3.63	0.78		0.00		0.00		0.00	0.00	0.11	0.74	0.24	1.02	11.0	200	0.40	20.74	0.05	0.66	0.34
	25A	26A	0.26	7		7	19	1.00	85	3.61	0.99		0.00		0.00		0.00	0.00	0.26	1.00	0.33	1.32	67.0	200	0.55	24.32	0.05	0.77	0.41
To avenue Derreen Avenue, Pipe 26A - 730A								1.00	85				0.00		0.00		0.00			1.00									
Block 236																													
To terrasse Crossway Terrace, Pipe 39A - 40A								0.00	0				0.00		0.00	0.53	0.53		0.53	0.53									
place Unity Place																													
	18A	19A	0.59	9	9		31	0.59	31	3.68	0.37		0.00		0.00		0.00	0.00	0.59	0.59	0.19	0.56	29.5	200	2.20	48.65	0.01	1.55	0.52
	19A	20A	0.59	14	14		48	1.18	79	3.62	0.93		0.00		0.00		0.00	0.00	0.59	1.18	0.39	1.32	79.0	200	0.65	26.44	0.05	0.84	0.43
	20A	21A	0.63	16	16		55	1.81	134	3.57	1.55		0.00		0.00		0.00	0.00	0.63	1.81	0.60	2.15	80.5	200	0.70	27.44	0.08	0.87	0.51
	21A	22A	0.13	2	2		7	1.94	141	3.56	1.63		0.00		0.00		0.00	0.00	0.13	1.94	0.64	2.27	13.5	200	0.35	19.40	0.12	0.62	0.41
	22A	23A	0.27	6	6		21	2.21	162	3.54	1.86		0.00		0.00		0.00	0.00	0.27	2.21	0.73	2.59	66.0	200	0.35	19.40	0.13	0.62	0.43
To avenue Derreen Avenue, Pipe 23A - 26A								2.21	162				0.00		0.00		0.00			2.21									
croissant Billrian Crescent																													
			0.09	1		1	3	0.09	3				0.00		0.00		0.00		0.09	0.09									
	1A	2A	0.41				0	0.50	3	3.76	0.04		0.00		0.00		0.00	0.00	0.41	0.50	0.17	0.20	11.0	200	1.20	35.93	0.01	1.14	0.29
	2A	3A	0.54	21		21	57	1.04	60	3.64	0.71		0.00		0.00		0.00	0.00	0.54	1.04	0.34	1.05	75.0	200	0.65	26.44	0.04	0.84	0.41
	3A	4A	0.44	16		16	44	1.48	104	3.59	1.21		0.00		0.00		0.00	0.00	0.44	1.48	0.49	1.70	82.0	200	0.40	20.74	0.08	0.66	0.39
To cours Curraglass Walk, Pipe 4A - 5A								1.48	104				0.00		0.00		0.00			1.48									
	27A	28A	0.09	1		1	3	0.09	3	3.76	0.04		0.00		0.00		0.00	0.00	0.09	0.09	0.03	0.07	11.0	200	1.20	35.93	0.00	1.14	0.21
	28A	29A	0.57	23		23	63	0.66	66	3.63	0.78		0.00		0.00		0.00	0.00	0.57	0.66	0.22	0.99	82.5	200	0.75	28.40	0.04	0.90	0.42
	29A	30A	0.47	18		18	49	1.13	115	3.58	1.33		0.00		0.00		0.00	0.00	0.47	1.13	0.37	1.71	74.0	200	0.40	20.74	0.08	0.66	0.39
To cours Curraglass Walk, Pipe 30A - 33A								1.13	115				0.00		0.00		0.00			1.13									
Future Development																													
	10A	11A	73.25				4900	73.25	4900	2.80	44.50		0.00		0.00		0.00	0.00	73.25	73.25	24.17	68.68	16.0	375	0.25	87.67	0.78	0.79	0.88
To avenue Derreen Avenue, Pipe 11A - 12A								73.25	4900				0.00		0.00		0.00			73.25									
cours Curraglass Walk																													
	31A	32A	0.77	22		22	60	0.77	60	3.64	0.71		0.00		0.00		0.00	0.00	0.77	0.77	0.25	0.96	104.0	200	0.65	26.44	0.04	0.84	0.40
	32A	33A	0.38	22		22	60	1.15	120	3.58	1.39		0.00		0.00		0.00	0.00	0.38	1.15	0.38	1.77	62.5	200	0.80	29.34	0.06	0.93	0.51
To Block 233, Pipe 33A - 34A								1.15	120				0.00		0.00		0.00			1.15									
Contribution croissant Billrian Crescent, Pipe 29A - 30A								1.13	115				0.00		0.00		0.00		1.13	1.13									
	30A	33A	0.29	7	7		24	1.42	139	3.56	1.60		0.00		0.00		0.00	0.00	0.29	1.42	0.47	2.07	68.5	200	0.40	20.74	0.10	0.66	0.42
To Block 233, Pipe 33A - 34A								1.42	139				0.00		0.00		0.00			1.42									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day					
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha			
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha			
Max Res. Peak Factor =	4.00						
Commercial/Inst./Park Peak Factor =	1.50						
Institutional =	0.32	l/s/Ha					

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =	0.330	L/s/ha		
Minimum Velocity =	0.600	m/s		
Manning's n =	(Conc)	0.013	(Pvc)	0.013
Townhouse coeff=	2.7			
Single house coeff=	3.4			

Designed: R.A.

Checked: W.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**

LOCATION: **City of Ottawa**

File Ref: 12-624

Date: **November 2020**

Sheet No. 3 of 5

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION								COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
	30A	4A	0.28	7	7		24	0.28	24	3.70	0.29		0.00		0.00		0.00	0.00	0.28	0.28	0.09	0.38	67.5	200	1.20	35.93	0.01	1.14	0.37
Contribution From croissant Billrian Crescent, Pipe 3A - 4A								1.48	104				0.00		0.00		0.00		1.48	1.48									
	4A	5A	0.11	2	2		7	1.87	135	3.56	1.56		0.00		0.00		0.00	0.00	0.11	1.87	0.62	2.18	24.5	200	0.40	20.74	0.10	0.66	0.42
	5A	6A	0.17	3	3		11	2.04	146	3.56	1.68		0.00		0.00		0.00	0.00	0.17	2.04	0.67	2.36	21.5	200	0.40	20.74	0.11	0.66	0.44
	6A	11A						2.04	146	3.56	1.68		0.00		0.00		0.00	0.00	0.00	2.04	0.67	2.36	16.5	200	0.40	20.74	0.11	0.66	0.44
To avenue Derreen Avenue, Pipe 11A - 12A								2.04	146				0.00		0.00		0.00			2.04									
Future Development												0.66							0.66	0.66									
	251A	200A						0.00				0.69	1.35		0.00		0.00	0.66	0.69	1.35	0.45	1.10	92.5	250	0.65	47.94	0.02	0.98	0.39
To avenue Robert Grant Avenue, Pipe 200A - 201A								0.00	0				1.35		0.00		0.00			1.35									
avenue Derreen Avenue																													
	7A	8A	0.67	7	7		24	0.67	24	3.70	0.29		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.51	90.0	200	0.65	26.44	0.02	0.84	0.33
	8A	9A	0.26	7	7		24	0.93	48	3.65	0.57		0.00		0.00		0.00	0.00	0.26	0.93	0.31	0.88	63.0	200	0.40	20.74	0.04	0.66	0.33
	9A	11A	0.07					1.00	48	3.65	0.57		0.00		0.00		0.00	0.00	0.07	1.00	0.33	0.90	28.0	200	0.40	20.74	0.04	0.66	0.33
Contribution From Future Development, Pipe 10A - 11A								73.25	4900				0.00		0.00		0.00		73.25	73.25									
Contribution From cours Curraglass Walk, Pipe 6A - 11A								2.04	146				0.00		0.00		0.00		2.04	2.04									
	11A	12A	0.19	3	3		11	76.48	5105	2.79	46.15		0.00		0.00		0.00	0.00	0.19	76.48	25.24	71.38	37.0	375	0.25	87.67	0.81	0.79	0.88
	12A	13A	0.11	1	1		4	76.59	5109	2.79	46.18		0.00		0.00		0.00	0.00	0.11	76.59	25.27	71.45	25.0	375	0.25	87.67	0.82	0.79	0.88
	13A	14A	0.10	1	1		4	76.69	5113	2.79	46.21		0.00		0.00		0.00	0.00	0.10	76.69	25.31	71.52	27.0	375	0.25	87.67	0.82	0.79	0.88
	14A	15A	0.21	3	3		11	76.90	5124	2.79	46.30		0.00		0.00		0.00	0.00	0.21	76.90	25.38	71.67	37.5	375	0.25	87.67	0.82	0.79	0.88
	15A	16A	0.07	1	1		4	76.97	5128	2.79	46.33		0.00		0.00		0.00	0.00	0.07	76.97	25.40	71.73	12.5	375	0.25	87.67	0.82	0.79	0.88
	16A	17A	0.72	17	17		58	77.69	5186	2.78	46.79		0.00		0.00		0.00	0.00	0.72	77.69	25.64	72.43	98.0	375	0.25	87.67	0.83	0.79	0.89
	17A	23A	0.48	12	12		41	78.17	5227	2.78	47.12		0.00		0.00		0.00	0.00	0.48	78.17	25.80	72.92	110.5	375	0.25	87.67	0.83	0.79	0.89
Contribution From place Unity Place, Pipe 22A - 23A								2.21	162				0.00		0.00		0.00		2.21	2.21									
	232A	231A	0.36	8	8		27	0.36	27	3.69	0.32		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.44	52.0	200	0.65	26.44	0.02	0.84	0.32
	231A	23A						0.36	27	3.69	0.32		0.00		0.00		0.00	0.00	0.00	0.36	0.12	0.44	2.0	200	0.40	20.74	0.02	0.66	0.26
To avenue Derreen Avenue, Pipe 23A - 26A								0.36	27				0.00		0.00		0.00			0.36									
	230A	260A	0.26	6		6	17	0.26	17	3.71	0.20		0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.29	43.5	200	1.00	32.80	0.01	1.04	0.32
	260A	261A	0.78	25		25	68	1.04	85	3.61	0.99		0.00		0.00		0.00	0.00	0.78	1.04	0.34	1.34	104.0	200	0.40	20.74	0.06	0.66	0.37
	261A	730A						1.04	85	3.61	0.99		0.00		0.00		0.00	0.00	0.00	1.04	0.34	1.34	2.0	200	1.00	32.80	0.04	1.04	0.51
To avenue Derreen Avenue, Pipe 730A - 73A								1.04	85				0.00		0.00		0.00			1.04									
	23A	26A	0.11				0	80.85	5416	2.77	48.62		0.00		0.00		0.00	0.00	0.11	80.85	26.68	75.30	70.5	375	0.30	96.03	0.78	0.87	0.96
Contribution From voie Bermondsey Way, Pipe 25A - 26A								1.00	85				0.00		0.00		0.00		1.00	1.00									
	26A	730A						81.85	5501	2.77	49.29		0.00		0.00		0.00	0.00	0.00	81.85	27.01	76.30	93.5	375	0.30	96.03	0.79	0.87	0.96
	730A	73A						82.89	5586	2.76	49.96		0.00		0.00		0.00	0.00	0.00	82.89	27.35	77.32	10.0	375	0.30	96.03	0.81	0.87	0.97
Contribution From chemin Culdaff Road, Pipe 64A - 73A								12.63	1447				1.67		0.00		0.53		14.83	14.83									
Contribution From chemin Culdaff Road, Pipe 72A - 73A								0.79	0				29.86		0.00		0.00		30.65	30.65									
	73A	75A	0.09				0	96.40	7033	2.68	61.17		31.53		0.00		0.53	15.41	0.09	128.46	42.39	118.97	35.5	450	0.25	142.55	0.83	0.90	1.00
Contribution From Block 241, Pipe 74A - 75A								0.00	0				1.06		0.00		0.00		1.06	129.52									
	75A	77A	0.31				0	96.71	7033	2.68	61.17		32.59		0.00		0.53	15.93	0.31	129.83	42.84	119.94	112.0	450	0.25	142.55	0.84	0.90	1.00
Contribution From Block 240, Pipe 76A - 77A								0.00	0				0.64		0.00		0.00		0.64	130.47									
	77A	78A	0.20				0	96.91	7033	2.68	61.17		33.23		0.00		0.53	16.24	0.20	130.67	43.12	120.53	72.0	450	0.25	142.55	0.85	0.90	1.01
	78A	200A	0.14				0	97.05	7033	2.68	61.17		33.23		0.00		0.53	16.24	0.14	130.81	43.17	120.57	26.5	450	0.25	142.55	0.85	0.90	1.01
To avenue Robert Grant Avenue, Pipe 200A - 201A								97.05	7033				33.23		0.00		0.53			130.81									
avenue Robert Grant Avenue																													
Contribution From Future Development, Pipe 251A - 200A								0.00	0				1.35		0.00		0.00		1.35	1.35									
Contribution From avenue Derreen Avenue, Pipe 78A - 200A								97.05	7033				33.23		0.00		0.53		130.81	130.81									
			0.26				0	97.31	7033				34.58		0.00		0.53		0.26	132.42									
	200A	201A	1.93				0	99.24	7033	2.68	61.17		34.58		0.00		0.53	16.90	1.93	134.35	44.34	122.40	67.0	450	0.25	142.55	0.86	0.90	1.01

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	Industrial Peak Factor = as per MOE Graph		
Average Daily Flow =	280	l/p/day			Extraneous Flow =	0.330	L/s/ha
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Minimum Velocity =	0.600	m/s
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Manning's n = (Conc)	0.013	(Pvc) 0.013
Max Res. Peak Factor =	4.00				Townhouse coeff=	2.7	
Commercial/Inst./Park Peak Factor =	1.50				Single house coeff=	3.4	
Institutional =	0.32	l/s/Ha					

Designed: R.A.

Checked: W.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**

LOCATION: **City of Ottawa**

File Ref: 12-624

Date: **November 2020**

Sheet No. 4 of 5

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATIO								COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	UNITS Singles	UNITS Townhouse	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
	201A	202A	0.26				0	99.50	7033	2.68	61.17		34.58		0.00		0.53	16.90	0.26	134.61	44.42	122.48	70.0	450	0.25	142.55	0.86	0.90	1.01
	202A	203A	0.23				0	99.73	7033	2.68	61.17		34.58		0.00		0.53	16.90	0.23	134.84	44.50	122.56	63.5	450	0.25	142.55	0.86	0.90	1.01
	203A	204A	0.43				0	100.16	7033	2.68	61.17		34.58		0.00		0.53	16.90	0.43	135.27	44.64	122.70	83.5	450	0.25	142.55	0.86	0.90	1.01
To rue Stittsville Main Street, Pipe 204A - 205A								100.16	7033				34.58		0.00		0.53			135.27									
rue Stittsville Main Street																													
			0.06				11												0.06	0.06									
			0.12				17												0.12	0.18									
	2000A	204A	0.83				0	1.01	28	3.69	0.33		0.00		0.00		0.00	0.00	0.83	1.01	0.33	0.67	100.0	200	0.65	26.44	0.03	0.84	0.35
Contribution From avenue Robert Grant Avenue, Pipe 203A - 204A								100.16	7033				34.58		0.00		0.53		135.27	136.28									
	204A	205A	0.69				0	101.86	7061	2.68	61.38		34.58		0.00		0.53	16.90	0.69	136.97	45.20	123.48	110.0	450	0.25	142.55	0.87	0.90	1.01
	205A	206A	0.52				0	102.38	7061	2.68	61.38		34.58		0.00		0.53	16.90	0.52	137.49	45.37	123.65	114.5	450	0.25	142.55	0.87	0.90	1.01
			0.16				0	102.54	7061				34.58	1.55	1.55		0.53		1.71	139.20									
	206A	207A						102.54	7061	2.68	61.38		34.58	5.91	7.46		0.53	20.52	5.91	145.11	47.89	129.79	37.0	450	0.30	156.16	0.83	0.98	1.10
			0.16				0	102.70	7061				34.58		7.46		0.53		0.16	145.27									
	207A	208A	0.70				0	103.40	7061	2.68	61.38		34.58		7.46		0.53	20.52	0.70	145.97	48.17	130.07	43.5	450	0.30	156.16	0.83	0.98	1.10
	208A	209A	0.34				0	103.74	7061	2.68	61.38		34.58		7.46		0.53	20.52	0.34	146.31	48.28	130.18	90.5	450	0.30	156.16	0.83	0.98	1.10
	209A	210A	0.38				0	104.12	7061	2.68	61.38		34.58		7.46		0.53	20.52	0.38	146.69	48.41	130.31	101.5	450	0.30	156.16	0.83	0.98	1.10
	210A	211A	0.27				0	104.39	7061	2.68	61.38		34.58		7.46		0.53	20.52	0.27	146.96	48.50	130.40	73.0	450	0.30	156.16	0.84	0.98	1.10
	211A	217A	0.38				0	104.77	7061	2.68	61.38	5.06	39.64		7.46		0.53	22.98	5.44	152.40	50.29	134.65	110.0	450	0.30	156.16	0.86	0.98	1.10
	217A	130 Huntmar Drive						104.77	7061	2.68	61.38		39.64		7.46		0.53	22.98	0.00	152.40	50.29	134.65	110.0	450	0.30	156.16	0.86	0.98	1.10
To 130 Huntmar Drive by Atrel Engineering Ltd.								104.77	7061				39.64		7.46		0.53			152.40									
Huntmar Drive																													
			0.00				0	0.00	0			6.95	6.95		0.00	5.89	5.89		12.84	12.84									
	Fut. 214A	Fut. 215A	0.95				0	0.95	0				6.95		0.00		5.89	4.33	0.95	13.79	4.55	8.88	70.0	250	0.30	32.57	0.27	0.66	0.56
			1.12				0	2.07	0				6.95		0.00		5.89	4.33	1.12	14.91									
	Fut. 215A	130 Huntmar Drive					0	2.07	0			0.00	6.95		0.00		5.89	4.33	0.00	14.91	4.92	9.25							
To 130 Huntmar Drive by Atrel Engineering Ltd.								2.07	0				6.95		0.00		5.89			14.91									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.50				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed: R.A.

Checked: W.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 87-93

PROJECT: **195 Huntmar Drive**

LOCATION: **City of Ottawa**

File Ref: 12-624

Date: **November 2020**

Sheet No. 5 of 5

LEGEND

- 0.63ha / 10 / 40 — SANITARY DRAINAGE SUB AREA; POPULATION EQUIVALENT
- NUMBER OF UNITS IN SUB AREA
- DRAINAGE AREA BOUNDARY
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY SEWER BY OTHERS
- EXISTING SANITARY SEWER
- OUTSIDE PROPOSED DEVELOPMENT
- NW=93.94 / SE=93.94 / SW=96.18 — PROPOSED OBVERT ELEVATION
- 348 — PROPOSED MANHOLE NUMBER

TRUE NORTH

CONSTRUCTION

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	JULY 6/20	AGS
2	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	AUG. 4/20	AGS
3	REVISED AS PER CITY COMMENTS	OCT. 7/20	AGS
4	REVISED AS PER NEW ROAD ALIGNMENT	MAR. 4/21	AGS
5	REVISED AS PER CITY COMMENTS	MAR. 30/21	AGS
6	*RECORD DRAWING*	*AUG. 25/21*	*AGS*
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE 1:500 (15m 0 45m)

DESIGN AGS · CHECKED JMD · DRAWN CED · CHECKED AGS · APPROVED JMD

LICENSED PROFESSIONAL ENGINEER — A.G.Y. SAUVE — 100142393 — Sept. 20, 2021 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — J.M. LEDECQUER — Sept. 20, 2021 — PROVINCE OF ONTARIO

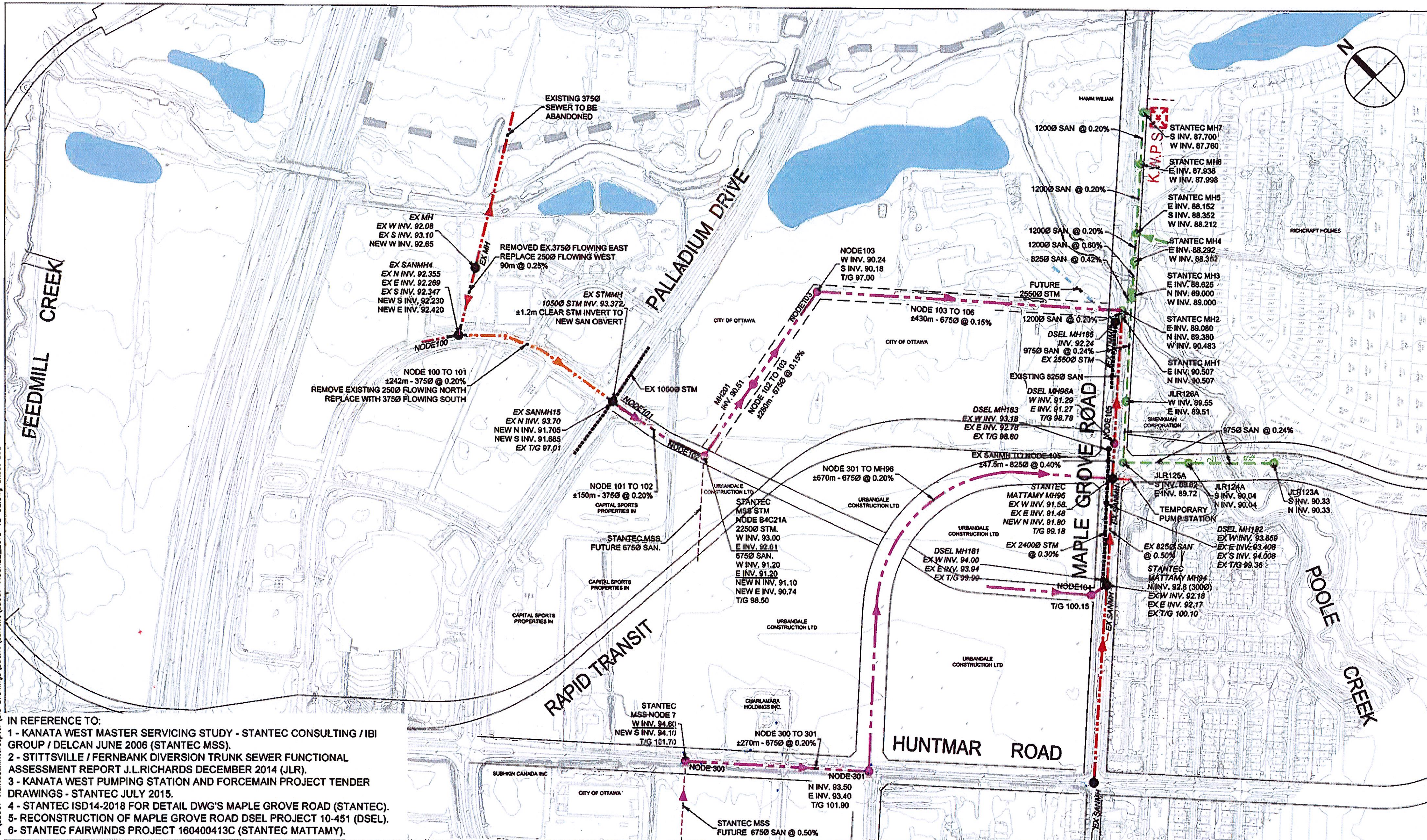
ATREL Engineering Ltd.
Engineers - Ingénieurs
2484 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-SANM

PLAN
MACRO SANITARY DRAINAGE AREA PLAN



IN REFERENCE TO:
1 - KANATA WEST MASTER SERVICING STUDY - STANTEC CONSULTING / IBI GROUP / DELCAN JUNE 2006 (STANTEC MSS).
2 - STITTSVILLE / FERNBANK DIVERSION TRUNK SEWER FUNCTIONAL ASSESSMENT REPORT J.L.RICHARDS DECEMBER 2014 (JLR).
3 - KANATA WEST PUMPING STATION AND FORCEMAIN PROJECT TENDER DRAWINGS - STANTEC JULY 2015.
4 - STANTEC ISD14-2018 FOR DETAIL DWG'S MAPLE GROVE ROAD (STANTEC).
5 - RECONSTRUCTION OF MAPLE GROVE ROAD DSEL PROJECT 10-451 (DSEL).
6 - STANTEC FAIRWINDS PROJECT 160400413C (STANTEC MATTAMY).

J:\35001-KantaSanInterceptor\5.9 Drawings\59civil\current\35001-FIGURE2_2015-12-02.dwg Sheet Set: ----

Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 0.387:1 Plotted At: Dec. 4, 15 2:03 PM Printed By: DENIS DORE Last Saved By: DDORE Last Saved At: Dec. 4, 15

IBI GROUP	Scale	Project Title	Drawing Title	Sheet No.
	N.T.S.	KANATA WEST NORTH SOUTH SANITARY INTERCEPTOR	PROPOSED ALIGNMENTS FOR KANATA WEST DEVELOPMENT NORTH-SOUTH SANITARY COLLECTOR SEWERS FUNCTIONAL DESIGN STUDY	FIGURE 1 (2015-12-02)

Maple Grove San Sewer Capacity Analysis (10/MH91 - SAMH 3)
DSEL, May 2019

Area consistent w/ KWMSS.

Area updated per attached as-builts.

Area redirected per attached IBI North-South Sanitary Interceptor. Demands consistent w/ KMSS.

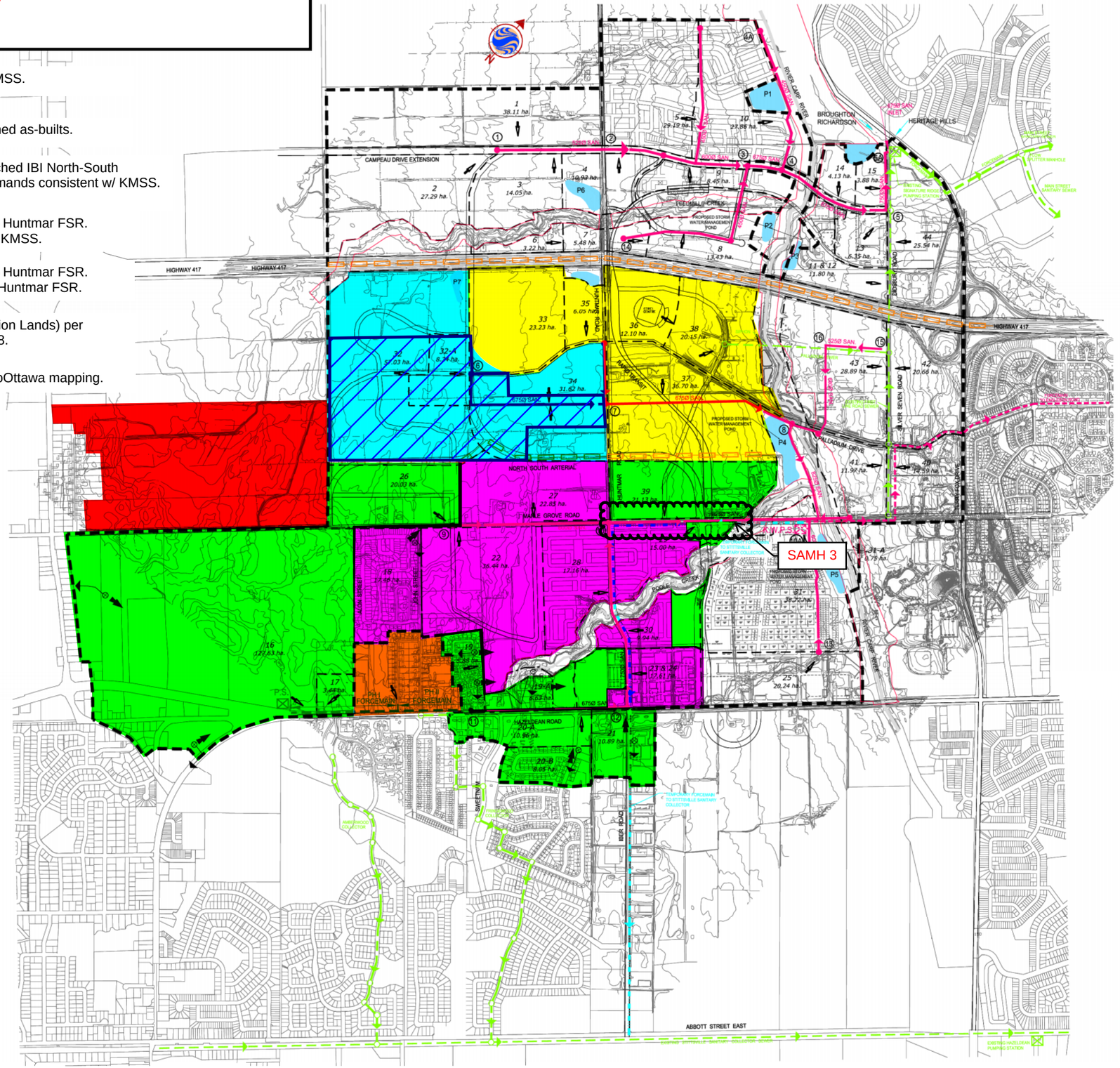
Area redirected per 195 Huntmar FSR. Demands consistent w/ KMSS.

Area redirected per 195 Huntmar FSR. Demands also per 195 Huntmar FSR.

Future development (Mion Lands) per attached Novatech 2018.

Additional Area per GeoOttawa mapping.

Analysis location.



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www.stantec.com

Stantec

CCL/IBI Consulting Limited

Legend

- ULTIMATE MAJOR DRAINAGE LIMIT
- SUBCATCHMENT AREAS
- PROPOSED TRUNK SEWER
- PROPOSED FORCEMAIN
- TEMPORARY FORCEMAIN
- PROPOSED STITTSVILLE PUMPING STATION AND FORCEMAIN
- EXISTING TRUNK SEWER
- MAJOR DRAINAGE SPLIT
- NODES
- EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
- 44 / 25.54 ha. — INPUT POINT AND AREA IN HECTARES
- EXISTING PUMPING STATION GRAVITY OUTLET

No.	Revision	By	Appd.	Date
5	REVISED FOR DEC.21/05 SUBMISSION	G.B.U.	S.v.P.	05/12/21
4	REVISED TRUNK SEWER FROM 16 TO KMPS	R.M.W.	R.M.W.	05/10/05
3	ARROWS FOR EXIST. PUMP STATIONS ADDED	R.M.W.	R.M.W.	05/08/09
2	REPORT JUNE 2005	R.M.W.	R.M.W.	05/06/07
1	REPORT APR. 2005	R.M.W.	R.M.W.	05/04/20

File Name: Dwn. Chkd. Dsgn. Date

Seals

Client/Project
Kanata West Concept Plan
Master Servicing Study
Ottawa, Ontario

Title
Preferred Waste-Water Option

Project No. 60400406
Scale 1:7500 (0, 75, 225, 375m)
Drawing No. S-I
Sheet 7 of 7
Revision 5

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION				RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET		FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
195 Huntmar FSR	Areas 32, 32A, 34 & Portion of 33		10	104.82		6981	104.82	6981	2.69	60.77	48.42	48.42	7.48	7.48	6.35	6.35	28.20	167.07	167.07	55.13	144.10							
	Area 33 Mod						0.00	0			22.37	22.37		0.00		0.00	10.87	22.37	22.37	7.38	18.25							
Corel Cente Etc (Existing Sewer)	Area 35 HP Employment						0.00	0			6.05	28.42		0.00		0.00	13.82	6.05	28.42	9.38	23.20							
	Area 36 (Corel Centre)																				30.00							
	Area 37 Mixed Use			15.60		2340	15.60	2340	3.03	22.98	21.10	49.52		0.00		0.00	24.07	36.70	65.12	21.49	68.54							
	Area 38 Extend. Employment		10				15.60	2340	3.03	22.98	20.15	69.67		0.00		0.00	33.87	20.15	85.27	28.14	114.99							
Maple Grove Road Trunk Sewer	Area 18			17.46		1129	17.46	1129	3.21	11.74		0.00		0.00		0.00	0.00	17.46	17.46	5.76	17.50							
	Area 19			5.88	112	336	23.34	1465	3.15	14.96		0.00		0.00		0.00	0.00	5.88	23.34	7.70	22.66							
	Area 27			20.83		2025	44.17	3490	2.91	32.91		0.00	2.52	2.52		0.00	1.22	23.35	46.69	15.41	49.54							
	Area 26			20.03	601	1803	64.20	5293	2.78	47.69		0.00		2.52		0.00	1.22	20.03	66.72	22.02	70.93							
	Area 22	9	10	32.33		2122	96.53	7415	2.67	64.16		0.00	2.47	4.99	1.23	1.23	2.62	36.03	102.75	33.91	100.69							
Hazeldean/Huntmar Trunk Sewer	Area 16/20 Residential			99.01		5644	99.01	5644	2.76	50.48	33.50	33.50		0.00	14.13	14.13	18.57	146.64	146.64	48.39	117.44							
	Area 17 Ex. Commercial	11	12				99.01	5644	2.76	50.48	3.44	36.94		0.00		14.13	20.24	3.44	150.08	49.53	120.25							
	Additional Area*			10.80	86	292	109.81	5936	2.74	52.71	6.70	43.64		0.00		14.13	23.50	17.50	167.58	55.30	131.51							
	Area 21 Exist. Employment						109.81	5936	2.74	52.71	10.89	54.53		0.00		14.13	28.79	10.89	178.47	58.90	140.40							
	Area 19A Exist. Residential			6.63		378	116.44	6314	2.72	55.66		54.53		0.00		14.13	28.79	6.63	185.10	61.08	145.53							
	5075 Hazeldean Rd						116.44	6314	2.72	55.66	8.45	62.98		0.00		14.13	32.90	8.45	193.55	63.87	152.43							
	15 Huntmar Restaurant			0.76		381	117.20	6695	2.70	58.58		62.98		0.00		14.13	32.90	0.76	194.31	64.12	155.60							
	Area 23/24 Mod						117.20	6695	2.70	58.58	8.40	71.38		0.00		14.13	36.98	8.40	202.71	66.89	162.45							
	Area 29 Mod			7.12	214	642	124.32	7337	2.67	63.49		71.38		0.00		14.13	36.98	7.12	209.83	69.24	169.71							
	Area 30 Mod			3.87	116	348	128.19	7685	2.65	66.00		71.38		0.00		14.13	36.98	3.87	213.70	70.52	173.50							
	Area 28 & Portions of 29 & 30	12	10	30.33		2325	158.52	10010	2.56	83.05		71.38		0.00		14.13	36.98	30.33	244.03	80.53	200.56							
Maple Grove Road Trunk Sewer	Area 39 Mixed Use		10	8.98		1347	8.98	1347	3.17	13.84	12.15	12.15		0.00		0.00	5.91	21.13	21.13	6.97	26.72							
		10/MH91	MH92				384.45	28093	2.20	200.29		201.62		12.47		21.71	107.58	0.00	620.25	204.68	542.55	96.10	825	0.28	759.56	0.71	1.42	1.53
		MH92	MH93																			88.90	825	0.51	1025.11	0.53	1.92	1.94
		MH94	MH94																			96.00	825	0.30	786.22	0.69	1.47	1.59
		MH94	MH95																			41.50	825	0.46	973.56	0.56	1.82	1.87
		MH95	MH96																			107.20	825	0.39	896.43	0.61	1.68	1.76
		MH96	MH96A																			47.50	825**	0.44	952.16	0.57	1.78	1.83
		MH96A	MH97A																			120.00	825**	0.44	952.16	0.57	1.78	1.83
		MH97A	MH98A/SAMH1																			65.00	825**	0.38	884.86	0.61	1.66	1.74
		MH98A/SAMH1	SAMH2																			6.70	825	0.36	861.26	0.63	1.61	1.71
		SAMH2	SAMH3																			18.90	825	0.42	930.27	0.58	1.74	1.81

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.108		Harmon Correction Factor =	0.800		
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.405		Extraneous Flow =	0.330	L/s/ha	
Industrial Flow =	28000	L/ha/da	0.405		Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.50	if ICI >20%	1.00	if ICI <20%				
Mixed Use	28000.00	L/ha/da						
Institutional =	0.324	l/s/Ha						

Designed: B.K.	PROJECT: **195 Huntmar Drive**		
Checked:	LOCATION: **City of Ottawa**		
Dwg. Reference:	File Ref: 14-624	Date: May-19	Sheet No. 1 of 1

*Additional area outside of MSS study area but directing wastewater to Maple Grove Road trunk sewer via Hazeldean Road. Areas and unit count taken from GeoOttawa mapping. 3.4 pop/unit applied.

**825mm dia. per Stantec Kanata West Pump Station and Forcemain Nov 2015 Issued for Construction drawings. 900mm dia. per DSEL Reconstruction of Maple Grove Road Sept 2013 As-built drawings.

EX. SANMH 96

SANITARY SEWER COMPUTATION FORM

Table 7A

DATE: **September 20, 2021**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **130 Huntmar Drive**
CLIENT: Urbandale Corporation
PROJECT #: 191002
BY: Atrel Engineering Ltd

q= 280 l/cap.day
I= 0.33 l/ha.s
PVC/CONC N= 0.013
OTHER N= 0.024

88.84

LOCATION				RESIDENTIAL						COMMERCIAL , INSTITUTIONAL						GREEN SPACE						Canadian Tire Centre FLOW		PEAK EXT.FLOW	PEAK DES.	SEWER DATA							UpStream		DwnStream	
				INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW															
FROM (Up)		TO (Down)		AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	Ind. (L/S)	Cum. (L/S)	Q(i) (L/S)	Q(d) (L/S)	TYPE PIPE	DIA. (N0M) (mm)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)
MH	212A	MH	213A	2.07		2.07				6.95	695.0	6.95	695	1.50	3.38	5.89	196.0	5.89	196	1.50	0.95			4.92	9.25	PVC	200	0.32	42.0	18.96	51%	0.60	96.81	96.61	96.67	96.47
MH	213A	MH	214A			2.07						6.95	695	1.50	3.38			5.89	196	1.50	0.95			4.92	9.25	PVC	200	0.32	120.0	18.96	51%	0.60	96.67	96.47	96.28	96.08
MH	214B	MH	214A																							PVC	200	0.32	120.0	18.96	100%	0.60	96.66	96.46	96.27	96.07
MH	214A	MH	215A			2.07						6.95	695	1.50	3.38			5.89	196	1.50	0.95			4.92	9.25	PVC	250	0.30	53.0	33.08	72%	0.67	96.27	96.02	96.11	95.86
MH	215A	MH	302	0.42	33.0	2.49	33	3.68	0.39			6.95	695	1.50	3.38			5.89	196	1.50	0.95			5.06	9.78	PVC	250	0.32	98.5	34.17	71%	0.69	96.05	95.80	95.73	95.48
MH	302	MH	303	0.43	27.0	2.92	60	3.64	0.71			6.95	695	1.50	3.38			5.89	196	1.50	0.95			5.20	10.24	PVC	250	0.32	102.0	34.38	70%	0.69	95.73	95.48	95.40	95.15
MH	303	MH	322	2.07	265.0	4.99	325	3.45	3.63			6.95	695	1.50	3.38			5.89	196	1.50	0.95			5.88	13.85	PVC	250	0.32	107.0	34.17	59%	0.69	95.40	95.15	95.06	94.81
MH	308	MH	309	0.79	62.0	0.79	62	3.64	0.73															0.26	0.99	PVC	200	0.65	80.0	26.86	96%	0.84	98.86	98.66	98.34	98.14
MH	309	MH	311			0.79	62	3.64	0.73															0.26	0.99	PVC	200	0.32	11.0	18.96	95%	0.60	98.31	98.11	98.27	98.07
MH	310	MH	311							0.74	74.0	0.74	74	1.50	0.36									0.24	0.60	PVC	200	1.00	11.0	33.31	98%	1.05	97.91	97.71	97.80	97.60
MH	311	MH	312	0.14		0.93	62	3.64	0.73			0.74	74	1.50	0.36									0.55	1.64	PVC	200	0.32	63.0	18.96	91%	0.60	97.74	97.54	97.54	97.34
MH	312	MH	313			0.93	62	3.64	0.73			0.74	74	1.50	0.36									0.55	1.64	PVC	200	0.32	12.0	18.96	91%	0.60	97.51	97.31	97.47	97.27
MH	313	MH	315	0.27	17.0	1.20	79	3.62	0.93			0.74	74	1.50	0.36									0.64	1.93	PVC	200	0.32	47.0	18.96	90%	0.60	97.44	97.24	97.29	97.09
MH	314	MH	315	0.26	14.0	0.26	14	3.72	0.17															0.09	0.25	PVC	200	0.65	41.5	26.86	99%	0.84	97.80	97.60	97.53	97.33
MH	315	MH	318	0.56	48.0	2.02	141	3.56	1.63			0.74	74	1.50	0.36									0.91	2.90	PVC	200	0.32	82.0	18.96	85%	0.60	96.93	96.73	96.66	96.46
MH	316	MH	317	0.34	21.0	0.34	21	3.70	0.25							1.07	36.0	1.07	36	1.50	0.18			0.47	0.89	PVC	200	0.65	60.0	26.86	97%	0.84	97.98	97.78	97.59	97.39
MH	317	MH	318	0.37	24.0	0.71	45	3.66	0.53									1.07	36	1.50	0.18			0.59	1.30	PVC	200	0.32	84.0	18.96	93%	0.60	96.99	96.79	96.72	96.52
MH	318	MH	321	0.37	34.0	3.10	220	3.51	2.50			0.74	74	1.50	0.36			1.07	36	1.50	0.18			1.62	4.65	PVC	200	0.32	82.0	18.96	75%	0.60	96.66	96.46	96.39	96.19
MH	319	MH	320	0.56	45.0	0.56	45	3.66	0.53															0.18	0.72	PVC	200	0.65	60.0	26.86	97%	0.84	97.99	97.79	97.60	97.40
MH	320	MH	321	0.50	49.0	1.06	94	3.60	1.10															0.35	1.45	PVC	200	0.32	83.0	18.96	92%	0.60	97.60	97.40	97.33	97.13
MH	321	MH	322	0.24	27.0	4.40	341	3.44	3.81			0.74	74	1.50	0.36			1.07	36	1.50	0.18			2.05	6.39	PVC	200	0.32	82.0	18.96	66%	0.60	95.83	95.63	95.56	95.36
MH	322	MH	324	0.07		9.46	666	3.33	7.18			7.69	769	1.50	3.74			6.96	232	1.50	1.13			7.96	20.00	PVC	300	0.20	47.5	42.94	53%	0.61	95.06	94.76	94.96	94.66
MH	323	MH	324	2.46	355.0	2.46	355	3.44	3.95	3.20	320.0	3.20	320	1.50	1.56									1.87	7.38	PVC	200	0.32	53.0	18.96	61%	0.60	94.84	94.64	94.67	94.47
MH	324	MH	350	0.11	11.0	12.03	1032	3.23	10.81			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			9.86	27.09	PVC	375	0.20	41.5	73.72	63%	0.70	94.67	94.30	94.59	94.22
MH	325	MH	350	0.26	33.0	0.26	33	3.68	0.39															0.09	0.48	PVC	200	0.65	82.5	26.86	98%	0.84	97.07	96.87	96.53	96.33
MH	350	MH	351	1.09	158.0	13.38	1223	3.19	12.66			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			10.31	29.38	PVC	375	0.20	81.0	73.72	60%	0.70	94.53	94.16	94.37	94.00
MH	351	MH	352			13.38	1223	3.19	12.66			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			10.31	29.38	PVC	375	0.20	10.5	73.72	60%	0.70	94.34	93.97	94.32	93.95
MH	352	MH	354	0.17		13.55	1223	3.19	12.66			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			10.36	29.44	PVC	375	0.20	39.5	73.72	60%	0.70	94.29	93.92	94.21	93.84
MH	353	MH	354	0.34	54.0	0.34	54	3.65	0.64															0.11	0.75	PVC	200	0.65	79.5	26.86	97%	0.84	96.73	96.53	96.21	96.01
MH	354	MH	356	0.16		14.05	1277	3.18	13.17			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			10.53	30.12	PVC	375	0.20	46.5	73.72	59%	0.70	94.21	93.84	94.12	93.75
MH	355	MH	356	1.24	172.0	1.24	172	3.54	1.97															0.41	2.38	PVC	200	0.65	96.5	26.86	91%	0.84	96.75	96.55	96.12	95.92
MH	356	MH	357	0.23		15.52	1449	3.15	14.80			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			11.01	32.24	PVC	375	0.20	67.5	73.72	56%	0.70	94.12	93.75	93.98	93.61
MH	357	MH	358	0.37		15.89	1449	3.15	14.80			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			11.13	32.36	PVC	375	0.20	102.5	73.72	56%	0.70	93.98	93.61	93.77	93.40
MH	358	MH	347			15.89	1449	3.15	14.80			10.89	1089	1.50	5.29			6.96	232	1.50	1.13			11.13	32.36	PVC	375	0.20	21.0	73.72	56%	0.70	93.74	93.37	93.70	93.33
MH	217A	MH	329	104.92	7061.0	104.92	7061	2.68	61.38	47.10	4710.0	47.10	4710	1.50	22.90	0.53	17.6	0.53	18	1.50	0.09			50.34	134.70	PVC	500	0.40	61.0	198.43	32%	1.16	97.09	96.62	96.85	96.38
MH	328	MH	329	0.77	57.0	0.77	57	3.64	0.67															0.25	0.93	PVC	200	1.00	104.5	33.31	97%	1.05	98.25	98.05	97.20	97.00
MH	329	MH	331	0.26		105.95	7118	2.68	61.81			47.10	4710	1.50	22.90			0.53	18	1.50	0.09			50.68	135.48	PVC	500	0.40	79.0	198.43	32%	1.16	96.85	96.38	96.53	96.06
MH	330	MH	331	0.76	45.0	0.76	45	3.66	0.53															0.25	0.78	PVC	200	1.00	85.5	33.31	98%	1.05	98.19	97.99	97.33	97.13
MH	331	MH	337	0.27		106.98	7163	2.68	62.16			47.10	4710	1.50	22.90			0.53	18	1.50	0.09			51.02	136.16	PVC	500	0.40	82.0	198.43	31%	1.16	96.53	96.06	96.20	95.73
MH	332	MH	333	0.87	72.0	0.87	72	3.62	0.85															0.29	1.13	PVC	200	1.00	98.5	33.31	97%	1.05	98.55	98.35	97.56	97.36
MH	333	MH	334	0.78	63.0	1.65	135	3.56	1.56															0.54	2.10	PVC	200	0.32	98.5	18.96	89%	0.60	97.56	97.36	97.24	97.04
MH	334	MH	335	0.06		1.71	135	3.56	1.56															0.56	2.12	PVC	200	0.32	28.5	18.96	89%	0.60	97.18	96.98	97.09	96.89
MH	335	MH	336			1.71	135	3.56	1.56															0.56	2.12	PVC	200	0.32	11.0	18.96	89%	0.60	97.06	96.86	97.02	96.82
MH	336	MH	337	0.70	53.0	2.41	188	3.53	2.15															0.80	2.94	PVC	200	0.60	89.5	25.80	89%	0.81	96.57	96.37	96.03	95.83
MH	337	MH	343	0.26		109.65	7351	2.67	63.58			47.10	4710	1.50	22.90			0.53	18	1.50	0.09			51.90	138.46	PVC	500	0.40	82.5	198.43	30%	1.16	95.70	95.23	95.37	94.90
MH	338	MH	339	1.32	194.0	1.32	194	3.52	2.21	1.11	111.0	1.11	111	1.50	0.54									0.80	3.56	PVC	200	0.32	57.0	18.96	81%	0.60	95.83	95.63	95.65	95.45
MH	339	MH	340	0.10		1.42	194	3.52	2.21			1.11	111	1.50	0.54									0.83	3.59	PVC	200	0.32	54.0	18.96	81%	0.60	95.65	95.45	95.48	95.28
MH	340	MH	341	0.10		1.52	194	3.52	2.21			1.11	111	1.50	0.54									0.87	3.62	PVC	200	0.32	58.0	18.96	81%	0.60	95.48	95.28	95.29	95.09
MH	341	MH	342	2.01	295.0	3.53	489	3.38	5.36			1.11	111	1.50	0.54									1.53	7.43	PVC	200	0.32	70.0	18.96	61%	0.60	95.29	95.09	95.06	94.86
MH	342	MH	343	0.23	17.0	3.76	506	3.38	5.54			1.11	111	1.50	0.54									1.61	7.68	PVC	200	0.32	57.5	18.96	59%	0.60	95.06	94.86	94.87	94.67
MH	343	MH	344	0.07		113.48	7857	2.65	67.38			48.21	4821	1.50	23.44			0.53	18	1.50	0.09			53.53	144.44	PVC	500	0.50	26.0	221.86	35%	1.30	94.87	94.40	94.74	94.27
MH	344	MH	345	0.16		113.64	7857	2.65	67.38			48.21	4821	1.50	23.44			0.53	18	1.50	0.09			53.59	144.49	PVC	500	0.50	40.5	221.86	35%	1.30	94.71	94.24	94.51	94.04
MH	345	MH	346	0.16		113.80	7857	2.65	67.38			48.21	4821	1.50	23.44			0.53	18	1.50	0.09			53.64	144.54	PVC	500	0.50	40.5	221.86	35%	1.30	94.48	94.01	94.28	93.81
MH	346	MH	347	0.15		113.95	7857	2.65	67.38			48.21	4821	1.50	23.44			0.53	18	1.50	0.09			53.69	144.59	PVC	500	0.50	40.5	221.86	35%	1.30	94.25	93.78	94.05	93.58
MH	347	MH	348	0.16		130.00	9306	2.59	78.07			59.10	5910	1.50	28.73			7.49	250	1.50	1.21			64.87	172.88	PVC	600	0.50	40.5	360.83	52%	1.47	93.70	93.14	93.50	92.94
MH	348	MH	349A	0.56		130.56	9306	2.59	78.07			59.10	5910	1.50	28.73			7.49	250	1.50	1.21			65.06	173.07	PVC	600	0.50	150.5	360.83	52%	1.47	93.47	92.91	92.72	92.16
MH	349A	MH	349B	0.15		130.71	9306	2.59	78.07			59.10	5910	1.50	28.73			7.49	250	1.50	1.21			65.11	173.12	PVC	600	0.50	47.0	360.83	52%	1.47	92.69	92.13	92.45	91.89
MH	349B	MH	EX			130.71	9306	2.59	78.07			59.10	5910	1.50	28.73			7.49	250	1.50	1.21			65.11	173.12	PVC	600	0.50	10.5	360.83	52%	1.47	92.42	91.86	92.37	91.81
EX.MH	96	EX.MH	97	264.00	18768.0	394.71	28074	2.20	200.57	137.05	13705.0	196.15	19615	1.50	95.35	15.36	510.0	22.85	760	1.50	3.69	30.00	30.00	202.52	532.13	CONC	900	0.38	47.5	1164.20	54%	1.77	92.35	91.45		

Mixed Uses Assumes: 15% Community Retail, 42.5% Business Park and 42.5% Residential (150 cap/ha.) as per KWMSS
Existing Sanitary Trunk Sewers
Proposed Sanitary Sewers
Future External Sanitary Sewers

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept 20, 2021
PROVINCE OF ONTARIO

Andre Sauve

From: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Sent: Tuesday, September 15, 2020 11:59 AM
To: Andre Sauve
Subject: Re: 130 Huntmar Drive
Attachments: Kanata LRT EA.pdf

Hello Andre,

Sorry for the delay in responding to your inquiry.

The HGL along Maple Grove during the annual event and a catastrophic failure at the KWPS is 94.4 m.

Also, please find attached the information related to the LRT EA.

Thanks

Eric Surprenant, CET
Sr, Project Manager, Infrastructure Projects, West
Planning, Infrastructure & Economic Development
613 580-2424 ext.: 27794

From: Andre Sauve <andresauve@atrel.com>
Sent: Friday, September 4, 2020 10:35 AM
To: Surprenant, Eric <Eric.Surprenant@ottawa.ca>
Subject: 130 Huntmar Drive

Hi Eric,

One of the comments is to verify the sanitary HGL in the event of a failure during the Annual Event. Can you provide the modeling file.

Also, would you have any concept drawings of the future LRT that you could share with us.

Thank you,

André Sauvé, P.Eng.
Atrel Engineering Ltd
1-2884 Chamberland Street | Rockland, ON K4K 1M6
Tel: (613) 446-7423 ext. 30 | Cell: (613) 857-8426
Email andresauve@atrel.com

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SANITARY SEWER COMPUTATION FORM

Table 7B

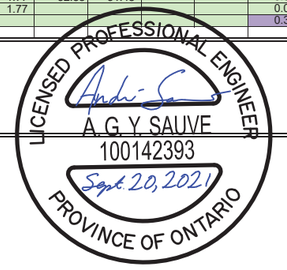
DATE: **September 20, 2021**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **130 Huntmar Drive**
CLIENT: Urbandale Corporation
PROJECT #: 191002
BY: Atrel Engineering Ltd

q= 200 l/cap.day
I= 0.30 l/ha.s
PVC/CONC N= 0.013
OTHER N= 0.024

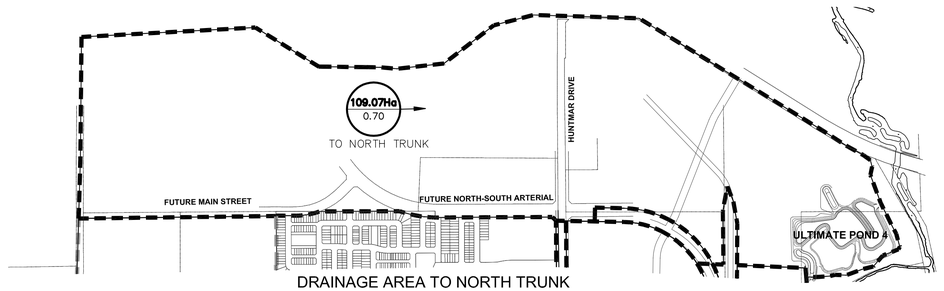
LOCATION				RESIDENTIAL						COMMERCIAL , INSTITUTIONAL						GREEN SPACE						Canadian Tire Centre FLOW		PEAK EXT.FLOW	PEAK DES.	SEWER DATA									UpStream		DwnStream		HGL	FRICT.	MINOR	HGL	UpStream		Down	USF	Freeboard
				INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	FLOW		Q(i)	Q(d)																		Hgl at	Hgl Out	MH		
FROM (Up)		TO (Down)		AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	AREA (ha.)	POP.	AREA (ha.)	POP.	FACTOR M	Q(p) (L/S)	Ind. (L/S)	Cum. (L/S)	(L/S)	(L/S)	TYPE PIPE	DIA. (N0M) (mm)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)	(%)	(M)	(M)	(M)	(M)	UP-MH (M)	UP-MH (M)	Hgl (M)	(m)	(m)
MH	212A	MH	213A	2.07		2.07				6.95	695.0	6.95	695	1.50	2.41	5.89	196.0	5.89	196	1.50	0.68			4.47	7.57	PVC	200	0.32	42.0	18.96	60%	0.60	96.81	96.61	96.67	96.47	0.05	0.02			96.69	96.69	96.67	99.79	2.98
MH	213A	MH	214A			2.07						6.95	695	1.50	2.41			5.89	196	1.50	0.68			4.47	7.57	PVC	200	0.32	120.0	18.96	60%	0.60	96.67	96.47	96.28	96.08	0.05	0.06			96.34	96.34	96.28	99.45	2.78
MH	214B	MH	214A																							PVC	200	0.32	120.0	18.96	100%	0.60	96.66	96.46	96.27	96.07					96.27	96.27	96.27	99.45	2.79
MH	214A	MH	215A			2.07						6.95	695	1.50	2.41			5.89	196	1.50	0.68			4.47	7.57	PVC	250	0.30	53.0	33.08	77%	0.67	96.27	96.02	96.11	95.86	0.02	0.01			96.12	96.12	96.11	99.50	3.23
MH	215A	MH	302	0.42	33.0	2.49	33	3.68	0.28			6.95	695	1.50	2.41			5.89	196	1.50	0.68			4.60	7.97	PVC	250	0.32	98.5	34.17	77%	0.69	96.05	95.80	95.73	95.48	0.02	0.02			95.93	95.93	95.91	99.59	3.54
MH	302	MH	303	0.43	27.0	2.92	60	3.64	0.51			6.95	695	1.50	2.41			5.89	196	1.50	0.68			4.73	8.33	PVC	250	0.32	102.0	34.38	76%	0.69	95.73	95.48	95.40	95.15	0.02	0.02			95.91	95.91	95.89	99.06	3.15
MH	303	MH	322	2.07	265.0	4.99	325	3.45	2.60			6.95	695	1.50	2.41			5.89	196	1.50	0.68			5.35	11.04	PVC	250	0.32	107.0	34.17	68%	0.69	95.40	95.15	95.06	94.81	0.03	0.04			95.89	95.89	95.85	98.15	2.26
MH	308	MH	309	0.79	62.0	0.79	62	3.64	0.52															0.24	0.76	PVC	200	0.65	80.0	26.86	97%	0.84	98.86	98.66	98.34	98.14	0.00				98.34	98.34	98.34	99.49	0.63
MH	309	MH	311			0.79	62	3.64	0.52															0.24	0.76	PVC	200	0.32	11.0	18.96	96%	0.60	98.31	98.11	98.27	98.07	0.00				98.27	98.27	98.27	99.39	1.08
MH	310	MH	311							0.74	74.0	0.74	74	1.50	0.26									0.22	0.48	PVC	200	1.00	11.0	33.31	99%	1.05	97.91	97.71	97.80	97.60					97.80	97.80	97.80	99.83	1.92
MH	311	MH	312	0.14		0.93	62	3.64	0.52			0.74	74	1.50	0.26									0.50	1.28	PVC	200	0.32	63.0	18.96	93%	0.60	97.74	97.54	97.54	97.34	0.00				97.54	97.54	97.54	99.39	1.65
MH	312	MH	313			0.93	62	3.64	0.52			0.74	74	1.50	0.26									0.50	1.28	PVC	200	0.32	12.0	18.96	93%	0.60	97.51	97.31	97.47	97.27	0.00				97.47	97.47	97.47	99.29	1.78
MH	313	MH	315	0.27	17.0	1.20	79	3.62	0.66			0.74	74	1.50	0.26									0.58	1.50	PVC	200	0.32	47.0	18.96	92%	0.60	97.44	97.24	97.29	97.09	0.00				97.29	97.29	97.29	99.29	1.85
MH	314	MH	315	0.26	14.0	0.26	14	3.72	0.12															0.08	0.20	PVC	200	0.65	41.5	26.86	99%	0.84	97.80	97.60	97.53	97.33					97.53	97.53	97.53	98.70	0.90
MH	315	MH	318	0.56	48.0	2.02	141	3.56	1.16			0.74	74	1.50	0.26									0.83	2.25	PVC	200	0.32	82.0	18.96	88%	0.60	96.93	96.73	96.66	96.46	0.01				96.66	96.66	96.66	99.23	2.30
MH	316	MH	317	0.34	21.0	0.34	21	3.70	0.18							1.07	36.0	1.07	36	1.50	0.13			0.42	0.73	PVC	200	0.65	60.0	26.86	97%	0.84	97.98	97.78	97.59	97.39					97.59	97.59	97.59	99.30	1.32
MH	317	MH	318	0.37	24.0	0.71	45	3.66	0.38									1.07	36	1.50	0.13			0.53	1.04	PVC	200	0.32	84.0	18.96	95%	0.60	96.99	96.79	96.72	96.52	0.00				96.72	96.72	96.72	98.74	1.75
MH	318	MH	321	0.37	34.0	3.10	220	3.51	1.79			0.74	74	1.50	0.26			1.07	36	1.50	0.13			1.47	3.64	PVC	200	0.32	82.0	18.96	81%	0.60	96.66	96.46	96.39	96.19	0.01	0.01			96.40	96.40	96.39	98.65	1.99
MH	319	MH	320	0.56	45.0	0.56	45	3.66	0.38															0.17	0.55	PVC	200	0.65	60.0	26.86	98%	0.84	97.99	97.79	97.60	97.40					97.60	97.60	97.60	98.62	0.63
MH	320	MH	321	0.50	49.0	1.06	94	3.60	0.78															0.32	1.10	PVC	200	0.32	83.0	18.96	94%	0.60	97.60	97.40	97.33	97.13	0.00				97.33	97.33	97.33	98.25	0.65
MH	321	MH	322	0.24	27.0	4.40	341	3.44	2.72			0.74	74	1.50	0.26			1.07	36	1.50	0.13			1.86	4.96	PVC	200	0.32	82.0	18.96	74%	0.60	95.83	95.63	95.56	95.36	0.02	0.02			95.87	95.87	95.85	98.15	2.28
MH	322	MH	324	0.07		9.46	666	3.33	5.13			7.69	769	1.50	2.67			6.96	232	1.50	0.81			7.23	15.84	PVC	300	0.20	47.5	42.94	63%	0.61	95.06	94.76	94.96	94.66	0.03	0.01			95.85	95.85	95.84	97.70	1.85
MH	323	MH	324	2.46	355.0	2.46	355	3.44	2.82	3.20	320.0	3.20	320	1.50	1.11									1.70	5.63	PVC	200	0.32	53.0	18.96	70%	0.60	94.84	94.64	94.67	94.47	0.03	0.02			95.86	95.86	95.84	97.35	1.49
MH	324	MH	350	0.11	11.0	12.03	1032	3.23	7.72			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			8.96	21.27	PVC	375	0.20	41.5	73.72	71%	0.70	94.67	94.30	94.59	94.22	0.02	0.01			95.84	95.84	95.83	97.29	1.45
MH	325	MH	350	0.26	33.0	0.26	33	3.68	0.28															0.08	0.36	PVC	200	0.65	82.5	26.86	99%	0.84	97.07	96.87	96.53	96.33					96.53	96.53	96.53	97.90	0.83
MH	350	MH	351	1.09	158.0	13.38	1223	3.19	9.04			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			9.37	23.00	PVC	375	0.20	81.0	73.72	69%	0.70	94.53	94.16	94.37	94.00	0.02	0.02			95.83	95.83	95.81	97.25	1.42
MH	351	MH	352			13.38	1223	3.19	9.04			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			9.37	23.00	PVC	375	0.20	10.5	73.72	69%	0.70	94.34	93.97	94.32	93.95	0.02				95.81	95.81	95.81	96.70	0.89
MH	352	MH	354	0.17		13.55	1223	3.19	9.04			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			9.42	23.05	PVC	375	0.20	39.5	73.72	69%	0.70	94.29	93.92	94.21	93.84	0.02	0.01			95.81	95.81	95.80	96.70	0.89
MH	353	MH	354	0.34	54.0	0.34	54	3.65	0.46															0.10	0.56	PVC	200	0.65	79.5	26.86	98%	0.84	96.73	96.53	96.21	96.01					96.21	96.21	96.21	97.62	0.89
MH	354	MH	356	0.16		14.05	1277	3.18	9.41			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			9.57	23.57	PVC	375	0.20	46.5	73.72	68%	0.70	94.21	93.84	94.12	93.75	0.02	0.01			95.80	95.80	95.79	96.65	0.85
MH	355	MH	356	1.24	172.0	1.24	172	3.54	1.41															0.37	1.78	PVC	200	0.65	96.5	26.86	93%	0.84	96.75	96.55	96.12	95.92	0.00				96.12	96.12	96.12	97.90	1.15
MH	356	MH	357	0.23		15.52	1449	3.15	10.57			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			10.01	25.17	PVC	375	0.20	67.5	73.72	66%	0.70	94.12	93.75	93.98	93.61	0.02	0.02			95.79	95.79	95.77	96.60	0.81
MH	357	MH	358	0.37		15.89	1449	3.15	10.57			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			10.12	25.28	PVC	375	0.20	102.5	73.72	66%	0.70	93.98	93.61	93.77	93.40	0.02	0.02			95.77	95.77	95.75	96.44	0.67
MH	358	MH	347			15.89	1449	3.15	10.57			10.89	1089	1.50	3.78			6.96	232	1.50	0.81			10.12	25.28	PVC	375	0.20	21.0	73.72	66%	0.70	93.74	93.37	93.70	93.33	0.02	0.01			95.75	95.75	95.74	97.20	1.45
MH	217A	MH	329	104.92	7061.0	104.92	7061	2.68	43.84	47.10	4710.0	47.10	4710	1.50	16.35	0.53	17.6	0.53	18	1.50	0.06			45.77	106.02	PVC	500	0.40	61.0	198.43	47%	1.16	97.09	96.62	96.85	96.38	0.11	0.07			96.92	96.92	96.85	99.75	2.66
MH	328	MH	329	0.77	57.0	0.77	57	3.64	0.48															0.23	0.71	PVC	200	1.00	104.5	33.31	98%	1.05	98.25	98.05	97.20	97.00					97.20	97.20	97.20	99.60	1.35
MH	329	MH	331	0.26		105.95	7118	2.68	44.15			47.10	4710	1.50	16.35			0.53	18	1.50	0.06			46.07	106.64	PVC	500	0.40	79.0	198.43	46%	1.16	96.85	96.38	96.53	96.06	0.12	0.09			96.62	96.62	96.53	99.44	2.59
MH	330	MH	331	0.76	45.0	0.76	45	3.66	0.38															0.23	0.61	PVC	200	1.00	85.5	33.31	98%	1.05	98.19	97.99	97.33	97.13					97.33	97.33	97.33	99.37	1.18
MH	331	MH	337	0.27		106.98	7163	2.68	44.40			47.10	4710	1.50	16.35			0.53	18	1.50	0.06			46.38	107.19	PVC	500	0.40	82.0	198.43	46%	1.16	96.53	96.06	96.20	95.73	0.12	0.10			96.30	96.30	96.20	99.40	2.87
MH	332	MH	333	0.87	72.0	0.87	72	3.62	0.60															0.26	0.86	PVC	200	1.00	98.5	33.31	97%	1.05	98.55	98.35	97.56	97.36	0.00				97.56	97.56	97.56	99.10	0.55
MH	333	MH	334	0.78	63.0	1.65	135	3.56	1.11															0.50	1.61	PVC	200	0.32	98.5	18.96	92%	0.60	97.56	97.36	97.24	97.04	0.00				97.24	97.24	97.24	99.31	1.75
MH	334	MH	335	0.06		1.71	135	3.56	1.11															0.51	1.63	PVC	200	0.32	28.5	18.96	91%	0.60	97.18	96.98	97.09	96.89	0.00				97.09	97.09	97.09	99.45	2.27
MH	335	MH	336			1.71	135	3.56	1.11															0.51	1.63	PVC	200	0.32	11.0	18.96	91%	0.60	97.06	96.86	97.02	96.82	0.00				97.02	97.02	97.02	99.08	2.02
MH	336	MH	337	0.70	53.0	2.41	188	3.53	1.53															0.72	2.26	PVC	200	0.60	89.5	25.80	91%	0.81	96.57	96.37	96.03	95.83	0.01				96.03	96.03	96.03	99.08	2.51
MH	337	MH	343	0.26		109.65	7351	2.67	45.41			47.10	4710	1.50	16.35			0.53	18	1.50	0.06			47.18	109.01	PVC	500	0.40	82.5	198.43	45%	1.16	95.70	95.23	95.37	94.90	0.12	0.10			96.02	96.02	95.92	99.30	3.28
MH	338	MH	339	1.32	194.0	1.32	194	3.52	1.58	1.11	111.0	1.11	111	1.50	0.39									0.73	2.70	PVC	200	0.32	57.0	18.96	86%	0.60	95.83	95.63	95.65	95.45	0.01				95.96	95.96	95.96	97.91	1.95
MH	339	MH	340	0.10		1.42	194	3.52	1.58			1.11	111	1.50	0.39									0.76	2.73	PVC	200	0.32	54.0	18.96	86%	0.60	95.65	95.45	95.48	95.28	0.01				95.96	95.96	95.96	98.45	2.49
MH	340	MH	341	0.10		1.52	194	3.52	1.58			1.11	111	1.50	0.39									0.79	2.76	PVC	200	0.32	58.0	18.96	85%	0.60	95.48	95.28	95.29	95.09	0.01				95.96	95.96	95.96	98.06	2.10
MH	341	MH	342	2.01	295.0	3.53	489	3.38	3.83			1.11	111	1.50	0.39									1.39	5.61	PVC	200	0.32	70.0	18.96	70%	0.60	95.29	95.09	95.06	94.86	0.03	0.02			95.96	95.96	95.94	98.30	2.34
MH	342	MH	343	0.23	17.0	3.76	506	3.38	3.96			1.11	111	1.50	0.39									1.46	5.80	PVC	200	0.32	57.5	18.96	69%	0.60	95.06	94.86	94.87	94.67	0.03	0.02			95.94	95.94	95.92	97.94	2.00
MH	343	MH	344	0.07		113.48	7857	2.65	48.13			48.21	4821	1.50	16.74			0.53	18	1.50	0.06			48.67	113.60	PVC	500	0.50	26.0	221.86	49%	1.30	94.87	94.40	94.74	94.27	0.13	0.03			95.92	95.92	95.89	98.20	2.28
MH	344	MH	345	0.16		113.64	7857	2.65	48.13			48.21	4821	1.50	16.74			0.53	18	1.50	0.06			48.71	113.64	PVC	500	0.50	40.5	221.86	49%	1.30	94.71	94.24	94.51	94.04	0.13	0.05			95.89	95.89	95.84	98.08	2.19
MH	345	MH	346	0.16		113.80	7857	2.65	48.13			48.21	4821	1.50	16.74			0.53	18	1.50	0.06			48.76	113.69	PVC	500	0.50	40.5	221.86	49%	1.30	94.48	94.01	94.28	93.81	0.13	0.05			95.84	95.84	95.79	97.88	2.04
MH	346	MH	347	0.15		113.95	7857	2.65	48.13			48.21	4821	1.50	16.74			0.53	18	1.50	0.06			48.81	113.74	PVC	500	0.50	40.5	221.86	49%	1.30	94.25	93.78	94.05	93.58	0.13	0.05			95.79	95.79	95.74	97.63	1.84
MH	347	MH	348	0.16		130.00	9306	2.59	55.76			59.10	5910	1.50	20.52			7.49	250	1.50	0.87			58.98	136.13	PVC	600	0.50	40.5	360.83	62%	1.47	93.70	93.14	93.50	92.94	0.07	0.03			95.74	95.74	95.71	97.40	1.66
MH	348	MH	349A	0.56		130.56	9306	2.59	55.76			59.10	5910	1.50	20.52			7.49	250	1.50	0.87			59.15	136.29	PVC	600	0.50	150.5	360.83	62%	1.47	93.47	92.91	92.72	92.16	0.07	0.11			95.71	95.71	95.60	97.25	1.54
MH	349A	MH	349B	0.15		130.71	9306	2.59	55.76			59.10	5910	1.50	20.52			7.49	250	1.50	0.87			59.19	136.34	PVC	600	0.50	47.0	360.83	62%	1.47	92.69	92.13	92.45	91.89	0.07	0.03	0.01		95.60	95.59	95.56	97.12	1.52
MH	349B	MH	EX			130.71	9306	2.59	55.76			59.10	5910	1.50	20.52			7.49	250	1.50	0.87			59.19	136.34	PVC	600	0.50	10.5	360.83	62%	1.47	92.42	91.86	92.37	91.81	0.07	0.01	0.01		95.56	95.55	95.54	97.00	1.44
EX.MH	96	EX.MH	97	264.00	18768.0	394.71	28074	2.20	143.26	137.05	13705.0	196.15	19615	1.50	68.11	15.36	510.0	22.85	760	1.50	2.64	30.00	30.00	184.11	428.12	CONC	900	0.38	47.5	1164.20	63%	1.77	92.35	91.45			0.05	0.02			95.54	95.54	95.52	N/A	N/A
EX.MH	97	EX.MH	100			394.71	28074	2.20	143.26			196.15	19615	1.50	68.11			22.85	760	1.50	2.64		30.00	184.11	428.12	CONC	900	0.38	212.5	1164.20	63%	1.77					0.05	0.11			95.52	95.52	95.41	N/A	N/A
EX.MH	100	EX.	PS									196.15	19615	1.50	68.11											CONC	1200	0.32	316.0	2300.81							0.32	1.01			95.41	95.41	94.40	N/A	N/A

Mixed Uses Assumes: 15% Community Retail, 42.5% Business Park and 42.5% Residential (150 cap/ha.) as per KWMSS
Existing Sanitary Sewers
Proposed Sanitary Sewers
Future External Sanitary Sewers
Area and population unknown, assummed HGL at 0.32% from MH 100 to KWPS
The HGL at KWPS during the annual event and at catastrphic failure is 94.40m



APPENDIX "E"

- Storm Drainage Plan – Pond 4 Kanata West (DSEL)
- 191002-STMM - Macro Storm Drainage Area Plan
- 191002-RC1 – Runoff Coefficient Detail Calculations
- Storm Sewer Calculation Sheet (DSEL)
- 195 Huntmar Drive Storm Drainage Area to Pond 4 Figure 1 (DSEL)
- Table 8 - Storm Sewer Design Sheet (Rational Method)
- Table 9 - Storm Sewer Design Sheet (Restricted)
- 130 Huntmar Drive / Preliminary Kanata West Pond 4 Sizing (JFSA)
- KWMSS - Storm Drainage Area Plan South Ponds – Drawing ST-PS
- Road Catchbasin Detail Sketch SK2



DRAINAGE AREA TO NORTH TRUNK
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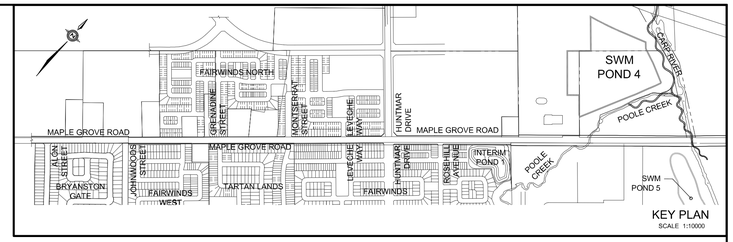

KEY PLAN
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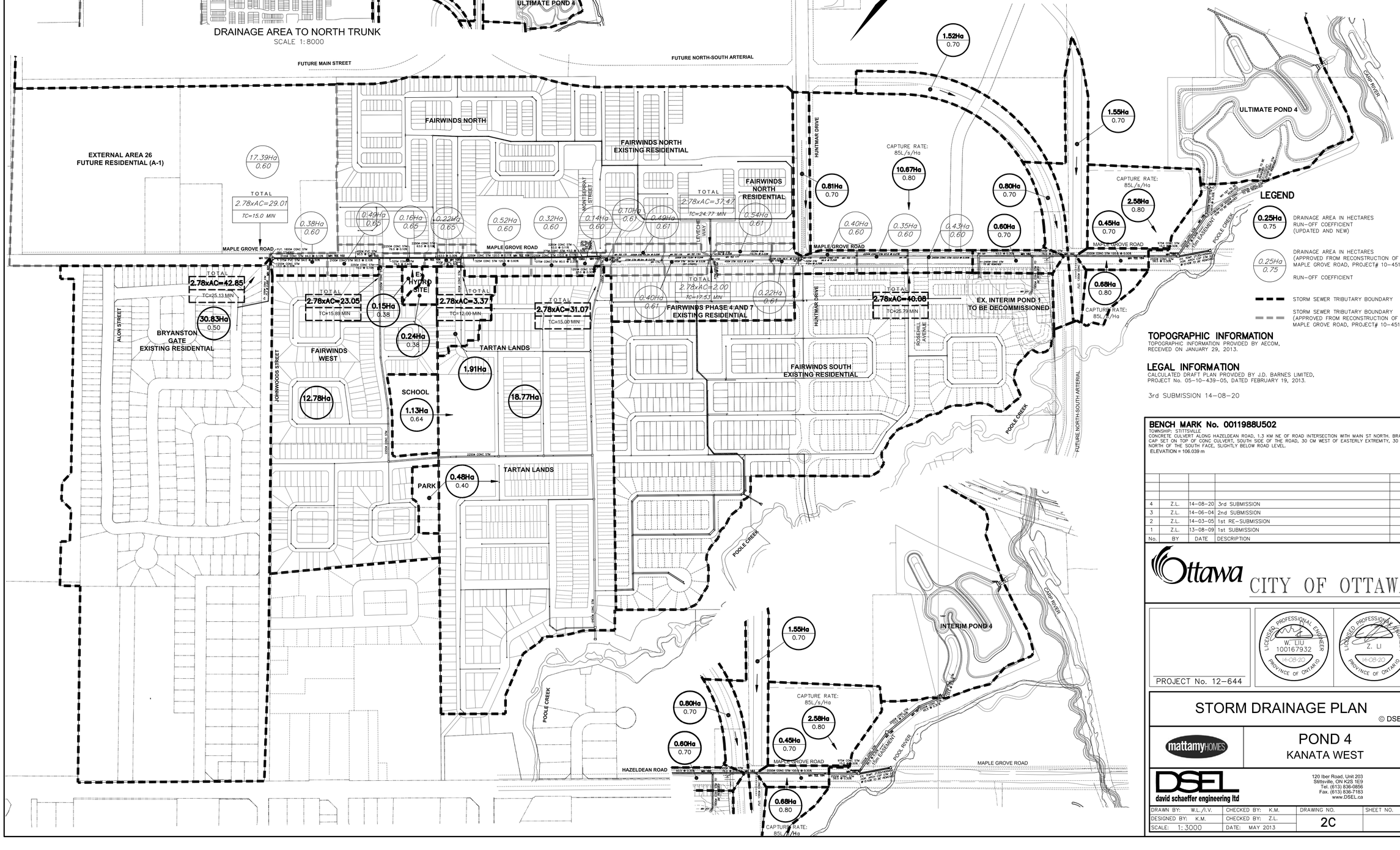


TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY AECOM, RECEIVED ON JANUARY 29, 2013.

LEGAL INFORMATION

CALCULATED DRAFT PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 05-10-439-05, DATED FEBRUARY 19, 2013.

3rd SUBMISSION 14-08-20

BENCH MARK No. 0011988U502

TOWNSHIP: STITTSVILLE
CONCRETE CULVERT ALONG HAZELDEAN ROAD, 1.3 KM NE OF ROAD INTERSECTION WITH MAIN ST NORTH. BRASS CAP SET ON TOP OF CONC CULVERT, SOUTH SIDE OF THE ROAD, 30 CM WEST OF EASTERLY EXTREMITY, 30 CM NORTH OF THE SOUTH FACE, SLIGHTLY BELOW ROAD LEVEL.
ELEVATION = 106.039 m

No.	BY	DATE	DESCRIPTION	BY
4	Z.L.	14-08-20	3rd SUBMISSION	
3	Z.L.	14-06-04	2nd SUBMISSION	
2	Z.L.	14-03-05	1st RE-SUBMISSION	
1	Z.L.	13-08-09	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 12-644

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
14-08-20
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
Z. LI
14-08-20
PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

© DSEL

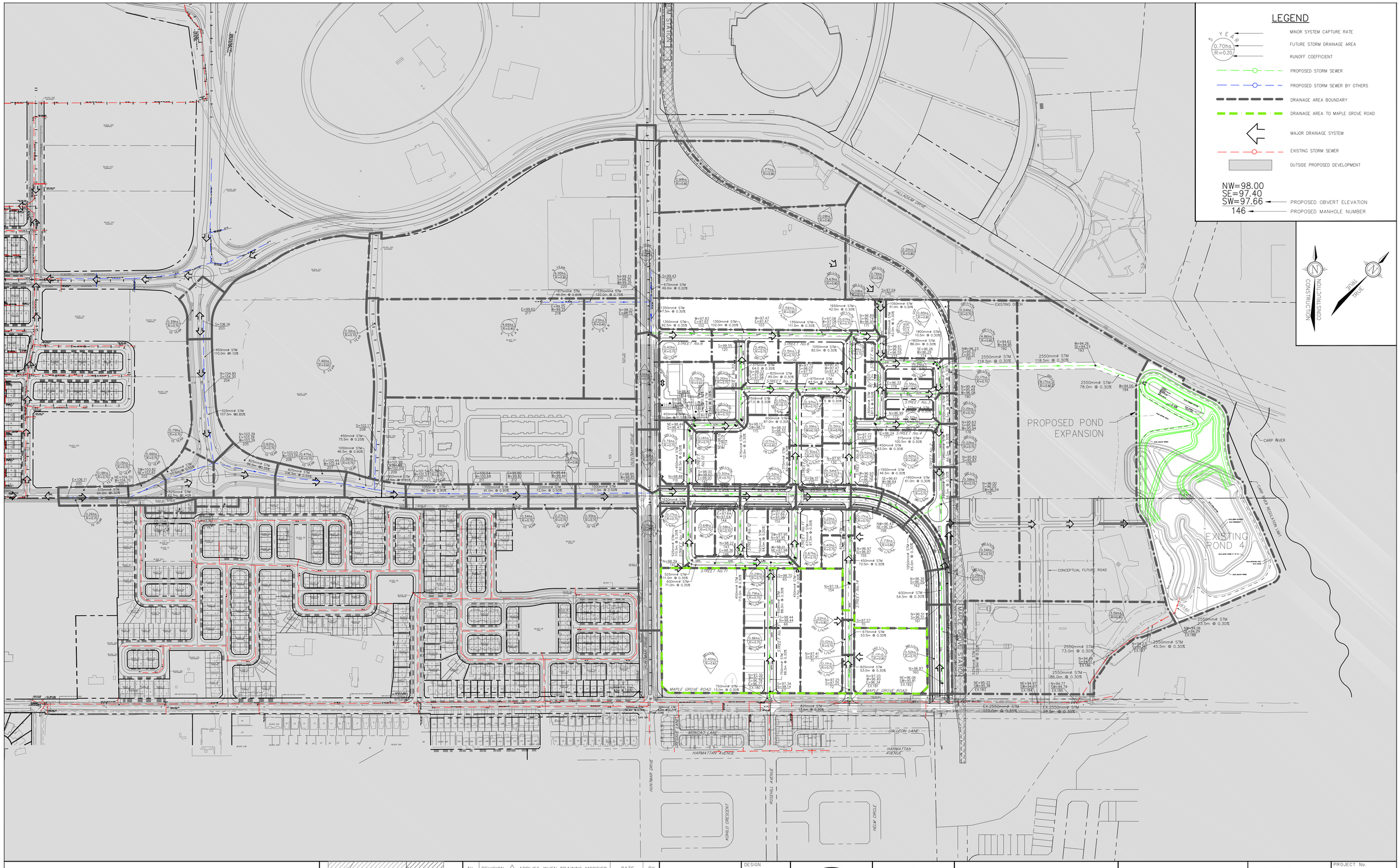
mattamyHOMES

POND 4
KANATA WEST

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: W.L./I.V.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.	2C	
SCALE: 1:3000	DATE: MAY 2013		

M:\12644\Subm_3\Drawings\02C_644_Stm_Drainage.dwg, vyao



THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	JULY 6/20	AGS
2	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	AUG. 4/20	AGS
3	REVISED AS PER CITY COMMENTS	OCT. 7/20	AGS
4	REVISED AS PER NEW ROAD ALIGNMENT	MAR. 4/21	AGS
5	REVISED AS PER CITY COMMENTS	MAR. 30/21	AGS
6	*RECORD DRAWING*	*AUG. 25/21*	*AGS*
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE
1 : 2 500
40m 0 60m
HORIZONTAL

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

LICENSED PROFESSIONAL ENGINEER
A.G.Y. SAUVE
100142393
Sept. 20, 2021
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J.M. J.DECOEUR
Sept. 20, 2021
PROVINCE OF ONTARIO

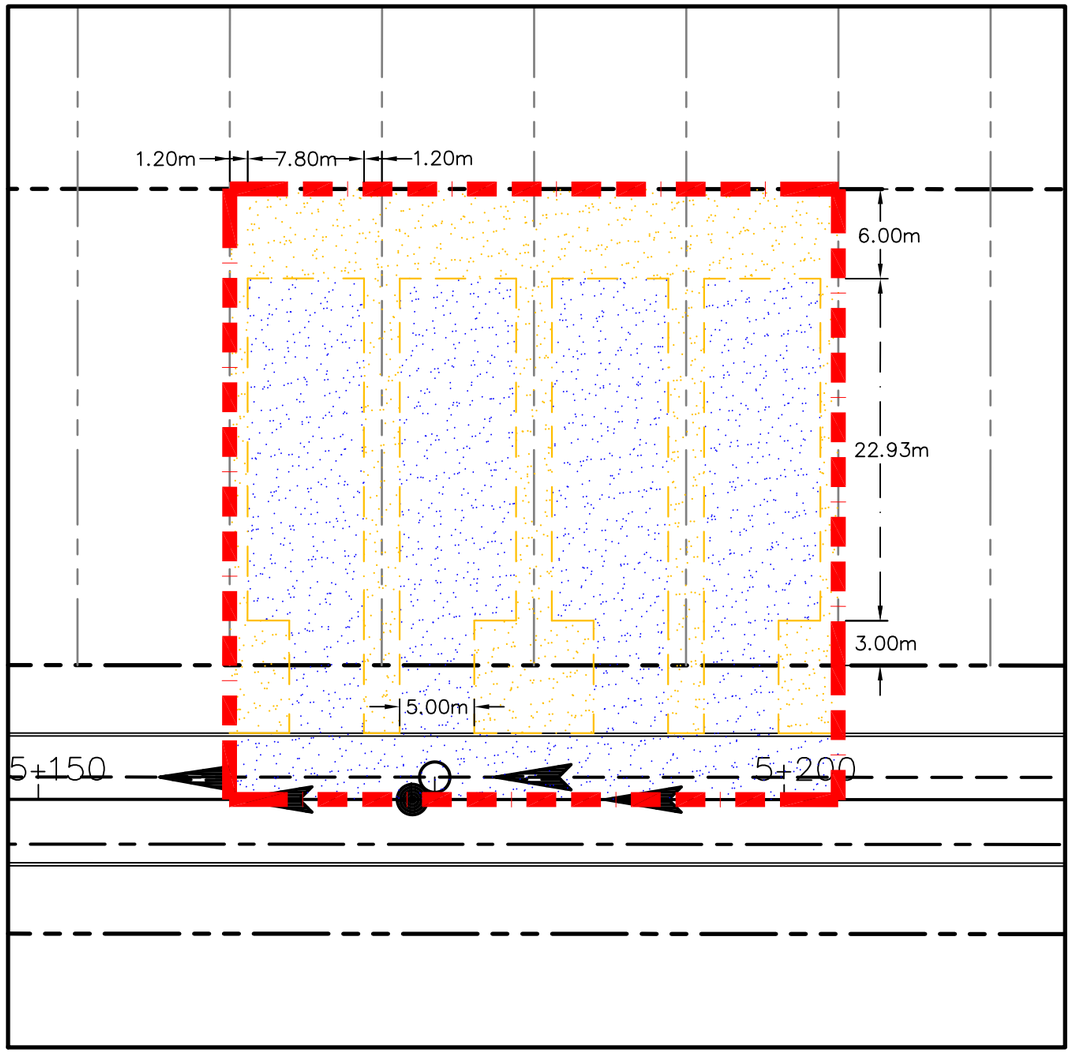
ATREL Engineering Ltd.
Engineers - Ingénieurs
I-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

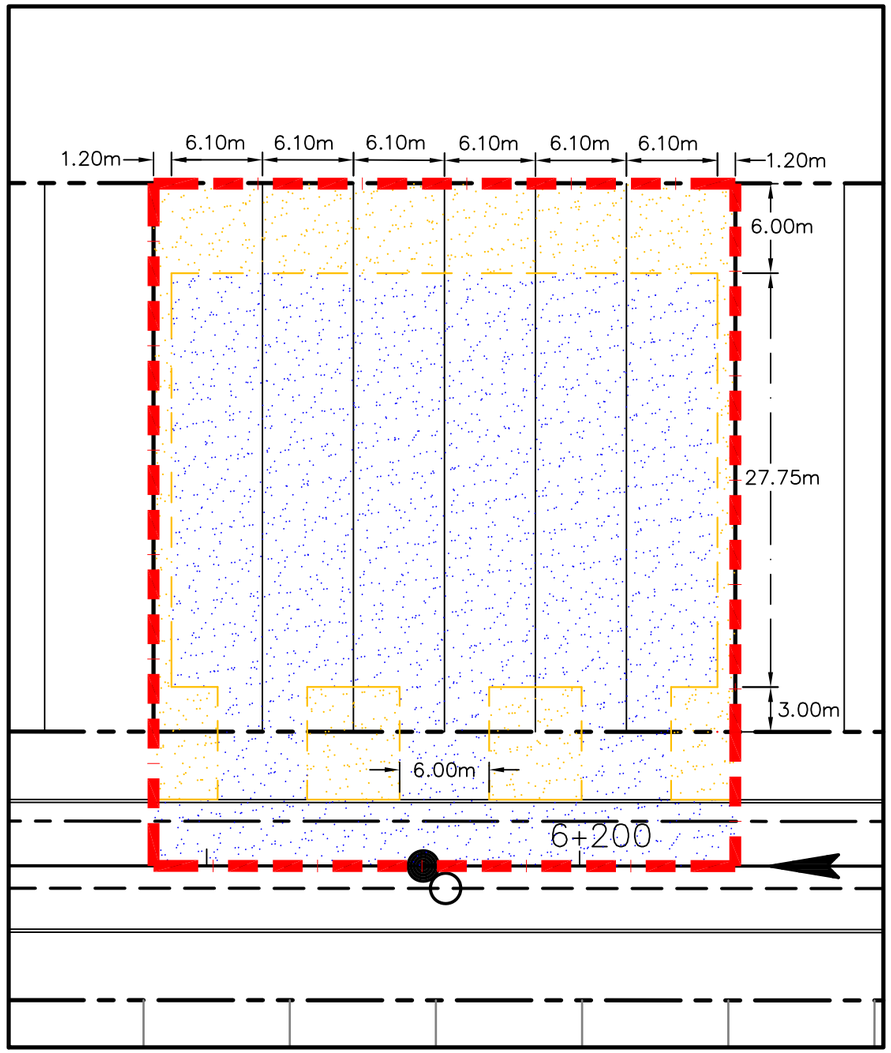
CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-STMM

PLAN
MACRO STORM DRAINAGE AREA PLAN





LEGEND

AREA @ 0.20 RUNOFF COEFFICIENT

AREA @ 0.90 RUNOFF COEFFICIENT

R_{AVG} AVERAGE RUNOFF COEFFICIENT

TYPICAL SINGLE DWELLING

AREA	RUNOFF COEFFICIENT
0.1047 ha.	0.90
0.0621 ha.	0.20

$$R_{AVG} = \frac{(0.1047ha. \times 0.90)+(0.0621ha. \times 0.20)}{(0.1047 + 0.0621)\ ha.}$$

R_{AVG} = 0.639 ---> 0.65

TYPICAL TOWNHOUSE

AREA	RUNOFF COEFFICIENT
0.1324 ha.	0.90
0.0459 ha.	0.20

$$R_{AVG} = \frac{(0.1324ha. \times 0.90)+(0.0459ha. \times 0.20)}{(0.1324 + 0.0459)\ ha.}$$

R_{AVG} = 0.720 ---> 0.70

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

RUNOFF COEFFICIENT DETAIL CALCULATIONS

SCALE: 1:400

130 HUNTMAR

OCT. / 2020 | 191002-RCI

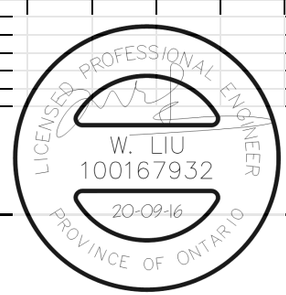
STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

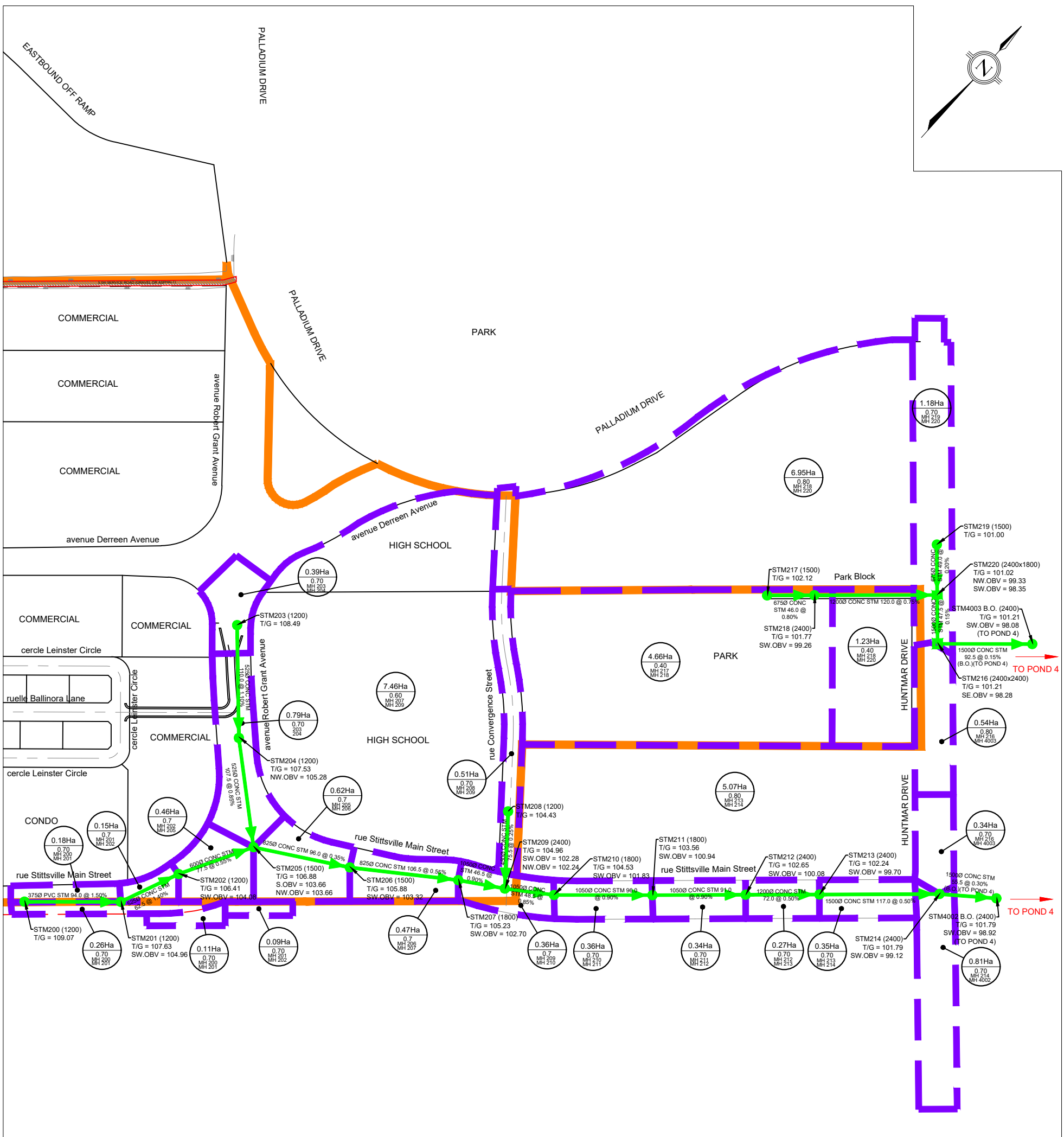
	LOCATION		AREA (Ha)																FLOW						SEWER DATA							
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
rue Convergence Street																																
	208	209			0.00	0.00	0.51	0.70	0.99	0.99			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	103	450	450	CONC	0.25	75.5	142.5531	0.8963	1.4039	0.725
To rue Stittsville Main Street, Pipe 209 - 210						0.00				0.99				0.00				0.00	11.40														
avenue Robert Grant Avenue																																
					0.00	0.00			0.00	0.00	0.39	0.70	0.76	0.76			0.00	0.00															
	203	204			0.00	0.00			0.00	0.00	0.79	0.70	1.54	2.30			0.00	0.00	10.00	76.81	104.19	122.14	178.56	280	525	525	CONC	1.10	110.0	451.0531	2.0836	0.8799	0.622
	204	205			0.00	0.00			0.00	0.00			0.00	2.30			0.00	0.00	10.88	73.58	99.76	116.93	170.90	268	525	525	CONC	0.85	107.5	396.4978	1.8316	0.9782	0.677
To rue Stittsville Main Street, Pipe 205 - 206						0.00				0.00				2.30				0.00	11.86														
rue Stittsville Main Street																																
					0.00	0.00			0.00	0.00	0.11	0.70	0.21	0.21			0.00	0.00															
					0.00	0.00	0.18	0.70	0.35	0.35			0.00	0.21			0.00	0.00															
	200	201			0.00	0.00			0.00	0.35	0.26	0.70	0.51	0.72			0.00	0.00	10.00	76.81	104.19	122.14	178.56	124	375	375	PVC	1.50	94.0	214.7347	1.9442	0.8058	0.580
					0.00	0.00			0.00	0.35	0.09	0.70	0.18	0.90			0.00	0.00															
	201	202			0.00	0.00			0.00	0.35	0.15	0.70	0.29	1.19			0.00	0.00	10.81	73.84	100.12	117.35	171.51	174	525	525	CONC	1.40	62.5	508.8565	2.3506	0.4431	0.343
	202	205			0.00	0.00			0.00	0.35	0.46	0.70	0.90	2.08			0.00	0.00	11.25	72.32	98.03	114.88	167.89	274	600	600	CONC	0.55	77.5	455.3631	1.6105	0.8020	0.601
Contribution From avenue Robert Grant Avenue, Pipe 204 - 205						0.00				0.00				2.30				0.00	11.86														
	205	206			0.00	0.00			0.00	0.35	0.62	0.70	1.21	5.59			0.00	0.00	12.05	69.74	94.48	110.70	161.76	651	825	825	CONC	0.35	96.0	849.2152	1.5886	1.0072	0.767
	206	207			0.00	0.00			0.00	0.35	0.47	0.70	0.91	6.50			0.00	0.00	13.06	66.77	90.41	105.91	154.72	720	825	825	CONC	0.55	106.5	1064.5476	1.9914	0.8913	0.676
	207	209			0.00	0.00	7.46	0.60	12.44	12.79			0.00	6.50			0.00	0.00	13.95	64.36	87.11	102.03	149.03	1778	1050	1050	CONC	0.90	46.5	2590.5934	2.9918	0.2590	0.686
Contribution From rue Convergence Street, Pipe 208 - 209						0.00				0.99				0.00				0.00	11.40														
	209	210			0.00	0.00			0.00	13.79	0.36	0.70	0.70	7.20			0.00	0.00	14.21	63.70	86.20	100.97	147.46	1915	1050	1050	CONC	0.85	48.5	2517.6042	2.9075	0.2780	0.761
	210	211			0.00	0.00			0.00	13.79	0.36	0.70	0.70	7.90			0.00	0.00	14.49	63.01	85.25	99.85	145.82	1964	1050	1050	CONC	0.90	96.0	2590.5934	2.9918	0.5348	0.758
	211	212			0.00	0.00			0.00	13.79	0.34	0.70	0.66	8.56			0.00	0.00	15.02	61.72	83.49	97.77	142.78	1988	1050	1050	CONC	0.90	91.0	2590.5934	2.9918	0.5069	0.767
	212	213			0.00	0.00			0.00	13.79	0.27	0.70	0.53	9.09			0.00	0.00	15.53	60.55	81.89	95.89	140.01	2000	1200	1200	CONC	0.50	72.0	2756.8186	2.4376	0.4923	0.726
					0.00	0.00			0.00	13.79	0.35	0.70	0.68	9.77			0.00	0.00															
	213	214			0.00	0.00	5.07	0.80	11.28	25.06			0.00	9.77			0.00	0.00	16.02	59.46	80.40	94.14	137.44	2935	1500	1500	CONC	0.50	117.0	4998.4447	2.8285	0.6894	0.587
	214	4002 (B.O.)			0.00	0.00			0.00	25.06	0.81	0.70	1.58	11.35			0.00	0.00	16.71	58.01	78.41	91.80	134.02	3007	1500	1500	CONC	0.30	55.5	3871.7786	2.1910	0.4222	0.777
						0.00				25.06				11.35				0.00	17.13														
Park Block																																
	217	218			0.00	0.00	4.66	0.40	5.18	5.18			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	540	675	675	CONC	0.80	46.0	751.8449	2.1010	0.3649	0.718
					0.00	0.00	1.23	0.40	1.37	6.55			0.00	0.00			0.00	0.00															
	218	220	6.95	0.80	15.46	15.46			0.00	6.55			0.00	0.00			0.00	0.00	10.36	75.43	102.30	119.92	175.29	1836	1200	1200	CONC	0.75	120.0	3376.3995	2.9854	0.6699	0.544
To HUNTMAR DRIVE, Pipe 220 - 216						15.46				6.55				0.00				0.00	11.03														
HUNTMAR DRIVE																																
	219	220			0.00	0.00			0.00	0.00	1.18	0.70	2.30	2.30			0.00	0.00	10.00	76.81	104.19	122.14	178.56	280	675	675	CONC	0.20	49.0	375.9224	1.0505	0.7774	0.746
Contribution From Park Block, Pipe 218 - 220						15.46				6.55				0.00				0.00	11.03														
	220	216			0.00	15.46			0.00	6.55			0.00	2.30			0.00	0.00	11.03	73.05	99.03	116.06	169.62	2044	1500	1500	CONC	0.15	47.5	2737.7609	1.5493	0.5110	0.747
To ROBERT GRANT AVENUE, Pipe 216 - 4003 (B.O.)						15.46				6.55				2.30				0.00	11.55														
ROBERT GRANT AVENUE																																
Contribution From HUNTMAR DRIVE, Pipe 220 - 216						15.46				6.55				2.30				0.00	11.55														
					0.00	15.46			0.00	6.55	0.34	0.70	0.66	2.96			0.00	0.00															
	216	4003 (B.O.)			0.00	15.46			0.00	6.55	0.54	0.80	1.20	4.16			0.00	0.00	11.55	71.34	96.68	113.29	165.56	2207	1500	1500	CONC	0.15	92.5	2737.7609	1.5493	0.9951	0.806
						15.46				6.55				4.16				0.00	12.54														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s



Designed: A.K.	PROJECT: 195 Huntmar Drive (Pond 4 Drainage Area)	
Checked: W.L.	LOCATION: City of Ottawa	
Dwg. Reference:	File Ref: 12-624	Date: Sep 2020
		Sheet No. SHEET 1 OF 1



david schaeffer engineering ltd

KANATA WEST
195 HUNTMAR DRIVE
STORM DRAINAGE AREA
TO POND 4
CITY OF OTTAWA

DATE:
SEP 2020

SCALE: 1:4000

PROJECT No.:
12-624

FIGURE: 01

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

LOCAL ROADS STORM FREQUENCY : 2 YEAR
COLECTOR ROADS STORM FREQUENCY : 5 YEAR
ARTERIAL ROADS STORM FREQUENCY :10 YEAR

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
September, 2021

Rational Method
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 8

LOCATION				AREA (ha.) RUNOFF COEFFICIENT										Rational Method 2 Year INDIV. 2.78AR	2 Year ACCUM. 2.78AR	5 Year INDIV. 2.78AR	5 Year ACCUM. 2.78AR	10 Year INDIV. 2.78AR	10 Year ACCUM. 2.78AR	TIME CONC.	RAINF. INTENS. 2 Year	RAINF. INTENS. 5 Year	RAINF. INTENS. 10 Year	2 Year Flow	5 Year Flow	10 Year Flow	ACTUAL PIPE FLOW	PIPE SEWER DATA								UpStream		DwStream	
FROM (Up)		TO (Down)		2 Year				5 Year				10 Year																											
				0.40	0.60	0.70	0.80	0.40	0.60	0.70	0.80	0.70	0.80							(MIN)	(MM/HR)	(MM/HR)	(MM/HR)	(L/S)	(L/S)	(L/S)	(L/S)	TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)
MH	217	MH	218					4.66								5.18	5.18			10.00	76.81	104.19	122.14		539.90		539.90	CONC	675	685.8	0.80	46.0	784.35	31%	2.12	0.36	99.62	98.95	99.25	98.58
MH	218	MH	220					1.23			6.95					16.82	22.01			10.36	75.45	102.32	119.94		2251.70		2251.70	CONC	1200	1219.2	0.75	120.0	3522.39	36%	3.02	0.66	99.25	98.05	98.35	97.15
																				11.02																			
MH	219	MH	220									1.13						2.20	2.20	10.00	76.81	104.19	122.14			268.58	268.58	CONC	675	685.8	0.20	49.0	392.18	32%	1.06	0.77	99.43	98.76	99.33	98.66
																				10.77																			
MH	220	MH	101														22.01		2.20	11.02	73.08	99.08	116.12		2180.40	255.35	2435.75	CONC	1350	1371.6	0.30	47.5	3049.82	20%	2.06	0.38	98.35	97.00	98.21	96.86
																				11.41																			
MH	101	MH	102			0.40						0.50		0.78	0.78		22.01	0.97	3.17	11.41	71.79	97.30	114.03	55.88	2141.23	361.70	2558.81	CONC	1350	1371.6	0.35	92.5	3294.18	22%	2.23	0.69	98.15	96.80	97.83	96.48
MH	102	MH	103			0.45								0.88	1.65		22.01		3.17	12.10	69.59	94.28	110.46	115.11	2074.77	350.38	2540.26	CONC	1350	1371.6	0.35	102.0	3294.18	23%	2.23	0.76	97.83	96.48	97.47	96.12
MH	103	MH	133			0.51								0.99	2.65		22.01		3.17	12.86	67.32	91.17	106.81	178.17	2006.33	338.80	2523.30	CONC	1350	1371.6	0.35	111.5	3294.18	23%	2.23	0.83	97.47	96.12	97.08	95.73
																				13.70																			
MH	110	MH	111			0.76								1.48	1.48					10.00	76.81	104.19	122.14	113.60			113.60	CONC	450	457.2	0.50	82.5	210.32	46%	1.28	1.07	98.88	98.43	98.47	98.02
MH	111	MH	113												1.48					11.07	72.92	98.85	115.84	107.85			107.85	CONC	450	457.2	0.50	11.0	210.32	49%	1.28	0.14	98.44	97.99	98.38	97.93
																				11.22																			
MH	112	MH	113		0.75									1.25	1.25					10.00	76.81	104.19	122.14	96.09			96.09	CONC	525	533.4	0.30	11.5	245.74	61%	1.10	0.17	98.41	97.89	98.38	97.86
																				10.17																			
MH	113	MH	114			0.14								0.27	3.00					11.22	72.43	98.18	115.06	217.46			217.46	CONC	675	685.8	0.30	62.5	480.32	55%	1.30	0.80	98.38	97.71	98.19	97.52
MH	114	MH	115												3.00					12.02	69.84	94.62	110.87	209.69			209.69	CONC	675	685.8	0.30	12.0	480.32	56%	1.30	0.15	98.16	97.49	98.12	97.45
MH	115	MH	121			0.25								0.49	3.49					12.17	69.36	93.97	110.10	241.99			241.99	CONC	750	762.0	0.30	47.0	636.13	62%	1.39	0.56	98.12	97.37	97.98	97.23
																				12.73																			
MH	120	MH	121			0.26								0.51	0.51					10.00	76.81	104.19	122.14	38.86			38.86	PVC	375	366.4	0.35	64.0	97.52	60%	0.92	1.15	98.55	98.18	98.33	97.96
																				11.15																			
MH	121	MH	127			0.57								1.11	5.10					12.73	67.69	91.68	107.41	345.50			345.50	CONC	825	838.2	0.30	85.0	820.21	58%	1.49	0.95	97.98	97.16	97.72	96.90
																				13.69																			
MH	125	MH	126			0.30								0.58	0.58					10.00	76.81	104.19	122.14	44.84			44.84	PVC	375	366.4	0.30	60.0	90.28	50%	0.86	1.17	98.51	98.14	98.33	97.96
MH	126	MH	127	1.07		0.39								1.95	2.53					11.17	72.59	98.40	115.32	183.84			183.84	CONC	600	609.6	0.30	87.0	350.85	48%	1.20	1.21	98.33	97.73	98.07	97.47
																				12.37																			
MH	127	MH	132			0.37								0.72	8.36					13.69	65.05	88.06	103.15	543.60			543.60	CONC	975	990.6	0.30	83.5	1280.55	58%	1.66	0.84	97.72	96.75	97.47	96.50
																				14.52																			
MH	130	MH	131			0.52								1.01	1.01					10.00	76.81	104.19	122.14	77.73			77.73	CONC	450	457.2	0.30	63.0	162.91	52%	0.99	1.06	97.91	97.46	97.72	97.27
MH	131	MH	132			0.51								0.99	2.00					11.06	72.97	98.92	115.93	146.26			146.26	CONC	525	533.4	0.30	84.5	245.74	40%	1.10	1.28	97.72	97.20	97.47	96.95
																				12.34																			
MH	132	MH	133			0.24								0.47	10.83					14.52	62.92	85.13	99.70	681.30			681.30	CONC	1050	1066.8	0.30	82.0	1560.35	56%	1.75	0.78	97.47	96.42	97.22	96.17
																				15.31																			
MH	133	MH	171			0.07								0.14	13.61		22.01		3.17	15.31	61.05	82.58	96.70	830.94	1817.30	306.73	2954.97	CONC	1650	1676.4	0.30	42.0	5208.04	43%	2.36	0.30	97.08	95.43	96.95	95.30
																				15.60																			
MH	170	MH	171			0.09	5.95							13.41	13.41					10.00	76.81	104.19	122.14	1029.86			1029.86	CONC	1050	1066.8	0.30	51.0	1560.35	34%	1.75	0.49	97.04	95.99	96.89	95.84
																				10.49																			
MH	171	MH	173			0.10								0.19	27.21		22.01		3.17	15.60	60.38	81.66	95.62	1643.15	1797.05	303.30	3743.50	CONC	1800	1828.8	0.30	42.0	6568.16	43%	2.50	0.28	96.74	94.94	96.61	94.81
																				15.88																			
MH	172	MH	173			0.27								0.53	0.53					10.00	76.81	104.19	122.14	40.36			40.36	PVC	300	299.2	0.50	87.5	67.90	41%	0.97	1.51	96.99	96.69	96.55	96.25
																				11.51																			
MH	173	MH	174			0.25	0.85							2.38	30.12		22.01		3.17	15.88	59.76	80.81	94.62	1799.72	1778.34	300.13	3878.19	CONC	1800	1828.8	0.30	86.0	6568.16	41%	2.50	0.57	96.55	94.75	96.29	94.49
MH	174	MH	191												30.12		22.01		3.17	16.46	58.53	79.13	92.65	1762.67	1741.37	293.88	3797.93	CONC	1800	1828.8	0.30	10.5	6568.16	42%	2.50	0.07	96.26	94.46	96.23	94.43
																				16.53																			
MH	200	MH	201							0.18		0.37				0.35	0.35	0.72	0.72	10.00	76.81	104.19	122.14		36.50	87.94	124.44	PVC	375	366.4	1.50	94.0	201.88	38%	1.91	0.82	106.11	105.74	104.70	104.33
MH	201	MH	202									0.24					0.35	0.47	1.19	10.82	73.80	100.06	117.27		35.05	139.21	174.26	CONC	525	533.4	1.40	62.5	530.86	67%	2.38	0.44	104.70	104.18	103.82	103.30
MH	202	MH	205									0.46					0.35	0.90	2.08	11.26	72.29	97.99	114.84		34.32	239.12	273.45	CONC	600	609.6	0.55	77.5	475.05	42%	1.63	0.79	103.82	103.22	103.39	102.79
																				12.05																			
MH	203	MH	204									0.39						0.76	0.76	10.00	76.81	104.19	122.14			92.70	92.70	CONC	450	457.2	1.10	110.0	311.95	70%	1.90	0.96	106.16	105.71	104.95	104.50
MH	204	MH	205									0.79						1.54	2.30	10.96	73.29	99.36	116.45			267.40	267.40	CONC	525	533.4	0.85	107.5	413.64	35%	1.85	0.97	104.30	103.78	103.39	102.87
																				11.93																			
MH	205	MH	206									0.62					0.35	1.21	5.59	12.05	69.74	94.48	110.71		33.09	618.32	651.41	CONC	825	838.2	0.35	96.0	885.93	26%	1.61	1.00	103.39	102.57	103.05	102.23
MH	206	MH	207									0.47					0.35	0.91	6.50	13.05	66.80	90.45	105.96		31.68	688.70	720.38	CONC	825	838.2	0.55	106.5	1110.58	35%	2.01	0.88	103.03	102.21	102.44	101.62
MH	207	MH	209						7.46							12.44	12.79		6.50	13.93	64.42	87.19	102.12		1115.47	663.74	1779.21	CONC	1050	1066.8	0.90	46.5	2702.60	34%	3.02	0.26	102.44	101.39	102.02	100.97
																				14.19																			
MH	208	MH	209							0.51						0.99	0.99			10.00	76.81	104.19	122.14		103.40		103.40	CONC	450	457.2	0.25	75.5	148.72	30%	0.91	1.39	102.17	101.72	101.98	101.53
																				11.39																			
MH	209	MH	210									0.36					13.79	0.70	7.20	14.19	63.76	86.29	101.06		1189.60	727.65	1917.25	CONC	1050	1066.8	0.85	48.5	2626.46	27%	2.94	0.28	101.98	100.93	101.57	100.52
MH	210	MH	211									0.36					13.79	0.70	7.90	14.46	63.07	85.34	99.95		1176.50	789.68	1966.18	CONC	1050	1066.8	0.90	96.0	2702.60	27%	3.02	0.53	101.54	100.49	100.68	99.63
MH	211	MH	212									0.34					13.79	0.66	8.56	14.99	61.79	83.59	97.89		1152.37	838.17	1990.55	CONC	1050	1066.8	0.90	91.0	2702.60	26%	3.02	0.50	100.64	99.59	99.82	98.77
MH	212	MH	213									0.27					13.79	0.53	9.09	15.49	60.63	82.00	96.02		1130.45	872.61	2003.07	CONC	1200	1219.2	0.50	72.0	2876.02	30%	2.46	0.49	99.80	98.60	99.44	98.24
MH	213	MH	140								5.07	0.35				11.28	25.06	0.68	9.77	15.98	59.55	80.52	94.29		2017.97	921.11	2939.08	CONC	1500	1524.0	0.50	117.0	5214.57	44%	2.86	0.68	99.44	97.94	98.85	97.35

STORM SEWER COMPUTATION FORM

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CHECKED BY: AGS

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ARTERIAL ROADS STORM FREQUENCY :10 YEAR

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Rational Method
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 8

LOCATION				AREA (ha.) RUNOFF COEFFICIENT										Rational Method 2 Year INDIV. 2.78AR	2 Year ACCUM. 2.78AR	Rational Method 5 Year INDIV. 2.78AR	5 Year ACCUM. 2.78AR	Rational Method 10 Year INDIV. 2.78AR	10 Year ACCUM. 2.78AR	TIME CONC. (MIN)	RAINF. INTENS. 2 Year (MM/HR)	RAINF. INTENS. 5 Year (MM/HR)	RAINF. INTENS. 10 Year (MM/HR)	2 Year Flow (L/S)	5 Year Flow (L/S)	10 Year Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)
FROM (Up)		TO (Down)		2 Year 0.40	0.60	0.70	0.80	5 Year 0.40	0.60	0.70	0.80	10 Year 0.70	0.80																										
																				16.66																		
MH	140	MH	142			0.17						1.06		0.33	0.33		25.06	2.06	11.83	16.66	58.11	78.55	91.96	19.22	1968.60	1088.04	3075.86	CONC	1650	1676.4	0.45	55.0	6378.52	52%	2.89	0.32	98.85	97.20	98.60	96.95
																				16.98																		
MH	141	MH	142			0.68								1.32	1.32					10.00	76.81	104.19	122.14	101.64			101.64	CONC	525	533.4	0.35	110.5	265.43	62%	1.19	1.55	98.39	97.87	98.00	97.48
																				11.55																		
MH	142	MH	144			0.30								0.58	2.24		25.06		11.83	16.98	57.46	77.67	90.93	128.59	1946.54	1075.85	3150.99	CONC	1650	1676.4	0.45	79.0	6378.52	51%	2.89	0.46	98.00	96.35	97.64	95.99
																				17.43																		
MH	143	MH	144			0.58								1.13	1.13					10.00	76.81	104.19	122.14	86.69			86.69	CONC	525	533.4	0.30	94.0	245.74	65%	1.10	1.42	98.22	97.70	97.94	97.42
																				11.42																		
MH	144	MH	152			0.32								0.62	3.99		25.06		11.83	17.43	56.56	76.44	89.48	225.63	1915.72	1058.70	3200.05	CONC	1650	1676.4	0.45	85.5	6378.52	50%	2.89	0.49	97.64	95.99	97.26	95.61
																				17.93																		
MH	146	MH	147			0.29								0.56	0.56					10.00	76.81	104.19	122.14	43.35			43.35	CONC	450	457.2	0.30	115.0	162.91	73%	0.99	1.93	98.36	97.91	98.01	97.56
MH	147	MH	148												0.56					11.93	70.11	94.99	111.30	39.57			39.57	CONC	450	457.2	0.30	11.5	162.91	76%	0.99	0.19	97.98	97.53	97.95	97.50
MH	148	MH	152			0.67								1.30	1.87					12.12	69.51	94.17	110.34	129.86			129.86	CONC	675	685.8	0.30	97.5	480.32	73%	1.30	1.25	97.95	97.28	97.66	96.99
																				13.37																		
MH	152	MH	156			0.31								0.60	6.46		25.06		11.83	17.93	55.63	75.16	87.98	359.41	1883.64	1040.95	3284.00	CONC	1800	1828.8	0.40	83.5	7584.26	57%	2.89	0.48	97.26	95.46	96.93	95.13
																				18.41																		
MH	154	MH	155			0.40								0.78	0.78					10.00	76.81	104.19	122.14	59.79			59.79	CONC	450	457.2	0.30	73.5	162.91	63%	0.99	1.23	97.19	96.74	96.97	96.52
MH	155	MH	156			0.20	1.73							4.24	5.02					11.23	72.37	98.10	114.96	362.94			362.94	CONC	825	838.2	0.30	63.0	820.21	56%	1.49	0.71	96.97	96.15	96.78	95.96
																				11.94																		
MH	156	MH	157			0.17								0.33	11.81		25.06		11.83	18.41	54.74	73.95	86.56	646.30	1853.31	1024.15	3523.76	CONC	1950	1981.2	0.30	46.5	8130.98	57%	2.64	0.29	96.78	94.83	96.64	94.69
MH	157	MH	158			0.20								0.39	12.20		25.06		11.83	18.70	54.22	73.24	85.72	661.26	1835.52	1014.21	3510.99	CONC	1950	1981.2	0.30	46.5	8130.98	57%	2.64	0.29	96.61	94.66	96.47	94.52
MH	158	MH	175												12.20		25.06		11.83	19.00	53.70	72.53	84.89	654.92	1817.73	1004.39	3477.03	CONC	1950	1981.2	0.30	45.0	8130.98	57%	2.64	0.28	96.18	94.23	96.04	94.09
																				19.28																		
MH	160	MH	161			0.52								1.01	1.01					10.00	76.81	104.19	122.14	77.73			77.73	CONC	525	533.4	0.30	120.0	245.74	68%	1.10	1.82	96.87	96.35	96.51	95.99
MH	161	MH	162			0.20								0.39	1.40					11.82	70.46	95.48	111.88	98.72			98.72	CONC	600	609.6	0.30	54.5	350.85	72%	1.20	0.76	96.51	95.91	96.35	95.75
MH	162	MH	175			0.34								0.66	2.06					12.57	68.16	92.31	108.15	140.60			140.60	CONC	675	685.8	0.30	99.0	480.32	71%	1.30	1.27	96.35	95.68	96.05	95.38
																				13.84																		
MH	175	MH	176			0.38								0.74	15.00		25.06		11.83	19.28	53.22	71.87	84.11	798.20	1801.18	995.16	3594.55	CONC	1950	1981.2	0.30	56.5	8130.98	56%	2.64	0.36	96.00	94.05	95.83	93.88
MH	176	MH	178			0.22	0.92							2.47	17.47		25.06		11.83	19.64	52.62	71.06	83.16	919.39	1780.88	983.92	3684.20	CONC	1950	1981.2	0.30	66.0	8130.98	55%	2.64	0.42	95.83	93.88	95.63	93.68
																				20.05																		
MH	177	MH	178			0.32								0.62	0.62					10.00	76.81	104.19	122.14	47.83			47.83	PVC	375	366.4	0.30	100.5	90.28	47%	0.86	1.96	96.24	95.87	95.94	95.57
																				11.96																		
MH	178	MH	190			0.15								0.29	18.39		25.06		11.83	20.05	51.94	70.13	82.07	955.02	1757.58	971.03	3683.62	CONC	1950	1981.2	0.30	46.5	8130.98	55%	2.64	0.29	95.63	93.68	95.49	93.54
																				20.35																		
MH	179	MH	190			0.35								0.68	0.68					10.00	76.81	104.19	122.14	52.32			52.32	PVC	375	366.4	0.30	83.0	90.28	42%	0.86	1.62	96.33	95.96	96.08	95.71
																				11.62																		
MH	190	MH	191			0.17								0.33	19.40		25.06		11.83	20.35	51.48	69.50	81.32	998.65	1741.79	962.15	3702.59	CONC	1950	1981.2	0.30	40.5	8130.98	54%	2.64	0.26	95.49	93.54	95.37	93.42
																				20.60																		
MH	191	MH	192			0.04	4.86							10.89	60.40		47.07		15.00	20.60	51.08	68.95	80.68	3085.29	3245.35	1210.50	7541.13	CONC	2550	2590.8	0.30	118.5	16627.39	55%	3.15	0.63	95.31	92.76	94.95	92.40
MH	192	MH	193				8.17							18.17	78.57		47.07		15.00	21.23	50.13	67.66	79.17	3938.77	3184.63	1187.84	8311.24	CONC	2550	2590.8	0.30	118.5	16627.39	50%	3.15	0.63	94.62	92.07	94.26	91.71
MH	193	MH	194												78.57		47.07		15.00	21.86	49.22	66.42	77.71	3867.27	3126.27	1165.93	8159.47	CONC	2550	2590.8	0.30	78.0	16627.39	51%	3.15	0.41	94.23	91.68	94.00	91.45
																				22.27																		
MH	School	MH	ex 179	2.40										4.00	4.00					10.00	76.81	104.19	122.14	307.49			307.49	CONC	750	762.0	0.30	14.0	636.13	52%	1.39	0.17	97.64	96.89	97.60	96.85
																				10.17																		
MH	65	MH	66			0.79								1.54	1.54					10.00	76.81	104.19	122.14	118.08			118.08	CONC	600	609.6	0.30	88.0	350.85	66%	1.20	1.22	98.70	98.10	98.44	97.84
MH	66	MH	67			0.86								1.67	3.21					11.22	72.42	98.16	115.04	232.35			232.35	CONC	750	762.0	0.30	98.5	636.13	63%	1.39	1.18	98.44	97.69	98.14	97.39
MH	67	MH	ex 180												3.21					12.40	68.68	93.03	109.00	220.35			220.35	CONC	750	762.0	0.30	13.0	636.13	65%	1.39	0.16	97.34	96.59	97.30	96.55
																				12.55																		
MH	70	MH	71			0.10	1.22							2.90	2.90					10.00	76.81	104.19	122.14	222.59			222.59	CONC	675	685.8	0.30	53.5	480.32	54%	1.30	0.69	97.57	96.90	97.41	96.74
MH	71	MH	72			0.11	1.11							2.68	5.58					10.69	74.27	100.71	118.03	414.47			414.47	CONC	825	838.2	0.30	53.0	820.21	49%	1.49	0.59	97.41	96.59	97.25	96.43
MH	72	MH	ex 181												5.58					11.28	72.22	97.89	114.71	403.03			403.03	CONC	825	838.2	0.30	17.5	820.21	51%	1.49	0.20	97.25	96.43	97.20	96.38
																				11.48																		

FUTURE STORM SEWERS FOR 195 HUNTMAR DRIVE.
PROPOSED STORM SEWERS TO NORTH FOREBAY
PROPOSED STORM SEWERS TO SOUTH FOREBAY
Area restricted to 220 l/s/ha
Area restricted to 115 l/s/ha
Area restricted to 340 l/s/ha
Area restricted to 250 l/s/ha

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Sept. 20, 2021
PROVINCE OF ONTARIO

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
September, 2021

Restricted Flow
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 9

LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 2 Year 0.40	2 Year 0.60	2 Year 0.70	2 Year 0.80	5 Year 0.40	5 Year 0.60	5 Year 0.70	5 Year 0.80	10 Year 0.70	10 Year 0.80	Restricted Flow (L/S)	**ACTUAL PIPE FLOW (L/S)**	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	**UpStream Hgl at UP-MH (M)**	UpStream Hgl Out UP-MH (M)	Down MH Hgl (M)	Down Up USF ELEV (M)	Down HGL FREEBOARD (M)
MH	217	MH	218					4.66						539.90	539.90	CONC	675	685.8	0.80	46.0	784.35	31%	2.12	99.62	98.95	99.25	98.58	99.62	99.62	99.25	N/A	n/a
MH	218	MH	220					1.23			6.95			1752.95	2292.86	CONC	1200	1219.2	0.75	120.0	3522.39	35%	3.02	99.25	98.05	98.35	97.15	99.25	99.25	98.70	N/A	n/a
MH	219	MH	220									1.13		268.58	268.58	CONC	675	685.8	0.20	49.0	392.18	32%	1.06	99.43	98.76	99.33	98.66	99.43	99.43	99.33	N/A	n/a
MH	220	MH	101												2561.44	CONC	1350	1371.6	0.30	47.5	3049.82	16%	2.06	98.35	97.00	98.21	96.86	98.70	98.47	98.37	N/A	n/a
MH	101	MH	102			0.40						0.50		206.84	2768.28	CONC	1350	1371.6	0.35	92.5	3294.18	16%	2.23	98.15	96.80	97.83	96.48	98.37	98.15	97.83	99.59	1.44
MH	102	MH	103			0.45								99.00	2867.28	CONC	1350	1371.6	0.35	102.0	3294.18	13%	2.23	97.83	96.48	97.47	96.12	97.83	97.83	97.47	99.20	1.37
MH	103	MH	133			0.51								112.20	2979.48	CONC	1350	1371.6	0.35	111.5	3294.18	10%	2.23	97.47	96.12	97.08	95.73	97.47	97.47	97.10	98.15	0.68
MH	110	MH	111			0.76								167.20	167.20	CONC	450	457.2	0.50	82.5	210.32	21%	1.28	98.88	98.43	98.47	98.02	98.88	98.88	98.47	99.50	0.62
MH	111	MH	113												167.20	CONC	450	457.2	0.50	11.0	210.32	21%	1.28	98.44	97.99	98.38	97.93	98.46	98.44	98.38	99.39	0.95
MH	112	MH	113		0.75									165.00	165.00	CONC	525	533.4	0.30	11.5	245.74	33%	1.10	98.41	97.89	98.38	97.86	98.41	98.41	98.38	N/A	n/a
MH	113	MH	114			0.14								30.80	363.00	CONC	675	685.8	0.30	62.5	480.32	24%	1.30	98.38	97.71	98.19	97.52	98.38	98.38	98.19	99.39	1.01
MH	114	MH	115												363.00	CONC	675	685.8	0.30	12.0	480.32	24%	1.30	98.16	97.49	98.12	97.45	98.18	98.16	98.14	99.29	1.13
MH	115	MH	121			0.25								55.00	418.00	CONC	750	762.0	0.30	47.0	636.13	34%	1.39	98.12	97.37	97.98	97.23	98.14	98.12	98.05	99.29	1.17
MH	120	MH	121			0.26								57.20	57.20	PVC	375	366.4	0.35	64.0	97.52	41%	0.92	98.55	98.18	98.33	97.96	98.55	98.55	98.33	99.00	0.45
MH	121	MH	127			0.57								125.40	600.60	CONC	825	838.2	0.30	85.0	820.21	27%	1.49	97.98	97.16	97.72	96.90	98.05	97.98	97.73	99.23	1.25
MH	125	MH	126			0.30								66.00	66.00	PVC	375	366.4	0.30	60.0	90.28	27%	0.86	98.51	98.14	98.33	97.96	98.51	98.51	98.33	99.30	0.79
MH	126	MH	127	1.07		0.39								208.85	274.85	CONC	600	609.6	0.30	87.0	350.85	22%	1.20	98.33	97.73	98.07	97.47	98.33	98.33	98.07	98.90	0.57
MH	127	MH	132			0.37								81.40	956.85	CONC	975	990.6	0.30	83.5	1280.55	25%	1.66	97.72	96.75	97.47	96.50	97.73	97.73	97.59	98.65	0.92
MH	130	MH	131			0.52								114.40	114.40	CONC	450	457.2	0.30	63.0	162.91	30%	0.99	97.91	97.46	97.72	97.27	97.91	97.91	97.81	98.62	0.71
MH	131	MH	132			0.51								112.20	226.60	CONC	525	533.4	0.30	84.5	245.74	8%	1.10	97.72	97.20	97.47	96.95	97.81	97.81	97.59	98.50	0.69
MH	132	MH	133			0.24								52.80	1236.25	CONC	1050	1066.8	0.30	82.0	1560.35	21%	1.75	97.47	96.42	97.22	96.17	97.59	97.47	97.22	98.15	0.68
MH	133	MH	171			0.07								15.40	4231.13	CONC	1650	1676.4	0.30	42.0	5208.04	19%	2.36	97.08	95.43	96.95	95.30	97.10	97.10	97.02	97.70	0.60
MH	170	MH	171			0.09	5.95							1328.80	1328.80	CONC	1050	1066.8	0.30	51.0	1560.35	15%	1.75	97.04	95.99	96.89	95.84	97.13	97.13	97.02	97.65	0.52
MH	171	MH	173			0.10								22.00	5581.93	CONC	1800	1828.8	0.30	42.0	6568.16	15%	2.50	96.74	94.94	96.61	94.81	97.02	96.74	96.61	97.29	0.55
MH	172	MH	173			0.27								59.40	59.40	PVC	300	299.2	0.50	87.5	67.90	13%	0.97	96.99	96.69	96.55	96.25	96.99	96.99	96.57	98.05	1.06
MH	173	MH	174			0.25	0.85							242.00	5883.33	CONC	1800	1828.8	0.30	86.0	6568.16	10%	2.50	96.55	94.75	96.29	94.49	96.57	96.57	96.36	97.25	0.68
MH	174	MH	191												5883.33	CONC	1800	1828.8	0.30	10.5	6568.16	10%	2.50	96.26	94.46	96.23	94.43	96.36	96.26	96.23	96.70	0.44
MH	200	MH	201							0.18		0.37		124.44	124.44	PVC	375	366.4	1.50	94.0	201.88	38%	1.91	106.11	105.74	104.70	104.33	106.11	106.11	104.72	N/A	n/a
MH	201	MH	202									0.24		57.04	181.48	CONC	525	533.4	1.40	62.5	530.86	66%	2.38	104.70	104.18	103.82	103.30	104.72	104.70	103.82	N/A	n/a
MH	202	MH	205									0.46		109.33	290.82	CONC	600	609.6	0.55	77.5	475.05	39%	1.63	103.82	103.22	103.39	102.79	103.82	103.82	103.48	N/A	n/a
MH	203	MH	204									0.39		92.70	92.70	CONC	450	457.2	1.10	110.0	311.95	70%	1.90	106.16	105.71	104.95	104.50	106.16	106.16	104.95	N/A	n/a
MH	204	MH	205									0.79		187.77	280.47	CONC	525	533.4	0.85	107.5	413.64	32%	1.85	104.30	103.78	103.39	102.87	104.30	104.30	103.48	N/A	n/a
MH	205	MH	206									0.62		147.36	718.65	CONC	825	838.2	0.35	96.0	885.93	19%	1.61	103.39	102.57	103.05	102.23	103.48	103.39	103.05	N/A	n/a
MH	206	MH	207									0.47		111.71	830.36	CONC	825	838.2	0.55	106.5	1110.58	25%	2.01	103.03	102.21	102.44	101.62	103.03	103.03	102.44	N/A	n/a
MH	207	MH	209						7.46					1296.47	2126.83	CONC	1050	1066.8	0.90	46.5	2702.60	21%	3.02	102.44	101.39	102.02	100.97	102.44	102.44	102.02	N/A	n/a
MH	208	MH	209							0.51				103.40	103.40	CONC	450	457.2	0.25	75.5	148.72	30%	0.91	102.17	101.72	101.98	101.53	102.17	102.17	101.98	N/A	n/a
MH	209	MH	210									0.36		85.57	2315.80	CONC	1050	1066.8	0.85	48.5	2626.46	12%	2.94	101.98	100.93	101.57	100.52	101.98	101.98	101.57	N/A	n/a
MH	210	MH	211									0.36		85.57	2401.36	CONC	1050	1066.8	0.90	96.0	2702.60	11%	3.02	101.54	100.49	100.68	99.63	101.54	101.54	100.68	N/A	n/a
MH	211	MH	212									0.34		80.81	2482.18	CONC	1050	1066.8	0.90	91.0	2702.60	8%	3.02	100.64	99.59	99.82	98.77	100.64	100.64	99.82	N/A	n/a
MH	212	MH	213									0.27		64.17	2546.35	CONC	1200	1219.2	0.50	72.0	2876.02	11%	2.46	99.80	98.60	99.44	98.24	99.80	99.80	99.44	N/A	n/a
MH	213	MH	140								5.07	0.35		1806.99	4353.34	CONC	1500	1524.0	0.50	117.0	5214.57	17%	2.86	99.44	97.94	98.85	97.35	99.44	99.44	98.85	N/A	n/a

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
September, 2021

Restricted Flow
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 9

LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 2 Year 0.40	0.60	0.70	0.80	5 Year 0.40	0.60	0.70	0.80	10 Year 0.70	0.80	Restricted Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	UpStream Obv. (M)	Inv. (M)	DwStream Obv. (M)	Inv. (M)	**UpStream Hgl at UP-MH (M)**	Hgl Out UP-MH (M)	Down MH Hgl (M)	Up USF ELEV (M)	HGL FREEBOARD (M)
MH	140	MH	142			0.17						1.06		288.44	4641.78	CONC	1650	1676.4	0.45	55.0	6378.52	27%	2.89	98.85	97.20	98.60	96.95	98.85	98.85	98.60	99.75	0.90
MH	141	MH	142			0.68								231.20	231.20	CONC	525	533.4	0.35	110.5	265.43	13%	1.19	98.39	97.87	98.00	97.48	98.39	98.39	98.00	99.70	1.31
MH	142	MH	144			0.30								102.00	4974.98	CONC	1650	1676.4	0.45	79.0	6378.52	22%	2.89	98.00	96.35	97.64	95.99	98.00	98.00	97.64	99.38	1.38
MH	143	MH	144			0.58								197.20	197.20	CONC	525	533.4	0.30	94.0	245.74	20%	1.10	98.22	97.70	97.94	97.42	98.22	98.22	97.94	99.28	1.06
MH	144	MH	152			0.32								108.80	5280.98	CONC	1650	1676.4	0.45	85.5	6378.52	17%	2.89	97.64	95.99	97.26	95.61	97.64	97.64	97.26	99.31	1.67
MH	146	MH	147			0.29								98.60	98.60	CONC	450	457.2	0.30	115.0	162.91	39%	0.99	98.36	97.91	98.01	97.56	98.36	98.36	98.01	99.18	0.82
MH	147	MH	148												98.60	CONC	450	457.2	0.30	11.5	162.91	39%	0.99	97.98	97.53	97.95	97.50	97.99	97.98	97.96	99.21	1.23
MH	148	MH	152			0.67								227.80	326.40	CONC	675	685.8	0.30	97.5	480.32	32%	1.30	97.95	97.28	97.66	96.99	97.96	97.95	97.66	99.15	1.20
MH	152	MH	156			0.31								105.40	5712.78	CONC	1800	1828.8	0.40	83.5	7584.26	25%	2.89	97.26	95.46	96.93	95.13	97.26	97.26	97.03	99.21	1.95
MH	154	MH	155			0.40								136.00	136.00	CONC	450	457.2	0.30	73.5	162.91	17%	0.99	97.19	96.74	96.97	96.52	97.29	97.29	97.14	99.21	1.92
MH	155	MH	156			0.20	1.73							500.50	636.50	CONC	825	838.2	0.30	63.0	820.21	22%	1.49	96.97	96.15	96.78	95.96	97.14	97.14	97.03	98.06	0.92
MH	156	MH	157			0.17								57.80	6407.08	CONC	1950	1981.2	0.30	46.5	8130.98	21%	2.64	96.78	94.83	96.64	94.69	97.03	97.03	96.94	98.27	1.24
MH	157	MH	158			0.20								68.00	6475.08	CONC	1950	1981.2	0.30	46.5	8130.98	20%	2.64	96.61	94.66	96.47	94.52	96.94	96.94	96.85	98.17	1.23
MH	158	MH	175												6475.08	CONC	1950	1981.2	0.30	45.0	8130.98	20%	2.64	96.18	94.23	96.04	94.09	96.85	96.76	96.67	97.63	0.87
MH	160	MH	161			0.52								176.80	176.80	CONC	525	533.4	0.30	120.0	245.74	28%	1.10	96.87	96.35	96.51	95.99	97.11	97.11	96.92	N/A	n/a
MH	161	MH	162			0.20								68.00	244.80	CONC	600	609.6	0.30	54.5	350.85	30%	1.20	96.51	95.91	96.35	95.75	96.92	96.92	96.84	N/A	n/a
MH	162	MH	175			0.34								115.60	360.40	CONC	675	685.8	0.30	99.0	480.32	25%	1.30	96.35	95.68	96.05	95.38	96.84	96.84	96.67	N/A	n/a
MH	175	MH	176			0.38								83.60	6919.08	CONC	1950	1981.2	0.30	56.5	8130.98	15%	2.64	96.00	94.05	95.83	93.88	96.67	96.58	96.46	N/A	n/a
MH	176	MH	178			0.22	0.92							48.40	6967.48	CONC	1950	1981.2	0.30	66.0	8130.98	14%	2.64	95.83	93.88	95.63	93.68	96.46	96.46	96.31	97.00	0.54
MH	177	MH	178			0.32								70.40	70.40	PVC	375	366.4	0.30	100.5	90.28	22%	0.86	96.24	95.87	95.94	95.57	96.49	96.49	96.31	98.05	1.56
MH	178	MH	190			0.15								33.00	7070.88	CONC	1950	1981.2	0.30	46.5	8130.98	13%	2.64	95.63	93.68	95.49	93.54	96.31	96.31	96.20	96.80	0.49
MH	179	MH	190			0.35								77.00	77.00	PVC	375	366.4	0.30	83.0	90.28	15%	0.86	96.33	95.96	96.08	95.71	96.38	96.38	96.20	97.75	1.37
MH	190	MH	191			0.17								37.40	7185.28	CONC	1950	1981.2	0.30	40.5	8130.98	12%	2.64	95.49	93.54	95.37	93.42	96.20	96.20	96.11	96.65	0.45
MH	191	MH	192			0.04	4.86							1078.00	14146.61	CONC	2550	2590.8	0.30	118.5	16627.39	15%	3.15	95.31	92.76	94.95	92.40	96.11	95.69	95.43	96.70	1.01
MH	192	MH	193				8.17							1797.40	15944.01	CONC	2550	2590.8	0.30	118.5	16627.39	4%	3.15	94.62	92.07	94.26	91.71	95.43	95.43	95.10	96.00	0.57
MH	193	MH	194												15944.01	CONC	2550	2590.8	0.30	78.0	16627.39	4%	3.15	94.23	91.68	94.00	91.45	95.10	94.92	94.70	95.20	0.28
MH	School	MH	ex 179		2.40									528.00	528.00	CONC	750	762.0	0.30	14.0	636.13	17%	1.39	97.64	96.89	97.60	96.85	97.64	97.64	97.60	99.20	1.56
MH	65	MH	66			0.79								268.60	268.60	CONC	600	609.6	0.30	88.0	350.85	23%	1.20	98.70	98.10	98.44	97.84	98.70	98.70	98.44	99.22	0.52
MH	66	MH	67			0.86								291.96	560.56	CONC	750	762.0	0.30	98.5	636.13	12%	1.39	98.44	97.69	98.14	97.39	98.44	98.44	98.14	99.31	0.87
MH	67	MH	ex 180												560.56	CONC	750	762.0	0.30	13.0	636.13	12%	1.39	97.34	96.59	97.30	96.55	97.34	97.34	97.30	99.06	1.72
MH	70	MH	71			0.10	1.22							337.88	337.88	CONC	675	685.8	0.30	53.5	480.32	30%	1.30	97.57	96.90	97.41	96.74	97.57	97.57	97.41	98.05	0.48
MH	71	MH	72			0.11	1.11							314.90	652.78	CONC	825	838.2	0.30	53.0	820.21	20%	1.49	97.41	96.59	97.25	96.43	97.41	97.41	97.25	98.33	0.92
MH	72	MH	ex 181												652.78	CONC	825	838.2	0.30	17.5	820.21	20%	1.49	97.25	96.43	97.20	96.38	97.25	97.25	97.20	97.94	0.69

FUTURE STORM SEWERS FOR 195 HUNTMAR DRIVE.
PROPOSED STORM SEWERS TO NORTH FOREBAY
PROPOSED STORM SEWERS TO SOUTH FOREBAY
Area restricted to 220 l/s/ha
Area restricted to 115 l/s/ha
Area restricted to 340 l/s/ha
Area restricted to 250 l/s/ha

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September 20, 2021 Project Number: P1801

Atrel Engineering Ltd
1-2884 Chamberland Street
Rockland, ON
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Attention: **Jean Décoeur, P.Eng**

Subject: **130 Huntmar Drive / Preliminary Kanata West Pond 4 Sizing**

Introduction

J.F. Sabourin and Associates Inc. (JFSA) was retained by Atrel Engineering Ltd. (Atrel) to complete a preliminary stormwater analysis for the proposed 26.63 ha residential/commercial development, located at 130 Huntmar Drive in Stittsville, Ontario. The following memo is an update of the original memo of the same name dated September 2020, which has been updated to reflect the latest development, address preliminary review comments from the City and include refinements to the proposed SWM pond design.

The proposed development will discharge to an existing Stormwater Management (SWM) pond, located on the west banks of the Carp River just south of Palladium Drive, which is commonly referred to as Pond 4. Runoff from the proposed development will be conveyed to Pond 4 through a proposed stormwater trunk sewer, in conjunction with major system flow routes directly from the development to the SWM pond. The proposed trunk sewer will also convey minor system flow from the approximately 31.08 ha future residential and commercial developments west of Huntmar Drive. As these lands will also discharge to Pond 4, they have also been included in this analysis. This memo intends to quantify the impacts that the proposed developments (both east and west of Huntmar Drive) will have on the operations of Pond 4 and on the greater Carp River watershed. It is anticipated that the abovementioned developments will require that the current Pond 4 SWM facility be upsized, and the proposed outlet configuration adjusted to ensure no adverse impacts to the surrounding area. As such the following memo details the proposed upgrading of the existing Pond 4 SWM facility.

Model Overview

Base Model

The proposed development sites are within the Carp River watershed and are captured in the City of Ottawa's existing PCSWMM models of the Carp River; these models were provided to JFSA by the City on May 11, 2017. It was confirmed by City staff that these models have not been officially updated by the City since February 24, 2017. For this study, the City's Ultimate conditions model has been set as the benchmark for future conditions modelling on the Carp River.

On February 6, 2019, JFSA updated the City's Ultimate conditions model as a part of a study for Kanata West Pond 7, full details of this analysis and changes made to the City's original PCSWMM model are documented in JFSA's report titled "Preliminary Kanata West Pond 7 Sizing". As this study proposed diverting a portion of the runoff from the developments west of Huntmar Drive to pond 7, which was originally earmarked to discharge to pond 4, the PCSWMM Model updated by JFSA in February 2019 (CarpUltimate_FullRestoration_D2) has been used as the base for developing the proposed conditions for the following study, to ensure continuity throughout the greater Carp River model.

Subcatchments

The proposed development is contained within existing model subcatchments areas PS201, PS202 and PS20. These subcatchments were clipped and replaced with the smaller more refined subcatchments as outlined in Atrel's drawing titled "Macro Storm Drainage Area Plan" which has been provided in Attachment A. Also provided in Attachment A are the rational method Calculation sheets used to preliminary size the storm sewer network both east and west of Huntmar Drive.

Small refinements had to be made to neighbouring subcatchments within the PCSWMM model to ensure that the existing and proposed drainage boundaries conformed. The parameters of both the new and the existing subcatchments were updated accordingly. Attachment B provides figures outlining the updated PCSWMM model, along with the proposed subcatchment parameters.

In reviewing and updating the subcatchments in the PCSWMM model it was noted that approximately 5.7 ha of the existing Canadian Tire Centre Parking lot located southeast of the intersection of Huntmar Drive and Palladium Drive, was miss identified as draining to Pond 4 under the City's Ultimate conditions model. Based on the storm sewer data provided on GeoOttawa, this parking lot discharges to the existing storm sewer that runs west to east along Palladium Drive. It was also noted that the GIS area for this subcatchment (PS207) was approximately 5.58 ha smaller than what had been applied in the City's model. Indicating that the City may have already identified that this parking lot area drains to the storm sewer running along Palladium Drive but did not bother updating the GIS area in the model. As all the neighbouring GIS and modelled subcatchment areas match up well, this disconnect between GIS and modelled area for subcatchment PS207 results in the City's Carp River Ultimate model overestimating the total drainage area at this location by approximately 5.8 ha. Further investigation of the neighbouring subcatchments also found that the City's Ultimate model under-represented the total drainage area for the lands just south of Pond 4 (subcatchment PS207) by approximately 0.2 ha. Accordingly, all subcatchments surrounding the subject area have been rectified in the latest modelling work to ensure that the GIS and modelled subcatchment areas align.

Within the proposed development area, the runoff coefficients as indicated in the drawing by Atrel were converted to percent impervious values and applied to the latest model. For subcatchments less than 0.5 ha, the subcatchment width was calculated by taking the subcatchment area divided by the average maximum overland flow length. For subcatchments greater than 0.5 ha, the width was calculated as $\sqrt{(Area/1.5)}$. The depression storage, pervious and impervious manning's values, as well as soil parameters for all these subcatchments were set as per the original parameters specified in the City's Ultimate PCSWMM model at their respective locations. Full details of these subcatchment parameters have been provided in Attachment B.

Minor System

The proposed storm trunk sewer that will pass through the proposed development to Pond 4 has been included in the latest modelling. All key pipe parameters such as length, diameter, slope, material, and loss coefficients have been included in this model, as per preliminary designs as provided by Atrel and DSEL in the rational method calculation sheets provided in Attachment A. Note that the current plan is a preliminary design and may be subject to future refinements.

Locations where the proposed development will connect to the existing trunk sewer along Maple Grove Road, draining to Pond 4, have also been included in the model. Provided in Attachment B is a markup of the storm drainage plan from the KWMSS completed by Stantec in June 2006, with annotations indicating deviations from this original drainage plan. Based on these markups the total allowable flow to the Maple Grove trunk sewer from the East Huntmar Development is 1,723 L/s. Under the latest design, a total of 6.504 ha will drain to the existing Maple Road Grove storm sewer, at a maximum total allowable release rate of 1,723 L/s (average release of 265 L/s/ha). Full details of the assumed release rates and on-site storage for these lands are documented in Attachment B, Tables B2 and B3. Note that the model used in this report is a simplistic lumped model, and a more detailed hydrologic and hydraulic analysis of the Maple Grove Road trunk sewer may need to be completed at detailed design.

Major System

Major system conveyance routes and storage has been accounted for in this model based on preliminary site grading plans for both developments east and west of Huntmar Drive as per designs by Atrel and DSEL. Generic road cross-section profiles have been applied to the model, based on the proposed right-of-way widths allocated at the various locations. In locations where major system flow occurs through natural ditches, generic triangular cross-sections with 3:1 slopes have been assumed for all routes. As the lengths, slopes and cross-sectional profiles of all major system flow routes have been represented in the model, the model is inherently able to account for the storage volume within these segments. Localized low points within the development have been included in the road segments west of Huntmar Drive (DSEL design) but have not been included east of Huntmar Drive. The exclusion of this localized road storage east of Huntmar Drive ensures that the proposed design is conservative. Based on the latest modelling results, ponding depths on the road within the proposed developments for the 100-Year event are all less than 30 cm. Road catchbasins will be implemented within the development at required locations to ensure water levels on the major system meet City guidelines and will be assessed in detail at the detailed design stage.

Major/Minor Linking

Runoff from the subcatchments was applied directly to the closest applicable major system node within the model. These nodes then have a depth/flow rating curve applied at this location (using an outlet link) connecting the flow from the streets to the minor system. The flow values applied in these rating curves were set based on the level of service provided at each respective location. For the lands east of Huntmar Drive the level of service is specified as per Atrel's design, with residential lands releasing at 340 L/s/ha or 220 L/s/ha (based on their location relative to the arterial road), commercial lands releasing at 250 L/s/ha with some on-site storage (assumed 50 m^3/ha) and the proposed school blocks and parklands releasing at 220 L/s/ha and 115 L/s/ha respectively, with onsite storage controlling up to the 100-Year event at both locations. Refer to Atrel's stormwater drainage plan figure provided in Attachment A.

For the lands west of Huntmar Drive these rating curves were set based on the level of service provided at each respective location; with a 2-Year minor system level of service provided on local roads, 5-year on collector roads, and 10-Year on arterial. With the lumped areas (commercial schools and parks) having a 5-Year level of service with 100-year on-site control, except for the 5.07 ha commercial lands, which will release at 340 L/s/ha with 100-year on-site control. Refer to the stormwater drainage plan figure provided in Attachment A for more details. Note that capture rates outlined in this analysis are for preliminary design purposes and will be refined during the detail design stage using the current City of Ottawa design guidelines. Also note that as per City guidelines that the modelling assumes 100% capture of flows from the proposed development west of Huntmar Drive at the intersection with Huntmar Drive, to ensure that no major system flow from this development will cross Huntmar Drive, the same has been applied to the 130 Huntmar site in the central east most extent of the development where there is a major system flow link between 130 Huntmar and the City Lands to the East.

On-Site Storage

On-site storage has been assumed for the large lumped development areas (schools, parks and commercial lands) and applied in the model. The on-site storage volumes have been calculated using the PCSWMM model based on the 100 Year 12 Hour SCS Storm (critical storm for the Carp River), and have been incorporated into the PCSWMM modelling, through the use of storage nodes. Table B2 in Attachment B outlines the allowable release rates for the various lumped areas and the required or assumed on-site storage volume for each location.

SWM Pond

Based on the analysis provided from the JFSA memo of the same name submitted February 11, 2020, it was found that the existing SWM “Pond 4” will need to be upsized by approximately 55% to accommodate the proposed Huntmar developments, which equated to approximately 25,600 m³ of additional active storage volume. The existing stage/storage curve that is currently physically in place at Pond 4 was developed by JFSA and DSEL, as an interim condition in December 2014, with full details of the design documented in JFSA’s December 2014 Pond 4 Pond Design brief.

Since the February 2020 study, Atrel has developed a detailed Pond 4 stage/storage curve that has been increased in volume to accommodate the proposed Huntmar developments. Detailed drawings of the proposed pond have been provided in Attachment C, which includes the current pond footprint. A comparison between the stage storage curves for the existing constructed pond, the pond assumed in the City’s Ultimate conditions modelling and the current proposed pond expansion have also been provided in Attachment C. This comparison indicates the latest proposed pond will need to be increased by approximately 25,932 m³ to accommodate the proposed development but will be approximately 15,678 m³ smaller than the volume assumed in the City’s Ultimate conditions modelling, due to the diversion of some drainage area to Pond 7, as discussed above.

To ensure that the proposed developments do not have any adverse impacts on existing stormwater infrastructure or on the greater Carp River watershed, the Pond 4 stage/storage curve and outlet rating curve have been adjusted to mitigate any impacts. This was completed through an iterative process, of adjusting the pond outlet structure sizes until all events were either under or closely matched the peak water levels from the City's Carp River Ultimate Conditions model, at key locations along the watercourse. Based on the location of Pond 4 relative to the greater Carp River it was determined that it was best to control only up to the 10-Year event, as the peak flow into Pond 4 occurs approximately 5.5 hours before the peak flow on the Carp River at this location. Attenuating flows from this area in Pond 4 for the larger return periods (e.g. 100-Year event) would exacerbate the peak flows and flooding along the Carp River, due to the timing of peaks. The latest Pond 4 design has been developed to ensure that the peak flow out of the pond for the 10-Year event does not exceed 17.282 m³/s, as specified in the KWMSS. The latest modelling of Pond 4 indicated that the peak flow out of the pond for this event is 10.74 m³/s.

Note that the City PCSWMM models for the pond outlet used a single rating curve derived from the summation of various weir and orifice calculations. For transparency and ease for future updates, the latest model has been updated to represent each proposed orifice and weir out of Pond 4, through individual links in the model. Refer to Attachment C, for full details of the simulated water levels and flows in and out of the pond for the various return periods, along with the pond outlet structure details and hydraulic operations.

Boundary Conditions and Hotstart Files

As per the City of Ottawa's "PCSWMM HotStart File Memo" dated April 17, 2015, HotStart files have been created and used for all model simulations documented in this memo. For all events, excluding the 100-year, a normal depth boundary condition has been applied at the downstream extent of the model on the Carp River (node CO001). For the 100-year event, a fixed water level of 92.50 m has been applied at the same location.

Model Results

Carp River

Tables 1 to 4 outline the peak flows, total volumes and peak water levels on the Carp River presented in the City's Ultimate Conditions and the updated proposed conditions models, at 4 key locations on the Carp River downstream of the Pond 4.

Table 1: Carp River at Palladium Drive
(Node: CJ150 - 2977.8 ha)

Event	City Ultimate [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	5.5	389	93.05	5.5	322	93.06	0.1	-67	0.00
2 Year SCS 12hr	24.0	669	93.37	21.2	657	93.36	-2.8	-12	-0.01
5 Year SCS 12hr	42.5	993	93.61	34.1	960	93.60	-8.4	-33	-0.01
10 Year SCS 12hr	47.0	1,220	93.75	49.2	1,224	93.74	2.1	4	-0.01
25 Year SCS 12hr	38.6	1,513	93.91	44.9	1,543	93.90	6.2	30	-0.01
50 Year SCS 12hr	42.1	1,727	94.02	37.8	1,693	94.01	-4.2	-34	-0.02
100 Year SCS 12hr	35.7	1,947	94.14	40.9	1,964	94.13	5.2	17	-0.02

Table 2: Carp River at Highway 417
(Node: CJ120 - 3080.559 ha)

Event	City Ultimate Conditions [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	5.2	455	92.66	5.2	372	92.67	0.0	-83	0.00
2 Year SCS 12hr	11.4	729	93.10	11.2	725	93.09	-0.2	-5	-0.01
5 Year SCS 12hr	17.1	1,063	93.39	16.9	1,053	93.38	-0.3	-10	-0.01
10 Year SCS 12hr	21.3	1,298	93.55	20.8	1,283	93.54	-0.5	-15	-0.01
25 Year SCS 12hr	26.0	1,606	93.73	25.5	1,588	93.72	-0.5	-18	-0.01
50 Year SCS 12hr	29.3	1,829	93.85	28.7	1,807	93.83	-0.6	-22	-0.01
100 Year SCS 12hr	32.4	2,057	93.98	31.7	2,032	93.96	-0.7	-25	-0.01

Table 3: Carp River at Confluence with Feed Mill Creek
(Node: CJ108 - 4259.23 ha)

Event	City Ultimate Conditions [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	6.0	546	92.46	6.0	457	92.46	0.0	-89	0.00
2 Year SCS 12hr	14.4	925	92.92	14.2	922	92.92	-0.2	-3	-0.01
5 Year SCS 12hr	22.3	1,365	93.21	22.1	1,357	93.20	-0.3	-8	-0.01
10 Year SCS 12hr	28.0	1,675	93.36	27.6	1,663	93.35	-0.4	-12	-0.01
25 Year SCS 12hr	34.9	2,080	93.54	34.4	2,066	93.53	-0.5	-14	-0.01
50 Year SCS 12hr	39.5	2,371	93.65	38.9	2,355	93.64	-0.6	-16	-0.01
100 Year SCS 12hr	44.4	2,674	93.78	43.8	2,643	93.77	-0.6	-31	-0.01

Table 4: Carp River at Richardson Side Road
(Node: CJ050 - 4711.672 ha)

Event	City Ultimate Conditions [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	5.7	685	92.12	5.7	553	92.12	0.0	-132	0.00
2 Year SCS 12hr	12.9	1,052	92.57	12.8	1,050	92.57	-0.1	-2	0.00
5 Year SCS 12hr	20.2	1,518	92.85	20.0	1,512	92.84	-0.2	-6	-0.01
10 Year SCS 12hr	25.0	1,851	93.03	24.6	1,841	93.03	-0.3	-10	-0.01
25 Year SCS 12hr	32.8	2,287	93.18	32.4	2,274	93.17	-0.4	-13	-0.01
50 Year SCS 12hr	37.4	2,601	93.29	37.1	2,585	93.28	-0.3	-16	-0.01
100 Year SCS 12hr	43.5	3,001	93.46	43.0	2,971	93.45	-0.5	-30	-0.01

From this analysis, it is seen that the proposed Pond 4 upgrade detailed in this report results in water levels on the Carp River to be either equal to or slightly less than that set by the City's Ultimate Condition model, at all key locations downstream of the proposed development. It should be noted that from this analysis it was found that for the 100-Year 12-hour SCS event peak flows out of the Pond 4 occurs at around 6 hours and 10 minutes into the event, while the peak flow on the Carp River at the Pond 4 outlet occurs at around 11 hours and 40 minutes into the event. Due to the 5.5-hour difference in timing of peaks between Pond 4 and the Carp River, there are no peak water level increases observed on the Carp River with the proposed pond and development implemented.

Pond 4

Tables 5 outlines the peak flows, total volumes and peak water levels in Pond 4 presented in the City's Ultimate conditions model and the latest proposed design. Full details of flows into and out of the pond have been provided in Attachment C.

Table 5: SWM Pond 4
(Node: PSto201 - 239.305 ha)

Event	City Ultimate Conditions [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	10.6	42	94.06	11.3	35	94.07	0.7	-7	0.01
2 Year SCS 12hr	15.2	85	94.35	15.0	72	94.32	-0.3	-13	-0.02
5 Year SCS 12hr	20.8	120	94.48	20.6	102	94.43	-0.2	-18	-0.05
10 Year SCS 12hr	23.3	143	94.57	24.3	121	94.49	0.9	-22	-0.08
25 Year SCS 12hr	26.3	172	94.63	29.0	145	94.57	2.7	-27	-0.06
50 Year SCS 12hr	28.1	192	94.66	32.2	161	94.63	4.1	-30	-0.03
100 Year SCS 12hr	31.0	211	94.70	34.7	177	94.68	3.7	-34	-0.01

From this analysis, it is seen that the peak flows into the pond are generally slightly higher than that approximated by the City's Ultimate model due to the greater discretization of subcatchment areas, with the total inflow volume less due to the reduction in total drainage area to the pond (approximately 34,000 m^3 less for the 100-year event). The pond has been sized to ensure that the peak proposed 100-Year water level in the pond does not exceed the elevation determined in the City's Ultimate condition. It is noted that there is a minor (1cm) increase in the pond peak water levels for the 25 mm event, which may be determined to be inconsequential or can be rectified at detailed design through slight adjustments to the pond stage/area curve or the outlet configuration.

Maple Grove Storm Sewer

The City's Ultimate condition model includes a simplistic representation of the existing stormwater trunk sewer to Pond 4 that runs west to east along Maple Grove Drive. Under the currently proposed design, approximately 6.52 ha of the Huntmar Development will discharge to this sewer and has been represented accordingly in this model.

The City's Ultimate conditions model assumed that approximately 14 ha of the proposed development would discharge to this trunk sewer. Table 6 below outlines the peak flows, total volumes and peak water levels on the existing storm sewer under the City's Ultimate Conditions and currently proposed conditions at model Node PJ206, which is located near the City of Ottawa's Maple Grove Depot at 1655 Maple Grove Road. Note that the results provided below are simply a comparison between the results outlined in the City's Ultimate condition model against the currently proposed conditions. A more comprehensive analysis of the lands draining to the Maple Grove Road trunk sewer and the trunk sewers hydraulic operation under future conditions may need to be completed at detailed design.

Table 6: Maple Grove Drive Existing Minor System
(Node: PJ206 - 163.71 ha)

Event	City Ultimate Conditions [1]			Proposed Conditions [2]			Difference [2] - [1]		
	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)	Peak Inflow (m^3/s)	Total Inflow (1000 m^3)	Peak WSE (m)
25mm Ch 3Hr	6.8	23	94.17	6.2	22	94.07	-0.5	-1	-0.10
2 Year SCS 12hr	9.1	48	94.55	8.5	45	94.33	-0.6	-3	-0.23
5 Year SCS 12hr	12.5	68	94.95	11.1	64	94.48	-1.4	-4	-0.47
10 Year SCS 12hr	15.1	81	95.06	13.4	76	94.61	-1.7	-5	-0.45
25 Year SCS 12hr	17.8	97	95.31	15.5	91	95.04	-2.3	-6	-0.27
50 Year SCS 12hr	19.6	108	95.69	16.7	101	95.30	-2.8	-7	-0.39
100 Year SCS 12hr	22.3	119	96.11	18.3	111	95.62	-4.0	-7	-0.49

From this analysis, it was shown that under the proposed conditions for all events, the peak water levels and flows are lower than those simulated in the City of Ultimate conditions model. Again, this model is a simplistic representation of the Maple Grove trunk sewer and a more comprehensive analysis of the future operations of the Maple Grove trunk sewer may need to be completed at detailed design.

Water Balance

A pre-and post-development water balance has been completed for the site based on the Ministry of the Environment, Conservation and Parks (MECP) SWM design guidelines; the following section outlines the approach and results of this analysis for the various site conditions.

Pre-Development

As per the Kanata West Master Servicing Study (KWMSS) dated June 16, 2006, by Stantec Consulting Limited and Cumming Cockburn Limited, the subject lands are considered to be in an area of moderate groundwater recharge and will need to meet the proposed target infiltration rates of 104 mm/Year. Based on Table 3.1 - Hydrologic Cycle Component Values of the MECP's SWM Manual assuming Type D soils with shallow root crops the annual surplus (runoff + infiltration) will be 415mm/year, the infiltration factors (topography factor soil factor and cover factor) were adjusted within reasonable limits to obtain an annual infiltration value of 104 mm/year, matching the target set out in the KWMSS.

To determine the total water budget for the site, the proposed development lands have been broken into pervious and impervious areas. The annual evaporation, runoff and infiltration volumes were calculated for the impervious and pervious lands separately and summated to provide the overall water balance for the site, note that for pre-development conditions, this site is 0% impervious. Based on continuous hydrologic SWMHYMO model simulations using 39 years of historical rainfall data from the Ottawa Airport, City default impervious Initial Abstraction parameters and an impervious drying time of 45 minutes, it was found that for 100% impervious surfaces, on average, 26% of the annual precipitation will be lost due to evaporation with runoff making up the remaining 74%, these values have been adopted in the water balance calculations for impervious surfaces.

Tables B1-1 to B1-3 outline the calculations of each of these components. Based on this analysis it was found that this site on average, 55.9% of the annual precipitation will return to the atmosphere through evaporation and evapotranspiration, 11.0% will infiltrate and 33.1% will runoff. For the total site drainage area of 26.83 ha, the site will infiltrate approximately 104 mm/yr. (27,835 m³/yr.) of the total annual precipitation of 940 mm/yr. (252,202 m³/yr.).

Post-Development-Without LIDs

Under post-development conditions, the site has been broken into 4 subcomponents based on the proposed land use type: Residential, Commercial, School and Park Lands. Note that the impervious area associated with the proposed roads has been included in the various development types outlined above. Based on the development conceptual plan, the 26.83 ha site will have a total imperviousness of 72%. The site's water budget parameters have been updated based on Table 3.1 - Hydrologic Cycle Component Values of the MECP's SWM Manual, assuming Urban Lawns and Type D hydrologic soil type. This analysis also assumes that the pervious surfaces within the development will be covered with imported topsoil, and as such a soil infiltration factor of 0.2 (reflective of a mix of clay and loam) was applied.

As completed under pre-development conditions, each of the land use types have been broken into pervious and impervious areas, and these resulting values summated. Tables D2-1 to D2-3 outline the calculations of each of these components. Based on this analysis it was found that, under post-development conditions (without any LID measures in place), this site on average will evaporate 34.4% of its annual precipitation while 5.0% will infiltrate and 60.6% will runoff. Based on the total development area of 26.83 ha, the site will infiltrate 47 mm/yr. (12,554 m³/yr.) of the total annual rainfall of 940 mm/yr., 57 mm/yr. (15,282 m³/yr.) short of the pre-development conditions.

Post-Development – With LIDs

As indicated above, the increase in the impervious area due to the proposed development will result in a decrease in annual infiltration volume. To offset this deficit, it is proposed that LID measures will be implemented throughout the site to capture a portion of the additional runoff and allow it to infiltrate back into the soil. For this site, it is currently proposed that selected street catchbasins have LID measures implemented that will capture and infiltrate runoff through perforated pipe systems connected to the catchbasins. It is proposed that the perforated pipes be connected to catchbasins, set with the obverts of the perforated pipes at the inverts of the lead pipes connected to the main storm sewer. The perforated pipes will be surrounded by a 50 mm clear stone infiltration trench, constructed per City of Ottawa standard drawing S29.

As a part of the “Barrhaven South Urban Expansion Area Master Servicing Study” completed by J.L. Richards and Associates Inc. (JLR), a detailed historical rainfall analysis was completed to correlate the volume of a single rainfall event to an annual event percentile; for example, based on JLR’s study a 22 mm rainfall event correlates to the 95th percentile of all annual rainfall events in the Ottawa region. Similarly, the 85th, 75th and 65th percentile events correspond to 11.4 mm, 7.5 mm and 5.1 mm rainfall events. Using JLR’s data, further extrapolation/interpolation can be applied to determine the annual percentiles for particular rainfall events. JLR’s analysis helps determine how much of the annual rainfall volume will be dealt with but is missing a key piece of information; the runoff volume (in mm) generated by such rainfall events, which then can be used to conceptually size LID measures. To provide this missing information, a series of conceptual SWMHYMO models were prepared for various total imperviousness (TIMP) ranging from 40% to 95% with various degrees of directly connected imperviousness (XIMP), all with City Standard parameters. These models were run for the 5 mm, 10 mm, 15 mm, 20 mm, 22 mm, 25 mm and 30 mm design storms. From the results obtained (provided in Attachment C) it is possible to determine the runoff (in mm) generated from a given TIMP and XIMP, for any of these storms. For events with less than 5 mm of rainfall, the runoff volume can be computed by simply removing the initial abstraction (IA), from the total rainfall, over the impervious surfaces as the pervious surfaces will not generate any runoff.

It is noted that for the proposed development, with 72% total imperviousness (TIMP) and 62% directly connected imperviousness (XIMP), a 5 mm event would generate approximately 1.92 mm of runoff volume. If 50% of the development is designed to capture and infiltrate all runoff from the 5mm event (zero runoff for 64% of all annual rainfall events) these LIDs will be able to infiltrate 70 mm/yr. (18,913 m³/yr.) bring the site total infiltration rate (pervious surfaces & LIDs) to 117 mm/yr. (31,467 m³/yr.) exceeding the infiltration target set out in the KWMSS by 14mm/yr. (3,631 m³/yr.).

A conceptual drawing of the proposed Catchbasin Infiltration LID measures has been provided in Attachment D. Note that the exact location and configuration of each LID measure is dependent on the total drainage area and runoff volume to each LID and the location of each measure can be refined at detailed design through coordination with the City. Irrespective of these specific LID details that will be refined at the detailed design stage, the following calculations have shown that the proposed development can meet the required infiltration targets by implementing LIDs that will capture the runoff for the 5mm event within 50% of the development.

Development Water Budget Scenario Summary

Tables 7-9 summarize the annual average water balance under existing conditions and post-development conditions for the proposed development lands with and without LID measures in place, as m³/year, mm/year and % of total annual rainfall.

Table 7: Pre-Development Water Balance

Drainage Area (ha)		26.83	Imperviousness:	2%
Annual Average Volume	**Precipitation**	**Evapotranspira-tion**	**Infiltration**	**Runoff**
m³	252,202	140,858	27,836	83,508
mm	940	525	104	311
%	100%	55.9%	11.0%	33.1%

Table 8:Post Development Water Balance – Without LIDs

Drainage Area (ha)		26.83	Imperviousness:	72%
Annual Average Volume	**Precipitation**	**Evapotranspira-tion**	**Infiltration**	**Runoff**
m³	252,202	86,793	12,554	152,854
mm	940	323	47	570
%	100%	34.4%	5.0%	60.61%

Table 9:Post Development Water Balance – With LIDs

Drainage Area (ha)		59.26	Imperviousness:	72%
Annual Average Volume	**Precipitation**	**Evapotranspira-tion**	**Infiltration**	**Runoff**
m³	252,202	86,793	31,467	133,941
mm	940	323	117	499
%	100%	34.4%	12.5%	53.1%

Based on this analysis of pre-development conditions this site will evaporate 55.9%, infiltrate 11.0% and runoff 33.1% of all annual rainfall. Under Post-development conditions without LID, this site will evaporate 34.4%, infiltrate 5.0% and runoff 60.6% of all annual rainfall. Under post-development conditions with LIDs, this site will evaporate 34.4%, infiltrate 12.5% and runoff 53.1% of all annual rainfall, exceeding existing pre-development infiltration rates.

Summary

The City of Ottawa's PCSWMM Ultimate conditions model of the Carp River has been updated to reflect the proposed developments east and west of Huntmar Drive. Detailed stage/storage curves have been developed for SWM "Pond 4" to accommodate this proposed development. To ensure that the proposed development and pond upsizing would not have any adverse impacts on the Carp River or the existing storm sewer infrastructure, comparisons were completed against the results obtained from the City's Ultimate condition model. This analysis confirmed that downstream of Pond 4 on the Carp River, there will be no increases in peak water levels for all design storms under the latest design.

The updated analysis indicated that the peak flows into Pond 4 are slightly higher than that approximated by the City's Ultimate model, with the total inflow volume lower due to the reduction in total drainage area to the pond than previously assumed, due to the proposed partial diversion of flows to Pond 7. Pond 4 has been sized to ensure that the peak proposed 100-Year water level in the pond does not exceed the elevation determined in the City's Ultimate conditions model. A full hydraulic summary of the proposed Pond 4 upgrades has been provided in Attachment C.

The City's Ultimate condition model includes a simplistic representation of the existing stormwater trunk sewer to Pond 4 that runs west to east along Maple Grove Drive. From this analysis, it was shown that under the proposed conditions water levels in this system are lower than that approximated from the City's Ultimate conditions model. Although, a more comprehensive analysis of the future operations of the Maple Grove trunk sewer may need to be completed at detailed design, using more detailed hydrologic and hydraulic models.

A pre-and post-development water balance has been completed for the site based on the Ministry of the Environment, Conservation and Parks (MECP) SWM design guidelines. As per the Kanata West Master Servicing Study (KWMSS) dated June 16, 2006, by Stantec Consulting Limited and Cumming Cockburn Limited, the subject lands are considered to be in an area of moderate groundwater recharge and will need to meet the proposed target infiltration rates of 104 mm/Year. Based on this analysis, under existing conditions it was found that this site on average, 55.9% of the annual precipitation will return to the atmosphere through evaporation and evapotranspiration, 11.0% will infiltrate and 33.1% will runoff. When the site is developed, it will infiltrate 47 mm/yr. of the total annual rainfall (5%), 57 mm/yr, short of the pre-development conditions. When Catchbasin Infiltration LID measures are implemented to infiltrate the 5mm event throughout 50% of the site, the annual infiltration rate will be 117 mm/yr, exceeding the pre-development targets of 104mm/yr by 14 mm/yr.

In summary, the City's Ultimate conditions PCSWMM model has been updated to reflect the proposed Huntmar development and proposed SWM pond 4 upsizing, which has concluded that there will be no adverse impacts within the existing infrastructure or on the greater Carp River.

Respectfully submitted,
J.F Sabourin and Associates Inc.

Jonathon Burnett, P.Eng
Water Resources Engineer, JFSA

cc: J.F Sabourin, M.Eng, P.Eng
Director of Water Resources Projects

Attachment A: Proposed Development Plan (Atrel & DSEL)

Attachment B: PCSWMM Model Overview

Attachment C: SWM Pond 4 Details

Attachment D: Water Budget

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Québec. QC

Attachment A

Proposed Development Plan (Atrel & DSEL)

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

LOCAL ROADS STORM FREQUENCY : 2 YEAR
COLECTOR ROADS STORM FREQUENCY : 5 YEAR
ARTERIAL ROADS STORM FREQUENCY :10 YEAR

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
September, 2021

Rational Method
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 8

LOCATION FROM (Up)		TO (Down)		AREA (ha.) RUNOFF COEFFICIENT 2 Year 0.40	0.60	0.70	0.80	5 Year 0.40	0.60	0.70	0.80	10 Year 0.70	0.80	Rational Method 2 Year INDIV. 2.78AR	ACCUM. 2.78AR	5 Year INDIV. 2.78AR	ACCUM. 2.78AR	10 Year INDIV. 2.78AR	ACCUM. 2.78AR	TIME CONC. (MIN)	RAINF. INTENS. 2 Year (MM/HR)	RAINF. INTENS. 5 Year (MM/HR)	RAINF. INTENS. 10 Year (MM/HR)	2 Year Flow (L/S)	5 Year Flow (L/S)	10 Year Flow (L/S)	ACTUAL PIPE FLOW (L/S)	PIPE SEWER DATA TYPE	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	UpStream Obv. (M)	Inv. (M)	DwStream Obv. (M)	Inv. (M)
MH	217	MH	218					4.66								5.18	5.18			10.00	76.81	104.19	122.14		539.90		539.90	CONC	675	685.8	0.80	46.0	784.35	31%	2.12	0.36	99.62	98.95	99.25	98.58
MH	218	MH	220					1.23			6.95					16.82	22.01			10.36	75.45	102.32	119.94		2251.70		2251.70	CONC	1200	1219.2	0.75	120.0	3522.39	36%	3.02	0.66	99.25	98.05	98.35	97.15
																				11.02																			
MH	219	MH	220									1.13						2.20	2.20	10.00	76.81	104.19	122.14			268.58	268.58	CONC	675	685.8	0.20	49.0	392.18	32%	1.06	0.77	99.43	98.76	99.33	98.66
																				10.77																			
MH	220	MH	101														22.01		2.20	11.02	73.08	99.08	116.12		2180.40	255.35	2435.75	CONC	1350	1371.6	0.30	47.5	3049.82	20%	2.06	0.38	98.35	97.00	98.21	96.86
																				11.41																			
MH	101	MH	102			0.40						0.50		0.78	0.78		22.01	0.97	3.17	11.41	71.79	97.30	114.03	55.88	2141.23	361.70	2558.81	CONC	1350	1371.6	0.35	92.5	3294.18	22%	2.23	0.69	98.15	96.80	97.83	96.48
MH	102	MH	103			0.45								0.88	1.65		22.01		3.17	12.10	69.59	94.28	110.46	115.11	2074.77	350.38	2540.26	CONC	1350	1371.6	0.35	102.0	3294.18	23%	2.23	0.76	97.83	96.48	97.47	96.12
MH	103	MH	133			0.51								0.99	2.65		22.01		3.17	12.86	67.32	91.17	106.81	178.17	2006.33	338.80	2523.30	CONC	1350	1371.6	0.35	111.5	3294.18	23%	2.23	0.83	97.47	96.12	97.08	95.73
																				13.70																			
MH	110	MH	111			0.76								1.48	1.48					10.00	76.81	104.19	122.14	113.60			113.60	CONC	450	457.2	0.50	82.5	210.32	46%	1.28	1.07	98.88	98.43	98.47	98.02
MH	111	MH	113												1.48					11.07	72.92	98.85	115.84	107.85			107.85	CONC	450	457.2	0.50	11.0	210.32	49%	1.28	0.14	98.44	97.99	98.38	97.93
																				11.22																			
MH	112	MH	113		0.75									1.25	1.25					10.00	76.81	104.19	122.14	96.09			96.09	CONC	525	533.4	0.30	11.5	245.74	61%	1.10	0.17	98.41	97.89	98.38	97.86
																				10.17																			
MH	113	MH	114			0.14								0.27	3.00					11.22	72.43	98.18	115.06	217.46			217.46	CONC	675	685.8	0.30	62.5	480.32	55%	1.30	0.80	98.38	97.71	98.19	97.52
MH	114	MH	115												3.00					12.02	69.84	94.62	110.87	209.69			209.69	CONC	675	685.8	0.30	12.0	480.32	56%	1.30	0.15	98.16	97.49	98.12	97.45
MH	115	MH	121			0.25								0.49	3.49					12.17	69.36	93.97	110.10	241.99			241.99	CONC	750	762.0	0.30	47.0	636.13	62%	1.39	0.56	98.12	97.37	97.98	97.23
																				12.73																			
MH	120	MH	121			0.26								0.51	0.51					10.00	76.81	104.19	122.14	38.86			38.86	PVC	375	366.4	0.35	64.0	97.52	60%	0.92	1.15	98.55	98.18	98.33	97.96
																				11.15																			
MH	121	MH	127			0.57								1.11	5.10					12.73	67.69	91.68	107.41	345.50			345.50	CONC	825	838.2	0.30	85.0	820.21	58%	1.49	0.95	97.98	97.16	97.72	96.90
																				13.69																			
MH	125	MH	126			0.30								0.58	0.58					10.00	76.81	104.19	122.14	44.84			44.84	PVC	375	366.4	0.30	60.0	90.28	50%	0.86	1.17	98.51	98.14	98.33	97.96
MH	126	MH	127	1.07		0.39								1.95	2.53					11.17	72.59	98.40	115.32	183.84			183.84	CONC	600	609.6	0.30	87.0	350.85	48%	1.20	1.21	98.33	97.73	98.07	97.47
																				12.37																			
MH	127	MH	132			0.37								0.72	8.36					13.69	65.05	88.06	103.15	543.60			543.60	CONC	975	990.6	0.30	83.5	1280.55	58%	1.66	0.84	97.72	96.75	97.47	96.50
																				14.52																			
MH	130	MH	131			0.52								1.01	1.01					10.00	76.81	104.19	122.14	77.73			77.73	CONC	450	457.2	0.30	63.0	162.91	52%	0.99	1.06	97.91	97.46	97.72	97.27
MH	131	MH	132			0.51								0.99	2.00					11.06	72.97	98.92	115.93	146.26			146.26	CONC	525	533.4	0.30	84.5	245.74	40%	1.10	1.28	97.72	97.20	97.47	96.95
																				12.34																			
MH	132	MH	133			0.24								0.47	10.83					14.52	62.92	85.13	99.70	681.30			681.30	CONC	1050	1066.8	0.30	82.0	1560.35	56%	1.75	0.78	97.47	96.42	97.22	96.17
																				15.31																			
MH	133	MH	171			0.07								0.14	13.61		22.01		3.17	15.31	61.05	82.58	96.70	830.94	1817.30	306.73	2954.97	CONC	1650	1676.4	0.30	42.0	5208.04	43%	2.36	0.30	97.08	95.43	96.95	95.30
																				15.60																			
MH	170	MH	171			0.09	5.95							13.41	13.41					10.00	76.81	104.19	122.14	1029.86			1029.86	CONC	1050	1066.8	0.30	51.0	1560.35	34%	1.75	0.49	97.04	95.99	96.89	95.84
																				10.49																			
MH	171	MH	173			0.10								0.19	27.21		22.01		3.17	15.60	60.38	81.66	95.62	1643.15	1797.05	303.30	3743.50	CONC	1800	1828.8	0.30	42.0	6568.16	43%	2.50	0.28	96.74	94.94	96.61	94.81
																				15.88																			
MH	172	MH	173			0.27								0.53	0.53					10.00	76.81	104.19	122.14	40.36			40.36	PVC	300	299.2	0.50	87.5	67.90	41%	0.97	1.51	96.99	96.69	96.55	96.25
																				11.51																			
MH	173	MH	174			0.25	0.85							2.38	30.12		22.01		3.17	15.88	59.76	80.81	94.62	1799.72	1778.34	300.13	3878.19	CONC	1800	1828.8	0.30	86.0	6568.16	41%	2.50	0.57	96.55	94.75	96.29	94.49
MH	174	MH	191												30.12		22.01		3.17	16.46	58.53	79.13	92.65	1762.67	1741.37	293.88	3797.93	CONC	1800	1828.8	0.30	10.5	6568.16	42%	2.50	0.07	96.26	94.46	96.23	94.43
																				16.53																			
MH	200	MH	201							0.18		0.37				0.35	0.35	0.72	0.72	10.00	76.81	104.19	122.14		36.50	87.94	124.44	PVC	375	366.4	1.50	94.0	201.88	38%	1.91	0.82	106.11	105.74	104.70	104.33
MH	201	MH	202									0.24					0.35	0.47	1.19	10.82	73.80	100.06	117.27		35.05	139.21	174.26	CONC	525	533.4	1.40	62.5	530.86	67%	2.38	0.44	104.70	104.18	103.82	103.30
MH	202	MH	205									0.46					0.35	0.90	2.08	11.26	72.29	97.99	114.84		34.32	239.12	273.45	CONC	600	609.6	0.55	77.5	475.05	42%	1.63	0.79	103.82	103.22	103.39	102.79
																				12.05																			
MH	203	MH	204									0.39						0.76	0.76	10.00	76.81	104.19	122.14			92.70	92.70	CONC	450	457.2	1.10	110.0	311.95	70%	1.90	0.96	106.16	105.71	104.95	104.50
MH	204	MH	205									0.79						1.54	2.30	10.96	73.29	99.36	116.45			267.40	267.40	CONC	525	533.4	0.85	107.5	413.64	35%	1.85	0.97	104.30	103.78	103.39	102.87
																				11.93																			
MH	205	MH	206									0.62					0.35	1.21	5.59	12.05	69.74	94.48	110.71		33.09	618.32	651.41	CONC	825	838.2	0.35	96.0	885.93	26%	1.61	1.00	103.39	102.57	103.05	102.23
MH	206	MH	207									0.47					0.35	0.91	6.50	13.05	66.80	90.45	105.96		31.68	688.70	720.38	CONC	825	838.2	0.55	106.5	1110.58	35%	2.01	0.88	103.03	102.21	102.44	101.62
MH	207	MH	209						7.46							12.44	12.79		6.50	13.93	64.42	87.19	102.12		1115.47	663.74	1779.21	CONC	1050	1066.8	0.90	46.5	2702.60	34%	3.02	0.26	102.44	101.39	102.02	100.97
																				14.19																			
MH	208	MH	209							0.51						0.99	0.99			10.00	76.81	104.19	122.14		103.40		103.40	CONC	450	457.2	0.25	75.5	148.72	30%	0.91	1.39	102.17	101.72	101.98	101.53
																				11.39																			
MH	209	MH	210									0.36					13.79	0.70	7.20	14.19	63.76	86.29	101.06		1189.60	727.65	1917.25	CONC	1050	1066.8	0.85	48.5	2626.46	27%	2.94	0.28	101.98	100.93	101.57	100.52
MH	210	MH	211									0.36					13.79	0.70	7.90	14.46	63.07	85.34	99.95		1176.50	789.68	1966.18	CONC	1050	1066.8	0.90	96.0	2702.60	27%	3.02	0.53	101.54	100.49	100.68	99.63
MH	211	MH	212									0.34					13.79	0.66	8.56	14.99	61.79	83.59	97.89		1152.37	838.17	1990.55	CONC	1050	1066.8	0.90	91.0	2702.60	26%	3.02	0.50	100.64	99.59	99.82	98.77
MH	212	MH	213									0.27					13.79	0.53	9.09	15.49	60.63	82.00	96.02		1130.45	872.61	2003.07	CONC	1200	1219.2	0.50	72.0	2876.02	30%	2.46	0.49	99.80	98.60	99.44	98.24
MH	213	MH	140								5.07	0.35				11.28	25.06	0.68	9.77	15.98	59.55	80.52	94.29		2017.97	921.11	2939.08	CONC	1500	1524.0	0.50	117.0	5214.57	44%	2.86	0.68	99.44	97.94	98.85	97.35

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

LOCAL ROADS STORM FREQUENCY : 2 YEAR
COLECTOR ROADS STORM FREQUENCY : 5 YEAR
ARTERIAL ROADS STORM FREQUENCY :10 YEAR

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
September, 2021

Rational Method
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 8

LOCATION				AREA (ha.) RUNOFF COEFFICIENT										Rational Method 2 Year INDIV. 2.78AR	2 Year ACCUM. 2.78AR	Rational Method 5 Year INDIV. 2.78AR	5 Year ACCUM. 2.78AR	Rational Method 10 Year INDIV. 2.78AR	10 Year ACCUM. 2.78AR	TIME CONC.	RAINF. INTENS. 2 Year	RAINF. INTENS. 5 Year	RAINF. INTENS. 10 Year	2 Year Flow	5 Year Flow	10 Year Flow	ACTUAL PIPE FLOW	PIPE SEWER DATA TYPE	DIA.		SLOPE	LENGTH	CAP.	Remaining	VEL.	TIME OF	UpStream Obv.	UpStream Inv.	DwStream Obv.	DwStream Inv.
FROM (Up)		TO (Down)		2 Year 0.40	0.60	0.70	0.80	5 Year 0.40	0.60	0.70	0.80	10 Year 0.70	0.80																(N0M) (mm)	(ACT)	(%)	(M)		Capacity (%)	(M/S)	FLOW (MIN)				
																				16.66																	
MH	140	MH	142			0.17						1.06		0.33	0.33		25.06	2.06	11.83	16.66	58.11	78.55	91.96	19.22	1968.60	1088.04	3075.86	CONC	1650	1676.4	0.45	55.0	6378.52	52%	2.89	0.32	98.85	97.20	98.60	96.95
																				16.98																	
MH	141	MH	142			0.68								1.32	1.32					10.00	76.81	104.19	122.14	101.64			101.64	CONC	525	533.4	0.35	110.5	265.43	62%	1.19	1.55	98.39	97.87	98.00	97.48
																				11.55																	
MH	142	MH	144			0.30								0.58	2.24		25.06		11.83	16.98	57.46	77.67	90.93	128.59	1946.54	1075.85	3150.99	CONC	1650	1676.4	0.45	79.0	6378.52	51%	2.89	0.46	98.00	96.35	97.64	95.99
																				17.43																	
MH	143	MH	144			0.58								1.13	1.13					10.00	76.81	104.19	122.14	86.69			86.69	CONC	525	533.4	0.30	94.0	245.74	65%	1.10	1.42	98.22	97.70	97.94	97.42
																				11.42																	
MH	144	MH	152			0.32								0.62	3.99		25.06		11.83	17.43	56.56	76.44	89.48	225.63	1915.72	1058.70	3200.05	CONC	1650	1676.4	0.45	85.5	6378.52	50%	2.89	0.49	97.64	95.99	97.26	95.61
																				17.93																	
MH	146	MH	147			0.29								0.56	0.56					10.00	76.81	104.19	122.14	43.35			43.35	CONC	450	457.2	0.30	115.0	162.91	73%	0.99	1.93	98.36	97.91	98.01	97.56
MH	147	MH	148												0.56					11.93	70.11	94.99	111.30	39.57			39.57	CONC	450	457.2	0.30	11.5	162.91	76%	0.99	0.19	97.98	97.53	97.95	97.50
MH	148	MH	152			0.67								1.30	1.87					12.12	69.51	94.17	110.34	129.86			129.86	CONC	675	685.8	0.30	97.5	480.32	73%	1.30	1.25	97.95	97.28	97.66	96.99
																				13.37																	
MH	152	MH	156			0.31								0.60	6.46		25.06		11.83	17.93	55.63	75.16	87.98	359.41	1883.64	1040.95	3284.00	CONC	1800	1828.8	0.40	83.5	7584.26	57%	2.89	0.48	97.26	95.46	96.93	95.13
																				18.41																	
MH	154	MH	155			0.40								0.78	0.78					10.00	76.81	104.19	122.14	59.79			59.79	CONC	450	457.2	0.30	73.5	162.91	63%	0.99	1.23	97.19	96.74	96.97	96.52
MH	155	MH	156			0.20	1.73							4.24	5.02					11.23	72.37	98.10	114.96	362.94			362.94	CONC	825	838.2	0.30	63.0	820.21	56%	1.49	0.71	96.97	96.15	96.78	95.96
																				11.94																	
MH	156	MH	157			0.17								0.33	11.81		25.06		11.83	18.41	54.74	73.95	86.56	646.30	1853.31	1024.15	3523.76	CONC	1950	1981.2	0.30	46.5	8130.98	57%	2.64	0.29	96.78	94.83	96.64	94.69
MH	157	MH	158			0.20								0.39	12.20		25.06		11.83	18.70	54.22	73.24	85.72	661.26	1835.52	1014.21	3510.99	CONC	1950	1981.2	0.30	46.5	8130.98	57%	2.64	0.29	96.61	94.66	96.47	94.52
MH	158	MH	175												12.20		25.06		11.83	19.00	53.70	72.53	84.89	654.92	1817.73	1004.39	3477.03	CONC	1950	1981.2	0.30	45.0	8130.98	57%	2.64	0.28	96.18	94.23	96.04	94.09
																				19.28																	
MH	160	MH	161			0.52								1.01	1.01					10.00	76.81	104.19	122.14	77.73			77.73	CONC	525	533.4	0.30	120.0	245.74	68%	1.10	1.82	96.87	96.35	96.51	95.99
MH	161	MH	162			0.20								0.39	1.40					11.82	70.46	95.48	111.88	98.72			98.72	CONC	600	609.6	0.30	54.5	350.85	72%	1.20	0.76	96.51	95.91	96.35	95.75
MH	162	MH	175			0.34								0.66	2.06					12.57	68.16	92.31	108.15	140.60			140.60	CONC	675	685.8	0.30	99.0	480.32	71%	1.30	1.27	96.35	95.68	96.05	95.38
																				13.84																	
MH	175	MH	176			0.38								0.74	15.00		25.06		11.83	19.28	53.22	71.87	84.11	798.20	1801.18	995.16	3594.55	CONC	1950	1981.2	0.30	56.5	8130.98	56%	2.64	0.36	96.00	94.05	95.83	93.88
MH	176	MH	178			0.22	0.92							2.47	17.47		25.06		11.83	19.64	52.62	71.06	83.16	919.39	1780.88	983.92	3684.20	CONC	1950	1981.2	0.30	66.0	8130.98	55%	2.64	0.42	95.83	93.88	95.63	93.68
																				20.05																	
MH	177	MH	178			0.32								0.62	0.62					10.00	76.81	104.19	122.14	47.83			47.83	PVC	375	366.4	0.30	100.5	90.28	47%	0.86	1.96	96.24	95.87	95.94	95.57
																				11.96																	
MH	178	MH	190			0.15								0.29	18.39		25.06		11.83	20.05	51.94	70.13	82.07	955.02	1757.58	971.03	3683.62	CONC	1950	1981.2	0.30	46.5	8130.98	55%	2.64	0.29	95.63	93.68	95.49	93.54
																				20.35																	
MH	179	MH	190			0.35								0.68	0.68					10.00	76.81	104.19	122.14	52.32			52.32	PVC	375	366.4	0.30	83.0	90.28	42%	0.86	1.62	96.33	95.96	96.08	95.71
																				11.62																	
MH	190	MH	191			0.17								0.33	19.40		25.06		11.83	20.35	51.48	69.50	81.32	998.65	1741.79	962.15	3702.59	CONC	1950	1981.2	0.30	40.5	8130.98	54%	2.64	0.26	95.49	93.54	95.37	93.42
																				20.60																	
MH	191	MH	192			0.04	4.86							10.89	60.40		47.07		15.00	20.60	51.08	68.95	80.68	3085.29	3245.35	1210.50	7541.13	CONC	2550	2590.8	0.30	118.5	16627.39	55%	3.15	0.63	95.31	92.76	94.95	92.40
MH	192	MH	193				8.17							18.17	78.57		47.07		15.00	21.23	50.13	67.66	79.17	3938.77	3184.63	1187.84	8311.24	CONC	2550	2590.8	0.30	118.5	16627.39	50%	3.15	0.63	94.62	92.07	94.26	91.71
MH	193	MH	194												78.57		47.07		15.00	21.86	49.22	66.42	77.71	3867.27	3126.27	1165.93	8159.47	CONC	2550	2590.8	0.30	78.0	16627.39	51%	3.15	0.41	94.23	91.68	94.00	91.45
																				22.27																	
MH	School	MH	ex 179	2.40										4.00	4.00					10.00	76.81	104.19	122.14	307.49			307.49	CONC	750	762.0	0.30	14.0	636.13	52%	1.39	0.17	97.64	96.89	97.60	96.85
																				10.17																	
MH	65	MH	66			0.79								1.54	1.54					10.00	76.81	104.19	122.14	118.08			118.08	CONC	600	609.6	0.30	88.0	350.85	66%	1.20	1.22	98.70	98.10	98.44	97.84
MH	66	MH	67			0.86								1.67	3.21					11.22	72.42	98.16	115.04	232.35			232.35	CONC	750	762.0	0.30	98.5	636.13	63%	1.39	1.18	98.44	97.69	98.14	97.39
MH	67	MH	ex 180												3.21					12.40	68.68	93.03	109.00	220.35			220.35	CONC	750	762.0	0.30	13.0	636.13	65%	1.39	0.16	97.34	96.59	97.30	96.55
																				12.55																	
MH	70	MH	71			0.10	1.22							2.90	2.90					10.00	76.81	104.19	122.14	222.59			222.59	CONC	675	685.8	0.30	53.5	480.32	54%	1.30	0.69	97.57	96.90	97.41	96.74
MH	71	MH	72			0.11	1.11							2.68	5.58					10.69	74.27	100.71	118.03	414.47			414.47	CONC	825	838.2	0.30	53.0	820.21	49%	1.49	0.59	97.41	96.59	97.25	96.43
MH	72	MH	ex 181												5.58					11.28	72.22	97.89	114.71	403.03			403.03	CONC	825	838.2	0.30	17.5	820.21	51%	1.49	0.20	97.25	96.43	97.20	96.38
																				11.48																	

FUTURE STORM SEWERS FOR 195 HUNTMAR DRIVE.
PROPOSED STORM SEWERS TO NORTH FOREBAY
PROPOSED STORM SEWERS TO SOUTH FOREBAY
Area restricted to 220 l/s/ha
Area restricted to 115 l/s/ha
Area restricted to 340 l/s/ha
Area restricted to 250 l/s/ha

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

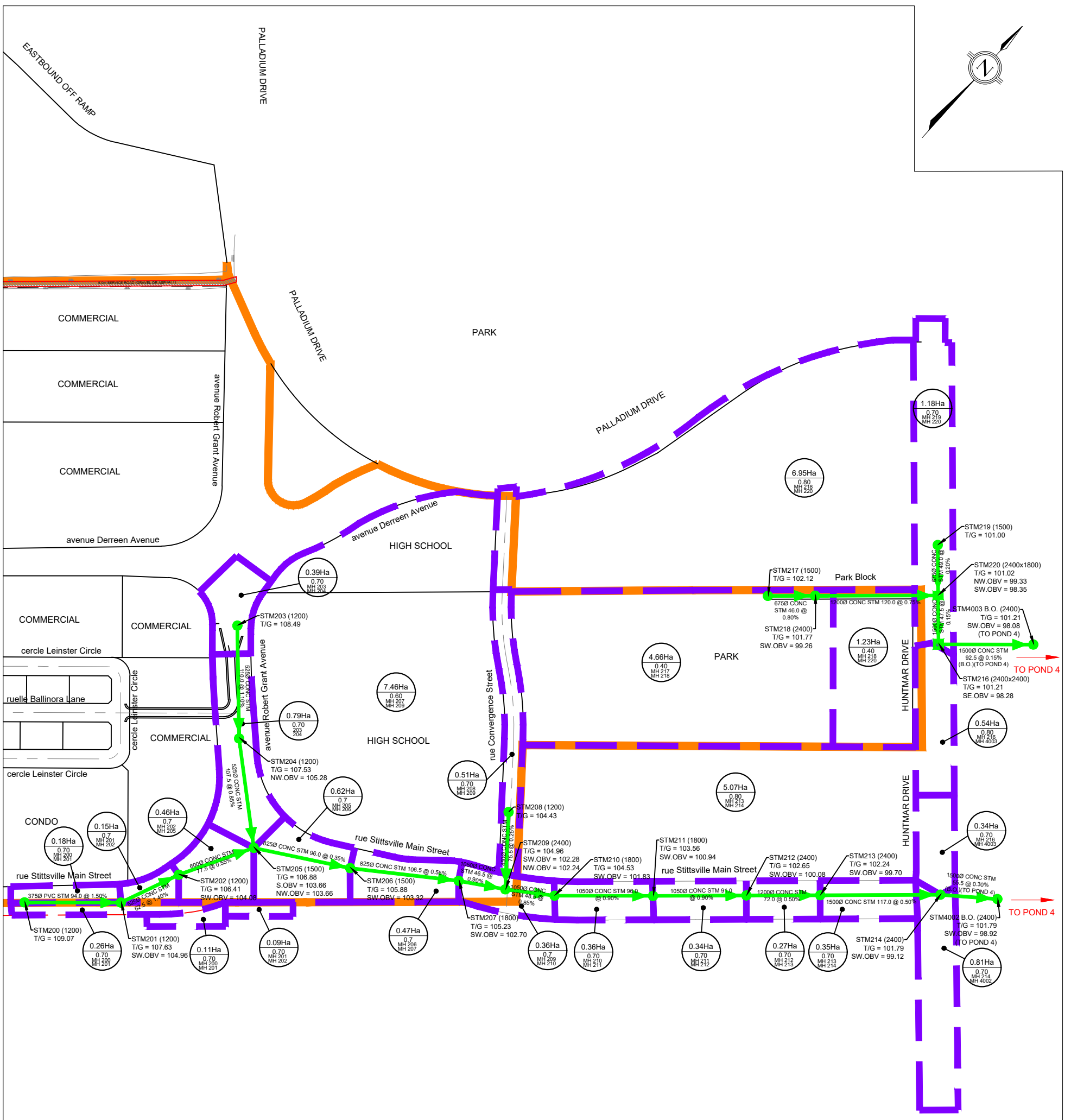
Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)														FLOW						SEWER DATA								
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
rue Convergence Street																																
	208	209			0.00	0.00	0.51	0.70	0.99	0.99			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	103	450	450	CONC	0.25	75.5	142.5531	0.8963	1.4039	0.725
To rue Stittsville Main Street, Pipe 209 - 210						0.00				0.99				0.00				0.00	11.40														
avenue Robert Grant Avenue																																
					0.00	0.00			0.00	0.00	0.39	0.70	0.76	0.76			0.00	0.00															
	203	204			0.00	0.00			0.00	0.00	0.79	0.70	1.54	2.30			0.00	0.00	10.00	76.81	104.19	122.14	178.56	280	525	525	CONC	1.10	110.0	451.0531	2.0836	0.8799	0.622
	204	205			0.00	0.00			0.00	0.00			0.00	2.30			0.00	0.00	10.88	73.58	99.76	116.93	170.90	268	525	525	CONC	0.85	107.5	396.4978	1.8316	0.9782	0.677
To rue Stittsville Main Street, Pipe 205 - 206						0.00				0.00				2.30				0.00	11.86														
rue Stittsville Main Street																																
					0.00	0.00			0.00	0.00	0.11	0.70	0.21	0.21			0.00	0.00															
					0.00	0.00	0.18	0.70	0.35	0.35			0.00	0.21			0.00	0.00															
	200	201			0.00	0.00			0.00	0.35	0.26	0.70	0.51	0.72			0.00	0.00	10.00	76.81	104.19	122.14	178.56	124	375	375	PVC	1.50	94.0	214.7347	1.9442	0.8058	0.580
					0.00	0.00			0.00	0.35	0.09	0.70	0.18	0.90			0.00	0.00															
	201	202			0.00	0.00			0.00	0.35	0.15	0.70	0.29	1.19			0.00	0.00	10.81	73.84	100.12	117.35	171.51	174	525	525	CONC	1.40	62.5	508.8565	2.3506	0.4431	0.343
	202	205			0.00	0.00			0.00	0.35	0.46	0.70	0.90	2.08			0.00	0.00	11.25	72.32	98.03	114.88	167.89	274	600	600	CONC	0.55	77.5	455.3631	1.6105	0.8020	0.601
Contribution From avenue Robert Grant Avenue, Pipe 204 - 205						0.00				0.00				2.30				0.00	11.86														
	205	206			0.00	0.00			0.00	0.35	0.62	0.70	1.21	5.59			0.00	0.00	12.05	69.74	94.48	110.70	161.76	651	825	825	CONC	0.35	96.0	849.2152	1.5886	1.0072	0.767
	206	207			0.00	0.00			0.00	0.35	0.47	0.70	0.91	6.50			0.00	0.00	13.06	66.77	90.41	105.91	154.72	720	825	825	CONC	0.55	106.5	1064.5476	1.9914	0.8913	0.676
	207	209			0.00	0.00	7.46	0.60	12.44	12.79			0.00	6.50			0.00	0.00	13.95	64.36	87.11	102.03	149.03	1778	1050	1050	CONC	0.90	46.5	2590.5934	2.9918	0.2590	0.686
Contribution From rue Convergence Street, Pipe 208 - 209						0.00				0.99				0.00				0.00	11.40														
	209	210			0.00	0.00			0.00	13.79	0.36	0.70	0.70	7.20			0.00	0.00	14.21	63.70	86.20	100.97	147.46	1915	1050	1050	CONC	0.85	48.5	2517.6042	2.9075	0.2780	0.761
	210	211			0.00	0.00			0.00	13.79	0.36	0.70	0.70	7.90			0.00	0.00	14.49	63.01	85.25	99.85	145.82	1964	1050	1050	CONC	0.90	96.0	2590.5934	2.9918	0.5348	0.758
	211	212			0.00	0.00			0.00	13.79	0.34	0.70	0.66	8.56			0.00	0.00	15.02	61.72	83.49	97.77	142.78	1988	1050	1050	CONC	0.90	91.0	2590.5934	2.9918	0.5069	0.767
	212	213			0.00	0.00			0.00	13.79	0.27	0.70	0.53	9.09			0.00	0.00	15.53	60.55	81.89	95.89	140.01	2000	1200	1200	CONC	0.50	72.0	2756.8186	2.4376	0.4923	0.726
					0.00	0.00			0.00	13.79	0.35	0.70	0.68	9.77			0.00	0.00															
	213	214			0.00	0.00	5.07	0.80	11.28	25.06			0.00	9.77			0.00	0.00	16.02	59.46	80.40	94.14	137.44	2935	1500	1500	CONC	0.50	117.0	4998.4447	2.8285	0.6894	0.587
	214	4002 (B.O.)			0.00	0.00			0.00	25.06	0.81	0.70	1.58	11.35			0.00	0.00	16.71	58.01	78.41	91.80	134.02	3007	1500	1500	CONC	0.30	55.5	3871.7786	2.1910	0.4222	0.777
						0.00				25.06				11.35				0.00	17.13														
Park Block																																
	217	218			0.00	0.00	4.66	0.40	5.18	5.18			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	540	675	675	CONC	0.80	46.0	751.8449	2.1010	0.3649	0.718
					0.00	0.00	1.23	0.40	1.37	6.55			0.00	0.00			0.00	0.00															
	218	220	6.95	0.80	15.46	15.46			0.00	6.55			0.00	0.00			0.00	0.00	10.36	75.43	102.30	119.92	175.29	1836	1200	1200	CONC	0.75	120.0	3376.3995	2.9854	0.6699	0.544
To HUNTMAR DRIVE, Pipe 220 - 216						15.46				6.55				0.00				0.00	11.03														
HUNTMAR DRIVE																																
	219	220			0.00	0.00			0.00	0.00	1.18	0.70	2.30	2.30			0.00	0.00	10.00	76.81	104.19	122.14	178.56	280	675	675	CONC	0.20	49.0	375.9224	1.0505	0.7774	0.746
Contribution From Park Block, Pipe 218 - 220						15.46				6.55				0.00				0.00	11.03														
	220	216			0.00	15.46			0.00	6.55			0.00	2.30			0.00	0.00	11.03	73.05	99.03	116.06	169.62	2044	1500	1500	CONC	0.15	47.5	2737.7609	1.5493	0.5110	0.747
To ROBERT GRANT AVENUE, Pipe 216 - 4003 (B.O.)						15.46				6.55				2.30				0.00	11.55														
ROBERT GRANT AVENUE																																
Contribution From HUNTMAR DRIVE, Pipe 220 - 216						15.46				6.55				2.30				0.00	11.55														
					0.00	15.46			0.00	6.55	0.34	0.70	0.66	2.96			0.00	0.00															
	216	4003 (B.O.)			0.00	15.46			0.00	6.55	0.54	0.80	1.20	4.16			0.00	0.00	11.55	71.34	96.68	113.29	165.56	2207	1500	1500	CONC	0.15	92.5	2737.7609	1.5493	0.9951	0.806
						15.46				6.55				4.16				0.00	12.54														

Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s

Designed: A.K.	PROJECT: 195 Huntmar Drive (Pond 4 Drainage Area)	
Checked: W.L.	LOCATION: City of Ottawa	
Dwg. Reference:	File Ref: 12-624	Date: Sep 2020
		Sheet No. SHEET 1 OF 1



david schaeffer engineering ltd

KANATA WEST
195 HUNTMAR DRIVE
STORM DRAINAGE AREA
TO POND 4
CITY OF OTTAWA

DATE:
SEP 2020

SCALE: 1:4000

PROJECT No.:
12-624

FIGURE: 01

J.F. Sabourin and Associates Inc.
52 Springbrook Drive,
Ottawa, ON K2S 1B9
T 613-836-3884 F 613-836-0332

jfsa.com

Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment B

PCSWMM Model Overview

Legend

Existing Subcatchments

J.F. Sabourin and Associates Inc.
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1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

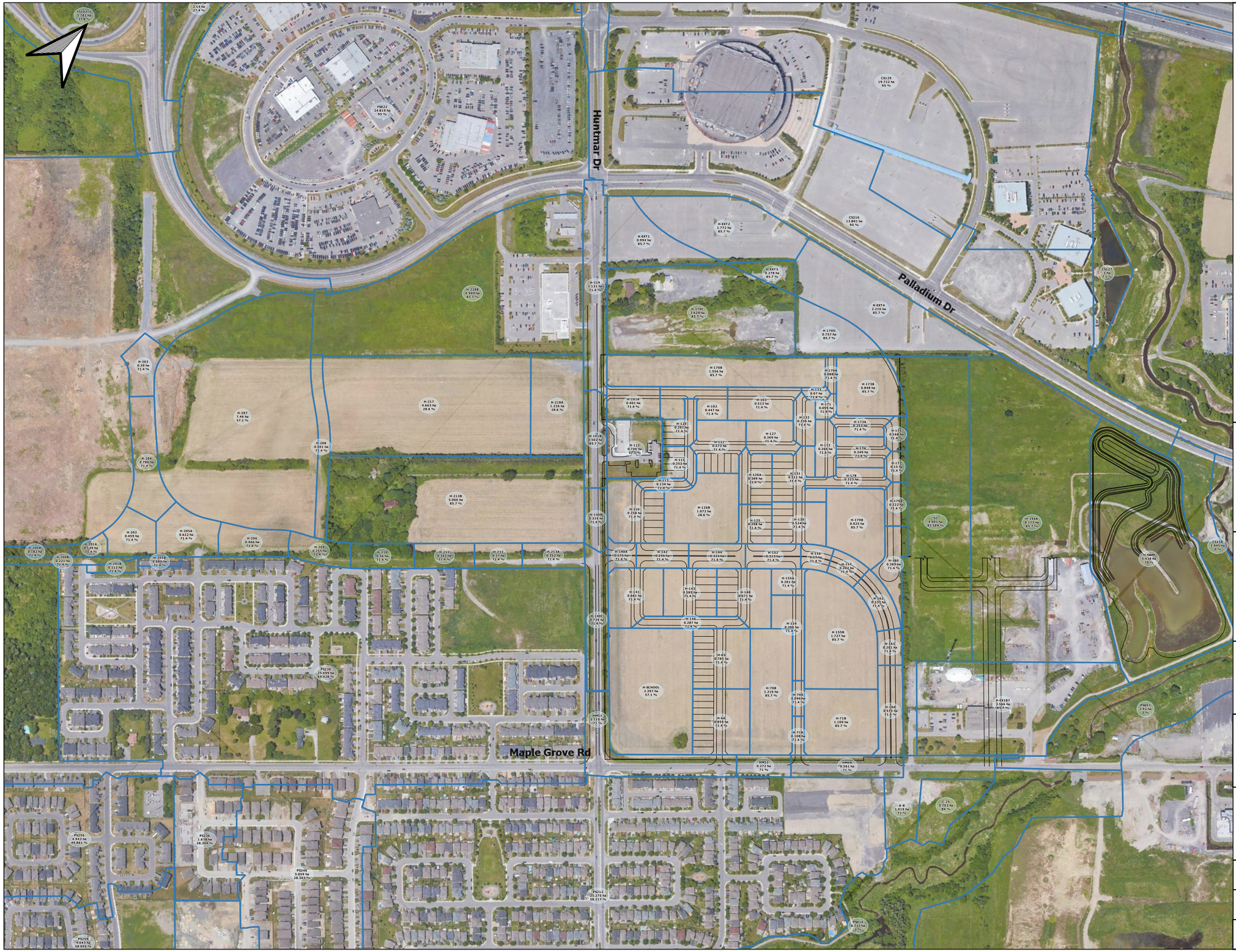
SCALE : 1:5,500

0 50 100 150 200 250 300 m

PROJECT :
130 Huntmar Drive /
Preliminary Kanata West Pond 4 Sizing

TITLE :
Figure B1: Existing Subcatchments

PROJECT	1801-19
DRAWN:	MP
DATE:	September 2021



Legend

Proposed Subcatchments

J.F. Sabourin and Associates Inc.
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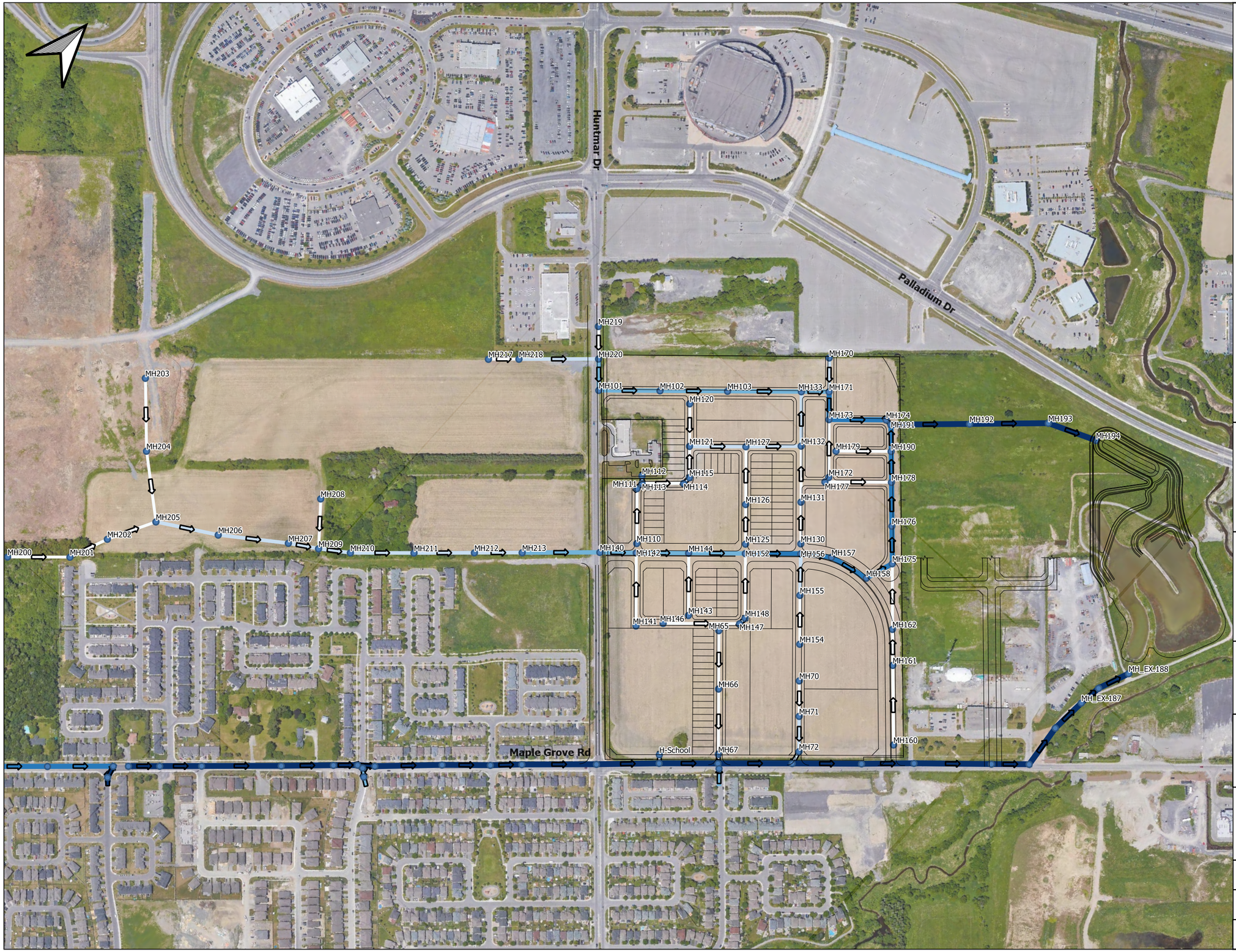
SCALE : 1:5,500

0 50 100 150 200 250 300 m

PROJECT :
130 Huntmar Drive /
Preliminary Kanata West Pond 4 Sizing

TITLE :
Figure B2: Proposed Subcatchments

PROJECT	1801-19
DRAWN:	MP
DATE:	September 2021



Legend

Storm Sewers

- 300mm-750mm
- 750mm-1200mm
- 1200mm-1650mm
- 1650mm-2100mm
- 2100mm-2550mm
- Manholes

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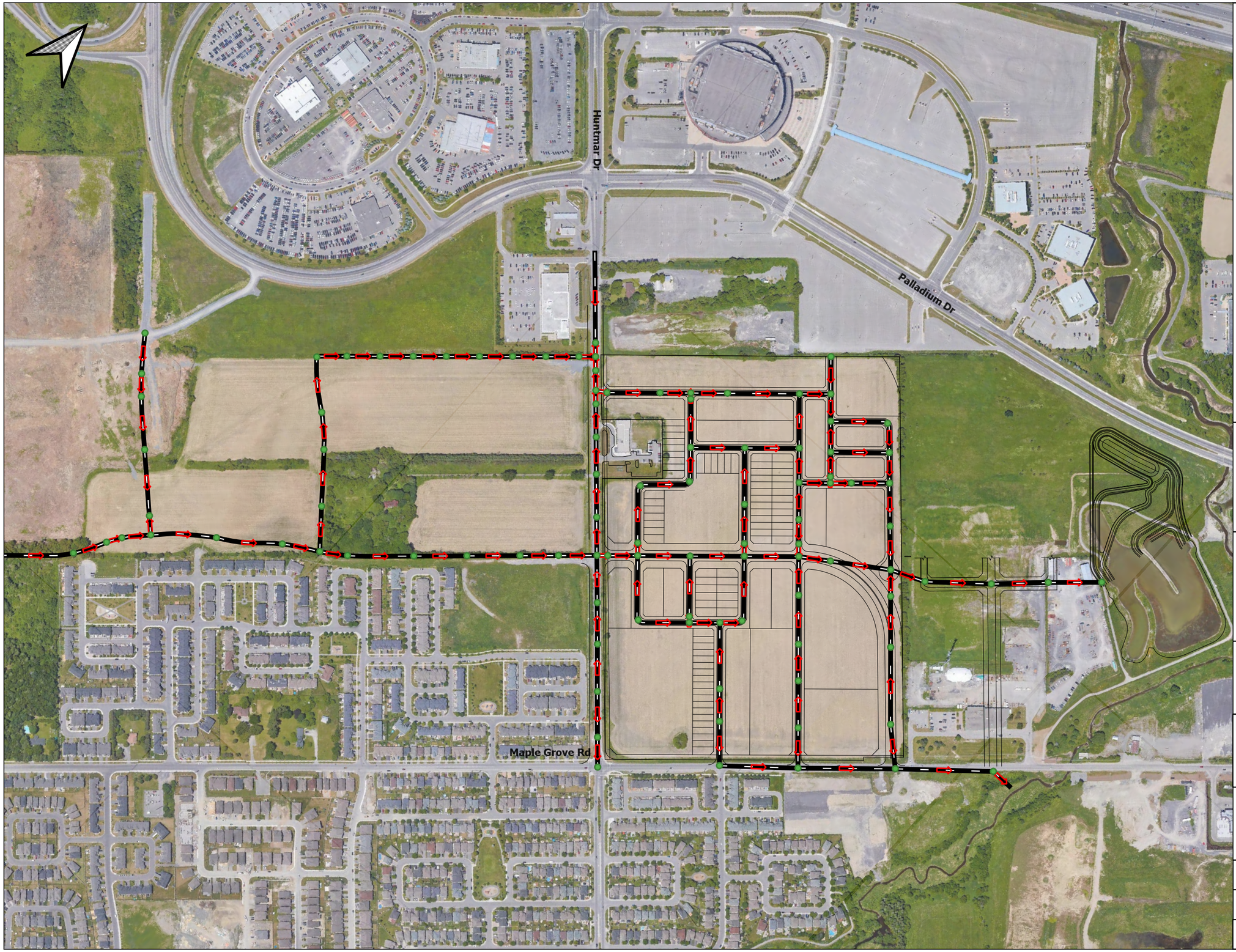
SCALE : 1:5,500

0 50 100 150 200 250 300 m

PROJECT :
130 Huntmar Drive /
Preliminary Kanata West Pond 4 Sizing

TITLE :
Figure B3: Proposed Minor System

PROJECT	1801-19
DRAWN:	MP
DATE:	September 2021



Legend

- Major System Junctions
- Major System Conduits

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SCALE : 1:5,500

0 50 100 150 200 250 300 m

PROJECT :
130 Huntmar Drive /
Preliminary Kanata West Pond 4 Sizing

TITLE :
Figure B4: Proposed Major System

PROJECT	1801-19
DRAWN:	MP
DATE:	September 2021

Table B1 - Subcatchment Parameters

NAME	AREA (ha)	IMPERV (%)	WIDTH (m)	SLOPE (%)	IMPERV (n)	PERV (n)	Dstor-IMP (mm)	Dstor-Perv (mm)	ZERO IMP (%)	ROUTING	ROUTED (%)	CURVE NO	DRYTIME
H-101A	0.40	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-101B	0.50	86	35	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-102	0.45	71	47	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-103	0.51	71	53	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-110	0.76	71	79	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-112	0.75	57	87	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-113	0.14	71	19	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-115	0.25	71	54	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-120	0.26	71	50	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-121	0.57	71	77	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-125	0.30	71	52	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-126A	0.39	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-126B	1.07	29	96	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-127	0.37	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-130	0.52	71	84	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-131	0.51	71	72	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-132	0.24	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-133	0.07	71	18	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-140A	0.17	71	41	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-140B	0.32	71	37	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-140C	0.74	71	35	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-141	0.68	71	83	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-142	0.30	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-143	0.59	71	82	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-144	0.32	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-146	0.29	71	19	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-148	0.67	71	90	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-152	0.31	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-154	0.40	71	42	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-155A	0.20	71	52	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-155B	1.73	86	171	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-156	0.17	71	43	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-157	0.20	71	43	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-160	0.52	71	39	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-161	0.20	71	41	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-162	0.34	71	42	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-170A	0.09	71	16	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-170B	1.56	86	48	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-170C	3.63	86	129	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-170D	0.76	86	113	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-171	0.10	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-172	0.27	71	31	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-173A	0.25	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-173B	0.85	86	86	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-175	0.17	71	35	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-176	0.35	71	46	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-177	0.15	71	33	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7

Table B1 - Subcatchment Parameters

NAME	AREA (ha)	IMPERV (%)	WIDTH (m)	SLOPE (%)	IMPERV (n)	PERV (n)	Dstor-IMP (mm)	Dstor-Perv (mm)	ZERO IMP (%)	ROUTING	ROUTED (%)	CURVE NO	DRYTIME
H-178	0.32	71	32	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-179A	0.22	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-179B	0.93	86	107	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-180	0.39	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-194A	8.18	86	192	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-200A	0.18	71	17	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-200B	0.22	71	12	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-201A	0.15	71	27	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-201B	0.11	71	15	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-202	0.46	71	61	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-203	0.39	71	49	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-204	0.79	71	45	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-205A	0.62	71	67	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-205B	0.09	71	14	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-206	0.47	71	45	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-207	7.46	57	238	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-208	0.50	71	18	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-209	0.36	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-210	0.36	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-211	0.34	71	39	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-212	0.27	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-213A	0.35	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-213B	5.07	86	133	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-217	4.66	29	156	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-218A	1.23	29	160	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-218B	6.95	86	240	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-219	1.13	71	36	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-65	0.79	71	88	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-66	0.86	71	89	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-70A	0.10	71	19	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-70B	1.22	86	202	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-71A	0.11	71	19	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-71B	1.11	86	104	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-EX187	3.57	86	111	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-EXT1	0.99	86	99	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-EXT2	1.77	86	100	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-EXT3	0.28	86	53	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-EXT4	2.22	86	129	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
HM49	0.56	71	61	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
HM51	1.12	71	86	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
HM52	0.27	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-SCHOOL	2.40	57	129	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
H-SWM	5.44	70	302	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
Total	89.32	73	-	-	-	-	-	-	-	-	-	-	-

Table B2 : East and West Huntmar Developments - Onsite Storage Summary

Location	Name	Land Use	Area (ha)	C	Control Rate	Assumed Storage	Required Storage Volume (m^3)	Required Storage Volume (m^3/ha)
West Huntmar	H-213B	Commercial	5.07	0.80	340 L/s/ha	50m^3/ha	253	50
	H-207	School	7.46	0.60	5YrCHI3hr	100Yr Onsite	300	40
	H-217	Park	4.66	0.40	5YrCHI3hr	100Yr Onsite	405	87
	H-218A	Park	1.23	0.40	5YrCHI3hr	100Yr Onsite	190	154
	H-218B	Commercial	6.95	0.80	5YrCHI3hr	100Yr Onsite	1267	182
East Huntmar	H-170C	Commercial	3.63	0.80	220 L/s/ha	50m^3/ha	181	50
	H-112	School	0.75	0.60	220 L/s/ha	100Yr Onsite	83	111
	H-126B	Park	1.07	0.40	115 L/s/ha	100Yr Onsite	75	70
	H-SCHOOL	School	2.40	0.60	220 L/s/ha	100Yr Onsite	153	64
	H-71B	Commercial	1.11	0.80	250 L/s/ha	50m^3/ha	55	50
	H-155B	Commercial	1.73	0.80	250 L/s/ha	50m^3/ha	86	50
	H-70B	Commercial	1.22	0.80	250L/s/ha	50m^3/ha	61	50
External	H-194A	Commercial	8.18	0.80	220 L/s/ha	50m^3/ha	409	50
	H-194B	Commercial	4.90	0.80	220 L/s/ha	50m^3/ha	245	50
	C-25	Commercial	0.70	0.80	85 L/s/ha	50m^3/ha	35	50
	A-8	Residential	1.02	0.70	230 L/s/ha	40m^3/ha	41	40

Table B3 - 130 Huntmar Flows to Maple Grove Sewer

Name	Area (ha)	Assumed Rate (L/s/ha)	Peak Flow (L/s)
ASCH	2.390	220	526
H-65	0.780	340	265
H-66	0.850	340	289
H-70B	1.210	250	303
H-71A	0.100	340	34
H-70A	0.090	340	31
H-71B	1.100	250	275
Total	**6.52**	**264**	**1722**

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Attachment C

SWM Pond 4 Details

Table C1:Pond 4 Ultimate Stage/Storage Comparison

Elevation* (m)	Depth (m)	Existing Pond (DSEL, 2014)		Ultimate Model (City, 2017)		Proposed Design (Atrel, July 2021)		Existing Difference		Ultimate Difference	
		Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)
93.20	0.00	19,714	0	38,860	0	31,921	0	12,206	0	-6,939	0
93.25	0.05	19,720	986	38,872	1,943	32,227	1,604	12,507	618	-6,646	-340
93.30	0.10	20,072	1,981	39,447	3,901	32,533	3,223	12,462	1,242	-6,914	-679
93.35	0.15	20,354	2,991	39,910	5,885	32,840	4,857	12,487	1,866	-7,070	-1,028
93.40	0.20	20,640	4,016	40,376	7,892	33,148	6,507	12,508	2,491	-7,228	-1,386
93.45	0.25	20,991	5,057	40,950	9,925	33,456	8,172	12,464	3,115	-7,495	-1,754
93.50	0.30	20,997	6,107	40,957	11,973	33,765	9,852	12,768	3,746	-7,192	-2,121
93.55	0.35	21,435	7,167	41,329	14,030	35,008	11,571	13,573	4,404	-6,321	-2,459
93.60	0.40	21,870	8,250	42,077	16,115	35,278	13,329	13,409	5,079	-6,799	-2,787
93.65	0.45	22,065	9,348	42,453	18,229	35,548	15,099	13,483	5,751	-6,904	-3,129
93.70	0.50	22,383	10,459	43,013	20,365	35,819	16,883	13,436	6,424	-7,195	-3,482
93.75	0.55	22,626	11,585	43,430	22,526	36,089	18,681	13,463	7,096	-7,341	-3,845
93.80	0.60	22,868	12,722	43,877	24,709	36,358	20,492	13,490	7,770	-7,518	-4,217
93.85	0.65	23,112	13,872	44,304	26,914	36,628	22,317	13,517	8,445	-7,675	-4,597
93.90	0.70	23,356	15,033	44,748	29,140	36,898	24,155	13,542	9,122	-7,850	-4,985
93.95	0.75	23,600	16,207	45,188	31,388	37,168	26,007	13,567	9,800	-8,020	-5,381
94.00	0.80	23,846	17,393	45,628	33,659	37,437	27,872	13,591	10,479	-8,190	-5,787
94.05	0.85	24,171	18,594	46,223	35,955	37,707	29,750	13,535	11,157	-8,516	-6,204
94.10	0.90	24,378	19,807	46,600	38,275	37,976	31,643	13,598	11,835	-8,624	-6,633
94.15	0.95	24,842	21,038	47,450	40,627	38,246	33,548	13,404	12,510	-9,205	-7,079
94.20	1.00	24,843	22,280	47,761	43,007	38,515	35,467	13,672	13,187	-9,246	-7,540
94.25	1.05	25,663	23,543	49,339	45,434	39,386	37,415	13,723	13,872	-9,953	-8,020
94.30	1.10	26,368	24,843	50,046	47,919	39,919	39,397	13,551	14,554	-10,127	-8,522
94.35	1.15	26,531	26,166	50,303	50,428	40,197	41,400	13,666	15,234	-10,107	-9,028
94.40	1.20	27,023	27,505	50,992	52,960	40,469	43,417	13,445	15,912	-10,523	-9,543
94.45	1.25	27,438	28,866	51,564	55,524	40,737	45,447	13,299	16,581	-10,828	-10,077
94.50	1.30	27,607	30,242	51,863	58,110	41,001	47,490	13,393	17,248	-10,862	-10,619
94.55	1.35	27,767	31,627	52,128	60,709	41,261	49,547	13,494	17,920	-10,867	-11,162
94.60	1.40	27,984	33,020	52,536	63,326	41,519	51,616	13,534	18,596	-11,017	-11,710
94.65	1.45	28,293	34,427	52,782	65,959	41,774	53,699	13,480	19,271	-11,008	-12,260
94.70	1.50	28,315	35,843	53,212	68,609	44,516	55,820	16,200	19,978	-8,697	-12,788
94.75	1.55	28,379	37,260	53,324	71,272	45,122	58,061	16,743	20,801	-8,202	-13,211
94.80	1.60	29,146	38,698	53,674	73,947	45,941	60,338	16,795	21,640	-7,733	-13,609
94.85	1.65	29,974	40,176	54,922	76,662	46,746	62,655	16,772	22,479	-8,176	-14,007
94.90	1.70	30,921	41,698	56,239	79,441	47,562	65,013	16,641	23,314	-8,677	-14,428
94.95	1.75	31,457	43,258	56,952	82,271	48,408	67,412	16,951	24,154	-8,545	-14,859
95.00	1.80	32,733	44,862	58,804	85,164	50,479	69,884	17,746	25,022	-8,325	-15,280
95.05	1.85	33,894	46,528	60,125	88,137	52,553	72,460	18,659	25,932	-7,572	-15,678

*Active Storage Only

FIGURE C1:
SWM POND 4 - STAGE/STORAGE COMPARISON

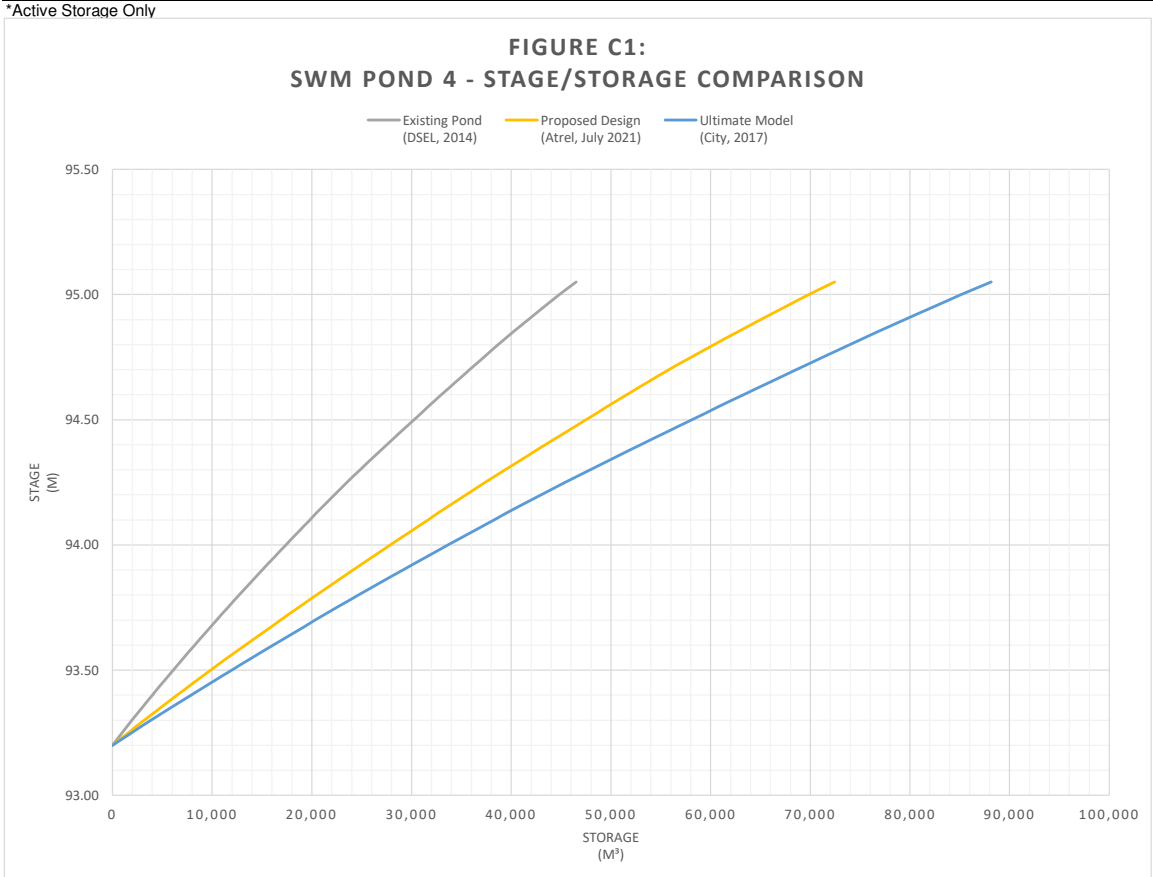

Table C2: SWM Pond Inflow, Outflow and Storage Summary

Event	Minor Inflow (m^3/s)		Major Inflow (m^3/s)	Total Inflow [(1)] (m^3/s)	Pond Outflow (m^3/s)	Pond Level (m)	Volume Used [(2)] (m^3)
	West	South					
25mm/3hr Chicago	4.24	6.72	0.000	11.290	0.262	94.072	29,890
2yr/12hr SCS	5.89	8.78	0.000	20.600	3.165	94.322	39,540
5yr/12hr SCS	8.38	11.77	0.000	14.990	7.755	94.431	43,940
10yr/12hr SCS	10.09	13.54	0.000	24.280	10.740	94.490	46,320
25yr/12hr SCS	12.35	16.20	0.000	29.010	15.580	94.574	49,780
50yr/12hr SCS	13.51	17.94	0.000	32.220	19.680	94.632	52,240
100yr/12hr SCS	14.46	19.28	0.137	34.690	24.170	94.682	54,340

Note: Maximum allowable release for the 10-Year event based on the KWMSS is 17.282 m^3/s

Table C-3 Criteria for Required Storage Volumes

Pond	Area [1] (ha)	Imperviousness (%)	Storage Volume for Impervious Level [2] (m^3/ha)
N/A	N/A	55	110
Pond 4	239.7	60	116.67
N/A	N/A	70	130

[1] Refer to Appendix C for drainage areas to SWM Facility.

[2] Protection Level for Wet Pond: Normal 70% long-term S.S. removal.
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

Table C-4: Required Storage Volumes for SWM Facility

Pond Component	Required Volume (m^3)	Provided Volume [4] (m^3)	Volume Ratio	Provided Area [5] (m^2)	Provided Elevation (m)
Permanent Pool (PP) [1]	18379	47482	2.58	31921	93.200
Quality Control [2]	9589	9852	1.03	N/A	93.500
Extended Detention [3]	N/A	35467	N/A	N/A	94.200
Forebay (20% PP)	3676	N/A	N/A	4855	92.900
PP - Forebay	14704	N/A	N/A	27066	93.200
			Area Ratio (%) [6] =	15	

[1] Required PP volume based on Table B-1 (116.7 - 40 = 76 m^3/ha).

[2] Required quality control volume based on 40 m^3/ha.

[3] Provided extended detention volume based on an elevation of 94.2 m as per KWMSS.

[4] Based on deatailed grading plan (refer to Pond Figure).

[5] As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.

Table C-5: Extended Detention Parameters for SWM Facility

Permanent Pool Parameters		Flow Augmentation Orifice		Quality Control Orifice	
Area (C3)	31920.58 m^2	Diameter 0.200	m	Diameter 0.350	m
Volume	47482.30 m^3				
PP Elev	93.200 m	Area 0.031	m^2	Area 0.096	m2
QC Det.	93.500 m	Invert 93.200	m	Invert 93.400	m
h (m)	0.300 m	C_o 0.62		Co 0.62	

Notes:
- C3 is the intercept from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- h is the maximum water elevation above the orifice (m).

Table C-6: Extended Detention Drawdown Time for SWM Facility

Elev.	Active Storage			C2	Drawdown Time	Drawdown Time	Flow	Demarkation
(m)	V (m^3)	A (m^2)	depth (m)	(m^2/m)	(h)	(days)	(m^3/s)	Point
93.20	**0.00**	**31920.58**	**0.00**				**0**	**PP Elev**
93.25	1603.68	32226.68	0.05	6122	46.04	1.92	0.01	
93.30	3222.66	32533.13	0.10	6126	65.32	2.72	0.01	
93.35	4856.99	32840.12	0.15	6130	80.25	3.34	0.02	
93.40	**6506.68**	**33147.60**	**0.20**	**6135**	**92.96**	**3.87**	**0.03**	**FA Elev**
93.45	8171.75	33455.58	0.25	6140	105.06	4.38	0.05	
93.50	**9852.25**	**33764.67**	**0.30**	**6147**	112.88	**4.70**	**0.07**	**QC Elev**
93.55	11571.48	35008.09	0.35	8821	118.82	4.95	0.09	
93.60	13328.63	35278.30	0.40	8394	123.68	5.15	0.11	
93.65	15099.30	35548.42	0.45	8062	127.77	5.32	0.13	
93.70	16883.46	35818.51	0.50	7796	131.32	5.47	0.15	
93.75	18681.14	36088.51	0.55	7578	134.46	5.60	0.17	
93.80	20492.30	36358.41	0.60	7396	137.30	5.72	0.19	
93.85	22316.97	36628.30	0.65	7243	139.91	5.83	0.20	
93.90	24155.12	36898.02	0.70	7111	142.34	5.93	0.22	
93.95	26006.76	37167.61	0.75	6996	144.63	6.03	0.23	
94.00	27871.88	37437.22	0.80	6896	146.81	6.12	0.24	
94.05	29750.47	37706.72	0.85	6807	148.89	6.20	0.26	
94.10	31642.54	37976.16	0.90	6728	150.89	6.29	0.27	
94.15	33548.08	38245.55	0.95	6658	152.82	6.37	0.28	
94.20	**35467.09**	**38515.09**	**1.00**	**6595**	154.69	**6.45**	**0.29**	**Ext. Det.**

Notes:
- C2 is the slope coefficient from the area-depth linear regression.
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- FA Elev indicates the elevation of flow augmentation provided in accordance with the KWMSS (10% of active volume).
- Ext. Det. indicates the elevation of extended detention provided as per the KWMSS.

Table B-7: Stage-Storage-Outflow Curve for SWM Facility (Free Outfall Conditions)

			Flow Augmentation		Quality Control		Quality Control 1		Quality Control 2			
			Vertical Orifice		Vertical Orifice		Broad Crested Weir		Broad Crested Weir			
			Dia (m)	0.200	Dia (m)	0.350	L (m)	37.000	L (m)	40.000		
							z (H:1V)	1.0	z (H:1V)	1.0		
			Area (m^2)	0.03142	Area (m^2)	0.09621	Trap H (m)	1.000	Trap H (m)	1.000		
			Invert (m)	93.20	Invert (m)	93.40	Invert (m)	94.20	Invert (m)	94.60		
			C_o	0.62	C_o	0.62	C_w	1.800	C_w	1.800		
			Q @ D	0.027	Q @ D	0.111	n contr.	0	n contr.	0		
Elevation (m)	**Active Sto. (m^3)**	**Notes**	**Head (m)**	**Outflow (m^3/s)**	**Head (m)**	**Outflow (m^3/s)**	**Head (m)**	**Outflow (m^3/s)**	**Head (m)**	**Outflow (m^3/s)**	**Outflow (m^3/s)**	**Storage (ha·m)**
93.20	**0**	**PP Elev**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
93.25	1604		0.050	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.160
93.30	3223		0.100	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.322
93.35	4857		0.150	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.486
93.40	**6507**	**FA Elev**	**0.200**	**0.027**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.027**	**0.651**
93.45	8172		0.250	0.033	0.050	0.016	0.000	0.000	0.000	0.000	0.033	0.817
93.50	**9852**	**QC Elev**	**0.300**	**0.039**	**0.100**	**0.032**	**0.000**	**0.000**	**0.000**	**0.000**	**0.039**	**0.985**
93.55	11571		0.350	0.043	0.150	0.047	0.000	0.000	0.000	0.000	0.043	1.157
93.60	13329		0.400	0.047	0.200	0.063	0.000	0.000	0.000	0.000	0.047	1.333
93.65	15099		0.450	0.051	0.250	0.079	0.000	0.000	0.000	0.000	0.051	1.510
93.70	16883		0.500	0.055	0.300	0.095	0.000	0.000	0.000	0.000	0.055	1.688
93.75	18681		0.550	0.058	0.350	0.111	0.000	0.000	0.000	0.000	0.058	1.868
93.80	20492		0.600	0.061	0.400	0.125	0.000	0.000	0.000	0.000	0.061	2.049
93.85	22317		0.650	0.064	0.450	0.139	0.000	0.000	0.000	0.000	0.064	2.232
93.90	24155		0.700	0.067	0.500	0.151	0.000	0.000	0.000	0.000	0.067	2.416
93.95	26007		0.750	0.070	0.550	0.162	0.000	0.000	0.000	0.000	0.070	2.601
94.00	27872		0.800	0.072	0.600	0.172	0.000	0.000	0.000	0.000	0.072	2.787
94.05	29750		0.850	0.075	0.650	0.182	0.000	0.000	0.000	0.000	0.075	2.975
94.10	31643		0.900	0.077	0.700	0.191	0.000	0.000	0.000	0.000	0.077	3.164
94.15	33548		0.950	0.080	0.750	0.200	0.000	0.000	0.000	0.000	0.080	3.355
94.20	**35467**	**Ext. Det.**	**1.000**	**0.082**	**0.800**	**0.209**	**0.000**	**0.000**	**0.000**	**0.000**	**0.082**	**3.547**
94.25	37415		1.050	0.084	0.850	0.217	0.050	0.746	0.000	0.000	0.830	3.741
94.30	39397		1.100	0.086	0.900	0.225	0.100	2.112	0.000	0.000	2.198	3.940
94.35	41400		1.150	0.088	0.950	0.233	0.150	3.885	0.000	0.000	3.973	4.140
94.40	43417		1.200	0.090	1.000	0.240	0.200	5.989	0.000	0.000	6.080	4.342
94.45	45447		1.250	0.093	1.050	0.247	0.250	8.381	0.000	0.000	8.474	4.545
94.50	47490		1.300	0.095	1.100	0.254	0.300	11.032	0.000	0.000	11.127	4.749
94.55	49547		1.350	0.096	1.150	0.261	0.350	13.921	0.000	0.000	14.017	4.955
94.60	51616		1.400	0.098	1.200	0.268	0.400	17.031	0.000	0.000	17.129	5.162
94.65	53699		1.450	0.100	1.250	0.274	0.450	20.349	0.050	0.806	20.449	5.370
94.70	55820		1.500	0.102	1.300	0.280	0.500	23.865	0.100	2.283	23.967	5.582
94.75	58061		1.550	0.104	1.350	0.286	0.550	27.569	0.150	4.199	27.673	5.806
94.80	60338		1.600	0.106	1.400	0.292	0.600	31.455	0.200	6.472	31.560	6.034
94.85	62655		1.650	0.107	1.450	0.298	0.650	35.515	0.250	9.056	35.622	6.266
94.90	65013		1.700	0.109	1.500	0.304	0.700	39.743	0.300	11.920	39.852	6.501
94.95	67412		1.750	0.111	1.550	0.310	0.750	44.135	0.350	15.039	44.246	6.741
95.00	69884		1.800	0.112	1.600	0.315	0.800	48.685	0.400	18.397	48.798	6.988
95.05	**72460**	**Top Berm**	**1.850**	**0.114**	**1.650**	**0.321**	**0.850**	**53.391**	**0.450**	**21.979**	**53.505**	**7.246**

Notes :
- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext Det indicates the elevation of extended detention provided based on the 15 mm storm target for erosion control.
- Ovf Elev indicates the elevation of the top of the drop inlet structure, set above the 100-year water level.
- Top of Berm indicates the elevation at the top of the berm.

CALCULATION SHEET C-8: CONTROLS

Flow Augmentation			**Quantity Control 1**			**Top of Drop Inlet Structure**			**Top of Drop Inlet Structure**		
Vertical Circular Orifice			**Vertical Rectangular Orifice**			**Sharp Crested Weir**			**Sharp Crested Weir**		
Diameter	(m)	0.200	Diameter	(m)	0.350	L	(m)	37.000	L	(m)	40.000
						C_w		1.80	C_w		1.80
A_o	(m^2)	0.031	A_o	(m^2)	0.096	Invert	(m)	94.20	Invert	(m)	94.60
invert	(m)	93.20	invert	(m)	93.40	n		0	n		0
C_o		0.62	C_o		0.62	Max Water Level	(m)	94.682	Max Water Level	(m)	94.682
						Head of Water	(m)	0.482	Head of Water	(m)	0.082
Max Water Level	(m)	94.682	Max Water Level	(m)	94.682	Q_w	(m^3/s)	22.287	Q_w	(m^3/s)	1.691
Head of Water	(m)	1.482	Head of Water	(m)	1.282	Note:			Note:		
Q_0	(m^3/s)	0.101	Q_0	(m^3/s)	0.278	Top perimeter of 1.8 m diameter MH			Top perimeter of 1.8 m diameter MH		
Orifice Equation:			Orifice Equation:			Weir Equation:			Weir Equation:		
$Q_o = C_o A_o (2gh)^{0.5}$			$Q_o = C_o A_o (2gh)^{0.5}$			$Q_w = C_w (L-0.1nh)(h)^{1.5}$			$Q_w = C_w (L-0.1nh)(h)^{1.5}$		
Not including reverse pipe losses											
Q_o *is the orifice flow*			Q_o *is the orifice flow*			Q_w *is the weir flow*			Q_w *is the weir flow*		
C_o *is the orifice coefficient*			C_o *is the orifice coefficient*			C_w *is the weir coefficient*			C_w *is the weir coefficient*		
A_o *is the orifice flow area*			A_o *is the orifice flow area*			*L is the weir length*			*L is the weir length*		
g is the gravitational constant			*g is the gravitational constant*			*h is the weir height*			*h is the weir height*		
h is the head of water			*h is the head of water*			*n is the # of side contractions*			*n is the # of side contractions*		

CALCULATION SHEET C-9: FOREBAY SIZING FOR SWM FACILITY

130 Huntmar Drive Subdivision
Pond 4
City of Ottawa
Calculation of South Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{rQ_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	4.42		(105 m / 14 m)
Q_p =	0.291	m^3/s	(at elevation 93.5 m)
V_s =	0.0003	m/s	

L_{min} = 65.47 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8Q}{dV_t}$$

where:
- Q = Inlet flow rate (10-Year, 12-Hour SCS Storm)
- d = depth of permanent pool (forebay) during peak 10-year inflow
- V_f = desired final velocity

Input:

Q =	13.580	m^3/s
d =	3.29	m
Vf =	0.5	m/s

L_{min} = 66.04 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	66 m	
Length of Forebay Provided	**105 m**	(at elevation 91.20)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\,W_{avg}}$$

where:
- Q = Inlet flow rate (10-Year, 12-Hour SCS Storm)
- d = depth of pond during peak 10-year inflow
- W_{avg} = average width of forebay

Input:

Q =	13.580	m^3/s	
d =	3.29	m	
W_{avg} =	20	m	(14 m bottom, 26 m permanent pool)

V = 0.21 m/s < 0.15 m/s

CALCULATION SHEET C-10: FOREBAY SIZING FOR SWM FACILITY

130 Huntmar Drive Subdivision
Pond 4
City of Ottawa
Calculation of North Forebay Size

Settling Criteria

From the SWMP Manual, the required length for settling is as follows:

$$L_{min} = \left(\frac{rQ_p}{V_s}\right)^{0.5}$$

where:
- r = length to width ratio, at the invert of the inlet pipe.
- Q_p = peak outflow during design quality storm
- V_s = settling velocity

Input:

r =	3.85		(100 m / 14 m)
Q_p =	0.291	m^3/s	(at elevation 93.5 m)
V_s =	0.0003	m/s	

L_{min} = 61.05 m

The peak flow rate from the pond during the quality storm is taken as the flow that would occur just below the quantity controls (Refer to Table B-5 of Appendix B)

Dispersion Criteria

From the SWMP Manual, the required length for dispersion is as follows:

$$L_{min} = \frac{8Q}{dV_t}$$

where:
- Q = Inlet flow rate (10-Year, 12-Hour SCS Storm)
- d = depth of permanent pool (forebay) during peak 10-year inflow
- V_f = desired final velocity

Input:

Q =	10.090	m^3/s
d =	2.92	m
Vf =	0.5	m/s

L_{min} = 55.29 m

The minimum forebay length is determined by the larger of the settling or dispersion criteria.

Minimum Length of Forebay Required	61 m	
Length of Forebay Provided	**100 m**	(at elevation 91.20)

Average Forebay Velocity

From the SWMP Manual, the maximum allowable average velocity is 0.15 m/s:

$$V_{avg} = \frac{Q}{d\ W_{avg}}$$

where:
- Q = Inlet flow rate (10-Year, 12-Hour SCS Storm)
- d = depth of pond during peak 10-year inflow
- W_{avg} = average width of forebay

Input:

Q =	10.090	m^3/s	
d =	2.94	m	
W_{avg} =	20	m	(14 m bottom, 26 m permanent pool)

V = 0.17 m/s < 0.15 m/s

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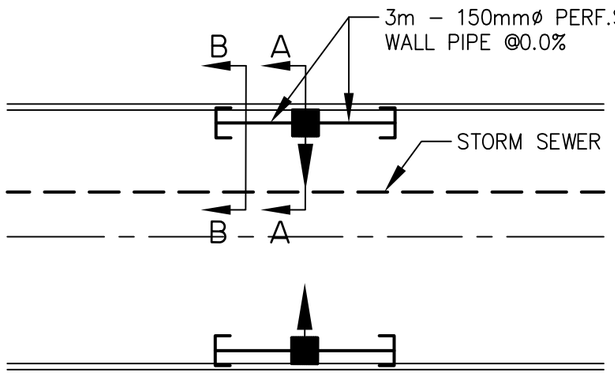
jfsa.com

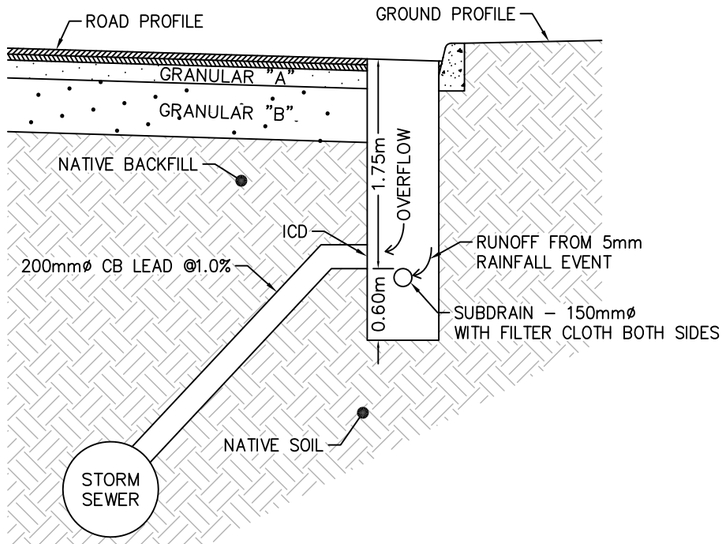
Ottawa. ON
Paris. ON
Gatineau. QC
Montréal. QC
Québec. QC

Attachment D

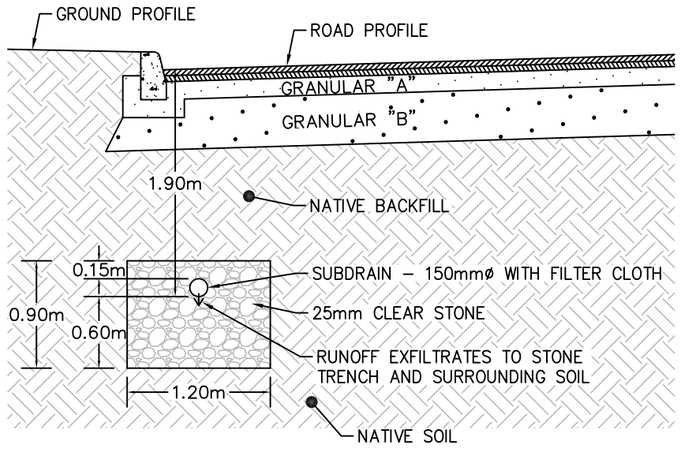
Water Budget



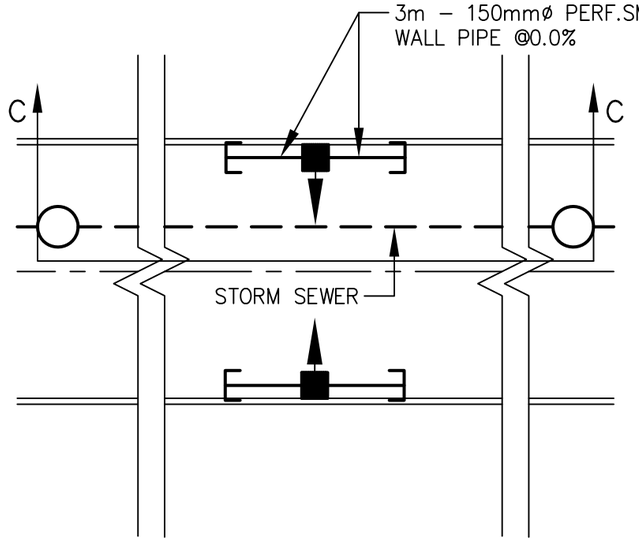
ROAD CATCHBASIN (SCALE-I:200)



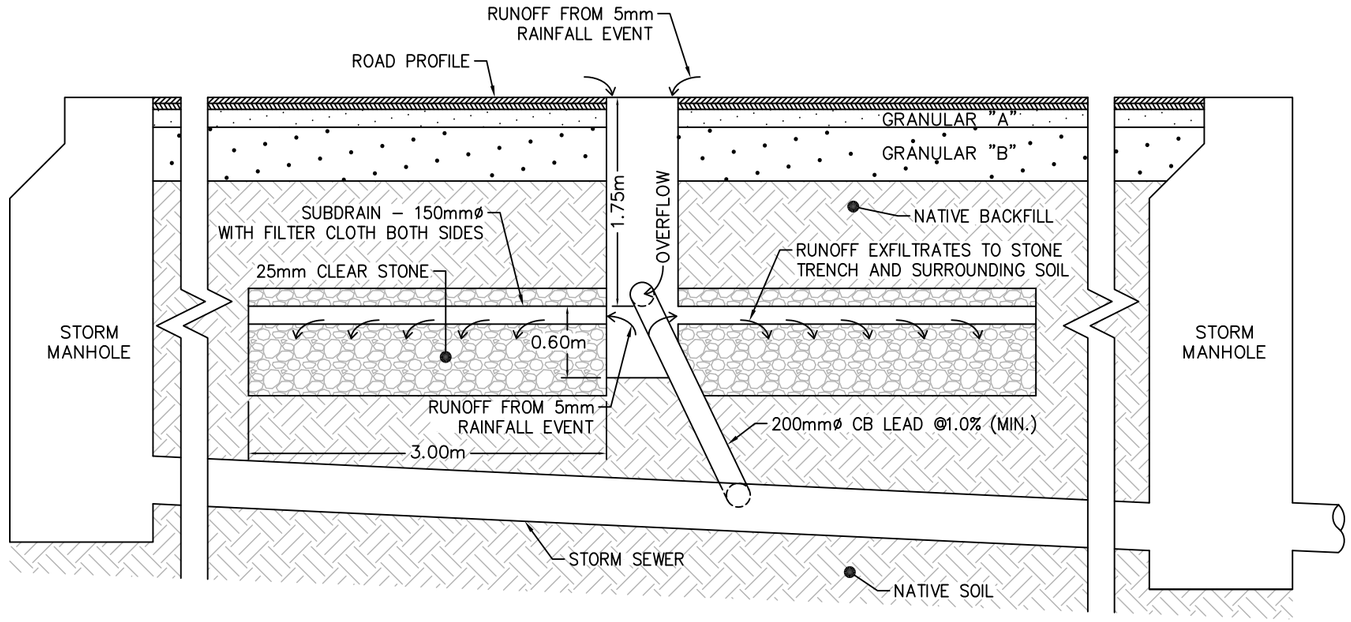
DETAIL A-A (SCALE-I:50)



DETAIL B-B (SCALE-I:50)



ROAD CATCHBASIN (SCALE-I:200)



DETAIL C-C (SCALE-I:50)

ATREL Engineering Ltd.
Engineers - Ingénieurs

130 HUNTMAR DRIVE

SCALE:	ROAD CATCHBASIN DETAIL
VARIES	SEPT, 2021 | SK-2

130 Huntmar - Pre Development Water Balance

Table D1-1: Pre Development Conditions - Pervious Areas

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Soil Type	Hydrologic Soil Group	Precipitation (mm/Year)	Evapo-transpiration (mm/Year)	Surplus (mm/Year)	Infiltration Factor*				Infiltration (mm/yr.)	Runoff (mm/yr.)	Infiltration Volume (m^3/yr.)	Runoff Volume (m^3/yr.)
											Topography Factor	Soils Factor	Cover Factor	Total				
Pre-Development	Natural	26.83	0%	26.83	0.00	Clay	D	940	525	415	0.1	0.05	0.1	0.25	104	311	27,836	83,508
Total		**26.83**		**26.83**	**0.00**												**27,836**	**83,508**

*Infiltration factor adjusted to match infiltration rate of 104 mm/yr provided in Kanata West Master Servicing Study (Stantec, June 2006).

Table D1-2: Pre Development Conditions - Impervious Areas

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Precipitation (mm/Year)	Evaporation (mm/Year)	Surplus (mm/Year)	Infiltration (mm/yr.)	Runoff (mm/yr.)	Infiltration Volume (m^3/yr.)	Runoff Volume (m^3/yr.)
Pre-Development	Natural	26.83	0%	26.83	0.00	940	244	696	0	696	0	0
Total		**26.83**		**26.83**	**0.00**						**0**	**0**

Table D1-3: Pre Development Conditions - Water Budget Summary

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Pervious Runoff Volume (m^3/yr.)	Impervious Runoff Volume (m^3/yr.)	Runoff Volume (m^3/yr.)	Infiltration Volume (m^3/yr.)
Pre-Development	Natural	26.83	0%	26.83	0.00	83,508	0	83,508	**27,836**
Total		**26.83**		**26.83**	**0.00**		**Total**	**83,508**	**27,836**

130 Huntmar - Post Development Water Balance

Table D2-1: Post Development Conditions - Pervious Areas

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Soil Type	Hydrologic Soil Group	Precipitation (mm/Year)	Evapo-transpiration (mm/Year)	Surplus (mm/Year)	Infiltration Factor*				Infiltration (mm/yr.)	Runoff (mm/yr.)	Infiltration Volume (m^3/yr.)	Runoff Volume (m^3/yr.)
											Topography Factor	Soils Factor	Cover Factor	Total				
Post Development	Parkland	1.07	29%	0.76	0.31	Clay	D	940	525	415	0.1	0.2	0.1	0.4	166	249	1,261	1,892
	School	3.14	57%	1.35	1.79	Clay	D	940	525	415	0.1	0.2	0.1	0.4	166	249	2,241	3,362
	Residential	15.24	71%	4.42	10.82	Clay	D	940	525	415	0.1	0.2	0.1	0.4	166	249	7,337	11,005
	Commercial	7.38	86%	1.03	6.35	Clay	D	940	525	415	0.1	0.2	0.1	0.4	166	249	1,715	2,573
Total		**26.83**	**72%**	**7.56**	**19.27**												**12,554**	**18,831**

*Infiltration factor adjusted to match infiltration rate of 104 mm/yr provided in Kanata West Master Servicing Study (Stantec, June 2006).

Table D2-2: Post Development Conditions - Impervious Areas

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Precipitation (mm/Year)	Evaporation (mm/Year)	Surplus (mm/Year)	Infiltration (mm/yr.)	Runoff (mm/yr.)	Infiltration Volume (m^3/yr.)	Runoff Volume (m^3/yr.)
Post Development	Parkland	1.07	29%	0.76	0.31	940	244	696	0	696	0	2,158
	School	3.14	57%	1.35	1.79	940	244	696	0	696	0	12,450
	Residential	15.24	71%	4.42	10.82	940	244	696	0	696	0	75,267
	Commercial	7.38	86%	1.03	6.35	940	244	696	0	696	0	44,148
Total		**26.83**	**72%**	**7.56**	**19.27**						**0**	**134,023**

Table D2-3: Post Development Conditions - Water Budget Summary

Condition	Land Use	Total Area (ha)	Total Imp (%)	Pervious Area (ha)	Impervious Area (ha)	Pervious Runoff Volume (m^3/yr.)	Impervious Runoff Volume (m^3/yr.)	Runoff Volume (m^3/yr.)	Infiltration Volume (m^3/yr.)
Post Development	Parkland	1.07	29%	0.76	0.31	1892	2158	4050	1261
	School	3.14	57%	1.35	1.79	3362	12450	15812	2241
	Residential	15.24	71%	4.42	10.82	11005	75267	86272	7337
	Commercial	7.38	86%	1.03	6.35	2573	44148	46721	1715
Total		**26.83**	**72%**	**7.56**	**19.27**			**152,854**	**12,554**

Table D2-4: Post Development Conditions - LID Infiltration Requirements

Description	Total Runoff Area (ha)	Area treated by LID (%)	Total Treated Area (ha)	Average Site Runoff (mm/yr.)	LID Storm Design Capacity (mm)	LID Runoff Capture Capacity[1] (mm)	Annual Rainfall Percentile Capture[2]	Captured Runoff (mm/yr.)	LID Infiltrated Volume (m^3/yr.)	Site Infiltration Surplus (m^3/yr.)
Post Development LID System	26.83	50%	13.42	570	5.0	1.92	64%	141	18,913	3,631

1 Refer to "TIMP vs Runoff Volume Summary Tables" in Attachment C

2 Refer table B2-5 Ottawa Airport Annual Rainfall Percentiles J.L. Richard - Barrhaven South MSS (2021)

Table B2-5: Ottawa Airport Annual Rainfall Percentiles
J.L. Richard - Barrhaven South MSS (2021)

Event Percentile	Rainfall Depth (mm)
0	0
50	2.9
55	3.4
60	4.2
65	5.1
70	6.2
75	7.5
80	9.1
85	11.4
90	15.1
95	21.6
99	37.1

MOE SWM Manual

Table 3.1: Hydrologic Cycle Component Values

	Water Holding Capacity mm	Hydrologic Soil Group	Precipitation mm	Evapo-transpiration mm	Runoff mm	Infiltration* mm
Urban Lawns/Shallow Rooted Crops (spinach, beans, beets, carrots)						
Fine Sand	50	A	940	515	149	276
Fine Sandy Loam	75	B	940	525	187	228
Silt Loam	125	C	940	536	222	182
Clay Loam	100	CD	940	531	245	164
Clay	75	D	940	525	270	145
Moderately Rooted Crops (corn and cereal grains)						
Fine Sand	75	A	940	525	125	291
Fine Sandy Loam	150	B	940	539	160	241
Silt Loam	200	C	940	543	199	199
Clay Loam	200	CD	940	543	218	179
Clay	150	D	940	539	241	160
Pasture and Shrubs						
Fine Sand	100	A	940	531	102	307
Fine Sandy Loam	150	B	940	539	140	261
Silt Loam	250	C	940	546	177	217
Clay Loam	250	CD	940	546	197	197
Clay	200	D	940	543	218	179
Mature Forests						
Fine Sand	250	A	940	546	79	315
Fine Sandy Loam	300	B	940	548	118	274
Silt Loam	400	C	940	550	156	234
Clay Loam	400	CD	940	550	176	215
Clay	350	D	940	549	196	196

Notes: Hydrologic Soil Group A represents soils with low runoff potential and Soil Group D represents soils with high runoff potential. The evapotranspiration values are for mature vegetation. Streamflow is composed of baseflow and runoff.

* *This is the total infiltration of which some discharges back to the stream as base flow. The infiltration factor is determined by summing a factor for topography, soils and cover.*

Infiltration Factor*		Value
Topography	Flat Land, average slope < 0.6 m/km	0.3
	Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
	Hilly Land, average slope 28 m to 47 m/km	0.1
Soils	Tight impervious clay	0.1
	Medium combinations of clay and loam	0.2
	Open Sandy loam	0.4
Cover	Cultivated Land	0.1
	Woodland	0.2

TIMP vs Runoff Volume Summary Tables

Runoff Volume (mm) Generated for 5 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	3.26	2.93	2.63	2.50	2.42	2.39	2.39	2.43	2.48	2.54	2.62
90.0%	3.09	2.78	2.47	2.16	1.86	1.69	1.60	1.51	1.43	1.38	1.36
85.0%	2.91	2.62	2.33	2.04	1.75	1.46	1.17	0.97	0.82	0.73	0.66
80.0%	2.74	2.47	2.19	1.92	1.65	1.37	1.10	0.82	0.55	0.30	0.15
75.0%	2.57	2.31	2.06	1.80	1.54	1.29	1.03	0.77	0.51	0.26	0.03
70.0%	2.40	2.16	1.92	1.68	1.44	1.20	0.96	0.72	0.48	0.24	0.02
65.0%	2.23	2.01	1.78	1.56	1.34	1.11	0.89	0.67	0.45	0.22	0.02
60.0%	2.06	1.85	1.65	1.44	1.23	1.03	0.82	0.62	0.41	0.21	0.02
55.0%	1.89	1.70	1.51	1.32	1.13	0.94	0.75	0.57	0.38	0.19	0.02
50.0%	1.71	1.54	1.37	1.20	1.03	0.86	0.69	0.51	0.34	0.17	0.02
45.0%	1.54	1.39	1.23	1.08	0.93	0.77	0.62	0.46	0.31	0.15	0.02
40.0%	1.37	1.23	1.10	0.96	0.82	0.69	0.55	0.41	0.27	0.14	0.01

Runoff Volume (mm) Generated for 22 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	19.41	18.62	18.40	18.36	18.41	18.52	18.63	18.75	18.87	19.00	19.12
90.0%	18.39	17.40	16.86	16.55	16.39	16.32	16.29	16.30	16.34	16.43	16.53
85.0%	17.37	16.35	15.63	15.15	14.81	14.56	14.41	14.32	14.26	14.23	14.22
80.0%	16.34	15.33	14.53	13.94	13.47	13.12	12.84	12.62	12.47	12.35	12.29
75.0%	15.32	14.30	13.55	12.86	12.32	11.87	11.51	11.21	10.95	10.73	10.58
70.0%	14.30	13.27	12.58	11.89	11.26	10.76	10.32	9.95	9.64	9.37	9.14
65.0%	13.28	12.30	11.60	10.95	10.31	9.75	9.27	8.85	8.48	8.14	7.88
60.0%	12.26	11.34	10.62	10.03	9.43	8.84	8.31	7.84	7.46	7.08	6.78
55.0%	11.24	10.38	9.64	9.10	8.55	8.01	7.46	6.96	6.53	6.13	5.81
50.0%	10.21	9.42	8.72	8.17	7.68	7.18	6.68	6.19	5.69	5.29	4.93
45.0%	9.19	8.46	7.83	7.24	6.79	6.34	5.90	5.45	5.02	4.56	4.16
40.0%	8.17	7.50	6.93	6.38	5.91	5.52	5.13	4.73	4.33	3.93	3.58

Runoff Volume (mm) Generated for 10 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	8.01	7.32	7.02	6.88	6.83	6.85	6.90	6.97	7.06	7.16	7.28
90.0%	7.59	6.83	6.24	5.92	5.65	5.48	5.36	5.29	5.24	5.24	5.25
85.0%	7.17	6.45	5.73	5.20	4.90	4.58	4.34	4.15	3.99	3.88	3.80
80.0%	6.74	6.07	5.39	4.72	4.24	3.91	3.62	3.33	3.08	2.87	2.72
75.0%	6.32	5.69	5.06	4.43	3.79	3.33	2.96	2.69	2.42	2.15	1.90
70.0%	5.90	5.31	4.72	4.13	3.54	2.95	2.48	2.09	1.80	1.54	1.32
65.0%	5.48	4.93	4.38	3.84	3.29	2.74	2.19	1.68	1.32	0.96	0.73
60.0%	5.06	4.55	4.05	3.54	3.03	2.53	2.02	1.52	1.01	0.61	0.31
55.0%	4.64	4.17	3.71	3.25	2.78	2.32	1.85	1.39	0.93	0.46	0.05
50.0%	4.21	3.79	3.37	2.95	2.53	2.11	1.69	1.26	0.84	0.42	0.04
45.0%	3.79	3.41	3.03	2.66	2.28	1.90	1.52	1.14	0.76	0.38	0.04
40.0%	3.37	3.03	2.70	2.36	2.02	1.69	1.35	1.01	0.67	0.34	0.03

Runoff Volume (mm) Generated for 25 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	22.29	21.52	21.32	21.30	21.38	21.49	21.60	21.72	21.85	21.98	22.10
90.0%	21.16	20.17	19.65	19.37	19.23	19.18	19.16	19.19	19.28	19.39	19.48
85.0%	20.02	18.99	18.29	17.83	17.50	17.29	17.17	17.09	17.05	17.03	17.04
80.0%	18.88	17.89	17.07	16.49	16.05	15.72	15.45	15.26	15.14	15.04	14.98
75.0%	17.75	16.79	15.94	15.29	14.75	14.33	13.99	13.69	13.45	13.27	13.14
70.0%	16.61	15.69	14.89	14.16	13.58	13.08	12.67	12.31	12.01	11.75	11.53
65.0%	15.47	14.59	13.84	13.10	12.48	11.95	11.47	11.07	10.70	10.41	10.16
60.0%	14.33	13.49	12.81	12.12	11.44	10.89	10.40	9.95	9.55	9.19	8.89
55.0%	13.20	12.40	11.77	11.14	10.50	9.89	9.40	8.91	8.51	8.11	7.79
50.0%	12.06	11.29	10.72	10.16	9.58	9.00	8.45	7.98	7.52	7.14	6.79
45.0%	10.92	10.20	9.68	9.17	8.65	8.13	7.62	7.10	6.67	6.26	5.88
40.0%	9.79	9.13	8.64	8.18	7.72	7.27	6.81	6.34	5.88	5.45	5.11

Runoff Volume (mm) Generated for 15 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	12.76	11.96	11.67	11.58	11.58	11.62	11.71	11.83	11.95	12.08	12.19
90.0%	12.09	11.08	10.54	10.18	9.96	9.81	9.74	9.72	9.72	9.75	9.78
85.0%	11.42	10.31	9.68	9.16	8.78	8.49	8.28	8.12	8.00	7.93	7.88
80.0%	10.74	9.67	8.85	8.35	7.85	7.44	7.14	6.87	6.66	6.49	6.36
75.0%	10.07	9.06	8.16	7.54	7.08	6.61	6.20	5.85	5.56	5.30	5.11
70.0%	9.40	8.46	7.52	6.83	6.31	5.87	5.43	5.00	4.65	4.33	4.08
65.0%	8.73	7.86	6.98	6.18	5.59	5.13	4.72	4.32	3.91	3.52	3.22
60.0%	8.06	7.25	6.45	5.64	4.99	4.44	4.01	3.64	3.27	2.89	2.55
55.0%	7.39	6.65	5.91	5.17	4.43	3.89	3.39	2.97	2.62	2.28	1.97
50.0%	6.71	6.04	5.37	4.70	4.03	3.36	2.88	2.43	1.97	1.66	1.38
45.0%	6.04	5.44	4.83	4.23	3.63	3.02	2.42	1.97	1.55	1.15	0.79
40.0%	5.37	4.83	4.30	3.76	3.22	2.69	2.15	1.61	1.14	0.78	0.45

Runoff Volume (mm) Generated for 30 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	27.14	26.38	26.22	26.24	26.34	26.45	26.57	26.69	26.82	26.95	27.08
90.0%	25.86	24.85	24.36	24.14	24.03	23.99	24.03	24.12	24.21	24.31	24.39
85.0%	24.57	23.49	22.82	22.39	22.12	21.96	21.86	21.80	21.77	21.79	21.85
80.0%	23.28	22.20	21.43	20.87	20.47	20.16	19.95	19.81	19.70	19.63	19.58
75.0%	22.00	20.94	20.12	19.48	18.98	18.59	18.26	18.02	17.83	17.70	17.59
70.0%	20.71	19.73	18.86	18.19	17.62	17.16	16.77	16.43	16.14	15.93	15.77
65.0%	19.42	18.51	17.64	16.94	16.34	15.82	15.39	15.02	14.67	14.38	14.14
60.0%	18.14	17.29	16.45	15.74	15.14	14.59	14.11	13.70	13.31	13.01	12.71
55.0%	16.85	16.08	15.30	14.58	13.96	13.43	12.92	12.48	12.06	11.72	11.41
50.0%	15.56	14.86	14.16	13.45	12.86	12.29	11.81	11.36	10.94	10.53	10.21
45.0%	14.28	13.64	13.01	12.39	11.74	11.24	10.73	10.29	9.87	9.45	9.12
40.0%	12.99	12.44	11.88	11.31	10.74	10.20	9.75	9.29	8.87	8.49	8.14

Runoff Volume (mm) Generated for 20 mm event

TIMP	XIMP = % of TIMP										
	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10	0.01
95.0%	17.51	16.70	16.46	16.41	16.44	16.53	16.65	16.76	16.89	17.02	17.14
90.0%	16.59	15.58	15.02	14.70	14.51	14.43	14.39	14.40	14.42	14.48	14.57
85.0%	15.67	14.60	13.89	13.39	13.04	12.79	12.60	12.49	12.43	12.39	12.37
80.0%	14.74	13.62	12.91	12.28	11.81	11.44	11.16	10.92	10.73	10.60	10.51
75.0%	13.82	12.68	11.98	11.31	10.74	10.30	9.91	9.59	9.35	9.11	8.93
70.0%	12.90	11.79	11.04	10.42	9.80	9.28	8.84	8.44	8.11	7.83	7.61
65.0%	11.98	10.89	10.10	9.52	8.95	8.37	7.87	7.44	7.06	6.72	6.44
60.0%	11.06	9.99	9.24	8.63	8.10	7.57	7.03	6.55	6.13	5.75	5.44
55.0%	10.14	9.12	8.40	7.74	7.25	6.76	6.28	5.79	5.30	4.91	4.56
50.0%	9.21	8.29	7.57	6.94	6.40	5.96	5.52	5.08	4.63	4.19	3.79
45.0%	8.29	7.46	6.73	6.17	5.60	5.15	4.76	4.36	3.97	3.57	3.21
40.0%	7.37	6.63	5.90	5.40	4.89	4.38	3.99	3.65	3.29	2.94	2.62

THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

STREET MAP

No.	REVISION △-APPLIES WHEN DRAWING MODIFIED	DATE	BY
1	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	JULY 6/20	AGS
2	ISSUED FOR SANITARY TRUNK MOECC APPROVAL	AUG. 4/20	AGS
3	REVISED AS PER CITY COMMENTS	OCT. 7/20	AGS
4	REVISED AS PER NEW ROAD ALIGNMENT	MAR. 4/21	AGS
5	REVISED AS PER CITY COMMENTS	MAR. 30/21	AGS
6	*RECORD DRAWING*	*AUG. 25/21*	*AGS*
7	REVISED AS PER CITY COMMENTS	SEP. 20/21	AGS

SCALE 1:750 (8m 0 24m)

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

LICENSED PROFESSIONAL ENGINEER A.G.Y. SAUVE 100142393 Sept 20, 2021 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J.M. LEDECQUER Sept 20, 2021 PROVINCE OF ONTARIO

ATREL Engineering Ltd. Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
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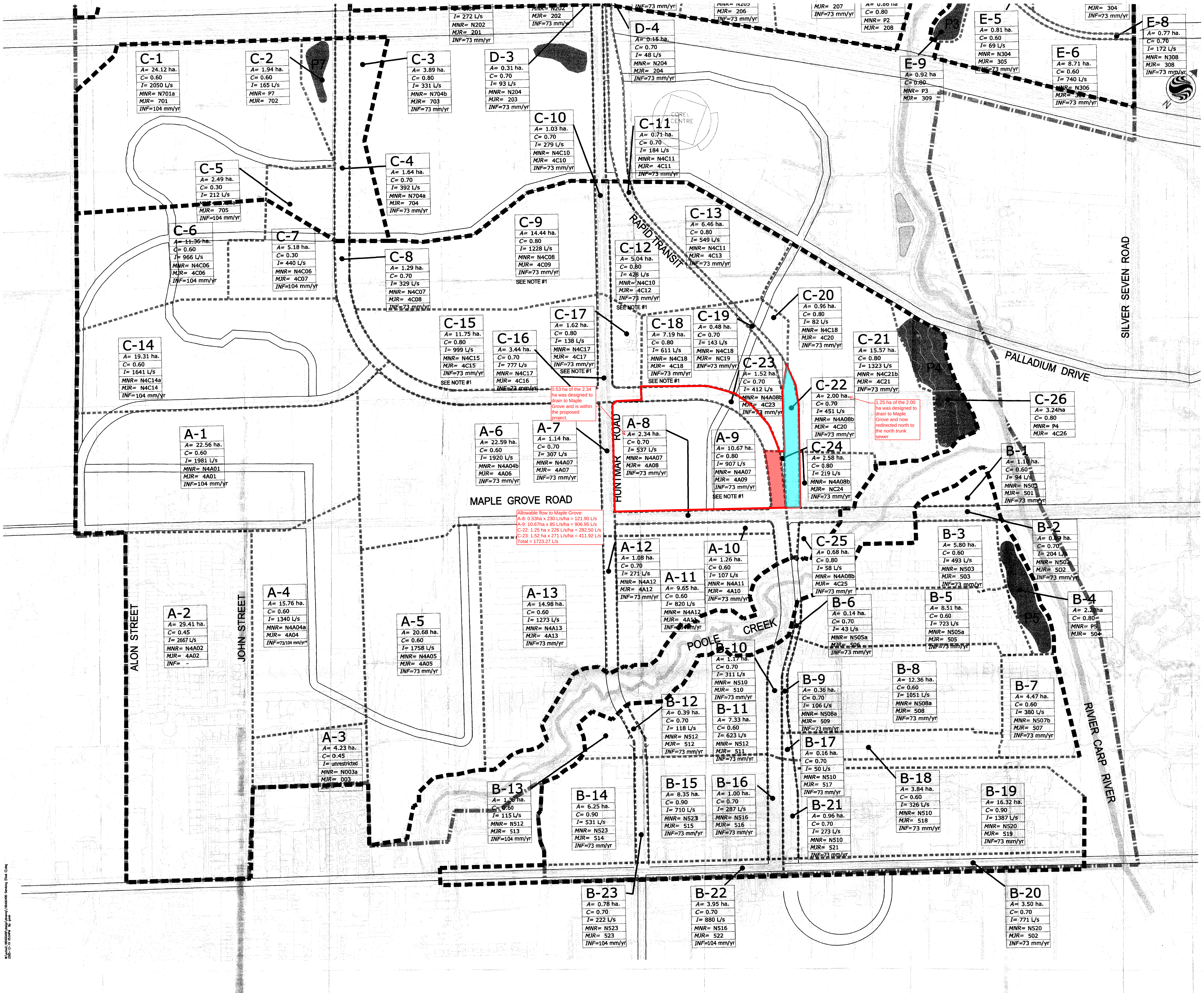
CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PLAN
STORMWATER MANAGEMENT POND

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-SWMP



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Legend

Symbol	Description
(dashed line)	KANATA–WEST CONCEPT PLAN BOUNDARY
(heavy dashed line)	POND DRAINAGE BOUNDARY
(light dashed line)	STORM SEWER DRAINAGE LIMIT
A-1	DRAINAGE AREA IDENTIFICATION
A= 72.31 ha.	AREA IN HECTARES
C= 0.60	RUNOFF COEFFICIENT
I= 246 L/s	100yr. INLET CAPACITY (L/s)
MNR= N4A01	MINOR SYSTEM NODE NUMBER
MJR= 4A01	MAJOR SYSTEM SEGMENT NUMBER
INF=73 mm/yr	INFILTRATION

Notes

* REFER TO FIGURE 3.2 IN KANATA WEST MASTER SERVICING STUDY FOR FURTHER INFILTRATION DETAILS

1. THOSE AREAS WHICH ARE COMPLETELY SURROUNDED BY ARTERIAL ROADWAYS (SPECIFICALLY AREAS A-9, C-9, C-12, C-15, C-17, C-18) MUST PROVIDE SURFACE STORAGE IN THE AMOUNT OF 360m³/ha, OR IN SUFFICIENT QUANTITY TO DEMONSTRATE COMPLETE CONTAINMENT OF THE 100yr EVENT. (i.e. NO MAJOR SYSTEM FLOW IN THE 1:100yr EVENT)

Revision	By	Appd.	Date
2 REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
1 REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05

File Name: 160400406	Dwn.	Chkd.	Dsgn.	Date
	LTM	MAF	MAF	AUG./05

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

STORM DRAINAGE AREA PLAN SOUTH PONDS

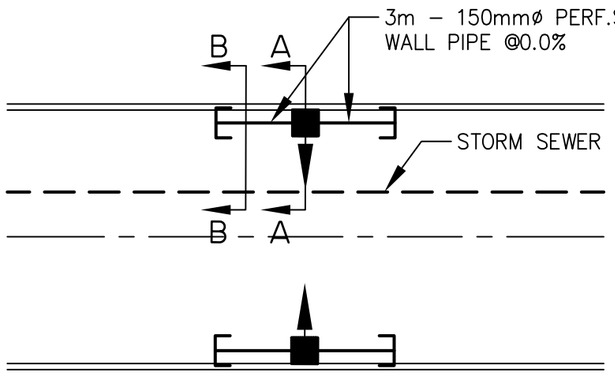
Project No. 60400406

Scale 1:3000 (0 30 90 150m)

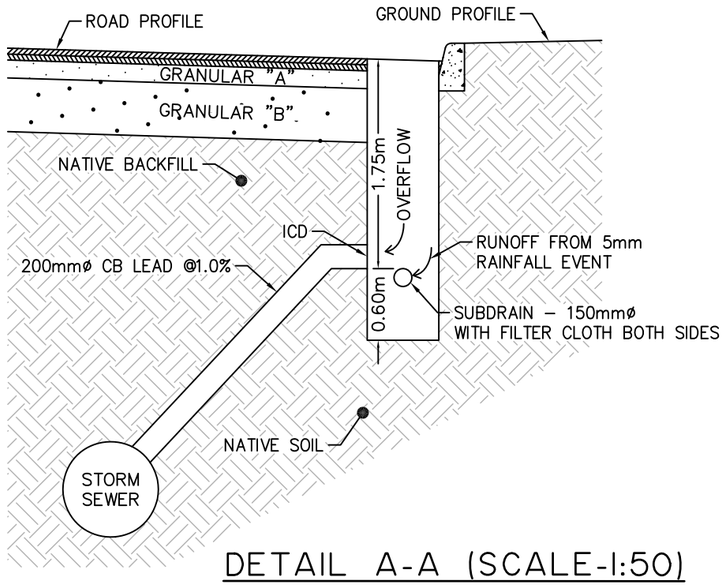
Drawing No. ST-PS

Sheet 3 of 7

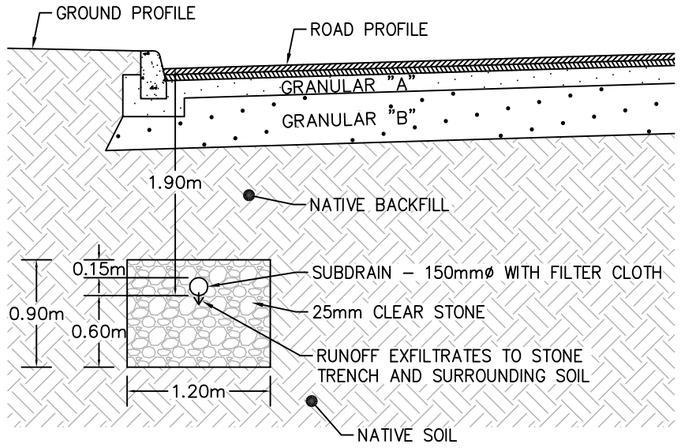
Revision 2



ROAD CATCHBASIN (SCALE-1:200)



DETAIL A-A (SCALE-1:50)



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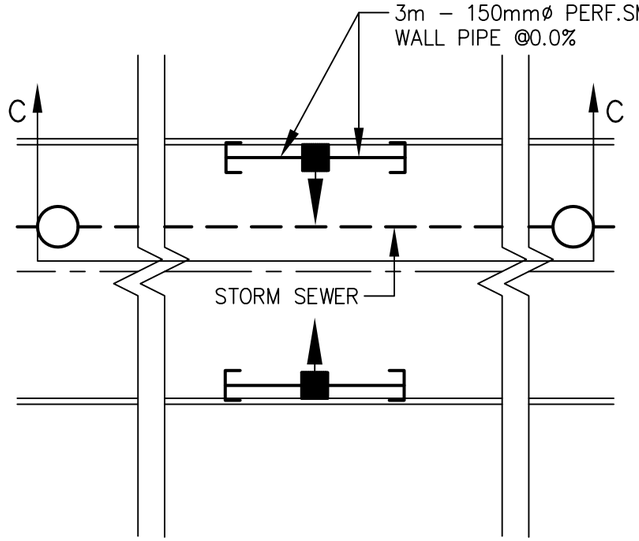
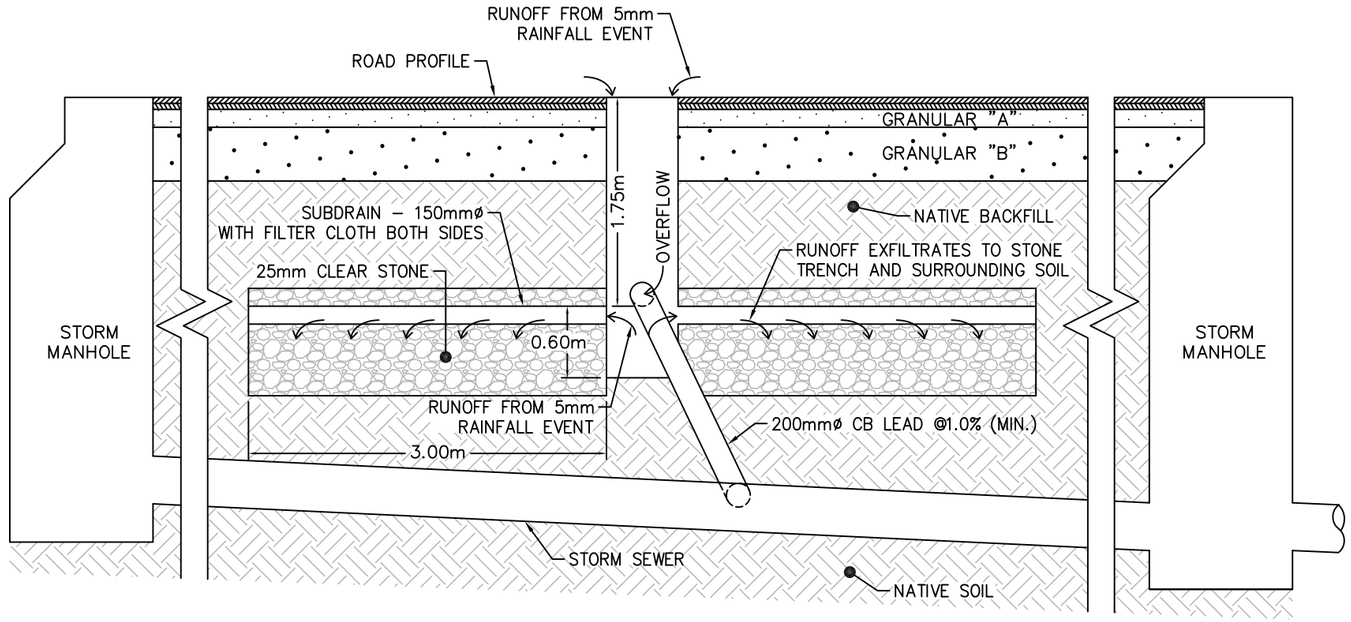


ROAD CATCHBASIN (SCALE-1:200)



DETAIL C-C (SCALE-1:50)

ATREL Engineering Ltd.
Engineers - Ingénieurs

130 HUNTMAR DRIVE

SCALE:	ROAD CATCHBASIN DETAIL
VARIES	SEPT, 2021 | SK-2