ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

130 HUNTMAR DRIVE

Prepared for:

LIONESS DEVELOPMENT INC.

PROJECT No: 191002

CITY OF OTTAWA

OCTOBER 2020

ATREL Engineering Ltd. Ltée
Engineers - Ingénieurs

REVISION 1

ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES
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 Assessment of Adequacy of Public Services 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 Assessment of Adequacy of Public Services 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 Assessment of Adequacy of Public Services 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 825mm diameter sanitary sewer on Maple Grove Road
- 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 Assessment of Adequacy of Public Services; 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 and the south portion of Street No. 2 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. The draft plan features a roundabout for the North-South arterial, however because major flow can't be conveyed through arterial roads, the ditch and overland spill point needs to be located away from the roundabout which could result in expanding the bridge. In order to convey the storm major flow for the northern parcel of the development it may be required to expand the bridge section of the LRT by approximately 67m as shown on the drawing

191002-DP1 in Appendix "B". The overflow will then be conveyed to the proposed ditch and reach the SWM facility, known as Pond 4, for quantity and quality treatment.

A second option is proposed to replace the round-about with a right-out lane only at the intersection of Street No.1 and Street No.2. This option would not require any alteration to the preliminary LRT design and the storm major flow can be directed at the prescribed LRT beginning of bridge location, as shown on the drawing 191002-DP2 in Appendix "B".

It is proposed to revise the LRT alignment by having the east rail straight instead of the west rail to allow for embankment. The revised alignment is shown in red on both drawings, 191002-DP1 and 191002-DP2 in Appendix "B".

It is to be noted that a line is shown at ±100m from Palladium Drive in the RMOC lands assuming commercial properties would face Palladium Drive. This line as no legal status but was assumed to place the overland ditch and the stormwater management pond.

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 is installed and extends on Huntmar Drive from Campeau Drive to Cyclone Taylor Boulevard. As per the Watermain Master Plan Update, the 600mm diameter waterermain remains to be extended from Cyclone Taylor Boulevard to Palladium Drive.

Since the watermain is not yet installed up to Palladium Drive and the 400mm diameter watermain is not installed on Huntmar Drive between Palladium Drive 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. Furthermore, the current KWOG agreement assumes that the watermain is to be constructed by the City as part of the future Huntmar reconstruction works and it is not currently shown in the KWOG schedules. 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. 9.

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.

There are three possible connections in the future to Huntmar Drive, however, as mentioned previously, there are currently no watermains. The possible connections could serve as a link between Lioness' development and the development west of Huntmar Drive, known as 195 Huntmar Drive.

In this analysis, no connections to Huntmar Drive were used as the timing of both developments and watermain installation is unclear. 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	2.7 x avg. day
Institutional	28,000 l/ha./d	1.5 x avg. day	1.8 x avg. 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), 233 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), 233 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. In addition, once the watermain will be connected to the 195 Huntmar development and the 400mm watermain along Huntmar Drive with the future road widening, available fire flows within the development would improve. 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 Street No. 2. 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. 9 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. 5, and, the other, at the intersection of Huntmar Drive and Street No. 1 (refer to the drawing 191002-SANM - Macro Sanitary Drainage Plan in Appendix "D").

2.4.1 Upstream Flow to Huntmar Drive and Street No. 5 (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 Street No. 1 (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	Infiltration	1.05	0
	Residential	104.95	7067
	Commercial	38.99	3899
	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 450mm and 525mm diameter trunk sewer along Street No.1 and along Street No.2 would be adequate to service the subject land.

Using the current recommended wastewater parameters, the total peak flow to ex. MH 96 is 503.67 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 57%.

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 95.53m 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 94.70 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 major flow system runoff from the parcel surrounded by Maple Grove Road, Huntmar Drive and the North-South arterial cannot be conveyed via overland, and therefore, it shall provide on-site storage for 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) An Enhanced Level of Protection (80 % 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.

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.

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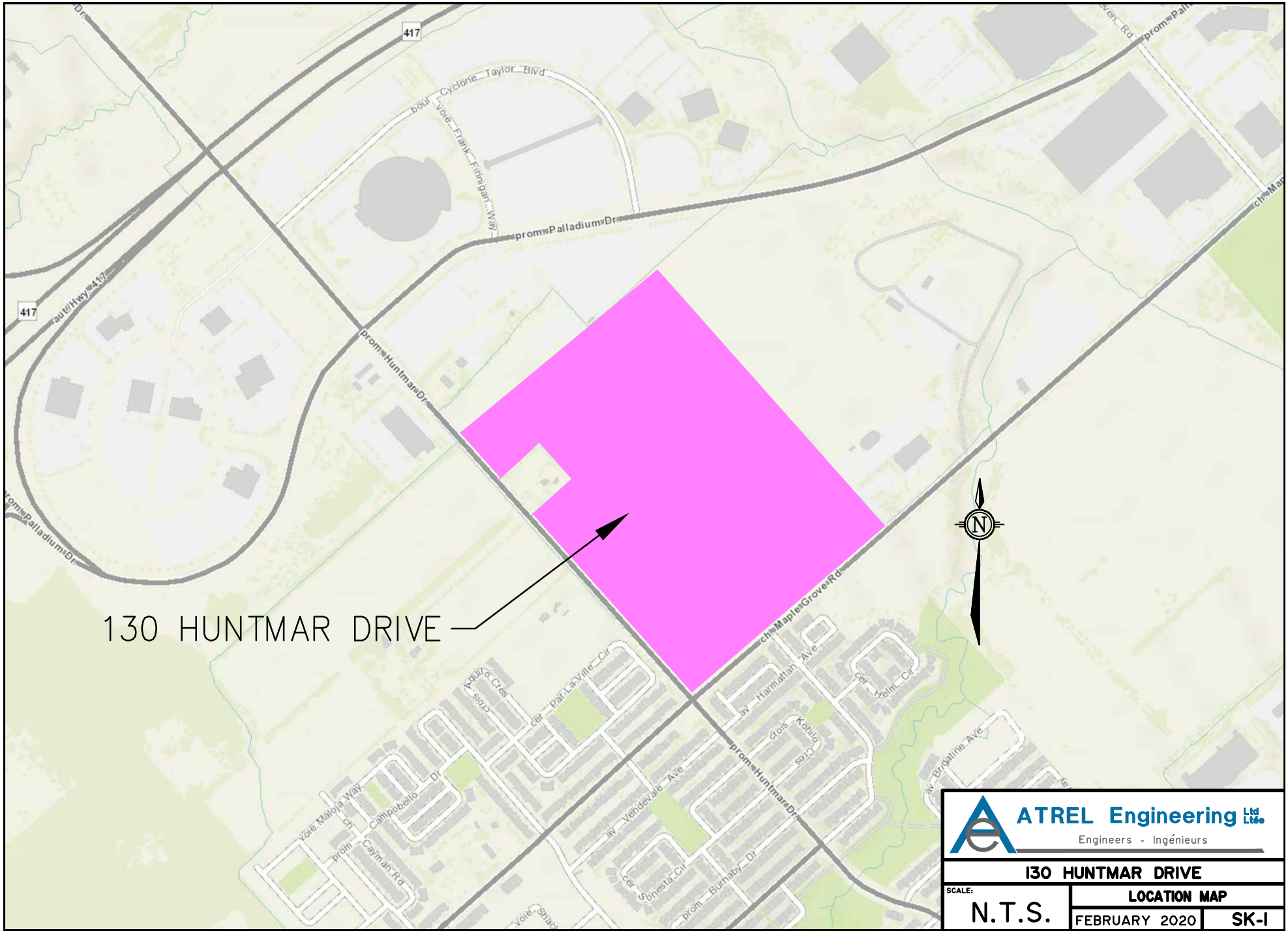
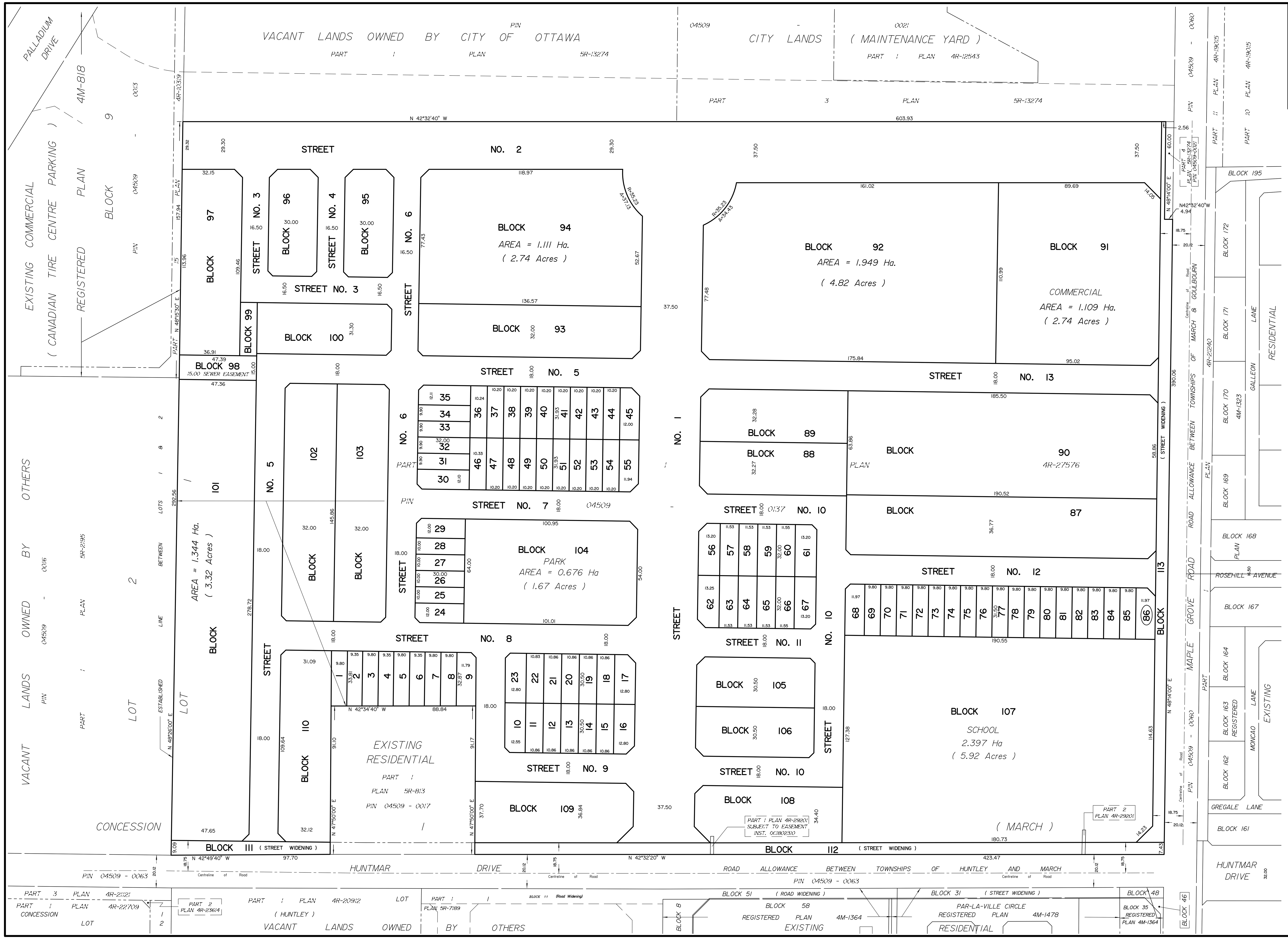
APPENDIX "A"

- SK-1 Location Map
- 130 Huntmar Drive – Draftplan of Subdivision
- 130 Huntmar Drive – Pre-Consultation Meeting Minutes
- 130 Huntmar Drive – Concept Plan



ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs

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



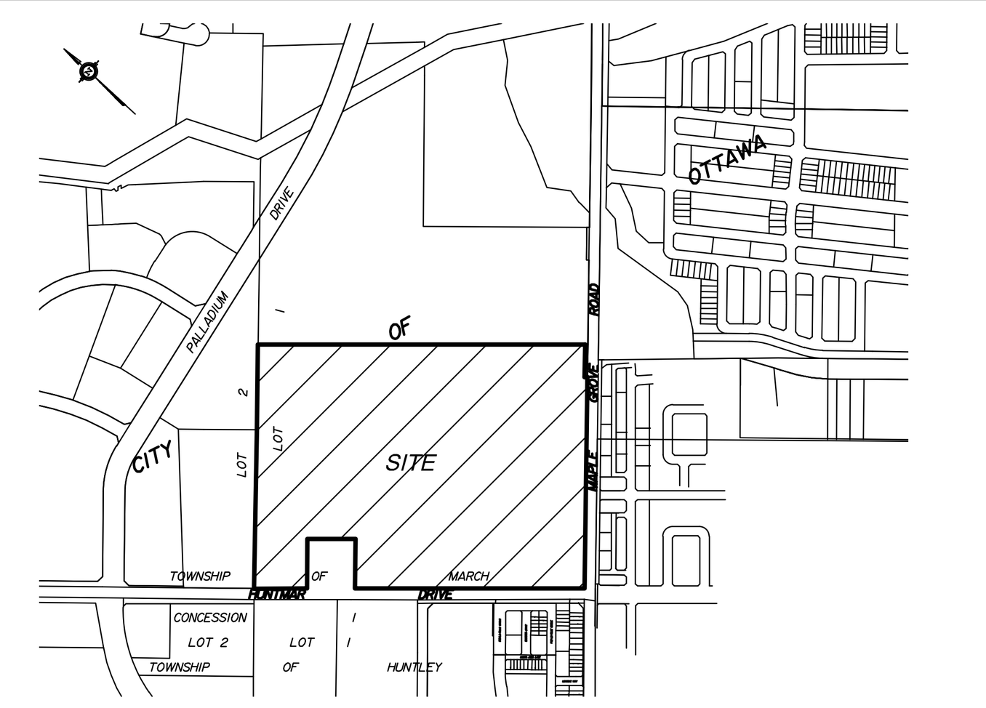
SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

____________________________.

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	
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 C1 MA DPS D10 | 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
- PROPERTY BOUNDARY
- SETBACKS

0 25m 50m 100m

No.	REVISION	DATE	BY
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

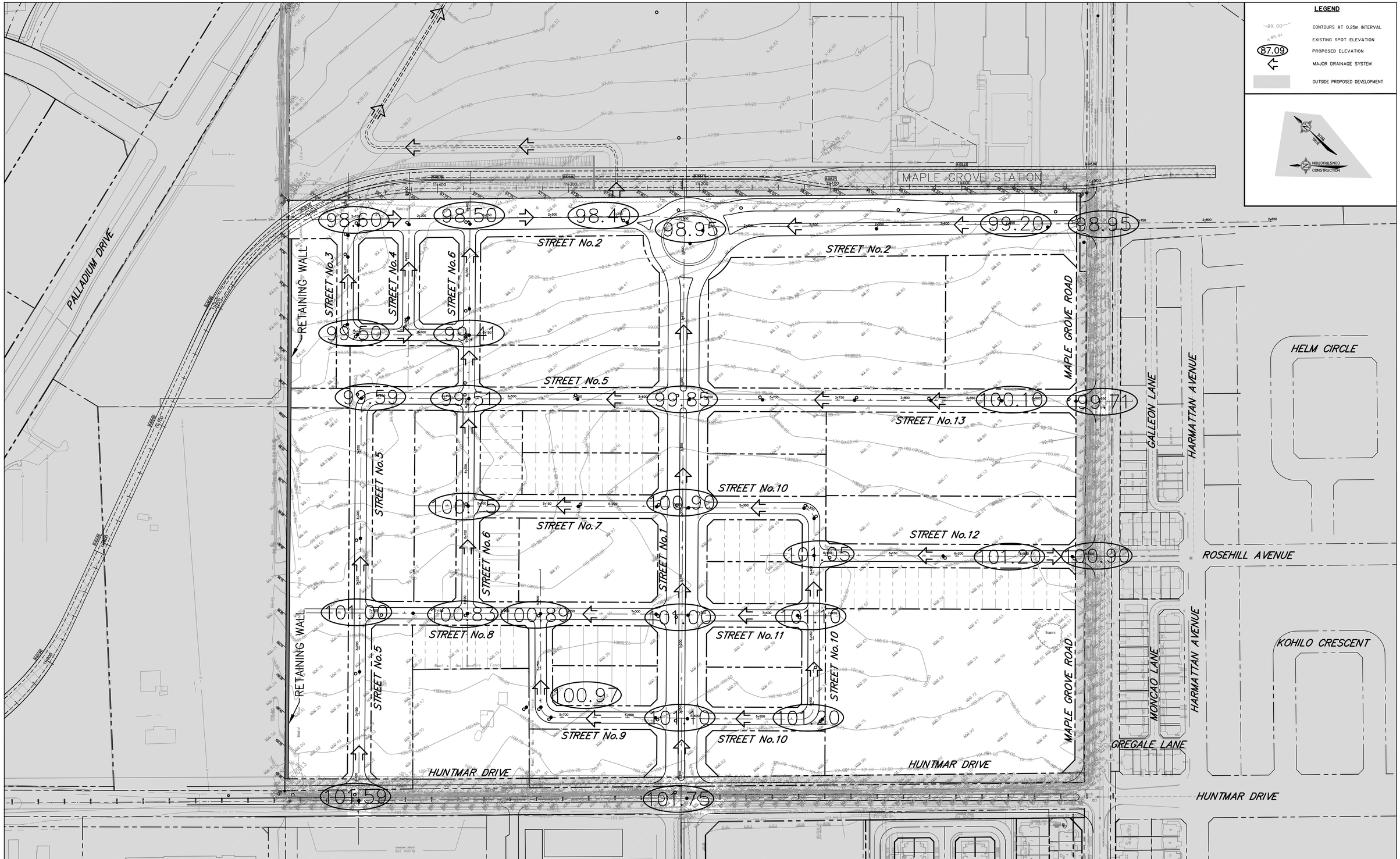
FOTENN
Planning + Design
223 McLeod Street, Ottawa ON K2P 0Z8
613.730.5709 www.fotenn.com

DESIGNED	RP
REVIEWED	MT
DATE	2018.12.20

P1

APPENDIX "B"

- 191002-GRM - Macro Grading Plan
- 191002-DP1 – Draft Plan Option 1
- 191002-DP2 – Draft Plan Option 2
- 191002-ESCM - Macro Erosion and Sediment Control Plan



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

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
Oct. 7, 2020
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J. M. DECOEUR
Oct. 7/2020
PROVINCE OF ONTARIO

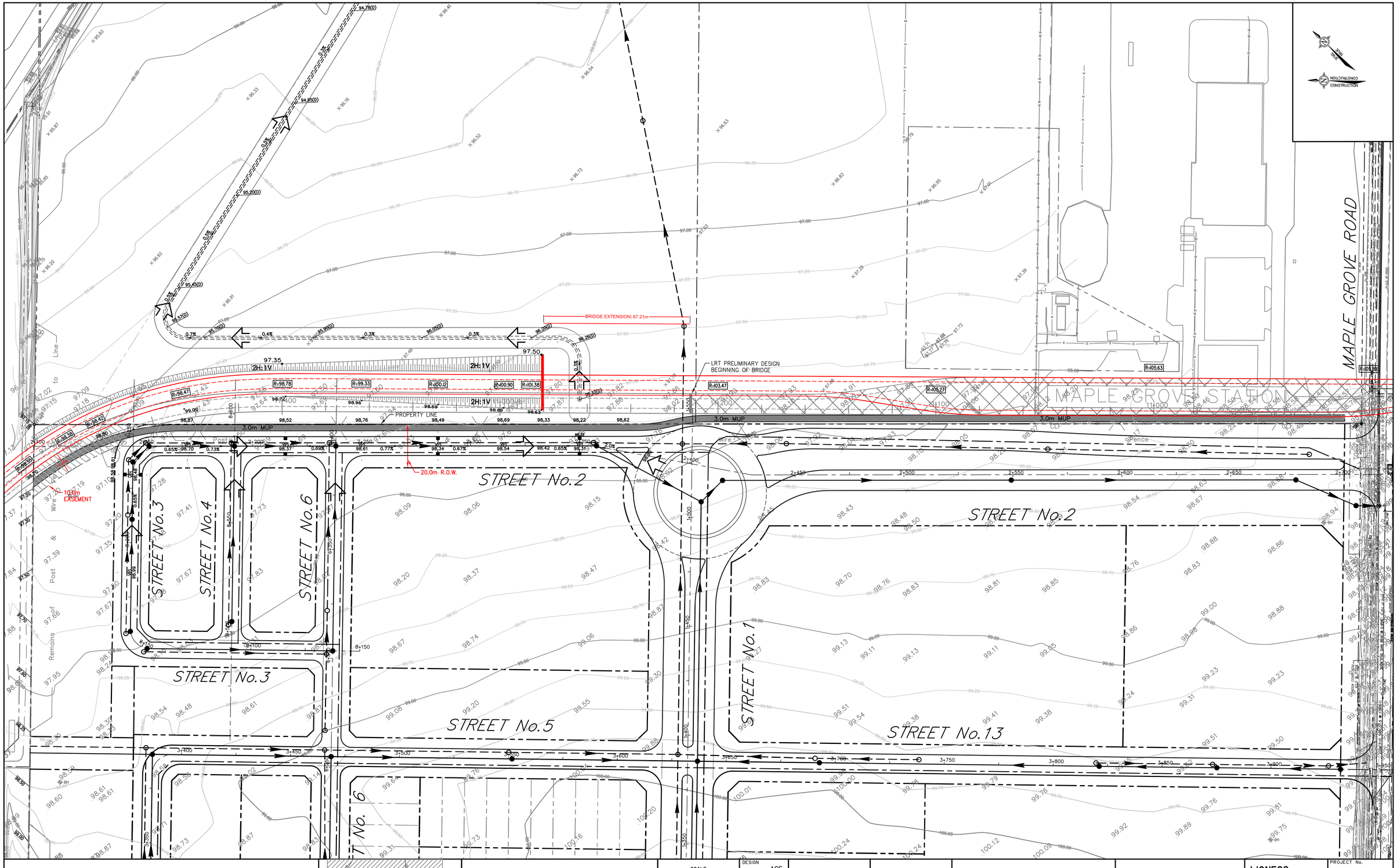
ATREL Engineering Ltd. Ltée.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

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

PLAN
MACRO GRADING PLAN



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SCALE 1:750 (8m 0 24m)

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

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-DP1

PLAN
DRAFT PLAN OPTION 1

MAPLE GROVE ROAD

MAPLE GROVE STATION

LRT PRELIMINARY DESIGN BEGINNING OF BRIDGE

PROPERTY LINE

20.0m R.O.W.

10.0m EASEMENT

STREET No.2

STREET No.3

STREET No.4

STREET No.6

STREET No.5

STREET No.1

STREET No.13

3.0m MUP

2H:1V

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STREET MAP

SCALE 1:750 (8m 0 24m)

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

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CITY OF OTTAWA

130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002

DATE JANUARY 2020

PLAN DRAFT PLAN OPTION 2

DRAWING No. 191002-DP1

STRAW BALE FLOW CHECK DAM

LIGHT-DUTY SILT FENCE BARRIER

LIGHT-DUTY SILT FENCE BARRIER

LIGHT-DUTY SILT FENCE BARRIER

LIGHT-DUTY SILT FENCE BARRIER

STREET No.2

STREET No.3

STREET No.4

STREET No.5

STREET No.6

STREET No.7

STREET No.8

STREET No.9

STREET No.1

STREET No.10

STREET No.10

STREET No.11

STREET No.12

STREET No.13

MAPLE GROVE ROAD

GALLEON LANE

HARMATTAN AVENUE

MONCAO LANE

HARMATTAN AVENUE

GREGALE LANE

HELM CIRCLE

ROSEHILL AVENUE

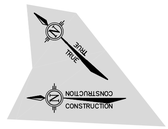
KOHILO CRES

HUNTMAR DRIVE

HUNTMAR DRIVE

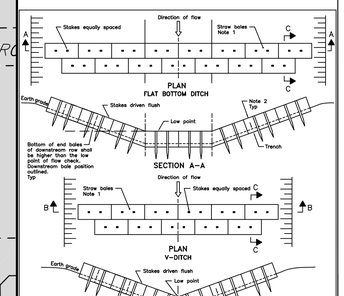
LEGEND

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

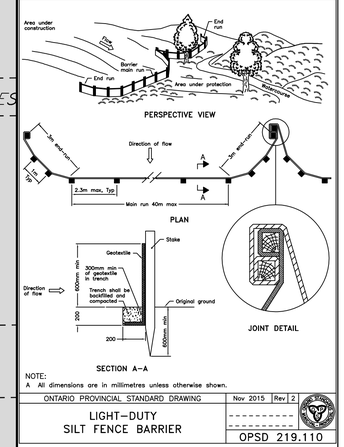


NOTES

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

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

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Oct 7, 2020
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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

Stantec

Memo

To:	Christopher Rogers, M.A.Sc., P.Eng. Ottawa, ON	From:	Kevin Alemany, M.A.Sc., P.Eng. Ottawa, ON
File:	163401169	Date:	December 16, 2013

Reference: Kanata West Master Serving Study Watermain Sizing - 2013 Water Master Plan Update

Chris,

The following memorandum addressing the watermain sizing requirements for the portion of Kanata West along Huntmar Drive from Palladium Drive and along an unnamed future road (east and parallel to Huntmar) down to Hazeldean Road as shown in **Figures 1** and **2**.

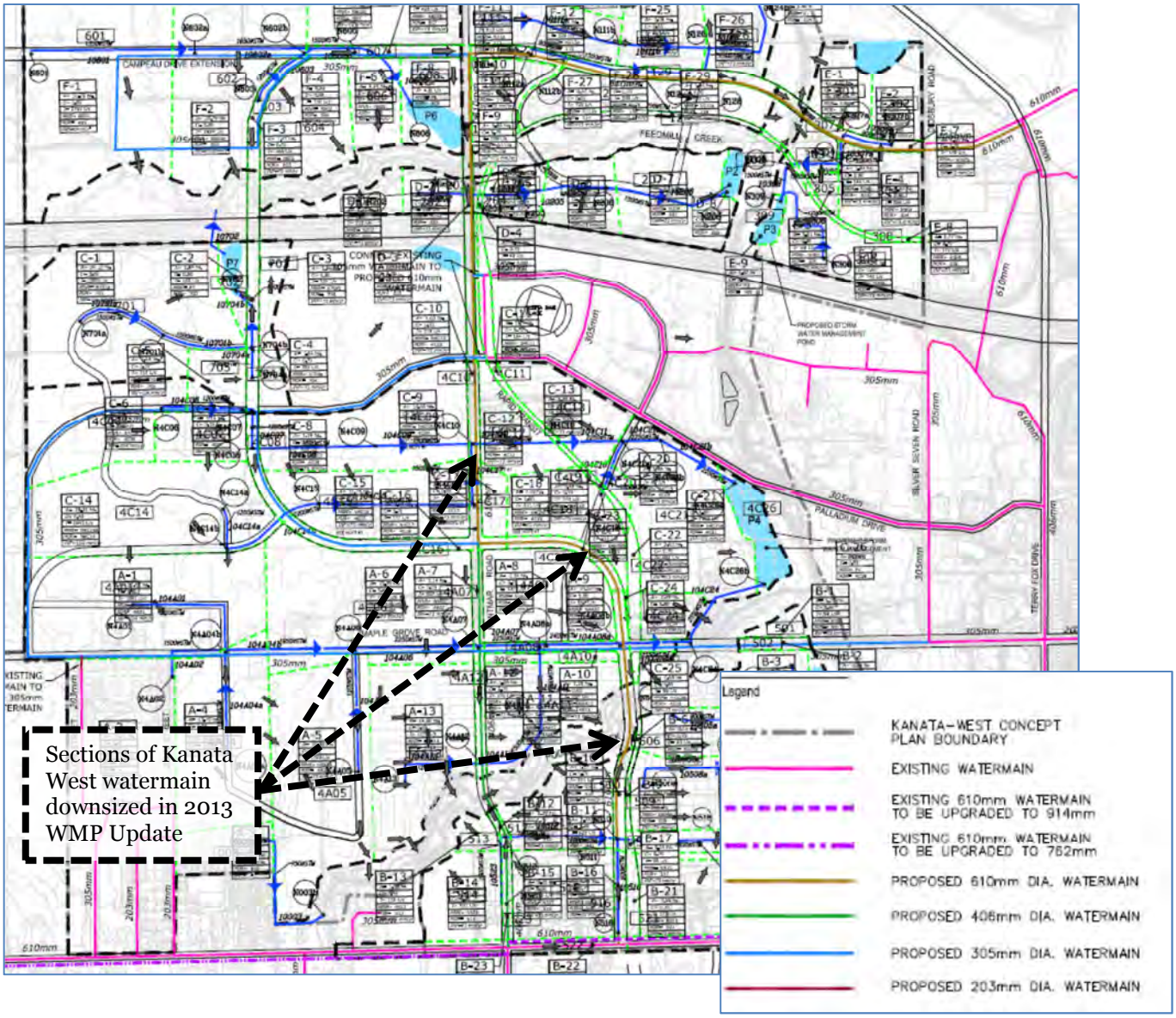
In 2006, Stantec Consulting Ltd in association with Cumming Cockburn Limited/IBI prepared the Kanata West Master Servicing Study. Through the assessment of planned future growth, proposed pumping and planned storage infrastructure in Zone 3W, Stantec identified a preferred sizing and alignment for a larger diameter watermain network within the Kanata West development lands. Due to the anticipated configuration of the zone and projection of demand use, a pipe configuration was proposed that included a large 610mm diameter watermain that passed through the Kanata West lands from Terry Fox Drive, along Campeau Drive, down Huntmar Drive, and along an future unnamed road alignment until it reached the larger diameter watermain along Hazeldean Road as shown in **Figure 1** below.

During the course of the 2013 Water Master Plan Update, Stantec under took an evaluation of the sizing requirements of the portion of unbuilt 610mm diameter watermain along Huntmar from Palladium Drive to Hazeldean Road. A smaller 406mm diameter watermain was assessed and it was determined that due to the change in projected unit demands that were updated by the City's planning department for the 2013 Infrastructure Master Plan Update and due to the rebuilt and upsized Hazeldean Road watermain, the remaining portion of the 610mm looping Kanata West watermain could be downsized to a 406mm diameter watermain and provide the same level of service as previously required (see **Figure 2**).

Per the final pipe alignments and sizing shown in the 2013 Water Master Plan Update, it is recommended that the Kanata West large 610mm diameter feedermain watermain be downsized to a 406mm diameter watermain as described above and shown in **Figure 2**.

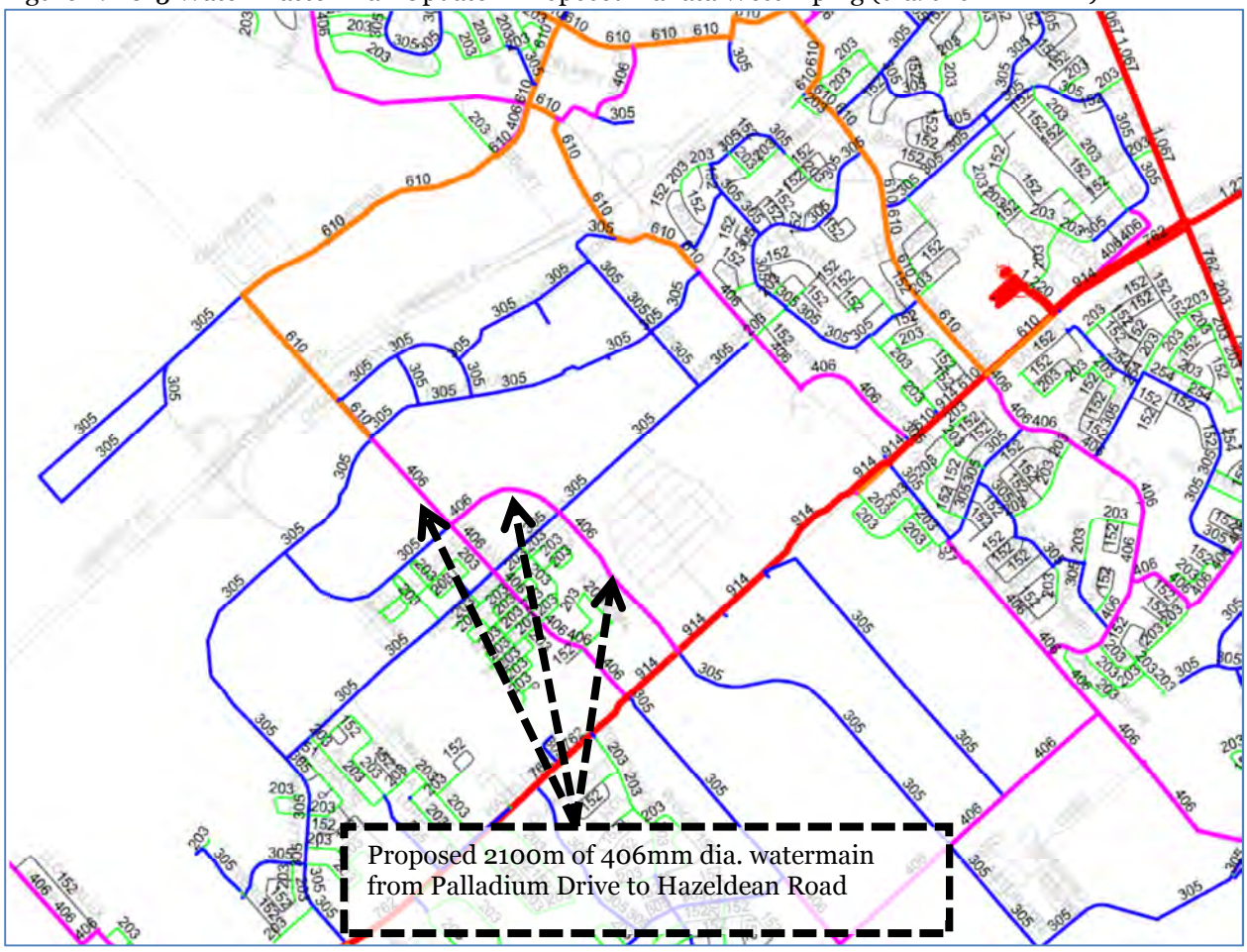
Reference: Kanata West Master Serving Study Watermain Sizing - 2013 Water Master Plan Update

Figure WM-1: Watermain Final Concept (Kanata West Master Servicing Study, Stantec, 2006)



Reference: Kanata West Master Serving Study Watermain Sizing - 2013 Water Master Plan Update

Figure 2: 2013 Water Master Plan Update – Proposed Kanata West Piping (dia. shown in mm)



Sincerely, Kevin

STANTEC CONSULTING LTD.

Kevin Alemany M.A.Sc., P.Eng.
Environmental Engineer
Phone: (613) 724-4091
Fax: (613) 722-2799
kevin.alemany@stantec.com

c. John Krug, Stantec

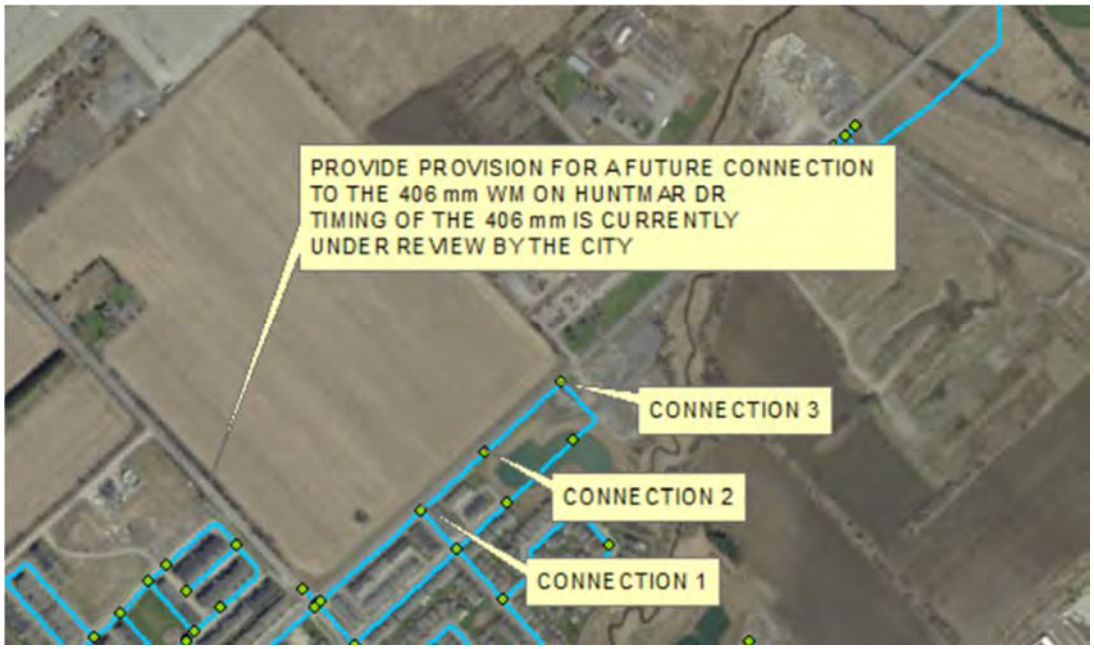
Boundary Conditions for 130 Huntmar Drive

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

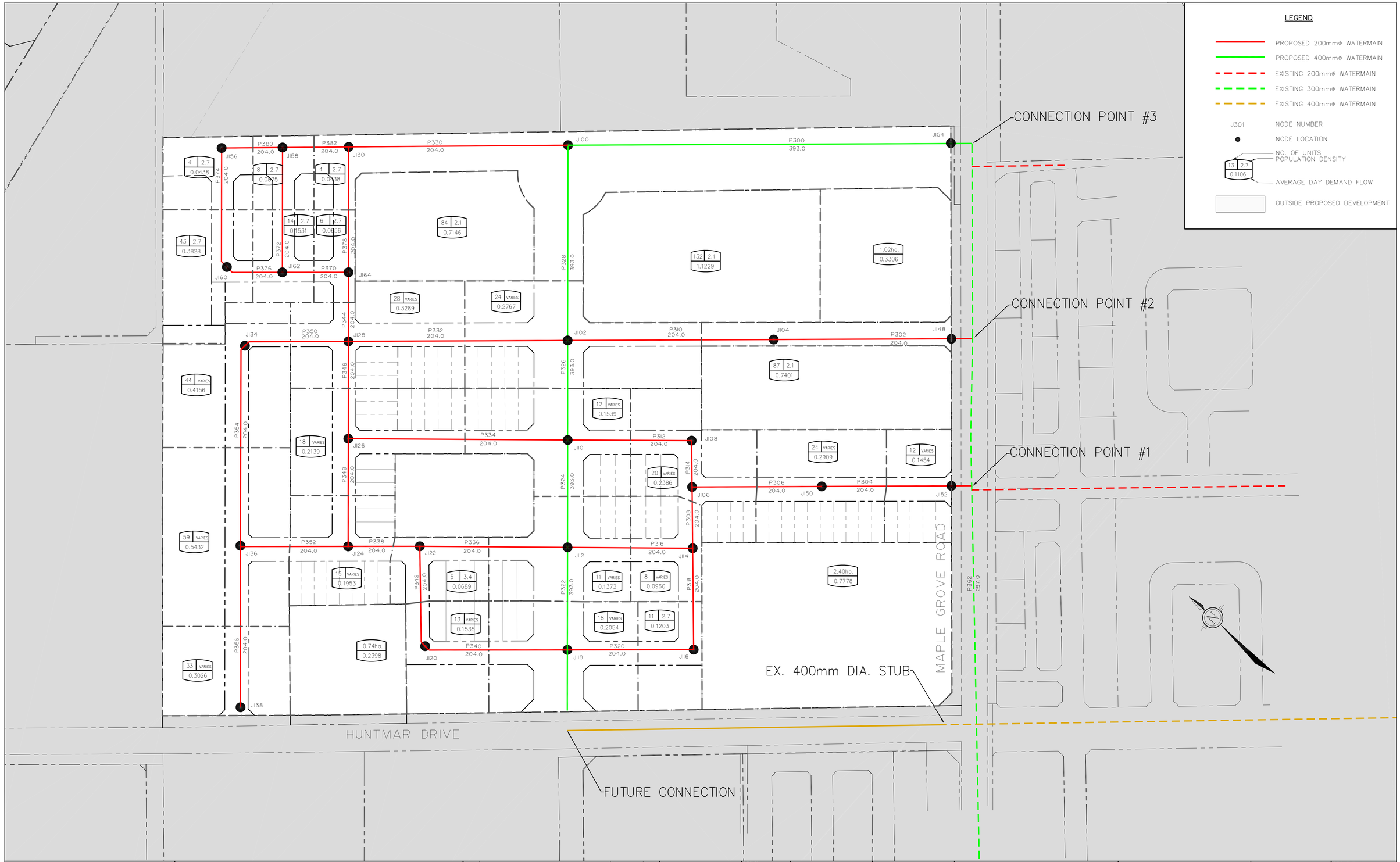
[1] Ground Elevation = 98.6m

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.



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

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

DESIGN JSG
CHECKED
DRAWN JSG
CHECKED
APPROVED AGS

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Oct 7, 2020
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J. M. DECOEUR
PROVINCE OF ONTARIO

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

CITY OF OTTAWA
130 HUNTMAR DRIVE

LIONESS DEVELOPMENT INC.

PLAN WATERMAIN LAYOUT AND DEMAND

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

TABLE 1: Boundary Condition Data

DATE: **October 2020**
DESIGNED BY: JSG
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: **October 2020**

CLIENT: Urbandale Corporation

DESIGNED BY: JSG

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	99.16	350395.03	5017241.06
J102	0.2767	100.84	350285.80	5017143.79
J104	1.8630	101.00	350390.47	5017026.64
J106	0.2386	101.05	350265.64	5016998.93
J108	0.0000	101.00	350291.86	5017022.75
J110	0.1539	100.92	350229.14	5017093.34
J112	0.1373	101.00	350167.90	5017038.81
J114	0.0960	101.11	350231.04	5016967.49
J116	0.1203	101.19	350173.74	5016915.43
J118	0.2054	101.08	350108.91	5016986.27
J120	0.3933	100.97	350039.00	5017068.99
J122	0.0689	100.89	350093.36	5017122.24
J124	0.1953	100.83	350056.19	5017163.84
J126	0.2139	100.75	350117.48	5017218.32
J128	0.3289	99.51	350174.19	5017268.71
J130	0.0438	98.99	350285.16	5017367.33
J134	0.4156	99.59	350119.31	5017325.64
J136	0.5432	101.09	350001.56	5017224.99
J138	0.3026	101.50	349909.39	5017142.94
J148	1.0707	99.82	350483.55	5016927.66
J150	1.0687	100.79	350331.80	5016925.33
J152	0.1454	100.52	350397.96	5016851.72
J154	0.0000	98.89	350585.39	5017018.96
J156	0.0438	98.88	350220.02	5017439.18
J158	0.0875	98.95	350251.26	5017404.73
J160	0.3828	99.32	350154.89	5017375.76
J162	0.1531	99.36	350180.02	5017341.43
J164	0.0656	99.41	350213.65	5017303.78

FIRE FLOW CALCULATIONS **Table 3**

CONSULTANT: ATREL ENGINEERING LTD
BY: JSG
DATE: October 2020

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		
		1.5

A = Area of structure considered (m²)

Building No.	SINGLES	TH	Back to Back	APARTMENT		
Location No.						
Combined gross floor area	3200	910	1530	1460		

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

= 220·C·(A)^½	18668	9955	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)		15868	8462	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	0	0
Reduction (L/min)	0	0	0	0		

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

· PW(Unpierced boundary party wall)	10%	North	22.0	10	1587	22.0	10	846	25.0	10	1097	25.0	10	1072			0			0
· 0 to 3.0 m	25 %																			
· 3.1 to 10.0 m	20 %	East	2.4	25	3967	3.1	20	1692	4.0	20	2194	5.0	20	2144			0			0
· 10.1 to 20.0 m	15 %																			
· 20.1 to 30.0 m	10 %	South	15.0	15	2380	15.0	15	1269	25.0	10	1097	25.0	10	1072			0			0
· 30.1 to 45.0 m	5 %																			
Maximum	75 %	West	2.4	25	3967	3.1	20	1692	4.0	20	2194	5.0	20	2144			0			0
Exposure surcharge total			11901			5500			6583			6431			0			0		

(5) Fire Flow

= (2) - (3) + (4)	27769	13962	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.	28000	14000	18000	17000	0	0
	(467 l/s)	(233 l/s)	(300 l/s)	(283 l/s)		

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings with minimum separation of 10 meters between the backs of adjacent units may be capped to 10,000 l/min (167 l/s)

TABLE 4: AVERAGE DAY AND PEAK HOUR DEMAND RESULTS

PROJECT: **130 Huntmar Drive**
DATE: **October 2020**
CLIENT: Urbandale Corporation
DESIGNED BY: JSG
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	99.16	0.0000	160.96	605.60	0.0000	156.84	565.24
J102	100.84	0.2767	160.96	589.13	1.5219	156.83	548.68
J104	101.00	1.8630	160.95	587.43	10.2464	156.79	546.71
J106	101.05	0.2386	160.96	587.08	1.3123	156.84	546.73
J108	101.00	0.0000	160.96	587.57	0.0000	156.84	547.19
J110	100.92	0.1539	160.96	588.35	0.8465	156.83	547.89
J112	101.00	0.1373	160.96	587.56	0.7552	156.83	547.10
J114	101.11	0.0960	160.96	586.49	0.5280	156.84	546.06
J116	101.19	0.1203	160.96	585.70	0.6617	156.83	545.25
J118	101.08	0.2054	160.96	586.78	1.1297	156.83	546.32
J120	100.97	0.3933	160.96	587.85	1.2759	156.82	547.32
J122	100.89	0.0689	160.96	588.64	0.3790	156.82	548.08
J124	100.83	0.1953	160.96	589.22	1.0742	156.81	548.59
J126	100.75	0.2139	160.96	590.01	1.1765	156.81	549.38
J128	99.51	0.3289	160.96	602.16	1.8090	156.81	561.51
J130	98.99	0.0438	160.96	607.25	0.2409	156.81	566.64
J134	99.59	0.4156	160.96	601.37	2.2858	156.80	560.65
J136	101.09	0.5432	160.96	586.67	2.9876	156.80	545.94
J138	101.50	0.3026	160.96	582.65	1.6643	156.80	541.89
J148	99.82	1.0707	160.95	598.98	4.9632	156.82	558.55
J150	100.79	1.0687	160.96	589.65	3.0000	156.91	549.88
J152	100.52	0.1454	160.97	592.35	0.7997	157.01	553.58
J154	98.89	0.0000	160.96	608.28	0.0000	156.87	568.19
J156	98.88	0.0438	160.96	608.33	0.2409	156.81	567.68
J158	98.95	0.0875	160.96	607.64	0.4813	156.81	567.00
J160	99.32	0.3828	160.96	604.02	2.1054	156.81	563.36
J162	99.36	0.1531	160.96	603.63	0.8421	156.81	562.98
J164	99.41	0.0656	160.96	603.14	0.3608	156.81	562.49
	Total =	8.6143	l/s		Total =	42.6883	l/s

TABLE 5: PIPE DATA

DATE: **October 2020**
DESIGNED BY: JSG
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	292.52	393	120	-5.9359	0.0489	0.0031	0.0107	-20.4149	0.1683	0.0308	0.1054
P302	J104	J148	135.87	204	110	1.0708	0.0328	0.0017	0.0129	-4.7894	0.1465	0.0280	0.2061
P304	J152	J150	98.97	204	110	2.5330	0.0775	0.0063	0.0633	11.7209	0.3586	0.1070	1.0812
P306	J106	J150	98.97	204	110	-1.4643	0.0448	0.0023	0.0229	-8.7209	0.2668	0.0619	0.6252
P308	J106	J108	35.42	204	110	0.4965	0.0152	0.0001	0.0032	3.0423	0.0931	0.0031	0.0888
P310	J104	J102	157.10	204	110	-2.9337	0.0898	0.0131	0.0831	-5.4570	0.1670	0.0412	0.2624
P312	J108	J110	94.43	204	110	0.4965	0.0152	0.0003	0.0030	3.0423	0.0931	0.0084	0.0891
P314	J114	J106	46.76	204	110	-0.7292	0.0223	0.0003	0.0064	-4.3663	0.1336	0.0081	0.1735
P316	J114	J112	95.25	204	110	0.3266	0.0100	0.0001	0.0014	2.0105	0.0615	0.0039	0.0414
P318	J114	J116	77.42	204	110	0.3066	0.0094	0.0001	0.0012	1.8278	0.0559	0.0027	0.0348
P320	J116	J118	96.03	204	110	0.1863	0.0057	0.0000	0.0004	1.1661	0.0357	0.0014	0.0149
P322	J118	J112	79.00	393	120	-0.5637	0.0046	0.0000	0.0000	-2.6706	0.0220	0.0002	0.0024
P324	J112	J110	82.00	393	120	-0.9357	0.0077	0.0000	0.0005	-4.4036	0.0363	0.0005	0.0061
P326	J110	J102	75.86	393	120	-1.1739	0.0097	0.0000	0.0005	-5.5743	0.0460	0.0007	0.0096
P328	J102	J100	146.26	393	120	-4.9962	0.0412	0.0011	0.0078	-16.1581	0.1332	0.0100	0.0684
P330	J100	J130	167.38	204	110	0.9397	0.0288	0.0017	0.0101	4.2568	0.1302	0.0277	0.1657
P332	J102	J128	167.51	204	110	0.6119	0.0187	0.0008	0.0046	3.6049	0.1103	0.0204	0.1217
P334	J110	J126	167.59	204	110	0.5808	0.0178	0.0007	0.0042	3.3666	0.1030	0.0180	0.1072
P336	J112	J122	111.88	204	110	0.5613	0.0172	0.0004	0.0038	2.9883	0.0914	0.0096	0.0860
P338	J122	J124	55.79	204	110	0.6437	0.0197	0.0003	0.0050	4.0404	0.1236	0.0084	0.1504
P340	J118	J120	108.30	204	110	0.5446	0.0167	0.0004	0.0038	2.7070	0.0828	0.0078	0.0716
P342	J120	J122	76.10	204	110	0.1513	0.0046	0.0000	0.0002	1.4311	0.0438	0.0017	0.0220
P344	J128	J164	52.79	204	110	-0.1631	0.0050	0.0000	0.0004	0.0146	0.0004	0.0000	0.0000
P346	J128	J126	75.86	204	110	-0.1626	0.0050	0.0000	0.0002	-1.4432	0.0442	0.0017	0.0223
P348	J126	J124	82.00	204	110	0.2043	0.0063	0.0000	0.0005	0.7469	0.0229	0.0005	0.0066
P350	J128	J134	79.07	204	110	0.6088	0.0186	0.0004	0.0045	3.2245	0.0987	0.0078	0.0991
P352	J124	J136	82.00	204	110	0.6526	0.0200	0.0004	0.0052	3.7131	0.1136	0.0105	0.1286
P354	J134	J136	154.90	204	110	0.1932	0.0059	0.0001	0.0006	0.9388	0.0287	0.0016	0.0101
P356	J136	J138	123.40	204	110	0.3026	0.0093	0.0001	0.0012	1.6643	0.0509	0.0036	0.0291
P370	J164	J162	50.48	204	110	0.1635	0.0050	0.0000	0.0004	1.2818	0.0392	0.0009	0.0181
P372	J162	J158	95.30	204	110	-0.1923	0.0059	0.0001	0.0006	-0.7986	0.0244	0.0007	0.0074
P374	J156	J160	90.91	204	110	0.1801	0.0055	0.0001	0.0006	0.8671	0.0265	0.0008	0.0086
P376	J160	J162	42.55	204	110	-0.2027	0.0062	0.0000	0.0009	-1.2383	0.0379	0.0007	0.0166
P378	J164	J130	95.67	204	110	-0.3922	0.0120	0.0002	0.0019	-1.6280	0.0498	0.0027	0.0278
P380	J156	J158	46.50	204	110	-0.2239	0.0069	0.0000	0.0008	-1.1080	0.0339	0.0006	0.0136
P382	J158	J130	50.48	204	110	-0.5037	0.0154	0.0001	0.0029	-2.3879	0.0731	0.0029	0.0568

TABLE 6: MAXIMUM DAY PLUS FIRE-FLOW RESULTS

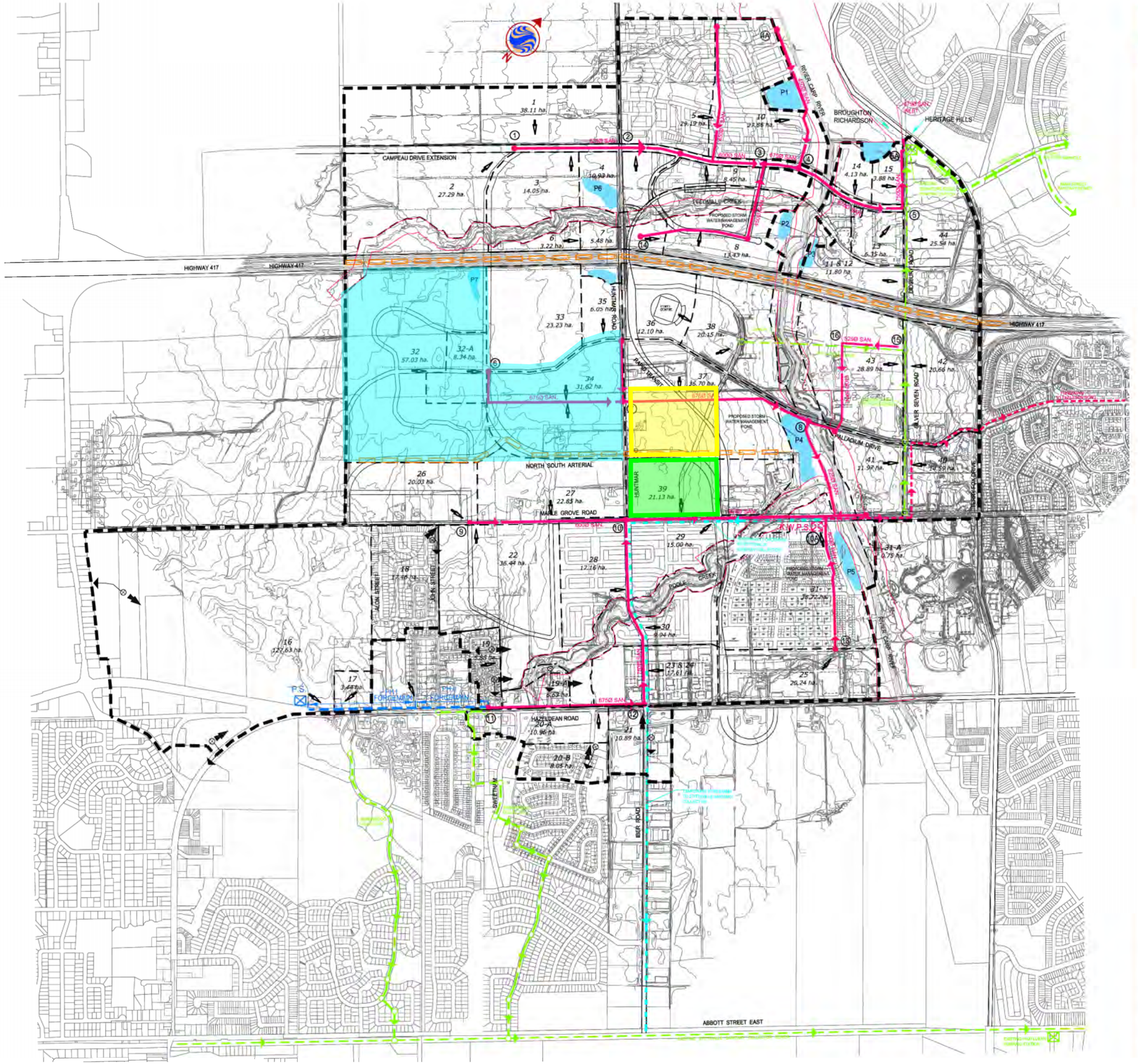
PROJECT: **130 Huntmar Drive**
DATE: **October 2020**
CLIENT: Urbandale Corporation
DESIGNED BY: JSG
PROJECT #: 191002
CHECKED BY: JMD
BY: Atrel Engineering Ltd

NODE NO.	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Available Flow @ Hydrant (L/s)	Available Flow Pressure (kPa)	Critical NODE ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
J100	0.0000	589.62	159.33	544.19	140.0	J138	132.22	114.99	536.50	536.08
J102	0.6918	573.13	159.33	527.65	140.0	J138	137.38	115.52	525.19	524.88
J104	4.6575	571.39	159.31	348.96	140.0	J104	139.96	115.28	348.96	348.91
J106	0.5965	571.11	159.33	449.32	140.0	J106	139.96	115.33	449.32	449.30
J108	0.0000	571.59	159.33	402.45	140.0	J108	139.96	115.28	402.45	402.45
J110	0.3848	572.35	159.33	518.39	140.0	J138	139.90	115.78	518.32	518.06
J112	0.3433	571.56	159.33	504.55	140.0	J118	139.76	115.34	504.37	504.20
J114	0.2400	570.50	159.33	429.37	140.0	J114	139.96	115.39	429.37	429.36
J116	0.3008	569.71	159.33	359.61	140.0	J116	139.96	115.47	359.61	359.47
J118	0.5135	570.78	159.33	488.23	140.0	J118	139.96	115.36	488.23	488.11
J120	0.7435	571.84	159.33	348.25	140.0	J120	139.96	115.25	348.25	348.18
J122	0.1723	572.62	159.33	396.83	140.0	J122	139.96	115.17	396.83	396.82
J124	0.4883	573.19	159.32	380.85	140.0	J124	139.96	115.11	380.85	380.48
J126	0.5348	573.97	159.32	388.34	140.0	J126	139.96	115.03	388.35	388.34
J128	0.8223	586.12	159.32	409.20	140.0	J128	139.96	113.79	409.20	409.19
J130	0.1095	591.22	159.32	339.41	140.0	J130	139.96	113.27	339.41	339.38
J134	1.0390	585.32	159.32	313.06	140.0	J134	139.96	113.87	313.06	313.06
J136	1.3580	570.62	159.32	302.15	140.0	J138	135.94	115.37	300.31	300.29
J138	0.7565	566.59	159.32	185.30	140.0	J138	139.96	115.78	185.30	185.30
J148	2.3462	582.98	159.31	444.31	140.0	J148	139.96	114.10	444.31	444.23
J150	1.8940	573.82	159.35	412.48	140.0	J150	139.96	115.07	412.48	412.48
J152	0.3635	576.80	159.38	634.10	140.0	J152	139.96	114.80	634.11	634.10
J154	0.0000	592.35	159.34	555.94	140.0	J154	139.96	113.17	555.94	555.94
J156	0.1095	592.29	159.32	282.46	140.0	J156	139.96	113.16	282.46	282.41
J158	0.2188	591.61	159.32	311.35	140.0	J158	139.96	113.23	311.35	311.35
J160	0.9570	587.98	159.32	282.92	140.0	J160	139.96	113.60	282.92	282.87
J162	0.3828	587.59	159.32	310.53	140.0	J162	139.96	113.64	310.53	310.52
J164	0.1640	587.10	159.32	349.13	140.0	J164	139.96	113.69	349.13	349.05

Total = 20.1882 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) (July 9, 2020)
- 195 Huntmar - Sanitary Drainage Plan – Sheet No. 88 to 93 (DSEL) (July 9, 2020)
- 195 Huntmar - Sanitary Sewer Calculation Sheet (DSEL) (July 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



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Stantec

CCL/IBI
Comerg Construct 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
- ① NODES
- EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
- 44 25.54 ha INPUT POINT AND AREA IN HECTARES
- EXISTING PUMPING STATION GRAVITY OUTLET

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.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
Revision		By	Appd.	Date

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

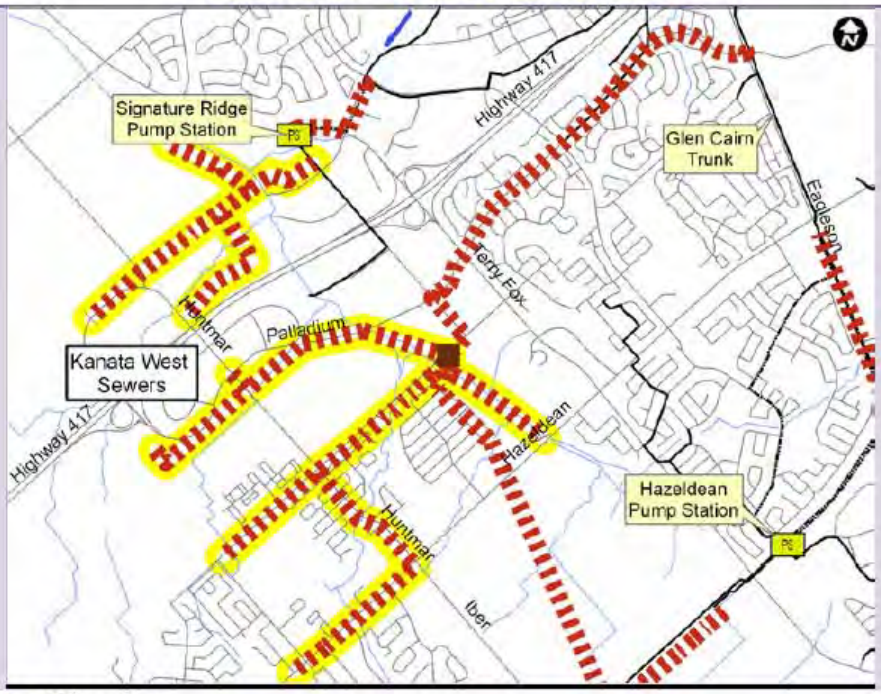
Scale 1:7500

Drawing No. S-1

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

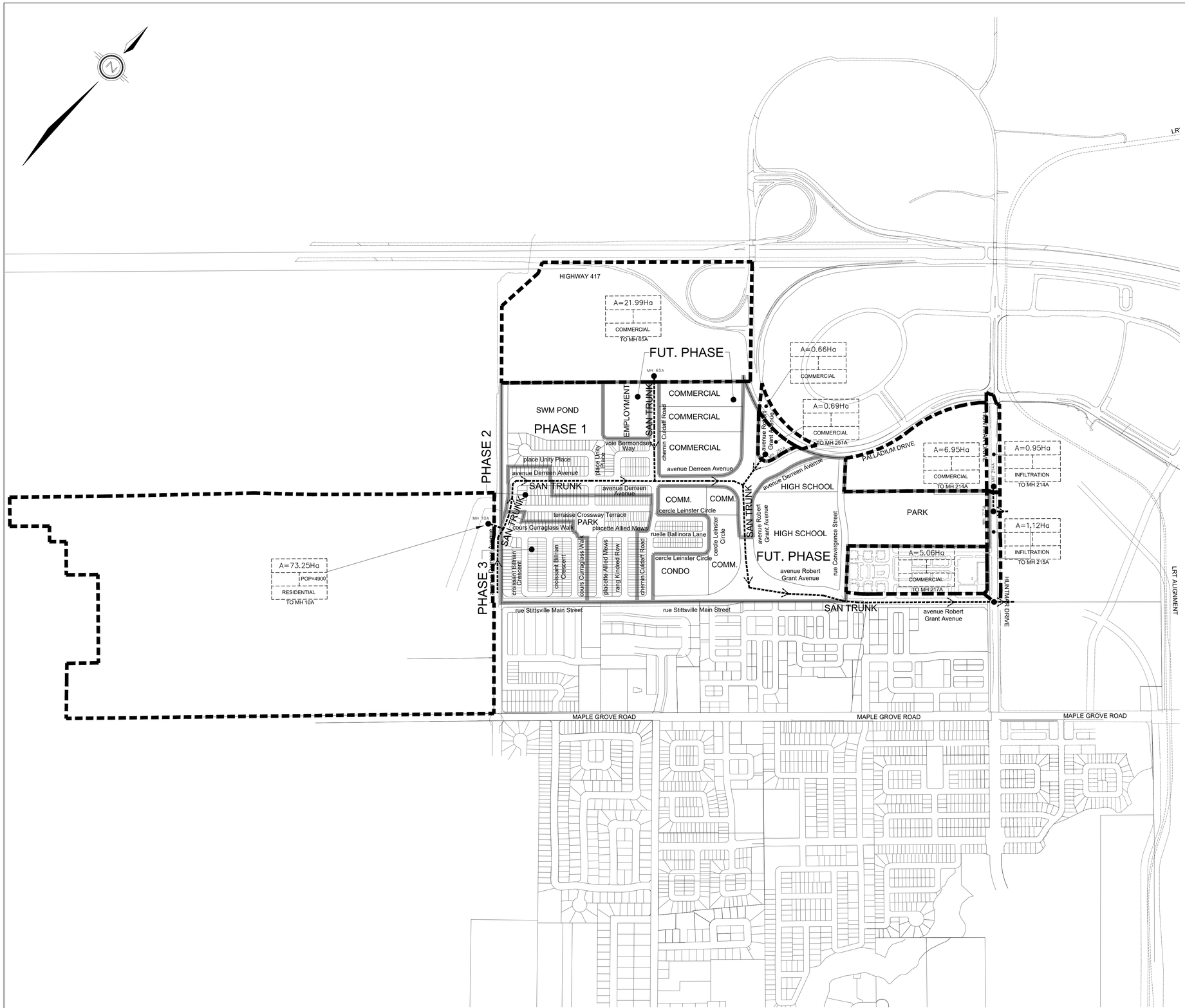
Construction Cost Estimate = $7.1 M
Capital Cost Estimate* = $11.3 M (100% Development Charges, 0% Rate)
**Including construction cost, engineering, city internal costs and contingency allowance.*

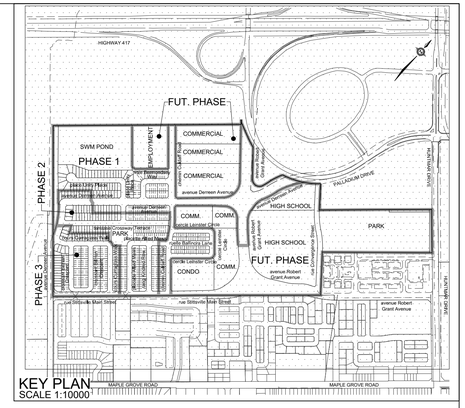
EA Requirements and Consultation

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 — 107 POP=5739

DENSITY (PERSONS/HECTARE)

EXTERNAL LAND USE — RESIDENTIAL

TOPOGRAPHIC INFORMATION

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3rd SUBMISSION 20-07-09

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CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER W. LIU 100167932 20-07-09 PROVINCE OF ONTARIO

EXTERNAL SAN DRAINAGE PLAN

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CITY PLAN No. 18059

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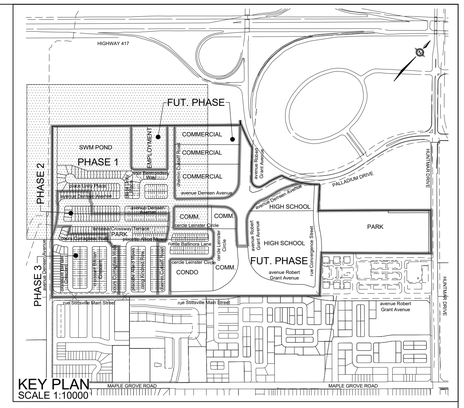

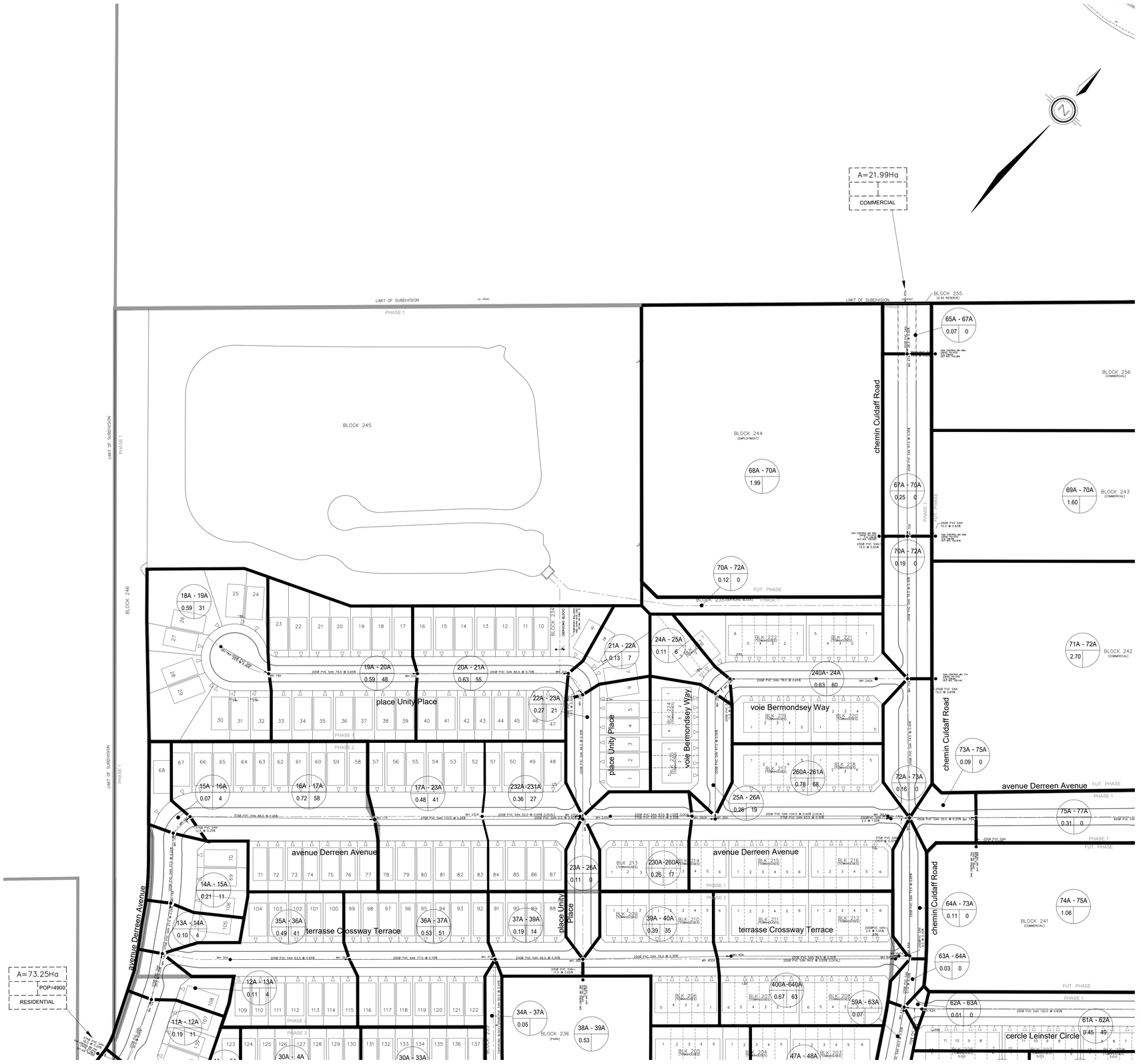

LEGEND

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

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CITY OF OTTAWA

PROJECT No. 12–624

W. LIU 100167932 20–07–09 LICENSED PROFESSIONAL ENGINEERS PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

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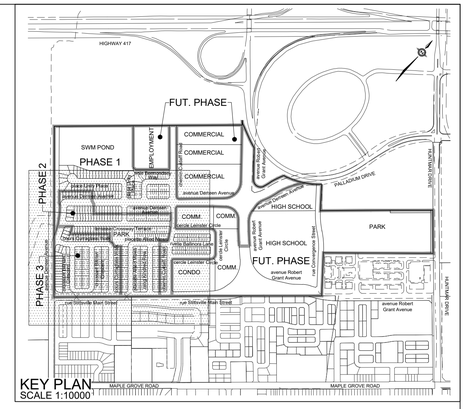
CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059



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CITY OF OTTAWA

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W. LIU
100167932
20-07-09
PROVINCE OF ONTARIO

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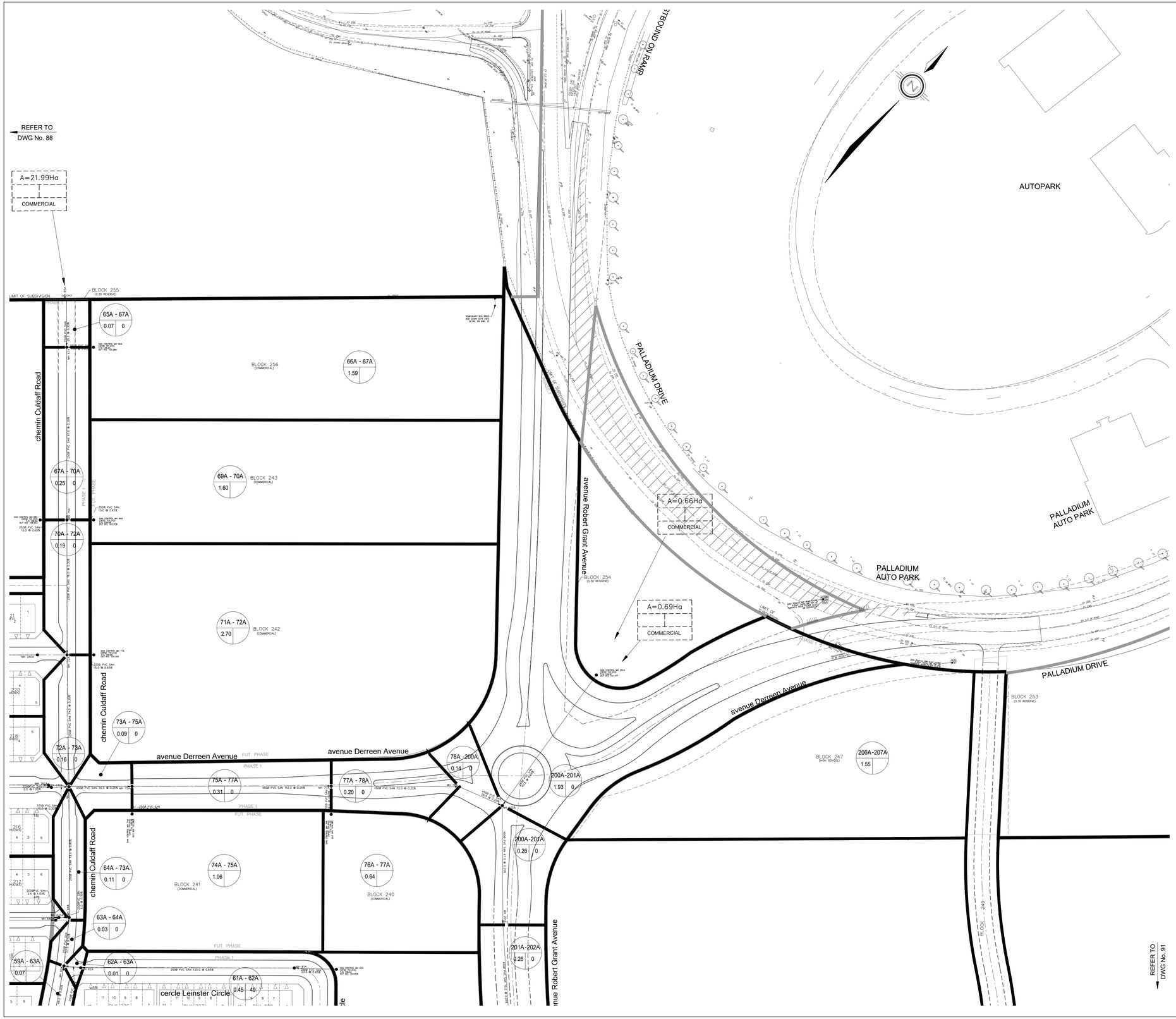

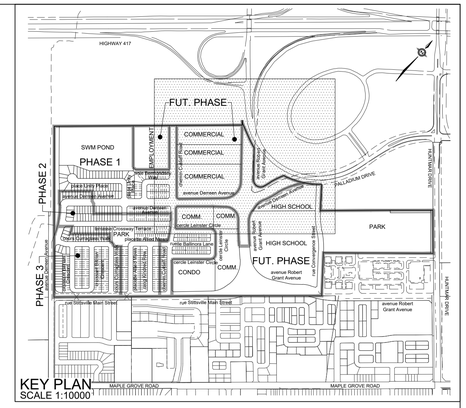

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Ottawa CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER — W. LIU — 100167932 — 20-07-09 — PROVINCE OF ONTARIO

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CITY PLAN No. 18059

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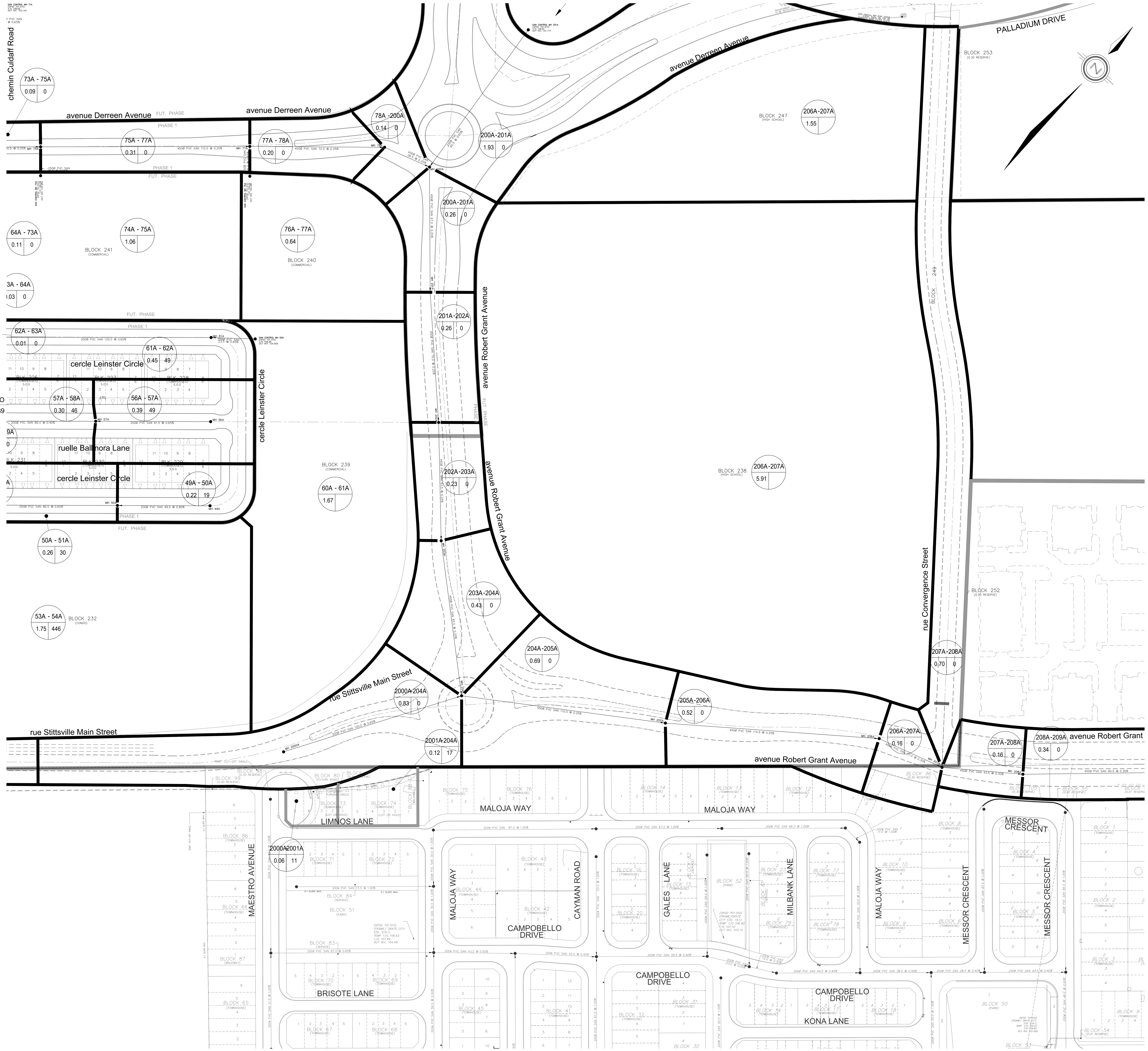

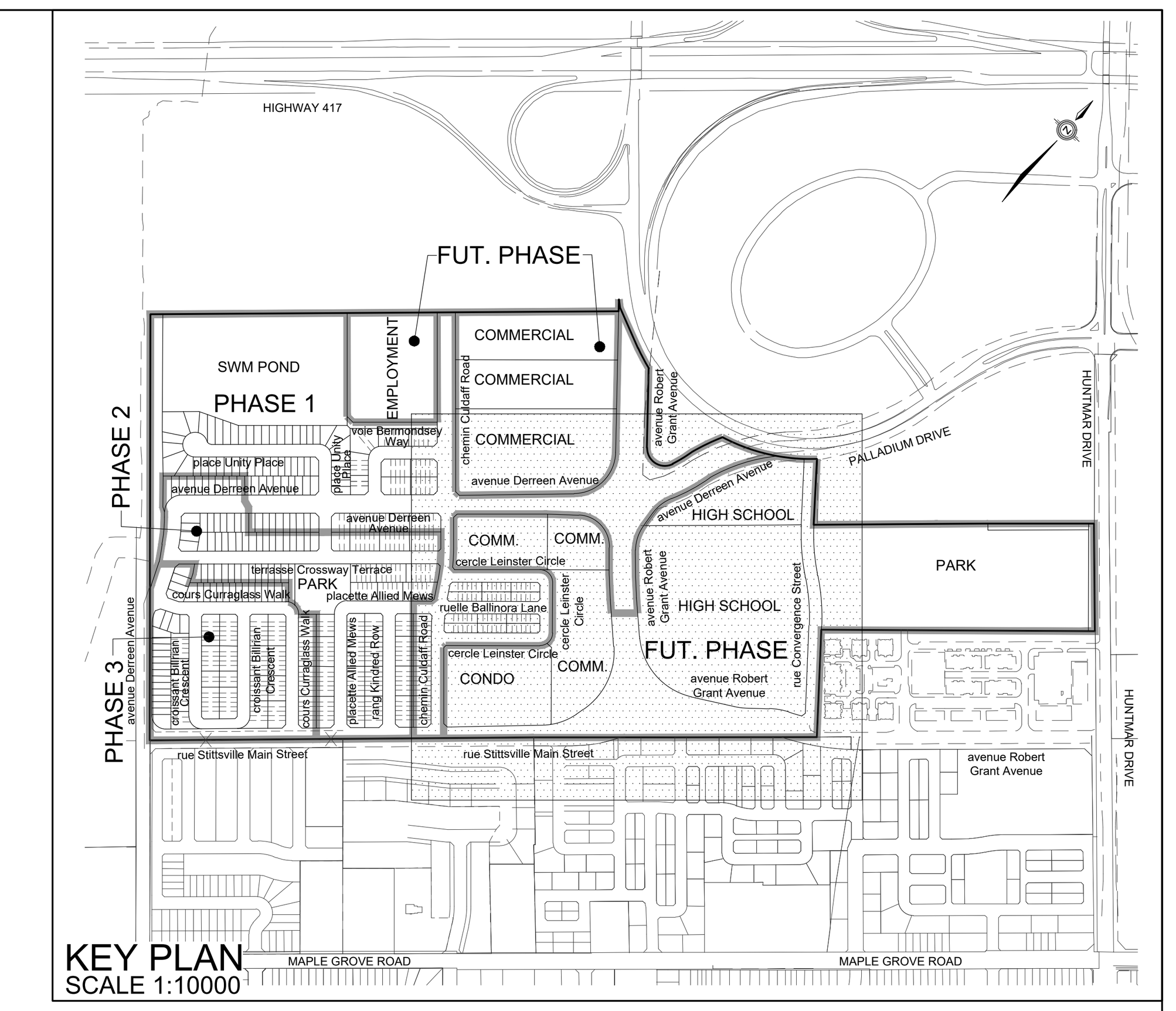

KEY PLAN
SCALE 1:10000

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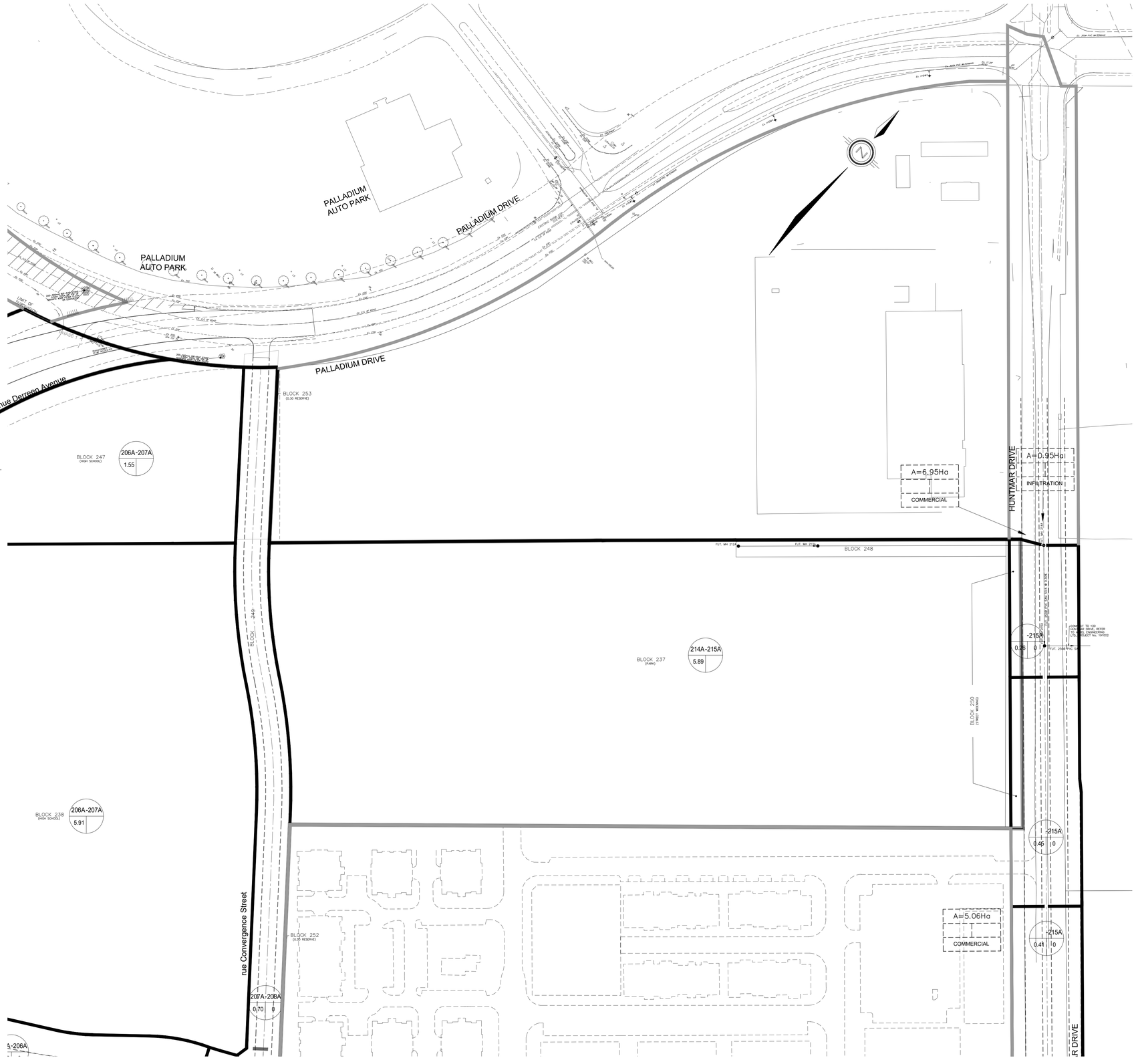
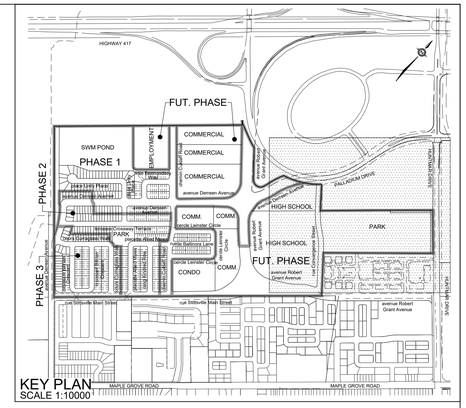
CITY PLAN No. 18059

CITY FILE No. D07-16-16-0011





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- CAP

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Ottawa CITY OF OTTAWA

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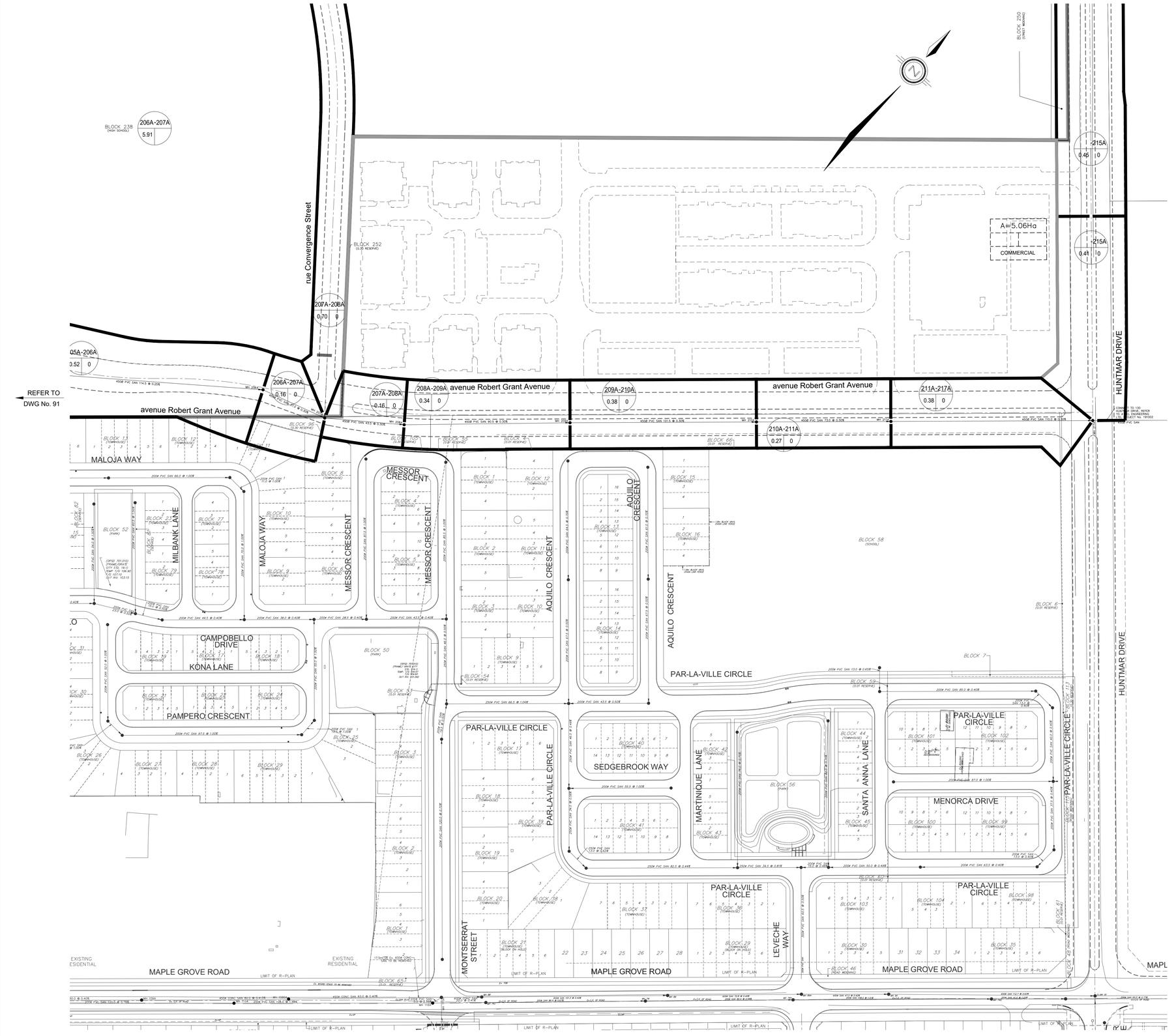
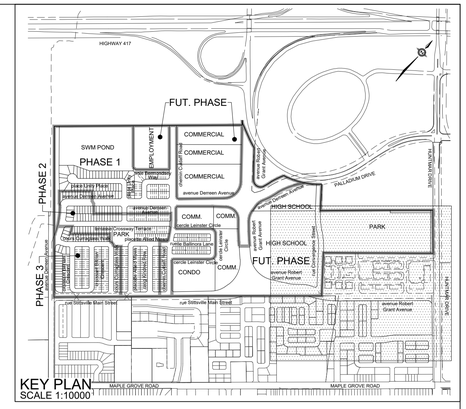
CITY FILE No. D07-16-16-0011 CITY PLAN No. 18059





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 — 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 MAY 21, 2020.
3rd SUBMISSION 20-07-09

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
3	W.L.	20-07-09	3rd SUBMISSION
2	W.L.	20-04-03	2nd SUBMISSION
1	W.L.	19-12-23	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12-624

LICENSED PROFESSIONAL ENGINEER — W. LIU — 100167932 — 20-07-09 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

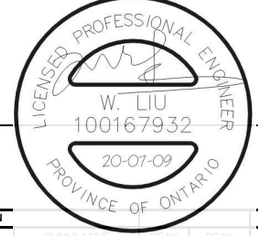
2325483 ONTARIO LTD.

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.	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				1.60	1.60		0.00		0.00	0.78	1.60	1.60	0.53	1.31	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 70A - 72A								0.00	0				1.60		0.00		0.00			1.60									
Block 256 (Commercial)																													
	66A	67A						0.00				1.59	1.59		0.00		0.00	0.77	1.59	1.59	0.52	1.30	15.0	250	0.65	47.94	0.03	0.98	0.42
To chemin Culdaff Road, Pipe 67A - 70A								0.00	0				1.59		0.00		0.00			1.59									
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), Pipe 38A - 39A								0.00	0				0.00		0.00		0.53		0.53	0.53	0.17	0.17	11.0	200	0.65	26.44	0.01	0.84	0.23
	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: **July 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				1.59		0.00		0.00		1.59	1.59									
	67A	70A	0.25				0	0.32	0				23.58		0.00		0.00	11.46	0.25	23.90	7.89	19.35	97.0	250	0.30	32.57	0.59	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				1.60		0.00		0.00		1.60	1.60									
			0.12				0	0.44	0				27.17		0.00		0.00		0.12	27.61									
	70A	72A	0.19				0	0.63	0				27.17		0.00		0.00	13.21	0.19	27.80	9.17	22.38	76.0	250	0.30	32.57	0.69	0.66	0.71
Contribution From Block 242, Pipe 71A - 72A								0.00	0				2.70		0.00		0.00		2.70	2.70									
	72A	73A	0.16				0	0.79	0				29.87		0.00		0.00	14.52	0.16	30.66	10.12	24.64	74.0	250	0.30	32.57	0.76	0.66	0.73
To avenue Derreen Avenue, Pipe 73A - 75A								0.79	0				29.87		0.00		0.00			30.66									
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

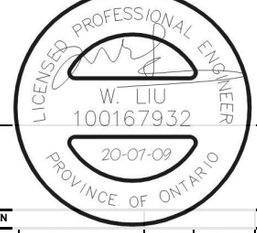
DESIGN PARAMETERS

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: **July 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				2.70	2.70		0.00		0.00	1.31	2.70	2.70	0.89	2.20	15.0	250	0.65	47.94	0.05	0.98	0.49
To chemin Culdaff Road, Pipe 72A - 73A								0.00	0				2.70		0.00		0.00			2.70									
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																													
	38A	39A						0.00					0.00		0.00	0.53	0.53	0.09	0.53	0.53	0.17	0.26	11.0	200	0.65	26.44	0.01	0.84	0.27
To terrasse Crossway Terrace, Pipe 39A - 40A								0.00	0				0.00		0.00		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.	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: **July 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	90.5	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				29.87		0.00		0.00		30.66	30.66									
	73A	75A	0.09				0	96.40	7033	2.68	61.17		31.54		0.00		0.53	15.42	0.09	128.47	42.40	118.98	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	129.53									
	75A	77A	0.31				0	96.71	7033	2.68	61.17		32.60		0.00		0.53	15.93	0.31	129.84	42.85	119.95	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	130.48									
	77A	78A	0.20				0	96.91	7033	2.68	61.17		33.24		0.00		0.53	16.24	0.20	130.68	43.12	120.54	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		33.24		0.00		0.53	16.24	0.14	130.82	43.17	120.58	26.5	450	0.25	142.55	0.85	0.90	1.01
To avenue Robert Grant Avenue, Pipe 200A - 201A								97.05	7033				33.24		0.00		0.53			130.82									
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				33.24		0.00		0.53		130.82	130.82									
			0.26				0	97.31	7033				34.59		0.00		0.53		0.26	132.43									
	200A	201A	1.93				0	99.24	7033	2.68	61.17		34.59		0.00		0.53	16.90	1.93	134.36	44.34	122.41	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

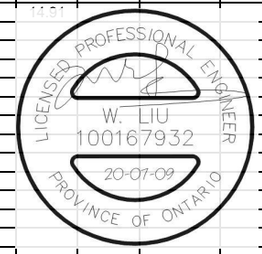
Date: **July 2020**

Sheet No. 4 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)
	201A	202A	0.26				0	99.50	7033	2.68	61.17		34.59		0.00		0.53	16.90	0.26	134.62	44.42	122.49	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		34.59		0.00		0.53	16.90	0.23	134.85	44.50	122.57	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		34.59		0.00		0.53	16.90	0.43	135.28	44.64	122.71	83.5	450	0.25	142.55	0.86	0.90	1.01
To rue Stittsville Main Street, Pipe 204A - 205A								100.16	7033				34.59		0.00		0.53			135.28									
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				34.59		0.00		0.53		135.28	136.29									
	204A	205A	0.69				0	101.86	7061	2.68	61.38		34.59		0.00		0.53	16.90	0.69	136.98	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		34.59		0.00		0.53	16.90	0.52	137.50	45.38	123.66	114.5	450	0.25	142.55	0.87	0.90	1.01
			0.16				0	102.54	7061				34.59	1.55	1.55		0.53		1.71	139.21									
	206A	207A						102.54	7061	2.68	61.38		34.59	5.91	7.46		0.53	20.53	5.91	145.12	47.89	129.80	37.0	450	0.30	156.16	0.83	0.98	1.10
			0.16				0	102.70	7061				34.59		7.46		0.53		0.16	145.28									
	207A	208A	0.70				0	103.40	7061	2.68	61.38		34.59		7.46		0.53	20.53	0.70	145.98	48.17	130.08	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		34.59		7.46		0.53	20.53	0.34	146.32	48.29	130.19	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		34.59		7.46		0.53	20.53	0.38	146.70	48.41	130.32	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		34.59		7.46		0.53	20.53	0.27	146.97	48.50	130.41	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		34.59		7.46		0.53	20.53	0.38	147.35	48.63	130.53	110.0	450	0.30	156.16	0.84	0.98	1.10
	217A	130 Huntmar Drive						104.77	7061	2.68	61.38	5.06	39.65		7.46		0.53	22.99	5.06	152.41	50.30	134.66	110.0	450	0.30	156.16	0.86	0.98	1.10
To 130 Huntmar Drive by Atrel Engineering Ltd.								104.77	7061				39.65		7.46		0.53			152.41									
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												



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.	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: **July 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
- EXISTING SANITARY SEWER
- OUTSIDE PROPOSED DEVELOPMENT
- NW=93.94 / SE=93.94 / SW=96.18 — PROPOSED OBVERT ELEVATION
- 348 — PROPOSED MANHOLE NUMBER

TRUE CONSTRUCTION

PALLADIUM DRIVE
MAPLE GROVE ROAD
MAPLE GROVE STATION
STREET No.1
STREET No.2
STREET No.3
STREET No.4
STREET No.5
STREET No.6
STREET No.7
STREET No.8
STREET No.9
STREET No.10
STREET No.11
STREET No.12
STREET No.13
HUNTMAR DRIVE
GALLEON LANE
HARMATTAN AVENUE
MONCAO LANE
ROSEHILL AVENUE
KOHIL
GREGALE LANE

69.67ha Pop.=3987 COMMERCIAL TO EX. SAN MH 98A
2.97ha Pop.=581 RESIDENTIAL TO EX. SAN MH 98A
2.83ha Pop.=581
4.03ha Pop.=656 RESIDENTIAL
1.34ha 64 | 177
0.07ha 0 | 0
5.89ha Pop.=196 GREEN SPACE
2.07ha Pop.=0 INFILTRATION
6.95ha Pop.=696 COMMERCIAL
104.95ha Pop.=7061 RESIDENTIAL
38.99ha Pop.=3899 COMMERCIAL
7.46ha Pop.=746 INSTITUTIONAL
0.63ha Pop.=7.6 GREEN SPACE
1.05ha Pop.=0 INFILTRATION
0.74ha Pop.=74 INSTITUTIONAL
206.29ha Pop.=17428 RESIDENTIAL
71.36ha Pop.=7138 COMMERCIAL
14.99ha Pop.=499 INSTITUTIONAL
15.36ha Pop.=310 GREEN SPACE
2.40ha Pop.=240 INSTITUTIONAL

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

SCALE 1:500 (15m 0 45m)

DESIGN AGS
CHECKED JMD
DRAWN CED
CHECKED AGS
APPROVED JMD

LICENSED PROFESSIONAL ENGINEER A. G. Y. SAUVE 100142393 Oct 7, 2020 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER J. M. J. LECOEUR OCT 9 2020 PROVINCE OF ONTARIO

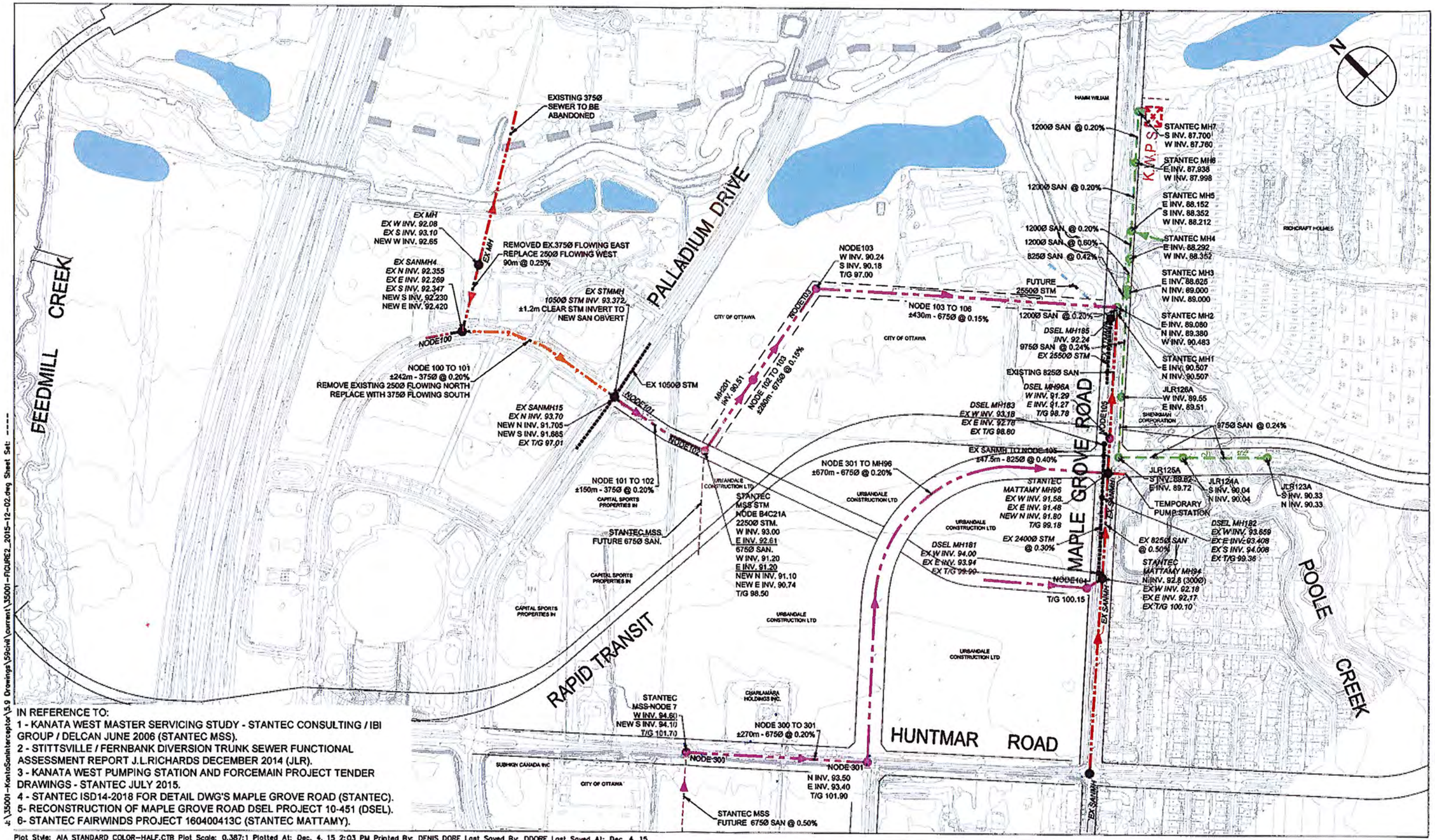
ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

PROJECT No. 191002
DATE JANUARY 2020
DRAWING No. 191002-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-KantoSanInterceptor\5.0 Drawings\50civil\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: N.T.S.

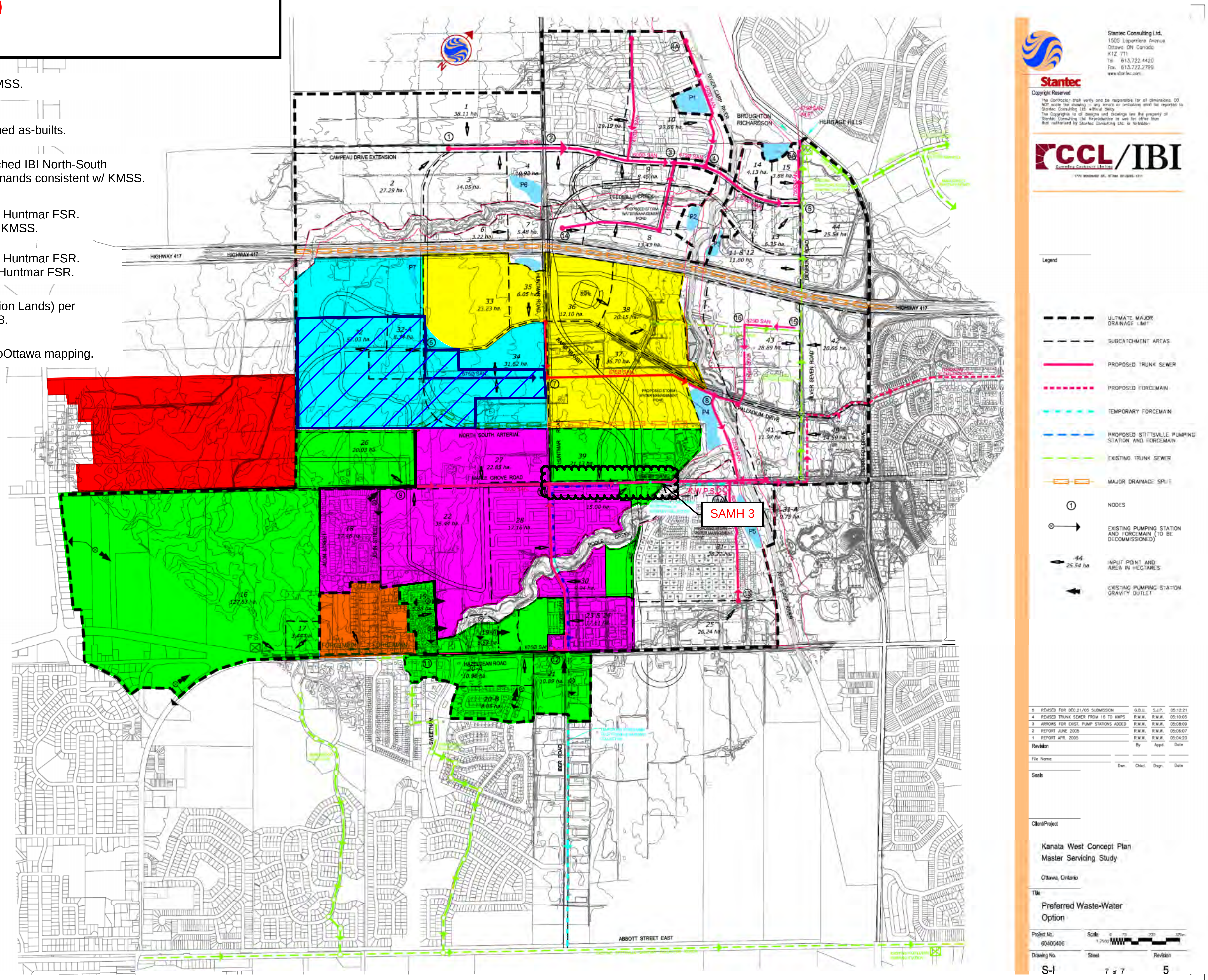
Project Title: KANATA WEST NORTH SOUTH SANITARY INTERCEPTOR

Drawing Title: PROPOSED ALIGNMENTS FOR KANATA WEST DEVELOPMENT NORTH-SOUTH SANITARY COLLECTOR SEWERS FUNCTIONAL DESIGN STUDY

Sheet No.: 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.



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.

Checked:

Dwg. Reference:

PROJECT: **195 Huntmar Drive**

LOCATION: **City of Ottawa**

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: **October 2020**
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

LOCATION				RESIDENTIAL						COMMERCIAL , INSTITUTIONAL						GREEN SPACE						PEAK EXT.FLOW Q(i) (L/S)	PEAK DES. Q(d) (L/S)	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)			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							6.95	695.0	6.95	695	1.50	3.38	5.89	196.0	5.89	196	1.50	0.95	4.24	8.57	PVC	200	0.32	42.0	18.96	55%	0.60	96.81	96.61	96.67	96.47
MH	213A	MH	214A									6.95	695	1.50	3.38			5.89	196	1.50	0.95	4.24	8.57	PVC	200	0.32	120.0	18.96	55%	0.60	96.67	96.47	96.28	96.08
MH	214B	MH	214A	1.21		1.21																0.40	0.40	PVC	200	0.32	120.0	18.96	98%	0.60	96.66	96.46	96.27	96.07
MH	214A	MH	215A			1.21						6.95	695	1.50	3.38			5.89	196	1.50	0.95	4.64	8.97	PVC	250	0.30	53.0	33.08	73%	0.67	96.27	96.02	96.11	95.86
MH	215A	MH	302	0.42	33.0	1.63	33	3.68	0.39			6.95	695	1.50	3.38			5.89	196	1.50	0.95	4.78	9.50	PVC	250	0.32	98.5	34.38	72%	0.69	96.05	95.80	95.73	95.48
MH	302	MH	303	0.43	27.0	2.06	60	3.64	0.71			6.95	695	1.50	3.38			5.89	196	1.50	0.95	4.92	9.96	PVC	250	0.32	102.0	34.38	71%	0.69	95.73	95.48	95.40	95.15
MH	303	MH	305	0.51	38.0	2.57	98	3.60	1.14			6.95	695	1.50	3.38			5.89	196	1.50	0.95	5.09	10.56	PVC	250	0.32	107.0	34.38	69%	0.69	95.40	95.15	95.05	94.80
MH	304	MH	305	5.44	832.0	5.44	832	3.28	8.84													1.80	10.64	PVC	200	0.32	56.0	18.96	44%	0.60	95.23	95.03	95.05	94.85
MH	305	MH	319	0.27	30.0	8.28	960	3.25	10.11			6.95	695	1.50	3.38			5.89	196	1.50	0.95	6.97	21.41	PVC	300	0.32	82.0	54.32	61%	0.77	95.05	94.75	94.79	94.49
MH	308	MH	309	0.76	59.0	0.76	59	3.64	0.70													0.25	0.95	PVC	200	0.65	80.0	26.86	96%	0.84	98.32	98.12	97.80	97.60
MH	309	MH	311			0.76	59	3.64	0.70													0.25	0.95	PVC	200	0.32	11.0	18.96	95%	0.60	97.77	97.57	97.73	97.53
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	96.87	96.67	96.76	96.56
MH	311	MH	313	0.13		0.89	59	3.64	0.70			0.74	74	1.50	0.36							0.54	1.59	PVC	200	0.32	71.5	18.96	92%	0.60	96.70	96.50	96.47	96.27
MH	312	MH	313	0.40	24.0	0.40	24	3.70	0.29													0.13	0.42	PVC	200	0.65	88.0	26.86	98%	0.84	98.18	97.98	97.61	97.41
MH	313	MH	315	0.22	14.0	1.51	97	3.60	1.13			0.74	74	1.50	0.36							0.74	2.23	PVC	200	0.32	56.0	18.96	88%	0.60	96.41	96.21	96.23	96.03
MH	314	MH	315	0.29	17.0	0.29	17	3.71	0.20													0.10	0.30	PVC	200	0.65	41.5	26.86	99%	0.84	96.50	96.30	96.23	96.03
MH	315	MH	318	0.56	48.0	2.36	162	3.54	1.86			0.74	74	1.50	0.36							1.02	3.24	PVC	200	0.32	82.0	18.96	83%	0.60	96.17	95.97	95.90	95.70
MH	316	MH	317	0.31	21.0	0.31	21	3.70	0.25							0.68	23.0	0.68	23	1.50	0.11	0.33	0.69	PVC	200	0.65	60.0	26.86	97%	0.84	98.12	97.92	97.73	97.53
MH	317	MH	318	0.27	14.0	0.58	35	3.67	0.42									0.68	23	1.50	0.11	0.42	0.94	PVC	200	0.32	84.0	18.96	95%	0.60	97.73	97.53	97.46	97.26
MH	318	MH	319	0.57	48.0	3.51	245	3.49	2.77			0.74	74	1.50	0.36			0.68	23	1.50	0.11	1.63	4.87	PVC	200	0.32	82.0	18.96	74%	0.60	95.90	95.70	95.63	95.43
MH	319	MH	320	0.50	41.0	12.29	1246	3.19	12.88			7.69	769	1.50	3.74			6.57	219	1.50	1.06	8.76	26.44	PVC	300	0.20	83.0	42.94	38%	0.61	94.79	94.49	94.62	94.32
MH	320	MH	343	0.52	45.0	12.81	1291	3.18	13.31			7.69	769	1.50	3.74			6.57	219	1.50	1.06	8.93	27.04	PVC	300	0.20	85.0	42.94	37%	0.61	94.62	94.32	94.45	94.15
MH	217A	MH	329	107.01	7067.0	107.01	7067	2.68	61.43	46.45	4644.0	46.45	4644	1.50	22.58	0.53	17.6	0.53	18	1.50	0.09	50.82	134.90	CONC	450	0.40	61.0	188.11	28%	1.15	97.09	96.64	96.85	96.40
MH	328	MH	329	0.75	60.0	0.75	60	3.64	0.71													0.25	0.95	PVC	200	1.00	103.0	33.31	97%	1.05	98.48	98.28	97.45	97.25
MH	329	MH	331	0.30		108.06	7127	2.68	61.88			46.45	4644	1.50	22.58			0.53	18	1.50	0.09	51.16	135.71	CONC	450	0.40	79.0	188.11	28%	1.15	96.85	96.40	96.53	96.08
MH	330	MH	331	0.74	48.0	0.74	48	3.65	0.57													0.24	0.81	PVC	200	1.00	84.0	33.31	98%	1.05	98.37	98.17	97.53	97.33
MH	331	MH	337	0.31		109.11	7175	2.68	62.25			46.45	4644	1.50	22.58			0.53	18	1.50	0.09	51.51	136.42	CONC	450	0.40	82.0	188.11	27%	1.15	96.53	96.08	96.20	95.75
MH	332	MH	333	0.87	72.0	0.87	72	3.62	0.85													0.29	1.13	PVC	200	0.65	99.5	26.86	96%	0.84	98.30	98.10	97.65	97.45
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	97.65	97.45	97.33	97.13
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	97.27	97.07	97.18	96.98
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	97.15	96.95	97.11	96.91
MH	336	MH	337	0.67	53.0	2.38	188	3.53	2.15													0.79	2.93	PVC	200	0.60	88.0	25.80	89%	0.81	97.08	96.88	96.55	96.35
MH	337	MH	343	0.31		111.80	7363	2.67	63.67			46.45	4644	1.50	22.58			0.53	18	1.50	0.09	52.40	138.73	CONC	450	0.40	82.5	188.11	26%	1.15	96.20	95.75	95.87	95.42
MH	338	MH	339	0.10		0.10				1.02	102.0	1.02	102	1.50	0.50							0.37	0.87	PVC	200	0.65	57.0	26.86	97%	0.84	97.16	96.96	96.79	96.59
MH	339	MH	340	0.10		0.20				1.22	183.0	2.24	285	1.50	1.39							0.81	2.19	PVC	200	0.32	54.0	18.96	88%	0.60	96.79	96.59	96.62	96.42
MH	340	MH	341	0.10		0.30						2.24	285	1.50	1.39							0.84	2.22	PVC	200	0.32	58.0	18.96	88%	0.60	96.62	96.42	96.43	96.23
MH	341	MH	342	0.28	17.0	0.58	17	3.71	0.20			2.24	285	1.50	1.39							0.93	2.52	PVC	200	0.32	70.0	18.96	87%	0.60	96.43	96.23	96.20	96.00
MH	342	MH	343	2.02	295.0	2.60	312	3.46	3.50			2.24	285	1.50	1.39							1.60	6.48	PVC	200	0.32	56.0	18.96	66%	0.60	96.20	96.00	96.02	95.82
MH	343	MH	344	0.53		127.74	8966	2.60	75.58			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	63.10	167.54	CONC	525	0.30	119.0	245.74	32%	1.10	94.45	93.93	94.09	93.57
MH	350	MH	351	0.22	22.0	0.22	22	3.70	0.26													0.07	0.34	PVC	200	0.65	51.5	26.86	99%	0.84	96.65	96.45	96.32	96.12
MH	351	MH	352	0.46	82.0	0.68	104	3.59	1.21													0.22	1.43	PVC	200	0.32	16.5	18.96	92%	0.60	95.72	95.52	95.67	95.47
MH	352	MH	353			0.68	104	3.59	1.21													0.22	1.43	PVC	200	0.32	11.0	18.96	92%	0.60	95.64	95.44	95.60	95.40
MH	353	MH	355	0.40		1.08	104	3.59	1.21													0.36	1.57	PVC	200	0.32	39.0	18.96	92%	0.60	95.57	95.37	95.44	95.24
MH	354	MH	355	0.31	44.0	0.31	44	3.66	0.52													0.10	0.62	PVC	200	0.65	71.0	26.86	98%	0.84	96.87	96.67	96.41	96.21
MH	355	MH	359			1.39	148	3.55	1.70													0.46	2.16	PVC	200	0.32	46.5	18.96	89%	0.60	95.15	94.95	95.00	94.80
MH	356	MH	357	0.28	30.0	0.28	30	3.68	0.36													0.09	0.45	PVC	200	0.65	71.5	26.86	98%	0.84	95.85	95.65	95.39	95.19
MH	357	MH	358	0.11	3.0	0.39	33	3.68	0.39													0.13	0.52	PVC	200	0.32	20.0	18.96	97%	0.60	95.33	95.13	95.27	95.07
MH	358	MH	359	1.29	196.0	1.68	229	3.50	2.60													0.55	3.15	PVC	200	0.32	65.0	18.96	83%	0.60	95.27	95.07	95.06	94.86
MH	359	MH	360	0.34		3.41	377	3.43	4.19													1.13	5.31	PVC	200	0.32	120.0	18.96	72%	0.60	95.00	94.80	94.61	94.41
MH	360	MH	344	0.19		3.60	377	3.43	4.19													1.19	5.38	PVC	200	0.32	50.5	18.96	72%	0.60	94.58	94.38	94.42	94.22
MH	344	MH	345			131.34	9343	2.59	78.33			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	64.29	171.47	CONC	525	0.30	14.0	245.74	30%	1.10	94.06	93.54	94.02	93.50
MH	345	MH	346	0.58		131.92	9343	2.59	78.33			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	64.48	171.67	CONC	525	0.30	132.5	245.74	30%	1.10	93.99	93.47	93.59	93.07
MH	346	MH	347	0.61		132.53	9343	2.59	78.33			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	64.68	171.87	CONC	525	0.30	130.5	245.74	30%	1.10	93.59	93.07	93.20	92.68
MH	347	MH	348	0.11		132.64	9343	2.59	78.33			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	64.72	171.90	CONC	525	0.30	30.0	245.74	30%	1.10	93.17	92.65	93.08	92.56
MH	348	EX.MH	96			132.64	9343	2.59	78.33			56.38	5698	1.50	27.70			7.10	237	1.50	1.15	64.72	171.90	CONC	525	0.30	10.5	245.74	30%	1.10	92.55	92.03	92.52	92.00
EX.MH	96	EX.MH	97	258.26	18006.0	390.90	27349	2.21	196.18	148.44	14844.0	204.82	20542	1.50	99.86	15.36	510.0	22.46	747	1.50	3.63	204.00	503.67	CONC	900	0.38	47.5	1164.20	57%	1.77	92.35	91.45		

Sanitary Trunk Sewers
Proposed Sanitary Sewers
Future External Sanitary Sewers
Existing Sanitary Sewers

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Oct. 7, 2020
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

Please take note that due to current COVID situation, I am working remotely and Phone communication and messaging may not be reliable at this time. Preferred method of communications will be e-mails during this period. If your preference is telephone communication, please indicate this via e-mail and provide a contact telephone number.
Absence alert:

I apologize for any inconvenience.

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 (ANNUAL)

Table 7B

PROJECT: **130 Huntmar Drive**
DATE: **October 2020** CLIENT: Urbandale Corporation
DESIGNED BY: AGS PROJECT #: 191002
CHECKED BY: AGS BY: Atrel Engineering Ltd

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

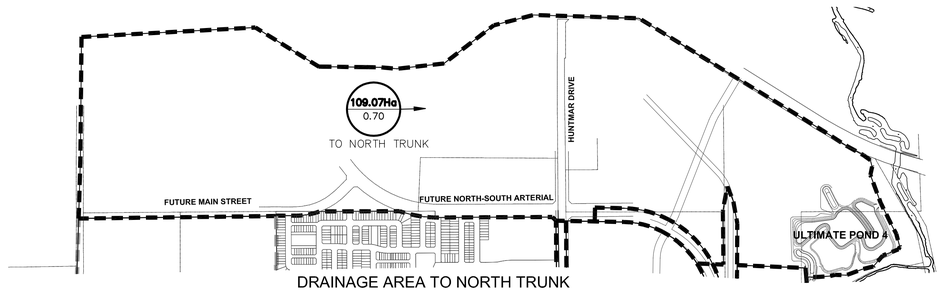
LOCATION				RESIDENTIAL						COMMERCIAL , INSTITUTIONAL						GREEN SPACE						PEAK EXT.FLOW Q(i) (L/S)	PEAK DES. Q(d) (L/S)	SEWER DATA						UpStream		DwnStream		HGL SLOPE (%)	FRICT. LOSS (M)	MINOR LOSS (M)	UpStream		Down MH Hgl (M)	USF (m)	USF Freeboard (m)
				INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW	INDIVIDUAL		CUMULATIVE		PEAKING	FLOW			TYPE	SLOPE	LENGTH	CAP.	Remaining	VEL.	Obv.	Inv.	Obv.	Inv.				Hgl at	Hgl Out			
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)			PIPE	(%)	(M)	(L/S)	Capacity (%)	(M/S)	(M)	(M)	(M)	(M)				UP-MH (M)	UP-MH (M)			
MH	212A	MH	213A							6.95	695.0	6.95	695	1.50	2.41	5.89	196.0	5.89	196	1.50	0.68	3.85	6.95	PVC	0.32	42.0	18.96	63%	0.60	96.81	96.61	96.67	96.47	0.04	0.02		96.81	96.81	96.67	99.79	2.98
MH	213A	MH	214A									6.95	695	1.50	2.41			5.89	196	1.50	0.68	3.85	6.95	PVC	0.32	120.0	18.96	63%	0.60	96.67	96.47	96.28	96.08	0.04	0.05		96.67	96.67	96.28	99.45	2.78
MH	214B	MH	214A	1.21		1.21																0.36	0.36	PVC	0.32	120.0	18.96	98%	0.60	96.66	96.46	96.27	96.07				96.66	96.66	96.27	99.45	2.79
MH	214A	MH	215A			1.21						6.95	695	1.50	2.41			5.89	196	1.50	0.68	4.22	7.31	PVC	0.30	53.0	33.08	78%	0.67	96.27	96.02	96.11	95.86	0.02	0.01		96.27	96.27	96.12	99.50	3.23
MH	215A	MH	302	0.42	33.0	1.63	33	3.68	0.28			6.95	695	1.50	2.41			5.89	196	1.50	0.68	4.34	7.72	PVC	0.32	98.5	34.38	78%	0.69	96.05	95.80	95.73	95.48	0.02	0.02		96.12	96.12	96.10	99.59	3.47
MH	302	MH	303	0.43	27.0	2.06	60	3.64	0.51			6.95	695	1.50	2.41			5.89	196	1.50	0.68	4.47	8.07	PVC	0.32	102.0	34.38	77%	0.69	95.73	95.48	95.40	95.15	0.02	0.02		96.10	96.10	96.08	98.53	2.43
MH	303	MH	305	0.51	38.0	2.57	98	3.60	0.82			6.95	695	1.50	2.41			5.89	196	1.50	0.68	4.62	8.53	PVC	0.32	107.0	34.38	75%	0.69	95.40	95.15	95.05	94.80	0.02	0.02		96.08	96.08	96.06	98.43	2.35
MH	304	MH	305	5.44	832.0	5.44	832	3.28	6.32													1.63	7.95	PVC	0.32	56.0	18.96	58%	0.60	95.23	95.03	95.05	94.85	0.06	0.03		96.09	96.09	96.06	97.50	1.41
MH	305	MH	319	0.27	30.0	8.28	960	3.25	7.22			6.95	695	1.50	2.41			5.89	196	1.50	0.68	6.34	16.65	PVC	0.32	82.0	54.32	69%	0.77	95.05	94.75	94.79	94.49	0.03	0.02		96.06	96.06	96.04	97.59	1.53
MH	308	MH	309	0.76	59.0	0.76	59	3.64	0.50													0.23	0.73	PVC	0.65	80.0	26.86	97%	0.84	98.32	98.12	97.80	97.60				98.32	98.32	97.80	99.08	0.76
MH	309	MH	311			0.76	59	3.64	0.50													0.23	0.73	PVC	0.32	11.0	18.96	96%	0.60	97.77	97.57	97.73	97.53				97.77	97.77	97.73	98.97	1.20
MH	310	MH	311							0.74	74.0	0.74	74	1.50	0.26							0.22	0.48	PVC	1.00	11.0	33.31	99%	1.05	96.87	96.67	96.76	96.56				96.87	96.87	96.76	98.50	1.63
MH	311	MH	313	0.13		0.89	59	3.64	0.50			0.74	74	1.50	0.26							0.49	1.24	PVC	0.32	71.5	18.96	93%	0.60	96.70	96.50	96.47	96.27	0.00			96.70	96.70	96.47	98.97	2.27
MH	312	MH	313	0.40	24.0	0.40	24	3.70	0.21													0.12	0.33	PVC	0.65	88.0	26.86	99%	0.84	98.18	97.98	97.61	97.41				98.18	98.18	97.61	99.00	0.82
MH	313	MH	315	0.22	14.0	1.51	97	3.60	0.81			0.74	74	1.50	0.26							0.68	1.74	PVC	0.32	56.0	18.96	91%	0.60	96.41	96.21	96.23	96.03	0.00			96.41	96.41	96.23	98.89	2.48
MH	314	MH	315	0.29	17.0	0.29	17	3.71	0.15													0.09	0.23	PVC	0.65	41.5	26.86	99%	0.84	96.50	96.30	96.23	96.03				96.50	96.50	96.23	98.90	2.40
MH	315	MH	318	0.56	48.0	2.36	162	3.54	1.33			0.74	74	1.50	0.26							0.93	2.52	PVC	0.32	82.0	18.96	87%	0.60	96.17	95.97	95.90	95.70	0.01			96.17	96.17	96.05	98.83	2.66
MH	316	MH	317	0.31	21.0	0.31	21	3.70	0.18							0.68	23.0	0.68	23	1.50	0.08	0.30	0.56	PVC	0.65	60.0	26.86	98%	0.84	98.12	97.92	97.73	97.53				98.12	98.12	97.73	98.92	0.80
MH	317	MH	318	0.27	14.0	0.58	35	3.67	0.30									0.68	23	1.50	0.08	0.38	0.76	PVC	0.32	84.0	18.96	96%	0.60	97.73	97.53	97.46	97.26	0.00			97.73	97.73	97.46	98.75	1.02
MH	318	MH	319	0.57	48.0	3.51	245	3.49	1.98			0.74	74	1.50	0.26			0.68	23	1.50	0.08	1.48	3.80	PVC	0.32	82.0	18.96	80%	0.60	95.90	95.70	95.63	95.43	0.01	0.01		96.05	96.05	96.04	98.75	2.70
MH	319	MH	320	0.50	41.0	12.29	1246	3.19	9.20			7.69	769	1.50	2.67			6.57	219	1.50	0.76	7.97	20.59	PVC	0.20	83.0	42.94	52%	0.61	94.79	94.49	94.62	94.32	0.05	0.04		96.04	96.04	96.00	97.51	1.47
MH	320	MH	343	0.52	45.0	12.81	1291	3.18	9.50			7.69	769	1.50	2.67			6.57	219	1.50	0.76	8.12	21.06	PVC	0.20	85.0	42.94	51%	0.61	94.62	94.32	94.45	94.15	0.05	0.04		96.00	96.00	95.96	97.59	1.59
MH	217A	MH	329	107.01	7067.0	107.01	7067	2.68	43.88	46.45	4644.0	46.45	4644	1.50	16.13	0.53	17.6	0.53	18	1.50	0.06	46.20	106.26	CONC	0.40	61.0	188.11	44%	1.15	97.09	96.64	96.85	96.40	0.13	0.08		97.09	97.09	96.85	99.75	2.66
MH	328	MH	329	0.75	60.0	0.75	60	3.64	0.51													0.23	0.73	PVC	1.00	103.0	33.31	98%	1.05	98.48	98.28	97.45	97.25				98.48	98.48	97.45	99.20	0.72
MH	329	MH	331	0.30		108.06	7127	2.68	44.20			46.45	4644	1.50	16.13			0.53	18	1.50	0.06	46.51	106.90	CONC	0.40	79.0	188.11	43%	1.15	96.85	96.40	96.53	96.08	0.13	0.10		96.85	96.85	96.53	99.08	2.23
MH	330	MH	331	0.74	48.0	0.74	48	3.65	0.41													0.22	0.63	PVC	1.00	84.0	33.31	98%	1.05	98.37	98.17	97.53	97.33				98.37	98.37	97.53	99.10	0.73
MH	331	MH	337	0.31		109.11	7175	2.68	44.46			46.45	4644	1.50	16.13			0.53	18	1.50	0.06	46.83	107.47	CONC	0.40	82.0	188.11	43%	1.15	96.53	96.08	96.20	95.75	0.13	0.11		96.53	96.53	96.20	99.00	2.47
MH	332	MH	333	0.87	72.0	0.87	72	3.62	0.60													0.26	0.86	PVC	0.65	99.5	26.86	97%	0.84	98.30	98.10	97.65	97.45	0.00			98.30	98.30	97.65	98.90	0.60
MH	333	MH	334	0.78	63.0	1.65	135	3.56	1.11													0.50	1.61	PVC	0.32	98.5	18.96	92%	0.60	97.65	97.45	97.33	97.13	0.00			97.65	97.65	97.33	99.15	1.50
MH	334	MH	335	0.06		1.71	135	3.56	1.11													0.51	1.63	PVC	0.32	28.5	18.96	91%	0.60	97.27	97.07	97.18	96.98	0.00			97.27	97.27	97.18	99.05	1.78
MH	335	MH	336			1.71	135	3.56	1.11													0.51	1.63	PVC	0.32	11.0	18.96	91%	0.60	97.15	96.95	97.11	96.91	0.00			97.15	97.15	97.11	99.00	1.85
MH	336	MH	337	0.67	53.0	2.38	188	3.53	1.53													0.71	2.25	PVC	0.60	88.0	25.80	91%	0.81	97.08	96.88	96.55	96.35	0.01			97.08	97.08	96.55	99.00	1.92
MH	337	MH	343	0.31		111.80	7363	2.67	45.48			46.45	4644	1.50	16.13			0.53	18	1.50	0.06	47.63	109.30	CONC	0.40	82.5	188.11	42%	1.15	96.20	95.75	95.87	95.42	0.14	0.11		96.20	96.20	95.96	98.90	2.70
MH	338	MH	339	0.10		0.10				1.02	102.0	1.02	102	1.50	0.35							0.34	0.69	PVC	0.65	57.0	26.86	97%	0.84	97.16	96.96	96.79	96.59				97.16	97.16	96.79	97.71	0.55
MH	339	MH	340	0.10		0.20				1.22	183.0	2.24	285	1.50	0.99							0.73	1.72	PVC	0.32	54.0	18.96	91%	0.60	96.79	96.59	96.62	96.42	0.00			96.79	96.79	96.62	98.10	1.31
MH	340	MH	341	0.10		0.30						2.24	285	1.50	0.99							0.76	1.75	PVC	0.32	58.0	18.96	91%	0.60	96.62	96.42	96.43	96.23	0.00			96.62	96.62	96.43	99.03	2.41
MH	341	MH	342	0.28	17.0	0.58	17	3.71	0.15			2.24	285	1.50	0.99							0.85	1.98	PVC	0.32	70.0	18.96	90%	0.60	96.43	96.23	96.20	96.00	0.00			96.43	96.43	96.20	97.98	1.55
MH	342	MH	343	2.02	295.0	2.60	312	3.46	2.50			2.24	285	1.50	0.99							1.45	4.94	PVC	0.32	56.0	18.96	74%	0.60	96.20	96.00	96.02	95.82	0.02	0.01		96.20	96.20	96.02	97.92	1.72
MH	343	MH	344	0.53		127.74	8966	2.60	53.99			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	57.37	131.96	CONC	0.30	119.0	245.74	46%	1.10	94.45	93.93	94.09	93.57	0.09	0.10		95.96	95.96	95.86	97.85	1.89
MH	350	MH	351	0.22	22.0	0.22	22	3.70	0.19													0.07	0.25	PVC	0.65	51.5	26.86	99%	0.84	96.65	96.45	96.32	96.12				96.65	96.65	96.32	97.50	0.85
MH	351	MH	352	0.46	82.0	0.68	104	3.59	0.86													0.20	1.07	PVC	0.32	16.5	18.96	94%	0.60	95.72	95.52	95.67	95.47	0.00			95.89	95.89	95.89	96.80	0.91
MH	352	MH	353			0.68	104	3.59	0.86													0.20	1.07	PVC	0.32	11.0	18.96	94%	0.60	95.64	95.44	95.60	95.40	0.00			95.89	95.89	95.89	96.60	0.71
MH	353	MH	355	0.40		1.08	104	3.59	0.86													0.32	1.19	PVC	0.32	39.0	18.96	94%	0.60	95.57	95.37	95.44	95.24	0.00			95.89	95.89	95.89	96.60	0.71
MH	354	MH	355	0.31	44.0	0.31	44	3.66	0.37													0.09	0.47	PVC	0.65	71.0	26.86	98%	0.84	96.87	96.67	96.41	96.21				96.87	96.87	96.41	97.45	0.58
MH	355	MH	359			1.39	148	3.55	1.22													0.42	1.63	PVC	0.32	46.5	18.96	91%	0.60	95.15	94.95	95.00	94.80	0.00			95.89	95.89	95.89	96.55	0.66
MH	356	MH	357	0.28	30.0	0.28	30	3.68	0.26													0.08	0.34	PVC	0.65	71.5	26.86	99%	0.84	95.85	95.65	95.39	95.19				95.89	95.89	95.89	97.50	1.61
MH	357	MH	358	0.11	3.0	0.39	33	3.68	0.28													0.12	0.40	PVC	0.32	20.0	18.96	98%	0.60	95.33	95.13	95.27	95.07				95.89	95.89	95.89	97.41	1.52
MH	358	MH	359	1.29	196.0	1.68	229	3.50	1.86													0.50	2.36	PVC	0.32	65.0	18.96	88%	0.60	95.27	95.07	95.06	94.86	0.01			95.89	95.89	95.89	97.20	1.31
MH	359	MH	360	0.34		3.41	377	3.43	2.99													1.02	4.01	PVC	0.32	120.0	18.96	79%	0.60	95.00	94.80	94.61	94.41	0.02	0.02		95.89	95.89	95.87	96.50	0.61
MH	360	MH	344	0.19		3.60	377	3.43	2.99													1.08	4.07	PVC	0.32	50.5	18.96	79%	0.60	94.58	94.38	94.42	94.22	0.02	0.01		95.87	95.87	95.86	96.40	0.53
MH	344	MH	345			131.34	9343	2.59	55.95			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	58.45	135.01	CONC	0.30	14.0	245.74	45%	1.10	94.06	93.54	94.02	93.50	0.09	0.01	0.01	95.86	95.85	95.84	96.95	1.09
MH	345	MH	346	0.58		131.92	9343	2.59	55.95			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	58.62	135.18	CONC	0.30	132.5	245.74	45%	1.10	93.99	93.47	93.59	93.07	0.09	0.12	0.01	95.84	95.83	95.71	96.95	1.11
MH	346	MH	347	0.61		132.53	9343	2.59	55.95			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	58.80	135.36	CONC	0.30	130.5	245.74	45%	1.10	93.59	93.07	93.20	92.68	0.09	0.12		95.71	95.71	95.59	97.10	1.39
MH	347	MH	348	0.11		132.64	9343	2.59	55.95			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	58.84	135.40	CONC	0.30	30.0	245.74	45%	1.10	93.17	92.65	93.08	92.56	0.09	0.03	0.01	95.59	95.58	95.55	97.20	1.61
MH	348	EX.MH	96			132.64	9343	2.59	55.95			56.38	5698	1.50	19.78			7.10	237	1.50	0.82	58.84	135.40	CONC	0.30	10.5	245.74	45%	1.10	92.55	92.03	92.52	92.00	0.09	0.01	0.01	95.55	95.54	95.53	96.95	1.40
EX.MH	96	EX.MH	97	258.26	18006.0	390.90	27349	2.21	140.13	148.44	14844.0	204.82	20542	1.50	71.33	15.36	510.0	22.46	747	1.50	2.59	185.45	399.50	CONC	0.44	47.5	1252.75	68%	1.91	92.35	91.45	92.14	91.24	0.05	0.02		95.53	95.53	95.51	N/A	N/A
EX.MH	97	EX.MH	100			390.90	27349	2.21	140.13			204.82	20542	1.50	71.33			22.46	747	1.50	2.59	185.45	399.50	CONC	0.38	212.5	1164.20	66%	1.77					0.05	0.10		95.51	95.51	95.41	N/A	N/A
EX.MH	100	EX.MH	PS									204.82	20542	1.50	71.33									CONC	0.32	316.0	2300.81							0.32	1.01		95.41	95.41	94.40	N/A	N/A

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Oct. 7, 2020
PROVINCE OF ONTARIO

Sanitary Trunk 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



DRAINAGE AREA TO NORTH TRUNK
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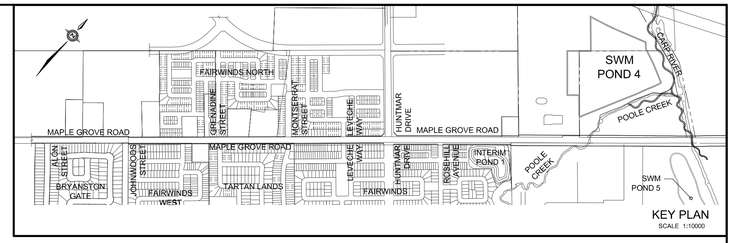

KEY PLAN
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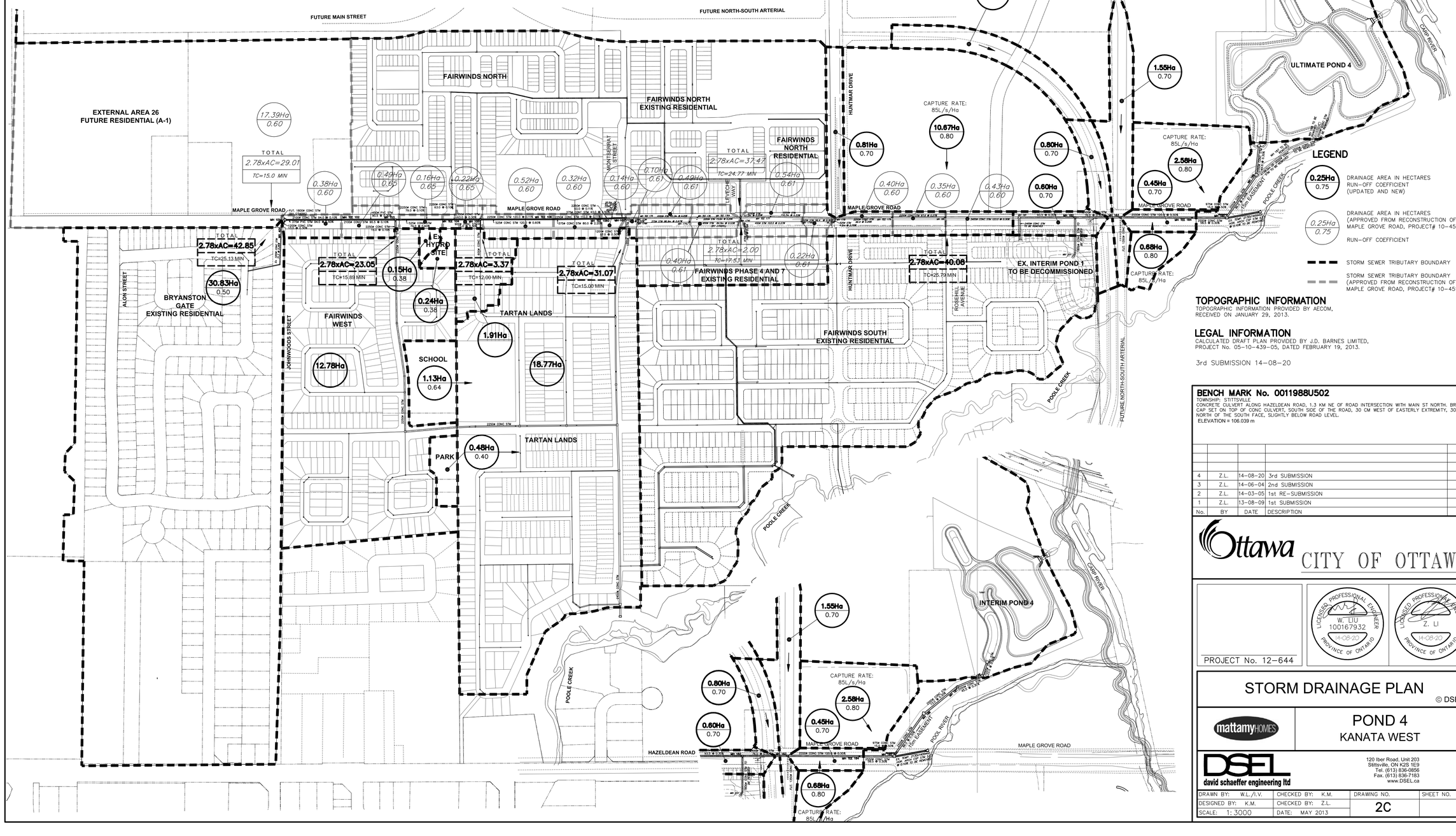


LEGEND

- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES, RUN-OFF COEFFICIENT (UPDATED AND NEW)
- 0.25Ha / 0.75 — DRAINAGE AREA IN HECTARES (APPROVED FROM RECONSTRUCTION OF MAPLE GROVE ROAD, PROJECT# 10-451), RUN-OFF COEFFICIENT
- STORM SEWER TRIBUTARY BOUNDARY
- STORM SEWER TRIBUTARY BOUNDARY (APPROVED FROM RECONSTRUCTION OF MAPLE GROVE ROAD, PROJECT# 10-451)

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	

Ottawa 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

mattamy HOMES

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

LEGEND

- MINOR SYSTEM CAPTURE RATE (5 YEAR: 0.70ha, R=0.20)
- FUTURE STORM DRAINAGE AREA
- RUNOFF COEFFICIENT
- PROPOSED STORM SEWER
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA TO MAPLE GROVE ROAD
- MAJOR DRAINAGE SYSTEM
- EXISTING STORM SEWER
- OUTSIDE PROPOSED DEVELOPMENT
- NW=98.00 SE=97.40 SW=97.66 — PROPOSED OBVERT ELEVATION
- 146 — PROPOSED MANHOLE NUMBER

CONSTRUCTION

TRUE

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

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 — Oct 7, 2020 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — J.M.J. DECOEUR — Oct 7/2020 — PROVINCE OF ONTARIO

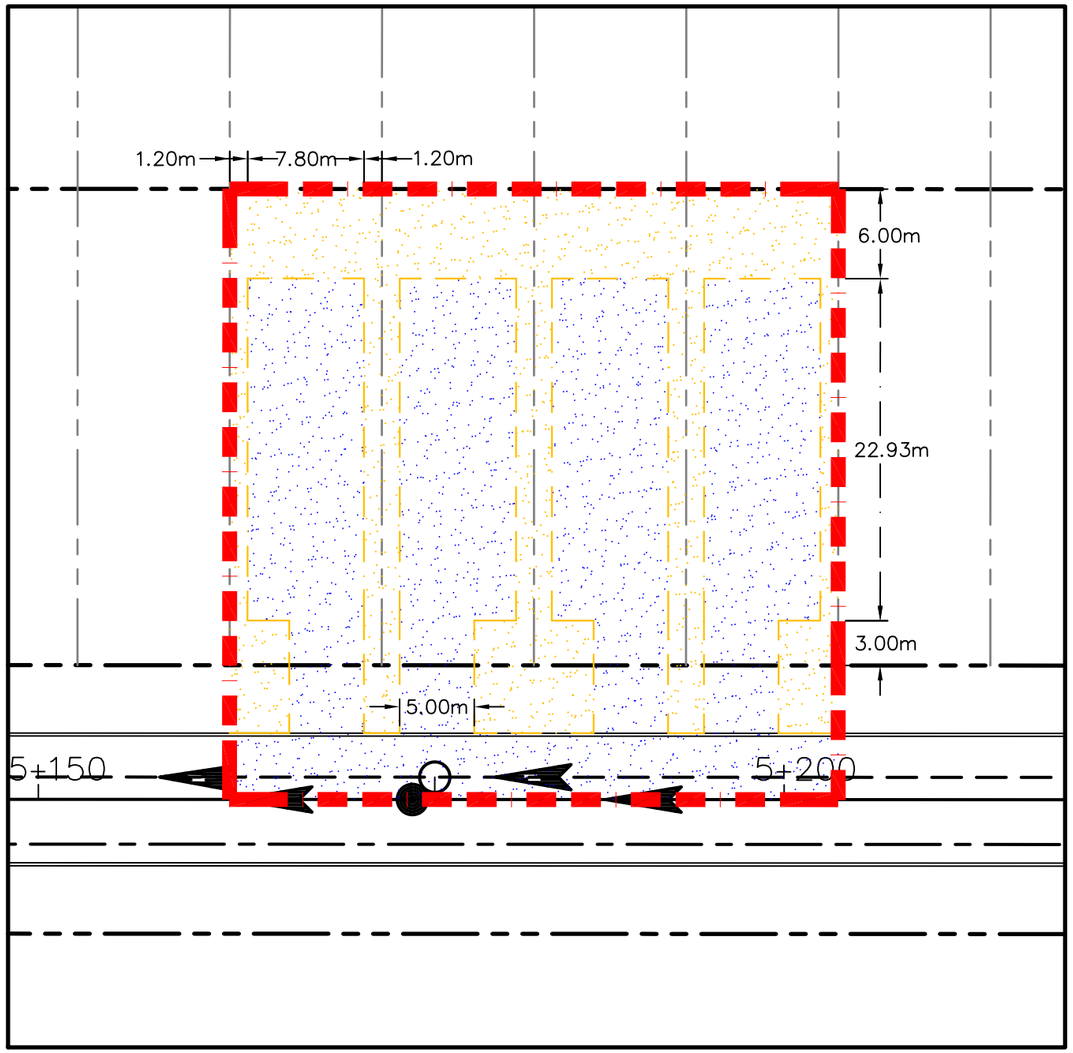
ATREL Engineering Ltd.
Engineers - Ingénieurs
1-2884 CHAMBERLAND STREET, ROCKLAND, ONTARIO K4K 1M6
TEL.: (613) 446-7423

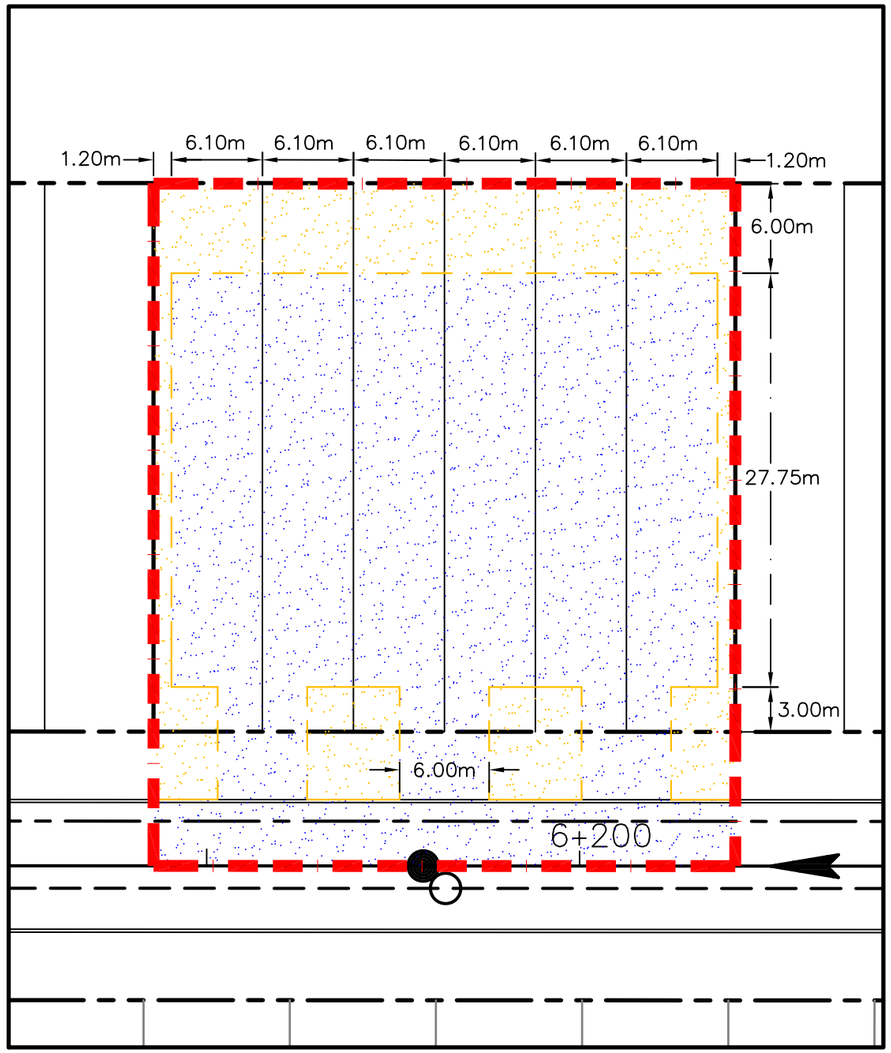
CITY OF OTTAWA
130 HUNTMAR DR.

LIONESS DEVELOPMENT INC.

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

Ottawa

	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
Trunk 1																																	
					0.00	0.00	0.21	0.70	0.41	0.41			0.00	0.00			0.00	0.00															
					0.00	0.00	0.24	0.70	0.47	0.88			0.00	0.00			0.00	0.00															
	1	2			0.00	0.00	0.50	0.70	0.97	1.85			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	193	600	600	CONC	0.18	82.0	260.5030	0.9213	1.4833	0.739
					0.00	0.00	0.19	0.70	0.37	2.22			0.00	0.00			0.00	0.00															
	2	3			0.00	0.00	0.20	0.70	0.39	2.61			0.00	0.00			0.00	0.00	11.48	71.54	96.96	113.62	166.05	253	675	675	CONC	0.17	82.0	346.5834	0.9685	1.4111	0.730
					0.00	0.00	0.01	0.70	0.02	2.63			0.00	0.00			0.00	0.00															
	3	4			0.00	0.00	0.05	0.70	0.10	2.72			0.00	0.00			0.00	0.00	12.89	67.23	91.04	106.66	155.82	248	675	675	CONC	0.16	26.5	336.2353	0.9396	0.4701	0.738
	4	5	0.16	0.70	0.31	0.31			0.00	2.72			0.00	0.00			0.00	0.00	13.36	65.92	89.24	104.54	152.71	264	750	750	CONC	0.11	43.5	369.2322	0.8358	0.8675	0.714
	5	8	0.14	0.70	0.27	0.58			0.00	2.72			0.00	0.00			0.00	0.00	14.23	63.64	86.12	100.87	147.32	272	750	750	CONC	0.11	28.0	369.2322	0.8358	0.5584	0.736
					0.00	0.58	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	12.91														
	8	11	1.40	0.70	2.72	3.31			0.00	2.72			0.00	0.00			0.00	0.00	14.79	62.27	84.24	98.66	144.07	435	900	900	CONC	0.11	63.0	600.4123	0.9438	1.1125	0.725
					0.00	3.31	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	12.85														
	11	14	1.37	0.70	2.67	5.97			0.00	2.72			0.00	0.00			0.00	0.00	15.90	59.72	80.75	94.55	138.05	577	975	975	CONC	0.12	70.5	776.3236	1.0398	1.1300	0.743
					0.00	5.97	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	13.37														
	14	17	1.19	0.70	2.32	8.29			0.00	2.72			0.00	0.00			0.00	0.00	17.03	57.35	77.52	90.75	132.47	687	1200	1200	CONC	0.10	77.5	1232.8868	1.0901	1.1849	0.557
	17	20			0.00	8.29			0.00	2.72			0.00	0.00			0.00	0.00	18.22	55.09	74.42	87.11	127.14	659	1200	1200	CONC	0.10	46.0	1232.8868	1.0901	0.7033	0.535
					0.00	8.29	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	18.69														
			0.53	0.40	0.59	8.88			0.00	2.72			0.00	0.00			0.00	0.00															
			1.18	0.70	2.30	11.18			0.00	2.72			0.00	0.00			0.00	0.00															
	20	31	1.22	0.70	2.37	13.55			0.00	2.72			0.00	0.00			0.00	0.00	18.92	53.83	72.71	85.10	124.19	928	1200	1200	CONC	0.10	76.0	1232.8868	1.0901	1.1620	0.752
					0.00	13.55	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	16.65														
					0.00	13.55	0.01	0.70	0.02	2.74			0.00	0.00			0.00	0.00															
					0.00	13.55	0.41	0.70	0.80	3.54			0.00	0.00			0.00	0.00															
					0.00	13.55	0.86	0.70	1.67	5.22			0.00	0.00			0.00	0.00															
			1.35	0.70	2.63	16.18			0.00	5.22			0.00	0.00			0.00	0.00															
	31	32	1.83	0.70	3.56	19.74			0.00	5.22			0.00	0.00			0.00	0.00	20.08	51.90	70.07	82.00	119.64	1390	1350	1350	CONC	0.13	59.5	1924.4277	1.3444	0.7376	0.722
	32	36	0.22	0.70	0.43	20.17			0.00	5.22			0.00	0.00			0.00	0.00	20.82	50.75	68.50	80.15	116.93	1381	1350	1350	CONC	0.12	12.0	1848.9303	1.2917	0.1548	0.747
					0.00	20.17	0.00	0.00	0.00	5.22			0.00	0.00			0.00	0.00	14.03														
	36	37	1.58	0.70	3.07	23.24			0.00	5.22			0.00	0.00			0.00	0.00	20.98	50.51	68.18	79.78	116.38	1530	1350	1350	CONC	0.15	58.5	2067.1669	1.4442	0.6751	0.740
	37	HW			0.00	23.24			0.00	5.22			0.00	0.00			0.00	0.00	21.65	49.52	66.82	78.19	114.05	1499	1350	1350	CONC	0.14	30.0	1997.0730	1.3952	0.3584	0.751
Trunk 3																																	
	56	57			0.00	0.00	0.48	0.70	0.93	0.93			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	450	450	PVC	0.21	80.5	130.6520	0.8215	1.6332	0.745
	57	58			0.00	0.00	0.24	0.70	0.47	1.40			0.00	0.00			0.00	0.00	11.63	71.06	96.29	112.84	164.89	135	600	600	CONC	0.14	98.5	229.7421	0.8125	2.0204	0.587
To Trunk 2, Pipe 58 - 61						0.00				1.40				0.00				0.00	13.65														
Trunk 2																																	
			0.49	0.70	0.95	0.95			0.00	0.00			0.00	0.00			0.00	0.00															
	46	47	2.38	0.80	5.29	6.25			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	480	825	825	CONC	0.20	70.5	641.9463	1.2009	0.9784	0.747
	47	50	0.36	0.70	0.70	6.95			0.00	0.00			0.00	0.00			0.00	0.00	10.98	73.24	99.29	116.37	170.08	509	825	825	CONC	0.23	73.5	688.4108	1.2878	0.9512	0.739
					0.00	6.95	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	12.19														
					0.00	6.95	0.24	0.70	0.47	0.47			0.00	0.00			0.00	0.00															
					0.00	6.95	0.26	0.70	0.51	0.97			0.00	0.00			0.00	0.00															
			0.70	0.70	1.36	8.31			0.00	0.97			0.00	0.00			0.00	0.00															
	50	51	1.75	0.80	3.89	12.20			0.00	0.97			0.00	0.00			0.00	0.00	12.19	69.30	93.88	109.99	160.72	937	1050	1050	CONC	0.21	45.0	1251.3755	1.4452	0.5190	0.749
					0.00	12.20	0.00	0.00	0.00	0.97			0.00	0.00			0.00	0.00	15.92														
					0.00	12.20	0.12	0.70	0.23	1.21			0.00	0.00			0.00	0.00															
					0.00	12.20	0.16	0.70	0.31	1.52			0.00	0.00			0.00	0.00															
	51	54	2.88	0.70	5.60	17.81			0.00	1.52			0.00	0.00			0.00	0.00	15.92	59.68	80.70	94.49	137.96	1185	1200	1200	CONC	0.17	45.5	1607.4877	1.4213	0.5335	0.737
					0.00	17.81	0.00	0.00	0.00	1.52			0.00	0.00			0.00	0.00	12.48														
			0.79	0.80	1.76	19.56			0.00	1.52			0.00	0.00			0.00	0.00															
			0.86	0.70	1.67	21.24			0.00	1.52			0.00	0.00			0.00	0.00															
	54	55	1.06	0.80	2.36	23.59			0.00	1.52			0.00	0.00			0.00	0.00	16.45	58.53	79.13	92.65	135.26	1501	1350	1350	CONC	0.15	26.5	2067.1669	1.4442	0.3058	0.726
	55	58	0.13	0.70	0.25	23.85			0.00	1.52			0.00	0.00			0.00	0.00	16.76	57.90	78.27	91.63	133.77	1500	1500	1500	CONC	0.10	75.5	2235.3724	1.2650	0.9948	0.671

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

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
APR 22, 2019
PROVINCE OF ONTARIO

Designed: A.K.	PROJECT: Kanata West - 195 Huntmar Drive		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2	File Ref: 12-624	Date: April, 2019	Sheet No. SHEET 1 OF 3

624_STM3.xlsx

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

Ottawa

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
Contribution From Trunk 3, Pipe 57 - 58						0.00				1.40				0.00				0.00	13.65														
			0.28	0.70	0.54	24.39			0.00	2.92			0.00	0.00			0.00	0.00															
	58	61	2.73	0.80	6.07	30.46			0.00	2.92			0.00	0.00			0.00	0.00	17.76	55.95	75.60	88.49	129.16	1925	1500	1500	CONC	0.14	111.0	2644.9283	1.4967	1.2360	0.728
					0.00	30.46	0.00	0.00	0.00	2.92			0.00	0.00			0.00	0.00	12.17														
			0.47	0.70	0.91	31.38			0.00	2.92			0.00	0.00			0.00	0.00															
	61	62	3.19	0.80	7.09	38.47			0.00	2.92			0.00	0.00			0.00	0.00	18.99	53.71	72.55	84.91	123.90	2278	1650	1650	CONC	0.10	74.0	2882.2416	1.3479	0.9150	0.790
	62	63	0.06	0.70	0.12	38.59			0.00	2.92			0.00	0.00			0.00	0.00	19.91	52.18	70.46	82.45	120.31	2219	1650	1650	CONC	0.10	74.5	2882.2416	1.3479	0.9212	0.770
	63	HW	2.00	0.80	4.45	43.04			0.00	2.92			0.00	0.00			0.00	0.00	20.83	50.74	68.49	80.14	116.91	2384	1650	1650	CONC	0.11	65.5	3022.9205	1.4137	0.7722	0.788
Trunk 6																																	
					0.00	0.00			0.00	0.00	0.43	0.70	0.84	0.84			0.00	0.00															
	419	420	0.66	0.80	1.46	1.46			0.00	0.00			0.00	0.84			0.00	0.00	10.00	76.81	104.19	122.14	178.56	215	675	675	CONC	0.12	100.5	291.1883	0.8137	2.0584	0.737
					0.00	1.46			0.00	0.00	0.39	0.70	0.76	1.60			0.00	0.00															
	420	421	0.93	0.80	2.07	3.53			0.00	0.00			0.00	1.60			0.00	0.00	12.06	69.71	94.45	110.67	161.70	423	900	900	CONC	0.10	119.0	572.4707	0.8999	2.2040	0.739
	421	422			0.00	3.53			0.00	0.00	1.34	0.70	2.61	4.20			0.00	0.00	14.26	63.56	86.02	100.75	147.14	648	900	900	CONC	0.21	42.5	829.5888	1.3040	0.5432	0.781
	422	423			0.00	3.53			0.00	0.00	0.33	0.70	0.64	4.85			0.00	0.00	14.81	62.23	84.19	98.60	143.99	698	975	975	CONC	0.14	118.5	838.5253	1.1231	1.7585	0.832
	423	424			0.00	3.53			0.00	0.00	0.26	0.70	0.51	5.35			0.00	0.00	16.56	58.31	78.82	92.28	134.72	700	975	975	CONC	0.14	93.0	838.5253	1.1231	1.3801	0.835
	424	403			0.00	3.53			0.00	0.00	0.32	0.70	0.62	5.97			0.00	0.00	17.94	55.59	75.11	87.92	128.33	722	975	975	CONC	0.15	69.0	867.9562	1.1625	0.9892	0.831
To Trunk 5, Pipe 403 - 404						3.53				0.00				5.97				0.00	18.93														
Trunk 5																																	
					0.00	0.00			0.00	0.00	0.11	0.70	0.21	0.21			0.00	0.00															
					0.00	0.00			0.00	0.00	0.26	0.70	0.51	0.72			0.00	0.00															
	401	402			0.00	0.00			0.00	0.00	0.31	0.70	0.60	1.32			0.00	0.00	10.00	76.81	104.19	122.14	178.56	162	450	450	PVC	0.93	111.5	274.9464	1.7288	1.0750	0.588
					0.00	0.00	-0.09	0.70	-0.18	-0.18			0.00	1.32			0.00	0.00															
	402	403			0.00	0.00			0.00	-0.18	0.09	0.70	0.18	1.50			0.00	0.00	11.07	72.91	98.84	115.84	169.30	156	450	450	PVC	0.86	84.5	264.3966	1.6624	0.8472	0.591
Contribution From Trunk 6, Pipe 424 - 403						3.53				0.00				5.97				0.00	18.93														
	403	404			0.00	3.53			0.00	-0.18	0.58	0.70	1.13	8.60			0.00	0.00	18.93	53.81	72.68	85.07	124.14	909	1050	1050	CONC	0.17	64.0	1125.9068	1.3003	0.8203	0.807
	404	405			0.00	3.53			0.00	-0.18	0.21	0.70	0.41	9.01			0.00	0.00	19.75	52.43	70.80	82.85	120.89	919	1050	1050	CONC	0.18	82.5	1158.5486	1.3380	1.0277	0.793
					0.00	3.53			0.00	-0.18	0.11	0.70	0.21	9.22			0.00	0.00															
	405	406			0.00	3.53	7.49	0.60	12.49	12.32			0.00	9.22			0.00	0.00	20.78	50.81	68.58	80.25	117.07	1764	1200	1200	CONC	0.35	78.5	2306.5199	2.0394	0.6415	0.765
					0.00	3.53	0.19	0.70	0.37	12.69			0.00	9.22			0.00	0.00															
	406	407			0.00	3.53	0.46	0.70	0.90	13.58			0.00	9.22			0.00	0.00	21.42	49.85	67.27	78.71	114.82	1816	1200	1200	CONC	0.36	64.0	2339.2382	2.0683	0.5157	0.776
	407	408			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	21.94	49.11	66.26	77.53	113.08	1789	1200	1200	CONC	0.35	64.0	2306.5199	2.0394	0.5230	0.775
	408	409			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	22.46	48.38	65.27	76.36	111.38	1762	1350	1350	CONC	0.18	92.0	2264.4679	1.5820	0.9692	0.778
	409	410			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	23.43	47.09	63.52	74.31	108.36	1715	1350	1350	CONC	0.17	92.0	2200.6672	1.5374	0.9973	0.779
	410	411			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	24.43	45.85	61.82	72.31	105.44	1669	1500	1500	CONC	0.11	92.0	2344.4784	1.3267	1.1557	0.712
					0.00	3.53			0.00	13.58	0.51	0.80	1.13	10.36			0.00	0.00															
					0.00	3.53	1.62	0.80	3.60	17.19			0.00	10.36			0.00	0.00															
					0.00	3.53			0.00	17.19	2.29	0.70	4.46	14.81			0.00	0.00															
	411	412	5.88	0.80	13.08	16.61			0.00	17.19			0.00	14.81			0.00	0.00	25.58	44.49	59.98	70.15	102.27	2809	1500	1500	CONC	0.27	97.5	3673.0917	2.0785	0.7818	0.765
	412	430			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	26.37	43.63	58.80	68.76	100.24	2754	1500	1500	CONC	0.26	23.0	3604.4298	2.0397	0.1879	0.764
	430	413			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	26.55	43.42	58.52	68.44	99.77	2741	1800	1800	CONC	0.26	74.5	5861.2002	2.3033	0.5391	0.468
	413	4C10			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	27.09	42.85	57.75	67.53	98.43	2705	1800	1800	CONC	0.25	97.5	5747.3797	2.2586	0.7195	0.471
To Trunk 4, Pipe 418 - 230						16.61				17.19				14.81				0.00	27.81														
Trunk 4																																	
	416	417			0.00	0.00	4.57	0.40	5.08	5.08			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	529	675	675	CONC	0.76	58.0	732.8078	2.0478	0.4720	0.723
					0.00	0.00	1.21	0.40	1.35	6.43			0.00	0.00			0.00	0.00															
	417	4C10	6.83	0.80	15.19	15.19			0.00	6.43			0.00	0.00			0.00	0.00	10.47	75.04	101.76	119.28	174.36	1794	1050	1050	CONC	0.77	100.0	2396.2016	2.7673	0.6023	0.749
Contribution From Trunk 5, Pipe 413 - 418						16.61				17.19				14.81				0.00	27.81														
					0.00	31.80			0.00	23.61	1.03	0.70	2.00	16.82			0.00	0.00															
	4C10	4C11			0.00	31.80	5.04	0.80	11.21	34.82			0.00	16.82			0.00	0.00	27.81	42.12	56.75	66.35	96.71	4431	1950	1950	CONC	0.40	259.0	8999.7165	3.0135	1.4324	0.492
					0.00	31.80	0.71	0.70	1.38	36.20			0.00	16.82			0.00	0.00															
	4C11	4C21a			0.00	31.80	6.46	0.80	14.37	50.57			0.00	16.82			0.00	0.00	29.24	40.73	54.86	64.15	93.48	5149	2250	2250	CONC	0.20	198.0	9320.5509	2.3442	1.4078	0.552

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

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
APR 22, 2019
PROVINCE OF ONTARIO

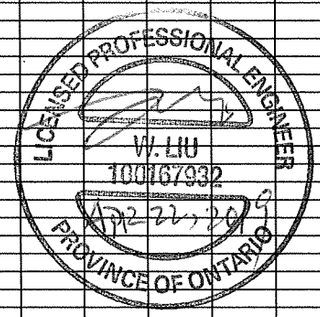
Designed: A.K.	PROJECT: Kanata West - 195 Huntmar Drive
Checked: W.L.	LOCATION: City of Ottawa
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2	File Ref: 12-624 / Date: April, 2019 / Sheet No. SHEET 2 OF 3

624_STM3.xlsx

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
					0.00	31.80	0.48	0.70	0.93	51.51			0.00	16.82			0.00	0.00															
					0.00	31.80	0.96	0.80	2.14	53.64			0.00	16.82			0.00	0.00															
	4C21a	4C21b			0.00	31.80	7.19	0.80	15.99	69.63			0.00	16.82			0.00	0.00	30.65	39.47	53.15	62.13	90.53	6001	2250	2250	CONC	0.30	116.0	11415.2969	2.8710	0.6734	0.526
	4C21b	4C26a(HW)			0.00	31.80	15.57	0.80	34.63	104.26			0.00	16.82			0.00	0.00	31.33	38.89	52.37	61.21	89.18	7726	2250	2250	CONC	0.40	259.0	13181.2494	3.3151	1.3021	0.586
SWM POND 7 OUTFALL																																	
					0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00						277									
	100	101			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	277	750	750	CONC	0.10	25.0	352.0491	0.7969	0.5229	0.787
	101	102			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.52	74.85	101.51	118.98	173.92	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	102	103			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	12.56	68.19	92.36	108.21	158.10	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	103	104			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	14.60	62.72	84.87	99.39	145.16	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	104	105			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	16.64	58.15	78.61	92.03	134.35	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	105	106			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	18.68	54.26	73.29	85.78	125.18	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	106	107			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	20.72	50.90	68.71	80.40	117.30	277	750	750	CONC	0.10	57.0	352.0491	0.7969	1.1922	0.787
	107	108			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	21.91	49.15	66.32	77.59	113.18	277	750	750	CONC	0.10	45.0	352.0491	0.7969	0.9412	0.787
	108	109			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	22.85	47.85	64.55	75.52	110.14	277	750	750	CONC	0.10	75.5	352.0491	0.7969	1.5791	0.787
	109	HW	(CULVERT)		0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	24.43	45.84	61.82	72.31	105.43	277	750	750	CONC	0.10	77.0	352.0491	0.7969	1.6105	0.787



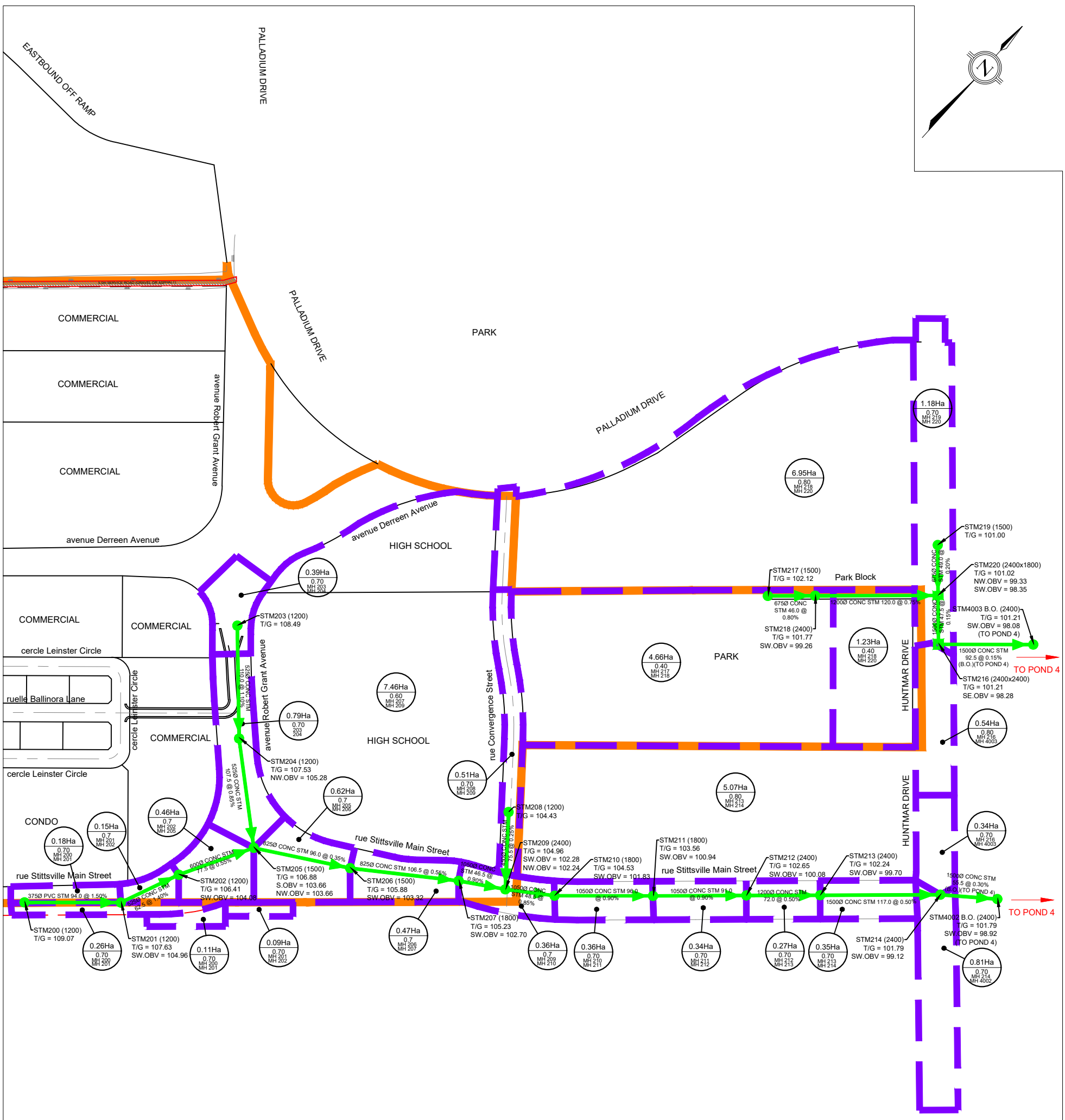
Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

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

Designed: A.K.
Checked: W.L.
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2

PROJECT: **Kanata West - 195 Huntmar Drive**
LOCATION: **City of Ottawa**
File Ref: **12-624** Date: **April, 2019** Sheet No. **SHEET 3 OF 3**

624_STM3.xlsx



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

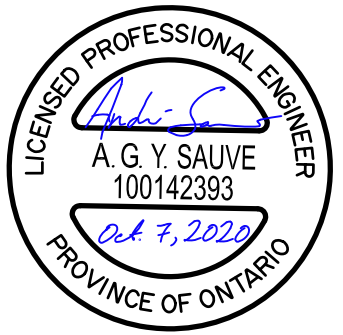
LOCAL ROADS STORM FREQUENCY : 2 YEAR
COLECTOR ROADS STORM FREQUENCY : 5 YEAR
ARTERIAL ROADS STORM FREQUENCY :10 YEAR

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
October, 2020

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						TIME	RAINF.	RAINF.	RAINF.				ACTUAL	PIPE SEWER DATA									UpStream		DwStream	
														2 Year		5 Year		10 Year																					
						2 Year				5 Year																													
FROM (Up)		TO (Down)		0.40	0.70	0.80	0.40	0.60	0.70	0.80	0.70	0.80		INDIV. 2.78AR	ACCUM. 2.78AR	INDIV. 2.78AR	ACCUM. 2.78AR	INDIV. 2.78AR	ACCUM. 2.78AR	CONC. (MIN)	INTENS. 2 Year (MM/HR)	INTENS. 5 Year (MM/HR)	INTENS. 10 Year (MM/HR)	2 Year Flow (L/S)	5 Year Flow (L/S)	10 Year Flow (L/S)	**PIPE FLOW (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
MH	219	MH	220								1.18							2.30	2.30	10.00	76.81	104.19	122.14			280.47	280.47	CONC	675	685.8	0.20	49.0	392.18	28%	1.06	0.77	99.43	98.76	99.33	98.66
MH	220	MH	101														22.01		2.30	11.02	73.08	99.08	116.12		2180.40	266.64	2447.05	CONC	1350	1371.6	0.30	47.5	3049.82	20%	2.06	0.38	98.35	97.00	98.21	96.86
MH	101	MH	102		0.40						0.54			0.78	0.78		22.01	1.05	3.35	11.41	71.79	97.30	114.03	55.88	2141.23	381.67	2578.78	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		0.44									0.86	1.63		22.01		3.35	12.10	69.59	94.28	110.46	113.75	2074.77	369.72	2558.25	CONC	1350	1371.6	0.35	102.0	3294.18	22%	2.23	0.76	97.83	96.48	97.47	96.12
MH	103	MH	105		0.51									0.99	2.63		22.01		3.35	12.86	67.32	91.17	106.81	176.86	2006.33	357.51	2540.69	CONC	1350	1371.6	0.35	111.5	3294.18	23%	2.23	0.83	97.47	96.12	97.08	95.73
MH	104	MH	105			1.41				4.03				3.14	3.14	8.96	8.96			10.00	76.81	104.19	122.14	240.86	933.83		1174.69	CONC	1050	1066.8	0.30	53.0	1560.35	25%	1.75	0.51	97.13	96.08	96.97	95.92
MH	105	MH	132			0.26								0.58	6.34		30.97		3.35	13.70	65.03	88.02	103.11	412.37	2725.91	345.12	3483.40	CONC	1650	1676.4	0.30	82.0	5208.04	33%	2.36	0.58	96.97	95.32	96.72	95.07
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	83.0	210.32	46%	1.28	1.08	98.66	98.21	98.24	97.79
MH	111	MH	113												1.48					11.08	72.89	98.82	115.81	107.80			107.80	CONC	450	457.2	0.50	11.0	210.32	49%	1.28	0.14	98.21	97.76	98.15	97.70
MH	112	MH	113					0.74								1.23	1.23			10.00	76.81	104.19	122.14		128.60		128.60	CONC	525	533.4	0.30	11.5	245.74	48%	1.10	0.17	98.18	97.66	98.15	97.63
MH	113	MH	116		0.13									0.25	1.73		1.23			11.22	72.41	98.15	115.02	125.41	121.15		246.56	CONC	675	685.8	0.30	71.5	480.32	49%	1.30	0.92	98.15	97.48	97.94	97.27
MH	115	MH	116		0.40									0.78	0.78					10.00	76.81	104.19	122.14	59.79			59.79	PVC	375	366.4	0.50	91.0	116.56	49%	1.11	1.37	98.40	98.03	97.94	97.57
MH	116	MH	121		0.25									0.49	3.00		1.23			12.14	69.46	94.10	110.26	208.16	116.15		324.31	CONC	750	762.0	0.30	56.0	636.13	49%	1.39	0.67	97.94	97.19	97.77	97.02
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	64.5	97.52	60%	0.92	1.16	98.35	97.98	98.12	97.75
MH	121	MH	127		0.57									1.11	4.61		1.23			12.81	67.48	91.38	107.05	311.22	112.79		424.01	CONC	825	838.2	0.30	85.0	820.21	48%	1.49	0.95	97.77	96.95	97.51	96.69
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	98.30	97.93	98.12	97.75
MH	126	MH	127	0.68	0.29									1.32	1.90					11.17	72.59	98.40	115.32	138.23			138.23	CONC	525	533.4	0.30	87.0	245.74	44%	1.10	1.32	98.12	97.60	97.86	97.34
MH	127	MH	132		0.57									1.11	7.63		1.23			13.76	64.85	87.78	102.82	494.52	108.35		602.86	CONC	975	990.6	0.30	83.5	1280.55	53%	1.66	0.84	97.51	96.54	97.26	96.29
MH	132	MH	133		0.50									0.97	14.94		32.20		3.35	14.60	62.73	84.88	99.40	937.17	2733.43	332.70	4003.31	CONC	1800	1828.8	0.30	84.0	6568.16	39%	2.50	0.56	96.72	94.92	96.47	94.67
MH	133	MH	156		0.52									1.01	15.95		32.20		3.35	15.16	61.39	83.05	97.25	979.27	2674.50	325.51	3979.28	CONC	1800	1828.8	0.30	77.5	6568.16	39%	2.50	0.52	96.47	94.67	96.24	94.44
MH	200	MH	201						0.55							1.07	1.07			10.00	76.81	104.19	122.14					PVC	375	366.4	1.50	94.0	201.88	100%	1.91	0.82	106.37	106.00	104.96	104.59
MH	201	MH	202								0.24						1.07	0.47	0.47	10.82	73.80	100.06	117.27		107.09	54.77	161.86	CONC	525	533.4	1.40	62.5	530.86	70%	2.38	0.44	104.96	104.44	104.08	103.56
MH	202	MH	205								0.46						1.07	0.90	1.36	11.26	72.29	97.99	114.84		104.88	156.44	261.31	CONC	600	609.6	0.55	77.5	475.05	45%	1.63	0.79	104.08	103.48	103.65	103.05
MH	203	MH	204								1.18							2.30	2.30	10.00	76.81	104.19	122.14			280.47	280.47	CONC	450	457.2	1.10	110.0	311.95	10%	1.90	0.96	106.42	105.97	105.21	104.76
MH	204	MH	205																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	104.56	104.04	103.65	103.13
MH	205	MH	206								0.62						1.07	1.21	4.87	12.05	69.74	94.48	110.71		101.12	538.60	639.73	CONC	825	838.2	0.35	96.0	885.93	28%	1.61	1.00	103.65	102.83	103.31	102.49
MH	206	MH	207								0.47						1.07	0.91	5.78	13.05	66.80	90.45	105.96		96.81	612.41	709.22	CONC	825	838.2	0.55	106.5	1110.58	36%	2.01	0.88	103.29	102.47	102.70	101.88
MH	207	MH	209					7.46								12.44	13.51		5.78	13.93	64.42	87.19	102.12		1178.25	590.21	1768.46	CONC	1050	1066.8	0.90	46.5	2702.60	35%	3.02	0.26	102.70	101.65	102.28	101.23
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	102.43	101.98	102.24	101.79
MH	209	MH	210								0.36						14.51	0.70	6.48	14.19	63.76	86.29	101.06		1251.73	654.89	1906.61	CONC	1050	1066.8	0.85	48.5	2626.46	27%	2.94	0.28	102.24	101.19	101.83	100.78
MH	210	MH	211								0.36						14.51	0.70	7.18	14.46	63.07	85.34	99.95		1237.95	717.71	1955.66	CONC	1050	1066.8	0.90	96.0	2702.60	28%	3.02	0.53	101.80	100.75	100.94	99.89
MH	211	MH	212								0.34						14.51	0.66	7.84	14.99	61.79	83.59	97.89		1212.56	767.69	1980.25	CONC	1050	1066.8	0.90	91.0	2702.60	27%	3.02	0.50	100.90	99.85	100.08	99.03
MH	212	MH	213								0.27						14.51	0.53	8.37	15.49	60.63	82.00	96.02		1189.50	803.48	1992.97	CONC	1200	1219.2	0.50	72.0	2876.02	31%	2.46	0.49	100.06	98.86	99.70	98.50
MH	213	MH	140							5.07	0.35					11.28	25.78	0.68	9.05	15.98	59.55	80.52	94.29		2075.94	853.22	2929.16	CONC	1500	1524.0	0.50	117.0	5214.57	44%	2.86	0.68	99.70	98.20	99.11	97.61



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

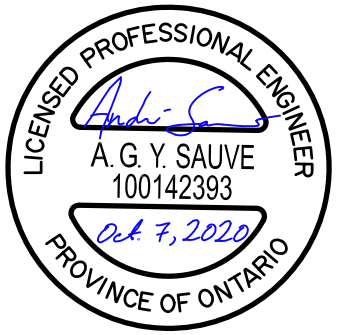
130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
October, 2020

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		5 Year		10 Year		TIME	RAINF.	RAINF.	RAINF.				ACTUAL	PIPE SEWER DATA									
														INDIV.	ACCUM.	INDIV.	ACCUM.	INDIV.	ACCUM.		INTENS.	INTENS.	INTENS.	2 Year	5 Year	10 Year									
FROM		TO		2 Year			5 Year				10 Year			2.78AR	2.78AR	2.78AR	2.78AR	2.78AR	2.78AR	CONC.	2 Year	5 Year	10 Year	Flow	Flow	Flow	PIPE	TYPE	DIA.		SLOPE	LENGTH	CAP.	Remaining	VEL.	TIME OF	UpStream		DwStream	
(Up)		(Down)		0.40	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)	FLOW (L/S)		(N0M) (mm)	(ACT)	(%)	(M)	(L/S)	Capacity (%)	(M/S)	FLOW (MIN)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)
MH	140	MH	142		0.17						1.15			0.33	0.33		25.78	2.24	11.29	16.66	58.11	78.55	91.96	19.22	2025.15	1037.93	3082.31	CONC	1650	1676.4	0.45	55.5	6378.52	52%	2.89	0.32	99.11	97.46	98.86	97.21
MH	141	MH	142		0.68									1.32	1.32					10.00	76.81						101.64	CONC	525	533.4	0.35	110.5	265.43	62%	1.19	1.55	98.88	98.36	98.49	97.97
MH	142	MH	144		0.29									0.56	2.22		25.78		11.29	16.98	57.46	77.66	90.92	127.47	2002.21	1026.20	3155.88	CONC	1650 1650	1676.4	0.45	79.0	6378.52	51%	2.89	0.46	98.49	96.84	98.13	96.48
MH	143	MH	144		0.59									1.15	1.15					10.00	76.81						88.19	CONC	525	533.4	0.30	94.0	245.74	64%	1.10	1.42	98.71	98.19	98.43	97.91
MH	144	MH	152		0.32									0.62	3.99		25.78		11.29	17.44	56.56	76.43	89.47	225.63	1970.50	1009.83	3205.96	CONC	1650 1650	1676.4	0.45	85.0	6378.52	50%	2.89	0.49	98.13	96.48	97.75	96.10
MH	146	MH	147		0.28									0.54	0.54					10.00	76.81						41.85	CONC	450	457.2	0.30	115.0	162.91	74%	0.99	1.93	98.85	98.40	98.50	98.05
MH	147	MH	148												0.54					11.93	70.11						38.20	CONC	450	457.2	0.30	11.5	162.91	77%	0.99	0.19	98.47	98.02	98.44	97.99
MH	148	MH	152		0.67									1.30	1.85					12.12	69.51						128.50	CONC	675	685.8	0.30	98.0	480.32	73%	1.30	1.26	98.44	97.77	98.15	97.48
MH	152	MH	156		0.31									0.60	6.44		25.78		11.29	17.93	55.63	75.16	87.98	358.33	1937.75	993.01	3289.09	CONC	1800	1828.8	0.40	82.5	7584.26	57%	2.89	0.48	97.75	95.95	97.42	95.62
MH	154	MH	155		0.57									1.11	1.11					10.00	76.81	104.19	122.14	85.20			85.20	CONC	525	533.4	0.30	74.5	245.74	65%	1.10	1.13	97.53	97.01	97.31	96.79
MH	155	MH	156			1.80								4.00	5.11					11.13	72.73	98.58	115.54	371.83			371.83	CONC	825	838.2	0.30	63.0	820.21	55%	1.49	0.71	97.31	96.49	97.12	96.30
MH	156	MH	192		0.56									1.09	28.60		57.99		14.63	18.40	54.75	73.96	86.57	1565.58	4288.59	1266.86	7121.03	CONC	2400	2438.4	0.30	141.5	14145.35	50%	3.03	0.78	96.24	93.84	95.82	93.42
MH	160	MH	161		0.63									1.23	1.23					10.00	76.81	104.19	122.14	94.17			94.17	CONC	525	533.4	0.30	120.0	245.74	62%	1.10	1.82	96.88	96.36	96.52	96.00
MH	161	MH	162		0.63									1.23	2.45					11.82	70.46	95.48	111.88	172.77			172.77	CONC	675	685.8	0.30	120.0	480.32	64%	1.30	1.54	96.52	95.85	96.16	95.49
MH	162	MH	192		0.15									0.29	2.74					13.36	65.94	89.27	104.57	180.93			180.93	CONC	750	762.0	0.30	48.0	636.13	72%	1.39	0.57	96.16	95.41	96.02	95.27
MH	170	MH	171		0.22									0.43	0.43					10.00	76.81	104.19	122.14	32.88			32.88	PVC	300	299.2	1.00	55.0	96.02	66%	1.37	0.67	97.05	96.75	96.50	96.20
MH	171	MH	172			0.46								1.02	1.45					10.67	74.32	100.78	118.12	107.85			107.85	CONC	450	457.2	0.40	15.5	188.11	43%	1.15	0.23	96.35	95.90	96.29	95.84
MH	172	MH	173												1.45					10.90	73.53	99.68	116.83	106.70			106.70	CONC	450	457.2	0.40	12.0	188.11	43%	1.15	0.17	96.26	95.81	96.21	95.76
MH	173	MH	175		0.39									0.76	2.21					11.07	72.92	98.86	115.86	161.16			161.16	CONC	600	609.6	0.30	39.0	350.85	54%	1.20	0.54	96.21	95.61	96.09	95.49
MH	174	MH	175		0.31									0.60	0.60					10.00	76.81	104.19	122.14	46.34			46.34	PVC	375	366.4	0.40	74.5	104.25	56%	0.99	1.26	96.99	96.62	96.69	96.32
MH	175	MH	190												2.81					11.61	71.12	96.39	112.95	200.09			200.09	CONC	600	609.6	0.40	45.0	405.13	51%	1.39	0.54	96.09	95.49	95.91	95.31
MH	176	MH	178		0.26									0.51	0.51					10.00	76.81	104.19	122.14	38.86			38.86	PVC	375	366.4	0.40	84.0	104.25	63%	0.99	1.42	97.05	96.68	96.71	96.34
MH	177	MH	178		0.11									0.21	0.21					10.00	76.81	104.19	122.14	16.44			16.44	PVC	300	299.2	0.30	35.0	52.60	69%	0.75	0.78	97.12	96.82	97.01	96.71
MH	178	MH	179			1.17								2.60	3.32					11.42	71.76	97.26	113.98	238.39			238.39	CONC	675	685.8	0.30	20.0	480.32	50%	1.30	0.26	96.71	96.04	96.65	95.98
MH	179	MH	190		0.19									0.37	3.69					11.67	70.93	96.12	112.63	261.86			261.86	CONC	675	685.8	0.30	68.0	480.32	45%	1.30	0.87	96.65	95.98	96.45	95.78
MH	190	MH	191		0.34									0.66	7.17					12.54	68.25	92.43	108.30	489.14			489.14	CONC	900	914.4	0.30	120.0	1034.42	53%	1.58	1.27	95.91	95.01	95.55	94.65
MH	191	MH	192		0.11									0.21	7.38					13.81	64.72	87.60	102.60	477.69			477.69	CONC	900	914.4	0.30	43.0	1034.42	54%	1.58	0.45	95.55	94.65	95.42	94.52
MH	192	MH	193												38.72		57.99		14.63	19.18	53.39	72.10	84.38	2067.25	4180.74	1234.81	7482.80	CONC	2400	2438.4	0.30	55.0	14145.35	47%	3.03	0.30	95.42	93.02	95.25	92.85
MH	193	MH	194												38.72		57.99		14.63	19.48	52.88	71.41	83.57	2047.51	4140.73	1222.96	7411.19	CONC	2400	2438.4	0.30	96.5	14145.35	48%	3.03	0.53	94.65	92.25	94.36	91.96
MH	194	MH	195		11.47									22.32	61.04		57.99		14.63	20.01	52.01	70.22	82.17	3174.71	4071.72	1202.47	8448.91	CONC	2550	2590.8	0.30	96.5	16627.39	49%	3.15	0.51	94.36	91.81	94.07	91.52
MH	195	MH	196												61.04		57.99		14.63	20.52	51.20	69.12	80.88	3125.27	4007.94	1183.59	8316.80	CONC	2550	2590.8	0.30	14.0	16627.39	50%	3.15	0.07	94.04	91.49	94.00	91.45
MH	School	MH	ex 179		2.40									4.67	4.67					10.00	76.81	104.19	122.14	358.73			358.73	CONC	750	762.0	0.30	14.0	636.13	44%	1.39	0.17	97.64	96.89	97.60	96.85
MH	65	MH	66		0.78									1.52	1.52					10.00	76.80	104.19	122.14	116.57			116.57	CONC	600	609.6	0.30	88.0	350.85	67%	1.20	1.22	98.70	98.10	98.44	97.84
MH	66	MH	67		0.86									1.67	3.19					11.22	72.41	98.16	115.03	231.09			231.09	CONC	750	762.0	0.30	99.0	636.13	64%	1.39	1.18	98.44	97.69	98.14	97.39
MH	67	MH	ex 180												3.19					12.40	68.66	93.01	108.97	219.12			219.12	CONC	750	762.0	0.30	13.0	636.13	66%	1.39	0.16	97.34	96.59	97.30	96.55
MH	70	MH	71		0.22	1.22								3.14	3.14					10.00	76.81	104.19	122.14	241.29			241.29	CONC	675	685.8	0.30	53.5	480.32	50%	1.30	0.69	97.58	96.91	97.42	96.75
MH	71	MH	72			1.02								2.27	5.41					10.69	74.27	100.71	118.03	401.79			401.79	CONC	825	838.2	0.30	53.5	820.21	51%	1.49	0.60	97.42	96.60	97.26	96.44
MH	72	MH	ex 181												5.41					11.29	72.20	97.86	114.68	390.59			390.59	CONC	900	914.4	0.30	18.5	1034.42	62%	1.58	0.20	97.26	96.36	97.20	96.30

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 COMPUTATION FORM

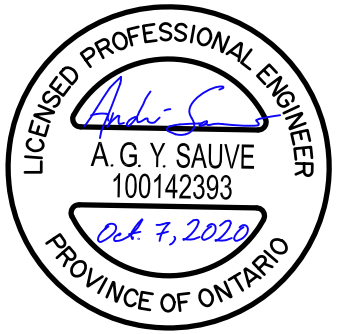
DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc
191002
Atrel Engineering Ltd
October, 2020

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 0.70	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)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	**UpStream Hgl at UP-MH (M)**	UpStream Hgl Out UP-MH (M)	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	0.36	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	0.66	99.25	98.05	98.35	97.15	99.25	99.25	98.70	N/A	N/A
MH	219	MH	220								1.18		280.47	280.47	CONC	675	685.8	0.20	49.0	392.18	28%	1.06	0.77	99.43	98.76	99.33	98.66	99.43	99.43	99.33	N/A	N/A
MH	220	MH	101											2573.32	CONC	1350	1371.6	0.30	47.5	3049.82	16%	2.06	0.38	98.35	97.00	98.21	96.86	98.70	98.47	98.37	N/A	N/A
MH	101	MH	102		0.40						0.54		216.35	2789.67	CONC	1350	1371.6	0.35	92.5	3294.18	15%	2.23	0.69	98.15	96.80	97.83	96.48	98.37	98.15	97.83	99.21	1.06
MH	102	MH	103		0.44								96.80	2886.47	CONC	1350	1371.6	0.35	102.0	3294.18	12%	2.23	0.76	97.83	96.48	97.47	96.12	97.83	97.83	97.55	99.18	1.35
MH	103	MH	105		0.51								112.20	2998.67	CONC	1350	1371.6	0.35	111.5	3294.18	9%	2.23	0.83	97.47	96.12	97.08	95.73	97.55	97.55	97.23	98.44	0.89
MH	104	MH	105			1.41				4.03			1196.80	1196.80	CONC	1050	1066.8	0.30	53.0	1560.35	23%	1.75	0.51	97.13	96.08	96.97	95.92	97.32	97.32	97.23	97.7	0.38
MH	105	MH	132			0.26							57.20	4252.67	CONC	1650	1676.4	0.30	82.0	5208.04	18%	2.36	0.58	96.97	95.32	96.72	95.07	97.23	96.97	96.77	97.59	0.62
MH	110	MH	111		0.76								167.20	167.20	CONC	450	457.2	0.50	83.0	210.32	21%	1.28	1.08	98.66	98.21	98.24	97.79	98.66	98.66	98.24	99.08	0.42
MH	111	MH	113											167.20	CONC	450	457.2	0.50	11.0	210.32	21%	1.28	0.14	98.21	97.76	98.15	97.70	98.23	98.21	98.17	98.97	0.76
MH	112	MH	113					0.74					162.80	162.80	CONC	525	533.4	0.30	11.5	245.74	34%	1.10	0.17	98.18	97.66	98.15	97.63	98.19	98.19	98.17	N/A	N/A
MH	113	MH	116		0.13								28.60	358.60	CONC	675	685.8	0.30	71.5	480.32	25%	1.30	0.92	98.15	97.48	97.94	97.27	98.17	98.15	98.03	98.97	0.82
MH	115	MH	116		0.40								88.00	88.00	PVC	375	366.4	0.50	91.0	116.56	25%	1.11	1.37	98.40	98.03	97.94	97.57	98.40	98.40	98.03	99.00	0.60
MH	116	MH	121		0.25								55.00	501.60	CONC	750	762.0	0.30	56.0	636.13	21%	1.39	0.67	97.94	97.19	97.77	97.02	98.03	97.96	97.86	98.89	0.93
MH	120	MH	121		0.26								57.20	57.20	PVC	375	366.4	0.35	64.5	97.52	41%	0.92	1.16	98.35	97.98	98.12	97.75	98.35	98.35	98.12	98.97	0.62
MH	121	MH	127		0.57								125.40	684.20	CONC	825	838.2	0.30	85.0	820.21	17%	1.49	0.95	97.77	96.95	97.51	96.69	97.86	97.77	97.51	98.83	1.06
MH	125	MH	126		0.30								66.00	66.00	PVC	375	366.4	0.30	60.0	90.28	27%	0.86	1.17	98.30	97.93	98.12	97.75	98.30	98.30	98.12	98.92	0.62
MH	126	MH	127	0.68	0.29								142.00	208.00	CONC	525	533.4	0.30	87.0	245.74	15%	1.10	1.32	98.12	97.60	97.86	97.34	98.12	98.12	97.86	98.79	0.67
MH	127	MH	132		0.57								125.40	1017.60	CONC	975	990.6	0.30	83.5	1280.55	21%	1.66	0.84	97.51	96.54	97.26	96.29	97.51	97.51	97.26	98.75	1.24
MH	132	MH	133		0.50								110.00	5380.27	CONC	1800	1828.8	0.30	84.0	6568.16	18%	2.50	0.56	96.72	94.92	96.47	94.67	96.77	96.77	96.60	97.51	0.74
MH	133	MH	156		0.52								15.50	5395.77	CONC	1800	1828.8	0.30	77.5	6568.16	18%	2.50	0.52	96.47	94.67	96.24	94.44	96.60	96.60	96.44	97.70	1.10
MH	200	MH	201						0.55				111.51	111.51	PVC	375	366.4	1.50	94.0	201.88	45%	1.91	0.82	106.37	106.00	104.96	104.59	106.37	106.37	104.98	N/A	N/A
MH	201	MH	202								0.24		57.04	168.56	CONC	525	533.4	1.40	62.5	530.86	68%	2.38	0.44	104.96	104.44	104.08	103.56	104.98	104.96	104.08	N/A	N/A
MH	202	MH	205								0.46		109.33	277.89	CONC	600	609.6	0.55	77.5	475.05	42%	1.63	0.79	104.08	103.48	103.65	103.05	104.08	104.08	103.73	N/A	N/A
MH	203	MH	204								1.18		280.47	280.47	CONC	450	457.2	1.10	110.0	311.95	10%	1.90	0.96	106.42	105.97	105.21	104.76	106.42	106.42	105.21	N/A	N/A
MH	204	MH	205											280.47	CONC	525	533.4	0.85	107.5	413.64	32%	1.85	0.97	104.56	104.04	103.65	103.13	104.56	104.56	103.73	N/A	N/A
MH	205	MH	206								0.62		147.36	705.73	CONC	825	838.2	0.35	96.0	885.93	20%	1.61	1.00	103.65	102.83	103.31	102.49	103.73	103.65	103.31	N/A	N/A
MH	206	MH	207								0.47		111.71	817.44	CONC	825	838.2	0.55	106.5	1110.58	26%	2.01	0.88	103.29	102.47	102.70	101.88	103.29	103.29	102.70	N/A	N/A
MH	207	MH	209					7.46					1296.47	2113.90	CONC	1050	1066.8	0.90	46.5	2702.60	22%	3.02	0.26	102.70	101.65	102.28	101.23	102.70	102.70	102.28	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	1.39	102.43	101.98	102.24	101.79	102.43	102.43	102.24	N/A	N/A
MH	209	MH	210								0.36		85.57	2302.87	CONC	1050	1066.8	0.85	48.5	2626.46	12%	2.94	0.28	102.24	101.19	101.83	100.78	102.24	102.24	101.83	N/A	N/A
MH	210	MH	211								0.36		85.57	2388.44	CONC	1050	1066.8	0.90	96.0	2702.60	12%	3.02	0.53	101.80	100.75	100.94	99.89	101.80	101.80	100.94	N/A	N/A
MH	211	MH	212								0.34		80.81	2469.25	CONC	1050	1066.8	0.90	91.0	2702.60	9%	3.02	0.50	100.90	99.85	100.08	99.03	100.90	100.90	100.08	N/A	N/A
MH	212	MH	213								0.27		64.17	2533.43	CONC	1200	1219.2	0.50	72.0	2876.02	12%	2.46	0.49	100.06	98.86	99.70	98.50	100.06	100.06	99.70	N/A	N/A
MH	213	MH	140							5.07	0.35		1806.99	4340.42	CONC	1500	1524.0	0.50	117.0	5214.57	17%	2.86	0.68	99.70	98.20	99.11	97.61	99.70	99.70	99.11	N/A	N/A



STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc
191002
Atrel Engineering Ltd
October, 2020

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 0.70	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)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	**UpStream Hgl at UP-MH (M)**	UpStream Hgl Out UP-MH (M)	MH Hgl (M)	Down Up USF ELEV (M)	Down HGL FREEBOARD (M)
MH	140	MH	142								1.15		448.80	4789.22	CONC	1650	1676.4	0.45	55.5	6378.52	25%	2.89	0.32	99.11	97.46	98.86	97.21	99.11	99.11	98.86	99.75	0.64
MH	141	MH	142		0.68								231.20	231.20	CONC	525	533.4	0.35	110.5	265.43	13%	1.19	1.55	98.88	98.36	98.49	97.97	98.89	98.88	98.49	99.20	0.32
MH	142	MH	144		0.29								98.60	4887.82	CONC	1650	1676.4	0.45	79.0	6378.52	23%	2.89	0.46	98.49	96.84	98.13	96.48	98.49	98.49	98.13	99.3	0.81
MH	143	MH	144		0.59								200.60	200.60	CONC	525	533.4	0.30	94.0	245.74	18%	1.10	1.42	98.71	98.19	98.43	97.91	98.73	98.71	98.43	99.10	0.39
MH	144	MH	152		0.32								108.80	4996.62	CONC	1650	1676.4	0.45	85.0	6378.52	22%	2.89	0.49	98.13	96.48	97.75	96.10	98.13	98.13	97.75	99.00	0.87
MH	146	MH	147		0.28								95.20	95.20	CONC	450	457.2	0.30	115.0	162.91	42%	0.99	1.93	98.85	98.40	98.50	98.05	98.85	98.85	98.50	99.15	0.30
MH	147	MH	148											95.20	CONC	450	457.2	0.30	11.5	162.91	42%	0.99	0.19	98.47	98.02	98.44	97.99	98.48	98.47	98.45	99.05	0.58
MH	148	MH	152		0.67								227.80	323.00	CONC	675	685.8	0.30	98.0	480.32	33%	1.30	1.26	98.44	97.77	98.15	97.48	98.45	98.44	98.15	99.05	0.61
MH	152	MH	156		0.31								105.40	5425.02	CONC	1800	1828.8	0.40	82.5	7584.26	28%	2.89	0.48	97.75	95.95	97.42	95.62	97.75	97.75	97.42	98.90	1.15
MH	154	MH	155		0.57								193.80	193.80	CONC	525	533.4	0.30	74.5	245.74	21%	1.10	1.13	97.53	97.01	97.31	96.79	97.53	97.53	97.31	97.95	0.42
MH	155	MH	156			1.80							450.00	643.80	CONC	825	838.2	0.30	63.0	820.21	22%	1.49	0.71	97.31	96.49	97.12	96.30	97.31	97.31	97.12	97.90	0.59
MH	156	MH	192		0.56								15.50	11480.09	CONC	2400	2438.4	0.30	141.5	14145.35	19%	3.03	0.78	96.24	93.84	95.82	93.42	96.44	96.24	95.82	97.85	1.61
MH	160	MH	161		0.63								214.20	214.20	CONC	525	533.4	0.30	120.0	245.74	13%	1.10	1.82	96.88	96.36	96.52	96.00	96.88	96.88	96.52	97.4	0.52
MH	161	MH	162		0.63								214.20	428.40	CONC	675	685.8	0.30	120.0	480.32	11%	1.30	1.54	96.52	95.85	96.16	95.49	96.52	96.52	96.16	97.10	0.58
MH	162	MH	192		0.15								51.00	479.40	CONC	750	762.0	0.30	48.0	636.13	25%	1.39	0.57	96.16	95.41	96.02	95.27	96.16	96.16	96.02	97.00	0.84
MH	170	MH	171		0.22								48.40	48.40	PVC	300	299.2	1.00	55.0	96.02	50%	1.37	0.67	97.05	96.75	96.50	96.20	97.05	97.05	96.50	97.50	0.45
MH	171	MH	172			0.46							101.20	149.60	CONC	450	457.2	0.40	15.5	188.11	20%	1.15	0.23	96.35	95.90	96.29	95.84	96.35	96.35	96.29	96.80	0.45
MH	172	MH	173											149.60	CONC	450	457.2	0.40	12.0	188.11	20%	1.15	0.17	96.26	95.81	96.21	95.76	96.28	96.26	96.22	96.60	0.34
MH	173	MH	175		0.39								85.80	235.40	CONC	600	609.6	0.30	39.0	350.85	33%	1.20	0.54	96.21	95.61	96.09	95.49	96.22	96.21	96.09	96.60	0.39
MH	174	MH	175		0.31								68.20	68.20	PVC	375	366.4	0.40	74.5	104.25	35%	0.99	1.26	96.99	96.62	96.69	96.32	96.99	96.99	96.69	97.45	0.46
MH	175	MH	190											303.60	CONC	600	609.6	0.40	45.0	405.13	25%	1.39	0.54	96.09	95.49	95.91	95.31	96.09	96.09	95.99	96.55	0.46
MH	176	MH	178		0.26								57.20	57.20	PVC	375	366.4	0.40	84.0	104.25	45%	0.99	1.42	97.05	96.68	96.71	96.34	97.05	97.05	96.75	97.50	0.45
MH	177	MH	178		0.11								24.20	24.20	PVC	300	299.2	0.30	35.0	52.60	54%	0.75	0.78	97.12	96.82	97.01	96.71	97.12	97.12	97.01	97.51	0.39
MH	178	MH	179			1.17							257.40	338.80	CONC	675	685.8	0.30	20.0	480.32	29%	1.30	0.26	96.71	96.04	96.65	95.98	96.75	96.71	96.65	97.41	0.70
MH	179	MH	190		0.19								41.80	380.60	CONC	675	685.8	0.30	68.0	480.32	21%	1.30	0.87	96.65	95.98	96.45	95.78	96.65	96.65	96.45	97.20	0.55
MH	190	MH	191		0.34								74.80	759.00	CONC	900	914.4	0.30	120.0	1034.42	27%	1.58	1.27	95.91	95.01	95.55	94.65	95.99	95.91	95.55	96.50	0.59
MH	191	MH	192		0.11								24.20	783.20	CONC	900	914.4	0.30	43.0	1034.42	24%	1.58	0.45	95.55	94.65	95.42	94.52	95.55	95.55	95.42	96.40	0.85
MH	192	MH	193											12742.69	CONC	2400	2438.4	0.30	55.0	14145.35	10%	3.03	0.30	95.42	93.02	95.25	92.85	95.42	95.42	95.25	96.95	1.53
MH	193	MH	194											12742.69	CONC	2400	2438.4	0.30	96.5	14145.35	10%	3.03	0.53	94.65	92.25	94.36	91.96	95.21	95.21	94.98	95.7	0.49
MH	194	MH	195		11.47								2523.40	15266.09	CONC	2550	2590.8	0.30	96.5	16627.39	8%	3.15	0.51	94.36	91.81	94.07	91.52	94.98	94.98	94.74	95.30	0.32
MH	195	MH	196											15266.09	CONC	2550	2590.8	0.30	14.0	16627.39	8%	3.15	0.07	94.04	91.49	94.00	91.45	94.74	94.74	94.70	N/A	N/A
MH	School	MH	ex 179		2.40								528.00	528.00	CONC	750	762.0	0.30	14.0	636.13	17%	1.39	0.17	97.64	96.89	97.60	96.85	97.74	97.74	97.71	99.20	1.46
MH	65	MH	66		0.78								265.20	265.20	CONC	600	609.6	0.30	88.0	350.85	24%	1.20	1.22	98.70	98.10	98.44	97.84	98.70	98.70	98.44	99.05	0.35
MH	66	MH	67		0.86								292.40	557.60	CONC	750	762.0	0.30	99.0	636.13	12%	1.39	1.18	98.44	97.69	98.14	97.39	98.44	98.44	98.14	99.15	0.71
MH	67	MH	ex 180											557.60	CONC	750	762.0	0.30	13.0	636.13	12%	1.39	0.16	97.34	96.59	97.30	96.55	97.54	97.54	97.51	98.90	1.36
MH	70	MH	71		0.22	1.22							379.80	379.80	CONC	675	685.8	0.30	53.5	480.32	21%	1.30	0.69	97.58	96.91	97.42	96.75	97.64	97.64	97.54	98.00	0.36
MH	71	MH	72			1.02							255.00	634.80	CONC	825	838.2	0.30	53.5	820.21	23%	1.49	0.60	97.42	96.60	97.26	96.44	97.54	97.54	97.44	98.10	0.56
MH	72	MH	ex 181											634.80	CONC	900	914.4	0.30	18.5	1034.42	39%	1.58	0.20	97.26	96.36	97.20	96.30	97.44	97.44	97.42	97.91	0.47

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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Oct. 7, 2020
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October 07, 2020 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 February 11, 2020, which has been updated to reflect the latest development and 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, that 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 mark up 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, a 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, with the exception of 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 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.

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 m^3 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. 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 25,628 m^3 to accommodate the proposed development but will be approximately 15,982 m^3 smaller than the volume assumed in the Citys 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 outlets 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 m^2/s, as specified in the KWMSS. The lastest modelling of Pond 4 indicated that the peak flow out of the pond for this event is 11.170 m^3/s.

Under the latest pond design, a new pond inlet location is proposed for the existing minor system trunk sewer along Maple Grove. It is proposed that the existing sewer connection from Maple Grove to the pond will remain, but a baffle will be placed in the existing MH187 above the peak water level for the 25mm event (94.20 m) that will ensure that the first flush (≤25mm event) will be adequately treated by the ponds forebay, while larger events (>25mm event) will be able to spill to the existing storm sewer bypassing the forebay, preventing sediment collected by the forebay to be redispersed throughout the pond. Calculation sheets outlining the updated permanent pool and forebay requirements have also been provided in Attachment C.

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	5.2	326	93.06	-0.3	-63	0.00
2 Year SCS 12hr	24.0	669	93.37	22.1	667	93.37	-1.9	-2	0.00
5 Year SCS 12hr	42.5	993	93.61	38.3	992	93.60	-4.2	-1	-0.01
10 Year SCS 12hr	47.0	1,220	93.75	40.3	1,194	93.74	-6.8	-26	-0.01
25 Year SCS 12hr	38.6	1,513	93.91	40.7	1,518	93.90	2.1	5	-0.01
50 Year SCS 12hr	42.1	1,727	94.02	42.7	1,736	94.01	0.6	9	-0.02
100 Year SCS 12hr	35.7	1,947	94.14	40.5	1,949	94.13	4.8	2	-0.01

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	5.3	373	92.67	0.0	-82	0.00
2 Year SCS 12hr	11.4	729	93.10	11.3	727	93.10	-0.1	-3	0.00
5 Year SCS 12hr	17.1	1,063	93.39	16.9	1,055	93.38	-0.3	-8	-0.01
10 Year SCS 12hr	21.3	1,298	93.55	20.8	1,287	93.54	-0.4	-11	-0.01
25 Year SCS 12hr	26.0	1,606	93.73	25.5	1,590	93.72	-0.5	-16	-0.01
50 Year SCS 12hr	29.3	1,829	93.85	28.6	1,809	93.83	-0.7	-20	-0.01
100 Year SCS 12hr	32.4	2,057	93.98	31.7	2,034	93.96	-0.7	-23	-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	458	92.46	0.0	-89	0.00
2 Year SCS 12hr	14.4	925	92.92	14.3	923	92.92	-0.1	-1	0.00
5 Year SCS 12hr	22.3	1,365	93.21	22.1	1,359	93.20	-0.2	-6	-0.01
10 Year SCS 12hr	28.0	1,675	93.36	27.6	1,668	93.35	-0.4	-7	-0.01
25 Year SCS 12hr	34.9	2,080	93.54	34.4	2,068	93.53	-0.5	-12	-0.01
50 Year SCS 12hr	39.5	2,371	93.65	38.9	2,357	93.64	-0.6	-14	-0.01
100 Year SCS 12hr	44.4	2,674	93.78	43.8	2,657	93.77	-0.6	-17	-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	554	92.12	0.0	-131	0.00
2 Year SCS 12hr	12.9	1,052	92.57	12.9	1,052	92.57	-0.1	0	0.00
5 Year SCS 12hr	20.2	1,518	92.85	20.1	1,514	92.84	-0.1	-4	-0.01
10 Year SCS 12hr	25.0	1,851	93.03	24.7	1,843	93.03	-0.3	-8	-0.01
25 Year SCS 12hr	32.8	2,287	93.18	32.5	2,275	93.17	-0.4	-12	-0.01
50 Year SCS 12hr	37.4	2,601	93.29	37.1	2,587	93.28	-0.3	-14	-0.01
100 Year SCS 12hr	43.5	3,001	93.46	43.0	2,984	93.45	-0.5	-17	-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	11.8	39	94.09	1.2	-3	0.03
2 Year SCS 12hr	15.2	85	94.35	16.8	74	94.34	1.6	-11	-0.01
5 Year SCS 12hr	20.8	120	94.48	20.7	103	94.44	-0.1	-18	-0.04
10 Year SCS 12hr	23.3	143	94.57	24.8	122	94.50	1.5	-21	-0.07
25 Year SCS 12hr	26.3	172	94.63	29.4	146	94.59	3.2	-26	-0.04
50 Year SCS 12hr	28.1	192	94.66	32.4	162	94.65	4.3	-30	-0.02
100 Year SCS 12hr	31.0	211	94.70	36.0	179	94.70	5.0	-33	0.00

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 33,000 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 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 6.50 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	6.6	22	94.11	-0.2	-1	-0.06
2 Year SCS 12hr	9.1	48	94.55	9.4	46	94.57	0.3	-2	0.02
5 Year SCS 12hr	12.5	68	94.95	11.7	65	94.79	-0.9	-3	-0.16
10 Year SCS 12hr	15.1	81	95.06	13.7	77	95.05	-1.4	-4	-0.01
25 Year SCS 12hr	17.8	97	95.31	16.1	92	95.30	-1.7	-5	-0.01
50 Year SCS 12hr	19.6	108	95.69	17.4	102	95.41	-2.1	-6	-0.27
100 Year SCS 12hr	22.3	119	96.11	19.6	112	95.66	-2.7	-6	-0.45

From this analysis, it was shown that under the proposed conditions for the 100-Year event the peak water level at the Maple Grove trunk sewer is approximately 45 cm lower than that approximated from the City's Ultimate conditions model. The inclusion of the proposed bypass structure that will be located between existing MH 186 and MH 187 appears to be helping reduce water levels in this trunk sewer for the larger events when compared to the Citys Ultimate model. For the lower return periods, the peak water levels are sometimes higher and sometimes lower (which may be due to instabilities in the existing PCSWMM model), although the total volume and peak inflows are lower under proposed conditions for all events simulated.

As stated before, 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 Budget

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. As demonstrated in Table 7 below, the existing estimated average annual infiltration volume over the 26.63 ha 130 Huntmar development site is 27,695 m^3/year.

Under proposed conditions, the development will include 15.8 ha of residential area (71% impervious, with 50% of that area directly connected), a 0.68 ha park block (29% impervious), a 3.14 ha school block (57% impervious) and 7.01 ha of commercial lands (86% impervious). Using the same 104 mm/Year average infiltration rate as under existing conditions, the estimated annual volume of infiltration would be reduced to 13,712 m³/Year under proposed conditions. This equates to a 13,983 m³/Year (50%) reduction in infiltration volume for the site. This can be explained by the simple fact that infiltration over paved areas, such as roads, sidewalks and driveways will no longer take place. This deficit can either be offset through the implementation of LIDs within the proposed development or through the application of amended soils.

Assuming that the topsoil applied to the pervious areas of the residential and parklands within the site are replaced with silty loam (Type C) soils, the infiltration rate for these lands will increase from 104 mm/year to 242 mm/year, as per table 3.1 of the MOE Stormwater Management Planning and Design Manual, MOE, March 2003. This takes the total average annual infiltration volumes for the development to 28,667 m³/Year, exceeding the annual infiltration target by 972 m³/Year (+3%). Alternatively, if LIDs are decided to be the preferred method to meeting the annual infiltration target, detailed hydrologic and hydraulic modelling of these measures will be conducted at the detailed design stage to ensure that the site is meeting the groundwater infiltration targets.

Table 7: MOE Water Budget
130 Huntmar (26.63 ha)

Condition	Land Use	Total Area (ha)	Total Imp (%)	Directly Connected Imp (%)	Area Available for Infiltration (ha)	Average Infiltration Rate[1] (mm/yr.)	Annual Infiltrated Volume (m³/yr.)
Pre-Development	Natural	26.63	-	-	26.63	104	27,695
						Total	**27,695**
Post Development	Parkland	0.68	29%	0%	0.68	104	707
	School	3.14	57%	100%	1.35	104	1,400
	Residential	15.8	71%	50%	10.16	104	10,563
	Commercial	7.01	86%	100%	1	104	1,041
						Total	**13,712**
Post Development - Modified Soils	Parklands*	0.68	29%	0%	0.68	242	1,646
	School	3.14	57%	100%	1.35	104	1,400
	Residential*	15.8	71%	50%	10.16	242	24,580
	Commercial	7.01	86%	100%	1	104	1,041
						Total	**28,667**

[1] Average infiltration rate based on pre-development targets or annual rates for silty loam, per the MOE March 2003 manual,
*Pervious areas of the park and residential lands to be topped with fine silty loam soils (Type C soils) to increase infiltration.

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 on 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 have 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 for the 100-year event the peak water level at the Maple Grove trunk sewer is approximately 45 cm lower than that approximated from the City's Ultimate conditions model, due to the proposed bypass for the higher flows, while peak flows and total inflow volume are lower for all events. 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 preliminary water budget for the 130 Huntmar Drive development was completed which showed that with the development in place and no BMPs implemented the annual average infiltration volume would be 13,983 m³/year (50%) below the required infiltration target. This infiltration deficit can be offset through the implementation of LID's within the development. Alternatively, topsoil applied to the pervious areas of the residential and parklands within the site could be replaced with silty loam (Type C) soils, increasing the infiltration rate for these lands will increase from 104 mm/year to 242 mm/year, which would result in the site exceeding the annual infiltration target by 972 m³/year (+3%). The preferred option (amended soils vs LIDs) will be investigated at detailed design.

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

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

Attachment A

Proposed Development Plan (Atrel & DSEL)

LEGEND

- MINOR SYSTEM CAPTURE RATE (5 YEAR: 0.70ha, R=0.20)
- FUTURE STORM DRAINAGE AREA
- RUNOFF COEFFICIENT
- PROPOSED STORM SEWER
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA TO MAPLE GROVE ROAD
- MAJOR DRAINAGE SYSTEM
- EXISTING STORM SEWER
- OUTSIDE PROPOSED DEVELOPMENT
- NW=98.00 SE=97.40 SW=97.66 — PROPOSED OBVERT ELEVATION
- 146 — PROPOSED MANHOLE NUMBER

CONSTRUCTION

TRUE

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

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 — Oct 7, 2020 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — J.M.J. DECOEUR — Oct 7/2020 — 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-STMM

PLAN
MACRO STORM DRAINAGE AREA PLAN

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

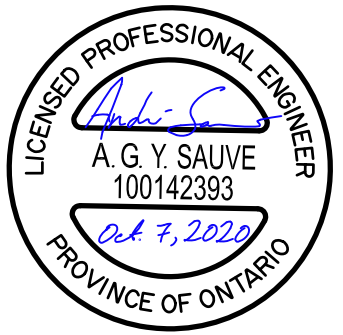
LOCAL ROADS STORM FREQUENCY : 2 YEAR
COLECTOR ROADS STORM FREQUENCY : 5 YEAR
ARTERIAL ROADS STORM FREQUENCY :10 YEAR

130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
October, 2020

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						TIME	RAINF.	RAINF.	RAINF.				ACTUAL	PIPE SEWER DATA									UpStream		DwStream	
														2 Year		5 Year		10 Year																					
						2 Year				5 Year																													
FROM (Up)		TO (Down)		0.40	0.70	0.80	0.40	0.60	0.70	0.80	0.70	0.80		INDIV. 2.78AR	ACCUM. 2.78AR	INDIV. 2.78AR	ACCUM. 2.78AR	INDIV. 2.78AR	ACCUM. 2.78AR	CONC. (MIN)	INTENS. 2 Year (MM/HR)	INTENS. 5 Year (MM/HR)	INTENS. 10 Year (MM/HR)	2 Year Flow (L/S)	5 Year Flow (L/S)	10 Year Flow (L/S)	**PIPE FLOW (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
MH	219	MH	220								1.18							2.30	2.30	10.00	76.81	104.19	122.14			280.47	280.47	CONC	675	685.8	0.20	49.0	392.18	28%	1.06	0.77	99.43	98.76	99.33	98.66
MH	220	MH	101														22.01		2.30	11.02	73.08	99.08	116.12		2180.40	266.64	2447.05	CONC	1350	1371.6	0.30	47.5	3049.82	20%	2.06	0.38	98.35	97.00	98.21	96.86
MH	101	MH	102		0.40						0.54			0.78	0.78		22.01	1.05	3.35	11.41	71.79	97.30	114.03	55.88	2141.23	381.67	2578.78	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		0.44									0.86	1.63		22.01		3.35	12.10	69.59	94.28	110.46	113.75	2074.77	369.72	2558.25	CONC	1350	1371.6	0.35	102.0	3294.18	22%	2.23	0.76	97.83	96.48	97.47	96.12
MH	103	MH	105		0.51									0.99	2.63		22.01		3.35	12.86	67.32	91.17	106.81	176.86	2006.33	357.51	2540.69	CONC	1350	1371.6	0.35	111.5	3294.18	23%	2.23	0.83	97.47	96.12	97.08	95.73
MH	104	MH	105			1.41				4.03				3.14	3.14	8.96	8.96			10.00	76.81	104.19	122.14	240.86	933.83		1174.69	CONC	1050	1066.8	0.30	53.0	1560.35	25%	1.75	0.51	97.13	96.08	96.97	95.92
MH	105	MH	132			0.26								0.58	6.34		30.97		3.35	13.70	65.03	88.02	103.11	412.37	2725.91	345.12	3483.40	CONC	1650	1676.4	0.30	82.0	5208.04	33%	2.36	0.58	96.97	95.32	96.72	95.07
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	83.0	210.32	46%	1.28	1.08	98.66	98.21	98.24	97.79
MH	111	MH	113												1.48					11.08	72.89	98.82	115.81	107.80			107.80	CONC	450	457.2	0.50	11.0	210.32	49%	1.28	0.14	98.21	97.76	98.15	97.70
MH	112	MH	113					0.74								1.23	1.23			10.00	76.81	104.19	122.14		128.60		128.60	CONC	525	533.4	0.30	11.5	245.74	48%	1.10	0.17	98.18	97.66	98.15	97.63
MH	113	MH	116		0.13									0.25	1.73		1.23			11.22	72.41	98.15	115.02	125.41	121.15		246.56	CONC	675	685.8	0.30	71.5	480.32	49%	1.30	0.92	98.15	97.48	97.94	97.27
MH	115	MH	116		0.40									0.78	0.78					10.00	76.81	104.19	122.14	59.79			59.79	PVC	375	366.4	0.50	91.0	116.56	49%	1.11	1.37	98.40	98.03	97.94	97.57
MH	116	MH	121		0.25									0.49	3.00		1.23			12.14	69.46	94.10	110.26	208.16	116.15		324.31	CONC	750	762.0	0.30	56.0	636.13	49%	1.39	0.67	97.94	97.19	97.77	97.02
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	64.5	97.52	60%	0.92	1.16	98.35	97.98	98.12	97.75
MH	121	MH	127		0.57									1.11	4.61		1.23			12.81	67.48	91.38	107.05	311.22	112.79		424.01	CONC	825	838.2	0.30	85.0	820.21	48%	1.49	0.95	97.77	96.95	97.51	96.69
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	98.30	97.93	98.12	97.75
MH	126	MH	127	0.68	0.29									1.32	1.90					11.17	72.59	98.40	115.32	138.23			138.23	CONC	525	533.4	0.30	87.0	245.74	44%	1.10	1.32	98.12	97.60	97.86	97.34
MH	127	MH	132		0.57									1.11	7.63		1.23			13.76	64.85	87.78	102.82	494.52	108.35		602.86	CONC	975	990.6	0.30	83.5	1280.55	53%	1.66	0.84	97.51	96.54	97.26	96.29
MH	132	MH	133		0.50									0.97	14.94		32.20		3.35	14.60	62.73	84.88	99.40	937.17	2733.43	332.70	4003.31	CONC	1800	1828.8	0.30	84.0	6568.16	39%	2.50	0.56	96.72	94.92	96.47	94.67
MH	133	MH	156		0.52									1.01	15.95		32.20		3.35	15.16	61.39	83.05	97.25	979.27	2674.50	325.51	3979.28	CONC	1800	1828.8	0.30	77.5	6568.16	39%	2.50	0.52	96.47	94.67	96.24	94.44
MH	200	MH	201						0.55							1.07	1.07			10.00	76.81	104.19	122.14					PVC	375	366.4	1.50	94.0	201.88	100%	1.91	0.82	106.37	106.00	104.96	104.59
MH	201	MH	202								0.24						1.07	0.47	0.47	10.82	73.80	100.06	117.27		107.09	54.77	161.86	CONC	525	533.4	1.40	62.5	530.86	70%	2.38	0.44	104.96	104.44	104.08	103.56
MH	202	MH	205								0.46						1.07	0.90	1.36	11.26	72.29	97.99	114.84		104.88	156.44	261.31	CONC	600	609.6	0.55	77.5	475.05	45%	1.63	0.79	104.08	103.48	103.65	103.05
MH	203	MH	204								1.18							2.30	2.30	10.00	76.81	104.19	122.14			280.47	280.47	CONC	450	457.2	1.10	110.0	311.95	10%	1.90	0.96	106.42	105.97	105.21	104.76
MH	204	MH	205																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	104.56	104.04	103.65	103.13
MH	205	MH	206								0.62						1.07	1.21	4.87	12.05	69.74	94.48	110.71		101.12	538.60	639.73	CONC	825	838.2	0.35	96.0	885.93	28%	1.61	1.00	103.65	102.83	103.31	102.49
MH	206	MH	207								0.47						1.07	0.91	5.78	13.05	66.80	90.45	105.96		96.81	612.41	709.22	CONC	825	838.2	0.55	106.5	1110.58	36%	2.01	0.88	103.29	102.47	102.70	101.88
MH	207	MH	209					7.46								12.44	13.51		5.78	13.93	64.42	87.19	102.12		1178.25	590.21	1768.46	CONC	1050	1066.8	0.90	46.5	2702.60	35%	3.02	0.26	102.70	101.65	102.28	101.23
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	102.43	101.98	102.24	101.79
MH	209	MH	210								0.36						14.51	0.70	6.48	14.19	63.76	86.29	101.06		1251.73	654.89	1906.61	CONC	1050	1066.8	0.85	48.5	2626.46	27%	2.94	0.28	102.24	101.19	101.83	100.78
MH	210	MH	211								0.36						14.51	0.70	7.18	14.46	63.07	85.34	99.95		1237.95	717.71	1955.66	CONC	1050	1066.8	0.90	96.0	2702.60	28%	3.02	0.53	101.80	100.75	100.94	99.89
MH	211	MH	212								0.34						14.51	0.66	7.84	14.99	61.79	83.59	97.89		1212.56	767.69	1980.25	CONC	1050	1066.8	0.90	91.0	2702.60	27%	3.02	0.50	100.90	99.85	100.08	99.03
MH	212	MH	213								0.27						14.51	0.53	8.37	15.49	60.63	82.00	96.02		1189.50	803.48	1992.97	CONC	1200	1219.2	0.50	72.0	2876.02	31%	2.46	0.49	100.06	98.86	99.70	98.50
MH	213	MH	140							5.07	0.35					11.28	25.78	0.68	9.05	15.98	59.55	80.52	94.29		2075.94	853.22	2929.16	CONC	1500	1524.0	0.50	117.0	5214.57	44%	2.86	0.68	99.70	98.20	99.11	97.61



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

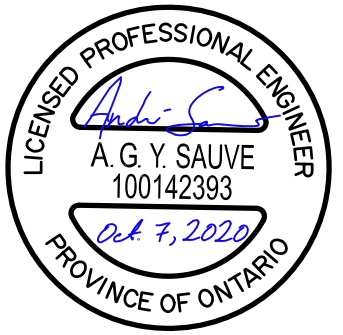
130 Huntmar Drive
Lioness Development Inc.
191002
Atrel Engineering Ltd
October, 2020

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		5 Year		10 Year		TIME	RAINF.	RAINF.	RAINF.				ACTUAL	PIPE SEWER DATA									
														INDIV.	ACCUM.	INDIV.	ACCUM.	INDIV.	ACCUM.		INTENS.	INTENS.	INTENS.	2 Year	5 Year	10 Year									
FROM		TO		2 Year			5 Year				10 Year			2.78AR	2.78AR	2.78AR	2.78AR	2.78AR	2.78AR	CONC.	2 Year	5 Year	10 Year	Flow	Flow	Flow	PIPE	TYPE	DIA.		SLOPE	LENGTH	CAP.	Remaining	VEL.	TIME OF	UpStream		DwStream	
(Up)		(Down)		0.40	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)	FLOW (L/S)		(N0M) (mm)	(ACT)	(%)	(M)	(L/S)	Capacity (%)	(M/S)	FLOW (MIN)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)
MH	140	MH	142		0.17						1.15			0.33	0.33		25.78	2.24	11.29	16.66	58.11	78.55	91.96	19.22	2025.15	1037.93	3082.31	CONC	1650	1676.4	0.45	55.5	6378.52	52%	2.89	0.32	99.11	97.46	98.86	97.21
MH	141	MH	142		0.68									1.32	1.32					10.00	76.81						101.64	CONC	525	533.4	0.35	110.5	265.43	62%	1.19	1.55	98.88	98.36	98.49	97.97
MH	142	MH	144		0.29									0.56	2.22		25.78		11.29	16.98	57.46	77.66	90.92	127.47	2002.21	1026.20	3155.88	CONC	1650 1650	1676.4	0.45	79.0	6378.52	51%	2.89	0.46	98.49	96.84	98.13	96.48
MH	143	MH	144		0.59									1.15	1.15					10.00	76.81						88.19	CONC	525	533.4	0.30	94.0	245.74	64%	1.10	1.42	98.71	98.19	98.43	97.91
MH	144	MH	152		0.32									0.62	3.99		25.78		11.29	17.44	56.56	76.43	89.47	225.63	1970.50	1009.83	3205.96	CONC	1650 1650	1676.4	0.45	85.0	6378.52	50%	2.89	0.49	98.13	96.48	97.75	96.10
MH	146	MH	147		0.28									0.54	0.54					10.00	76.81						41.85	CONC	450	457.2	0.30	115.0	162.91	74%	0.99	1.93	98.85	98.40	98.50	98.05
MH	147	MH	148												0.54					11.93	70.11						38.20	CONC	450	457.2	0.30	11.5	162.91	77%	0.99	0.19	98.47	98.02	98.44	97.99
MH	148	MH	152		0.67									1.30	1.85					12.12	69.51						128.50	CONC	675	685.8	0.30	98.0	480.32	73%	1.30	1.26	98.44	97.77	98.15	97.48
MH	152	MH	156		0.31									0.60	6.44		25.78		11.29	17.93	55.63	75.16	87.98	358.33	1937.75	993.01	3289.09	CONC	1800	1828.8	0.40	82.5	7584.26	57%	2.89	0.48	97.75	95.95	97.42	95.62
MH	154	MH	155		0.57									1.11	1.11					10.00	76.81	104.19	122.14	85.20			85.20	CONC	525	533.4	0.30	74.5	245.74	65%	1.10	1.13	97.53	97.01	97.31	96.79
MH	155	MH	156			1.80								4.00	5.11					11.13	72.73	98.58	115.54	371.83			371.83	CONC	825	838.2	0.30	63.0	820.21	55%	1.49	0.71	97.31	96.49	97.12	96.30
MH	156	MH	192		0.56									1.09	28.60		57.99		14.63	18.40	54.75	73.96	86.57	1565.58	4288.59	1266.86	7121.03	CONC	2400	2438.4	0.30	141.5	14145.35	50%	3.03	0.78	96.24	93.84	95.82	93.42
MH	160	MH	161		0.63									1.23	1.23					10.00	76.81	104.19	122.14	94.17			94.17	CONC	525	533.4	0.30	120.0	245.74	62%	1.10	1.82	96.88	96.36	96.52	96.00
MH	161	MH	162		0.63									1.23	2.45					11.82	70.46	95.48	111.88	172.77			172.77	CONC	675	685.8	0.30	120.0	480.32	64%	1.30	1.54	96.52	95.85	96.16	95.49
MH	162	MH	192		0.15									0.29	2.74					13.36	65.94	89.27	104.57	180.93			180.93	CONC	750	762.0	0.30	48.0	636.13	72%	1.39	0.57	96.16	95.41	96.02	95.27
MH	170	MH	171		0.22									0.43	0.43					10.00	76.81	104.19	122.14	32.88			32.88	PVC	300	299.2	1.00	55.0	96.02	66%	1.37	0.67	97.05	96.75	96.50	96.20
MH	171	MH	172			0.46								1.02	1.45					10.67	74.32	100.78	118.12	107.85			107.85	CONC	450	457.2	0.40	15.5	188.11	43%	1.15	0.23	96.35	95.90	96.29	95.84
MH	172	MH	173												1.45					10.90	73.53	99.68	116.83	106.70			106.70	CONC	450	457.2	0.40	12.0	188.11	43%	1.15	0.17	96.26	95.81	96.21	95.76
MH	173	MH	175		0.39									0.76	2.21					11.07	72.92	98.86	115.86	161.16			161.16	CONC	600	609.6	0.30	39.0	350.85	54%	1.20	0.54	96.21	95.61	96.09	95.49
MH	174	MH	175		0.31									0.60	0.60					10.00	76.81	104.19	122.14	46.34			46.34	PVC	375	366.4	0.40	74.5	104.25	56%	0.99	1.26	96.99	96.62	96.69	96.32
MH	175	MH	190												2.81					11.61	71.12	96.39	112.95	200.09			200.09	CONC	600	609.6	0.40	45.0	405.13	51%	1.39	0.54	96.09	95.49	95.91	95.31
MH	176	MH	178		0.26									0.51	0.51					10.00	76.81	104.19	122.14	38.86			38.86	PVC	375	366.4	0.40	84.0	104.25	63%	0.99	1.42	97.05	96.68	96.71	96.34
MH	177	MH	178		0.11									0.21	0.21					10.00	76.81	104.19	122.14	16.44			16.44	PVC	300	299.2	0.30	35.0	52.60	69%	0.75	0.78	97.12	96.82	97.01	96.71
MH	178	MH	179			1.17								2.60	3.32					11.42	71.76	97.26	113.98	238.39			238.39	CONC	675	685.8	0.30	20.0	480.32	50%	1.30	0.26	96.71	96.04	96.65	95.98
MH	179	MH	190		0.19									0.37	3.69					11.67	70.93	96.12	112.63	261.86			261.86	CONC	675	685.8	0.30	68.0	480.32	45%	1.30	0.87	96.65	95.98	96.45	95.78
MH	190	MH	191		0.34									0.66	7.17					12.54	68.25	92.43	108.30	489.14			489.14	CONC	900	914.4	0.30	120.0	1034.42	53%	1.58	1.27	95.91	95.01	95.55	94.65
MH	191	MH	192		0.11									0.21	7.38					13.81	64.72	87.60	102.60	477.69			477.69	CONC	900	914.4	0.30	43.0	1034.42	54%	1.58	0.45	95.55	94.65	95.42	94.52
MH	192	MH	193												38.72		57.99		14.63	19.18	53.39	72.10	84.38	2067.25	4180.74	1234.81	7482.80	CONC	2400	2438.4	0.30	55.0	14145.35	47%	3.03	0.30	95.42	93.02	95.25	92.85
MH	193	MH	194												38.72		57.99		14.63	19.48	52.88	71.41	83.57	2047.51	4140.73	1222.96	7411.19	CONC	2400	2438.4	0.30	96.5	14145.35	48%	3.03	0.53	94.65	92.25	94.36	91.96
MH	194	MH	195		11.47									22.32	61.04		57.99		14.63	20.01	52.01	70.22	82.17	3174.71	4071.72	1202.47	8448.91	CONC	2550	2590.8	0.30	96.5	16627.39	49%	3.15	0.51	94.36	91.81	94.07	91.52
MH	195	MH	196												61.04		57.99		14.63	20.52	51.20	69.12	80.88	3125.27	4007.94	1183.59	8316.80	CONC	2550	2590.8	0.30	14.0	16627.39	50%	3.15	0.07	94.04	91.49	94.00	91.45
MH	School	MH	ex 179		2.40									4.67	4.67					10.00	76.81	104.19	122.14	358.73			358.73	CONC	750	762.0	0.30	14.0	636.13	44%	1.39	0.17	97.64	96.89	97.60	96.85
MH	65	MH	66		0.78									1.52	1.52					10.00	76.80	104.19	122.14	116.57			116.57	CONC	600	609.6	0.30	88.0	350.85	67%	1.20	1.22	98.70	98.10	98.44	97.84
MH	66	MH	67		0.86									1.67	3.19					11.22	72.41	98.16	115.03	231.09			231.09	CONC	750	762.0	0.30	99.0	636.13	64%	1.39	1.18	98.44	97.69	98.14	97.39
MH	67	MH	ex 180												3.19					12.40	68.66	93.01	108.97	219.12			219.12	CONC	750	762.0	0.30	13.0	636.13	66%	1.39	0.16	97.34	96.59	97.30	96.55
MH	70	MH	71		0.22	1.22								3.14	3.14					10.00	76.81	104.19	122.14	241.29			241.29	CONC	675	685.8	0.30	53.5	480.32	50%	1.30	0.69	97.58	96.91	97.42	96.75
MH	71	MH	72			1.02								2.27	5.41					10.69	74.27	100.71	118.03	401.79			401.79	CONC	825	838.2	0.30	53.5	820.21	51%	1.49	0.60	97.42	96.60	97.26	96.44
MH	72	MH	ex 181												5.41					11.29	72.20	97.86	114.68	390.59			390.59	CONC	900	914.4	0.30	18.5	1034.42	62%	1.58	0.20	97.26	96.36	97.20	96.30

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 COMPUTATION FORM

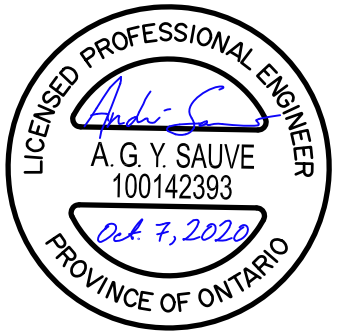
DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc
191002
Atrel Engineering Ltd
October, 2020

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 0.70	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)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	**UpStream Hgl at UP-MH (M)**	UpStream Hgl Out UP-MH (M)	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	0.36	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	0.66	99.25	98.05	98.35	97.15	99.25	99.25	98.70	N/A	N/A
MH	219	MH	220								1.18		280.47	280.47	CONC	675	685.8	0.20	49.0	392.18	28%	1.06	0.77	99.43	98.76	99.33	98.66	99.43	99.43	99.33	N/A	N/A
MH	220	MH	101											2573.32	CONC	1350	1371.6	0.30	47.5	3049.82	16%	2.06	0.38	98.35	97.00	98.21	96.86	98.70	98.47	98.37	N/A	N/A
MH	101	MH	102		0.40						0.54		216.35	2789.67	CONC	1350	1371.6	0.35	92.5	3294.18	15%	2.23	0.69	98.15	96.80	97.83	96.48	98.37	98.15	97.83	99.21	1.06
MH	102	MH	103		0.44								96.80	2886.47	CONC	1350	1371.6	0.35	102.0	3294.18	12%	2.23	0.76	97.83	96.48	97.47	96.12	97.83	97.83	97.55	99.18	1.35
MH	103	MH	105		0.51								112.20	2998.67	CONC	1350	1371.6	0.35	111.5	3294.18	9%	2.23	0.83	97.47	96.12	97.08	95.73	97.55	97.55	97.23	98.44	0.89
MH	104	MH	105			1.41				4.03			1196.80	1196.80	CONC	1050	1066.8	0.30	53.0	1560.35	23%	1.75	0.51	97.13	96.08	96.97	95.92	97.32	97.32	97.23	97.7	0.38
MH	105	MH	132			0.26							57.20	4252.67	CONC	1650	1676.4	0.30	82.0	5208.04	18%	2.36	0.58	96.97	95.32	96.72	95.07	97.23	96.97	96.77	97.59	0.62
MH	110	MH	111		0.76								167.20	167.20	CONC	450	457.2	0.50	83.0	210.32	21%	1.28	1.08	98.66	98.21	98.24	97.79	98.66	98.66	98.24	99.08	0.42
MH	111	MH	113											167.20	CONC	450	457.2	0.50	11.0	210.32	21%	1.28	0.14	98.21	97.76	98.15	97.70	98.23	98.21	98.17	98.97	0.76
MH	112	MH	113					0.74					162.80	162.80	CONC	525	533.4	0.30	11.5	245.74	34%	1.10	0.17	98.18	97.66	98.15	97.63	98.19	98.19	98.17	N/A	N/A
MH	113	MH	116		0.13								28.60	358.60	CONC	675	685.8	0.30	71.5	480.32	25%	1.30	0.92	98.15	97.48	97.94	97.27	98.17	98.15	98.03	98.97	0.82
MH	115	MH	116		0.40								88.00	88.00	PVC	375	366.4	0.50	91.0	116.56	25%	1.11	1.37	98.40	98.03	97.94	97.57	98.40	98.40	98.03	99.00	0.60
MH	116	MH	121		0.25								55.00	501.60	CONC	750	762.0	0.30	56.0	636.13	21%	1.39	0.67	97.94	97.19	97.77	97.02	98.03	97.96	97.86	98.89	0.93
MH	120	MH	121		0.26								57.20	57.20	PVC	375	366.4	0.35	64.5	97.52	41%	0.92	1.16	98.35	97.98	98.12	97.75	98.35	98.35	98.12	98.97	0.62
MH	121	MH	127		0.57								125.40	684.20	CONC	825	838.2	0.30	85.0	820.21	17%	1.49	0.95	97.77	96.95	97.51	96.69	97.86	97.77	97.51	98.83	1.06
MH	125	MH	126		0.30								66.00	66.00	PVC	375	366.4	0.30	60.0	90.28	27%	0.86	1.17	98.30	97.93	98.12	97.75	98.30	98.30	98.12	98.92	0.62
MH	126	MH	127	0.68	0.29								142.00	208.00	CONC	525	533.4	0.30	87.0	245.74	15%	1.10	1.32	98.12	97.60	97.86	97.34	98.12	98.12	97.86	98.79	0.67
MH	127	MH	132		0.57								125.40	1017.60	CONC	975	990.6	0.30	83.5	1280.55	21%	1.66	0.84	97.51	96.54	97.26	96.29	97.51	97.51	97.26	98.75	1.24
MH	132	MH	133		0.50								110.00	5380.27	CONC	1800	1828.8	0.30	84.0	6568.16	18%	2.50	0.56	96.72	94.92	96.47	94.67	96.77	96.77	96.60	97.51	0.74
MH	133	MH	156		0.52								15.50	5395.77	CONC	1800	1828.8	0.30	77.5	6568.16	18%	2.50	0.52	96.47	94.67	96.24	94.44	96.60	96.60	96.44	97.70	1.10
MH	200	MH	201						0.55				111.51	111.51	PVC	375	366.4	1.50	94.0	201.88	45%	1.91	0.82	106.37	106.00	104.96	104.59	106.37	106.37	104.98	N/A	N/A
MH	201	MH	202								0.24		57.04	168.56	CONC	525	533.4	1.40	62.5	530.86	68%	2.38	0.44	104.96	104.44	104.08	103.56	104.98	104.96	104.08	N/A	N/A
MH	202	MH	205								0.46		109.33	277.89	CONC	600	609.6	0.55	77.5	475.05	42%	1.63	0.79	104.08	103.48	103.65	103.05	104.08	104.08	103.73	N/A	N/A
MH	203	MH	204								1.18		280.47	280.47	CONC	450	457.2	1.10	110.0	311.95	10%	1.90	0.96	106.42	105.97	105.21	104.76	106.42	106.42	105.21	N/A	N/A
MH	204	MH	205											280.47	CONC	525	533.4	0.85	107.5	413.64	32%	1.85	0.97	104.56	104.04	103.65	103.13	104.56	104.56	103.73	N/A	N/A
MH	205	MH	206								0.62		147.36	705.73	CONC	825	838.2	0.35	96.0	885.93	20%	1.61	1.00	103.65	102.83	103.31	102.49	103.73	103.65	103.31	N/A	N/A
MH	206	MH	207								0.47		111.71	817.44	CONC	825	838.2	0.55	106.5	1110.58	26%	2.01	0.88	103.29	102.47	102.70	101.88	103.29	103.29	102.70	N/A	N/A
MH	207	MH	209					7.46					1296.47	2113.90	CONC	1050	1066.8	0.90	46.5	2702.60	22%	3.02	0.26	102.70	101.65	102.28	101.23	102.70	102.70	102.28	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	1.39	102.43	101.98	102.24	101.79	102.43	102.43	102.24	N/A	N/A
MH	209	MH	210								0.36		85.57	2302.87	CONC	1050	1066.8	0.85	48.5	2626.46	12%	2.94	0.28	102.24	101.19	101.83	100.78	102.24	102.24	101.83	N/A	N/A
MH	210	MH	211								0.36		85.57	2388.44	CONC	1050	1066.8	0.90	96.0	2702.60	12%	3.02	0.53	101.80	100.75	100.94	99.89	101.80	101.80	100.94	N/A	N/A
MH	211	MH	212								0.34		80.81	2469.25	CONC	1050	1066.8	0.90	91.0	2702.60	9%	3.02	0.50	100.90	99.85	100.08	99.03	100.90	100.90	100.08	N/A	N/A
MH	212	MH	213								0.27		64.17	2533.43	CONC	1200	1219.2	0.50	72.0	2876.02	12%	2.46	0.49	100.06	98.86	99.70	98.50	100.06	100.06	99.70	N/A	N/A
MH	213	MH	140							5.07	0.35		1806.99	4340.42	CONC	1500	1524.0	0.50	117.0	5214.57	17%	2.86	0.68	99.70	98.20	99.11	97.61	99.70	99.70	99.11	N/A	N/A



STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

130 Huntmar Drive
Lioness Development Inc
191002
Atrel Engineering Ltd
October, 2020

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 0.70	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)	TIME OF FLOW (MIN)	UpStream Obv. (M)	UpStream Inv. (M)	DwStream Obv. (M)	DwStream Inv. (M)	**UpStream Hgl at UP-MH (M)**	UpStream Hgl Out UP-MH (M)	MH Hgl (M)	Down Up USF ELEV (M)	Down HGL FREEBOARD (M)
MH	140	MH	142								1.15		448.80	4789.22	CONC	1650	1676.4	0.45	55.5	6378.52	25%	2.89	0.32	99.11	97.46	98.86	97.21	99.11	99.11	98.86	99.75	0.64
MH	141	MH	142		0.68								231.20	231.20	CONC	525	533.4	0.35	110.5	265.43	13%	1.19	1.55	98.88	98.36	98.49	97.97	98.89	98.88	98.49	99.20	0.32
MH	142	MH	144		0.29								98.60	4887.82	CONC	1650	1676.4	0.45	79.0	6378.52	23%	2.89	0.46	98.49	96.84	98.13	96.48	98.49	98.49	98.13	99.3	0.81
MH	143	MH	144		0.59								200.60	200.60	CONC	525	533.4	0.30	94.0	245.74	18%	1.10	1.42	98.71	98.19	98.43	97.91	98.73	98.71	98.43	99.10	0.39
MH	144	MH	152		0.32								108.80	4996.62	CONC	1650	1676.4	0.45	85.0	6378.52	22%	2.89	0.49	98.13	96.48	97.75	96.10	98.13	98.13	97.75	99.00	0.87
MH	146	MH	147		0.28								95.20	95.20	CONC	450	457.2	0.30	115.0	162.91	42%	0.99	1.93	98.85	98.40	98.50	98.05	98.85	98.85	98.50	99.15	0.30
MH	147	MH	148											95.20	CONC	450	457.2	0.30	11.5	162.91	42%	0.99	0.19	98.47	98.02	98.44	97.99	98.48	98.47	98.45	99.05	0.58
MH	148	MH	152		0.67								227.80	323.00	CONC	675	685.8	0.30	98.0	480.32	33%	1.30	1.26	98.44	97.77	98.15	97.48	98.45	98.44	98.15	99.05	0.61
MH	152	MH	156		0.31								105.40	5425.02	CONC	1800	1828.8	0.40	82.5	7584.26	28%	2.89	0.48	97.75	95.95	97.42	95.62	97.75	97.75	97.42	98.90	1.15
MH	154	MH	155		0.57								193.80	193.80	CONC	525	533.4	0.30	74.5	245.74	21%	1.10	1.13	97.53	97.01	97.31	96.79	97.53	97.53	97.31	97.95	0.42
MH	155	MH	156			1.80							450.00	643.80	CONC	825	838.2	0.30	63.0	820.21	22%	1.49	0.71	97.31	96.49	97.12	96.30	97.31	97.31	97.12	97.90	0.59
MH	156	MH	192		0.56								15.50	11480.09	CONC	2400	2438.4	0.30	141.5	14145.35	19%	3.03	0.78	96.24	93.84	95.82	93.42	96.44	96.24	95.82	97.85	1.61
MH	160	MH	161		0.63								214.20	214.20	CONC	525	533.4	0.30	120.0	245.74	13%	1.10	1.82	96.88	96.36	96.52	96.00	96.88	96.88	96.52	97.4	0.52
MH	161	MH	162		0.63								214.20	428.40	CONC	675	685.8	0.30	120.0	480.32	11%	1.30	1.54	96.52	95.85	96.16	95.49	96.52	96.52	96.16	97.10	0.58
MH	162	MH	192		0.15								51.00	479.40	CONC	750	762.0	0.30	48.0	636.13	25%	1.39	0.57	96.16	95.41	96.02	95.27	96.16	96.16	96.02	97.00	0.84
MH	170	MH	171		0.22								48.40	48.40	PVC	300	299.2	1.00	55.0	96.02	50%	1.37	0.67	97.05	96.75	96.50	96.20	97.05	97.05	96.50	97.50	0.45
MH	171	MH	172			0.46							101.20	149.60	CONC	450	457.2	0.40	15.5	188.11	20%	1.15	0.23	96.35	95.90	96.29	95.84	96.35	96.35	96.29	96.80	0.45
MH	172	MH	173											149.60	CONC	450	457.2	0.40	12.0	188.11	20%	1.15	0.17	96.26	95.81	96.21	95.76	96.28	96.26	96.22	96.60	0.34
MH	173	MH	175		0.39								85.80	235.40	CONC	600	609.6	0.30	39.0	350.85	33%	1.20	0.54	96.21	95.61	96.09	95.49	96.22	96.21	96.09	96.60	0.39
MH	174	MH	175		0.31								68.20	68.20	PVC	375	366.4	0.40	74.5	104.25	35%	0.99	1.26	96.99	96.62	96.69	96.32	96.99	96.99	96.69	97.45	0.46
MH	175	MH	190											303.60	CONC	600	609.6	0.40	45.0	405.13	25%	1.39	0.54	96.09	95.49	95.91	95.31	96.09	96.09	95.99	96.55	0.46
MH	176	MH	178		0.26								57.20	57.20	PVC	375	366.4	0.40	84.0	104.25	45%	0.99	1.42	97.05	96.68	96.71	96.34	97.05	97.05	96.75	97.50	0.45
MH	177	MH	178		0.11								24.20	24.20	PVC	300	299.2	0.30	35.0	52.60	54%	0.75	0.78	97.12	96.82	97.01	96.71	97.12	97.12	97.01	97.51	0.39
MH	178	MH	179			1.17							257.40	338.80	CONC	675	685.8	0.30	20.0	480.32	29%	1.30	0.26	96.71	96.04	96.65	95.98	96.75	96.71	96.65	97.41	0.70
MH	179	MH	190		0.19								41.80	380.60	CONC	675	685.8	0.30	68.0	480.32	21%	1.30	0.87	96.65	95.98	96.45	95.78	96.65	96.65	96.45	97.20	0.55
MH	190	MH	191		0.34								74.80	759.00	CONC	900	914.4	0.30	120.0	1034.42	27%	1.58	1.27	95.91	95.01	95.55	94.65	95.99	95.91	95.55	96.50	0.59
MH	191	MH	192		0.11								24.20	783.20	CONC	900	914.4	0.30	43.0	1034.42	24%	1.58	0.45	95.55	94.65	95.42	94.52	95.55	95.55	95.42	96.40	0.85
MH	192	MH	193											12742.69	CONC	2400	2438.4	0.30	55.0	14145.35	10%	3.03	0.30	95.42	93.02	95.25	92.85	95.42	95.42	95.25	96.95	1.53
MH	193	MH	194											12742.69	CONC	2400	2438.4	0.30	96.5	14145.35	10%	3.03	0.53	94.65	92.25	94.36	91.96	95.21	95.21	94.98	95.7	0.49
MH	194	MH	195		11.47								2523.40	15266.09	CONC	2550	2590.8	0.30	96.5	16627.39	8%	3.15	0.51	94.36	91.81	94.07	91.52	94.98	94.98	94.74	95.30	0.32
MH	195	MH	196											15266.09	CONC	2550	2590.8	0.30	14.0	16627.39	8%	3.15	0.07	94.04	91.49	94.00	91.45	94.74	94.74	94.70	N/A	N/A
MH	School	MH	ex 179		2.40								528.00	528.00	CONC	750	762.0	0.30	14.0	636.13	17%	1.39	0.17	97.64	96.89	97.60	96.85	97.74	97.74	97.71	99.20	1.46
MH	65	MH	66		0.78								265.20	265.20	CONC	600	609.6	0.30	88.0	350.85	24%	1.20	1.22	98.70	98.10	98.44	97.84	98.70	98.70	98.44	99.05	0.35
MH	66	MH	67		0.86								292.40	557.60	CONC	750	762.0	0.30	99.0	636.13	12%	1.39	1.18	98.44	97.69	98.14	97.39	98.44	98.44	98.14	99.15	0.71
MH	67	MH	ex 180											557.60	CONC	750	762.0	0.30	13.0	636.13	12%	1.39	0.16	97.34	96.59	97.30	96.55	97.54	97.54	97.51	98.90	1.36
MH	70	MH	71		0.22	1.22							379.80	379.80	CONC	675	685.8	0.30	53.5	480.32	21%	1.30	0.69	97.58	96.91	97.42	96.75	97.64	97.64	97.54	98.00	0.36
MH	71	MH	72			1.02							255.00	634.80	CONC	825	838.2	0.30	53.5	820.21	23%	1.49	0.60	97.42	96.60	97.26	96.44	97.54	97.54	97.44	98.10	0.56
MH	72	MH	ex 181											634.80	CONC	900	914.4	0.30	18.5	1034.42	39%	1.58	0.20	97.26	96.36	97.20	96.30	97.44	97.44	97.42	97.91	0.47

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
Oct. 7, 2020
PROVINCE OF ONTARIO

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

Ottawa

	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
Trunk 1																																	
					0.00	0.00	0.21	0.70	0.41	0.41			0.00	0.00			0.00	0.00															
					0.00	0.00	0.24	0.70	0.47	0.88			0.00	0.00			0.00	0.00															
	1	2			0.00	0.00	0.50	0.70	0.97	1.85			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	193	600	600	CONC	0.18	82.0	260.5030	0.9213	1.4833	0.739
					0.00	0.00	0.19	0.70	0.37	2.22			0.00	0.00			0.00	0.00															
	2	3			0.00	0.00	0.20	0.70	0.39	2.61			0.00	0.00			0.00	0.00	11.48	71.54	96.96	113.62	166.05	253	675	675	CONC	0.17	82.0	346.5834	0.9685	1.4111	0.730
					0.00	0.00	0.01	0.70	0.02	2.63			0.00	0.00			0.00	0.00															
	3	4			0.00	0.00	0.05	0.70	0.10	2.72			0.00	0.00			0.00	0.00	12.89	67.23	91.04	106.66	155.82	248	675	675	CONC	0.16	26.5	336.2353	0.9396	0.4701	0.738
	4	5	0.16	0.70	0.31	0.31			0.00	2.72			0.00	0.00			0.00	0.00	13.36	65.92	89.24	104.54	152.71	264	750	750	CONC	0.11	43.5	369.2322	0.8358	0.8675	0.714
	5	8	0.14	0.70	0.27	0.58			0.00	2.72			0.00	0.00			0.00	0.00	14.23	63.64	86.12	100.87	147.32	272	750	750	CONC	0.11	28.0	369.2322	0.8358	0.5584	0.736
					0.00	0.58	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	12.91														
	8	11	1.40	0.70	2.72	3.31			0.00	2.72			0.00	0.00			0.00	0.00	14.79	62.27	84.24	98.66	144.07	435	900	900	CONC	0.11	63.0	600.4123	0.9438	1.1125	0.725
					0.00	3.31	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	12.85														
	11	14	1.37	0.70	2.67	5.97			0.00	2.72			0.00	0.00			0.00	0.00	15.90	59.72	80.75	94.55	138.05	577	975	975	CONC	0.12	70.5	776.3236	1.0398	1.1300	0.743
					0.00	5.97	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	13.37														
	14	17	1.19	0.70	2.32	8.29			0.00	2.72			0.00	0.00			0.00	0.00	17.03	57.35	77.52	90.75	132.47	687	1200	1200	CONC	0.10	77.5	1232.8868	1.0901	1.1849	0.557
	17	20			0.00	8.29			0.00	2.72			0.00	0.00			0.00	0.00	18.22	55.09	74.42	87.11	127.14	659	1200	1200	CONC	0.10	46.0	1232.8868	1.0901	0.7033	0.535
					0.00	8.29	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	18.69														
			0.53	0.40	0.59	8.88			0.00	2.72			0.00	0.00			0.00	0.00															
			1.18	0.70	2.30	11.18			0.00	2.72			0.00	0.00			0.00	0.00															
	20	31	1.22	0.70	2.37	13.55			0.00	2.72			0.00	0.00			0.00	0.00	18.92	53.83	72.71	85.10	124.19	928	1200	1200	CONC	0.10	76.0	1232.8868	1.0901	1.1620	0.752
					0.00	13.55	0.00	0.00	0.00	2.72			0.00	0.00			0.00	0.00	16.65														
					0.00	13.55	0.01	0.70	0.02	2.74			0.00	0.00			0.00	0.00															
					0.00	13.55	0.41	0.70	0.80	3.54			0.00	0.00			0.00	0.00															
					0.00	13.55	0.86	0.70	1.67	5.22			0.00	0.00			0.00	0.00															
			1.35	0.70	2.63	16.18			0.00	5.22			0.00	0.00			0.00	0.00															
	31	32	1.83	0.70	3.56	19.74			0.00	5.22			0.00	0.00			0.00	0.00	20.08	51.90	70.07	82.00	119.64	1390	1350	1350	CONC	0.13	59.5	1924.4277	1.3444	0.7376	0.722
	32	36	0.22	0.70	0.43	20.17			0.00	5.22			0.00	0.00			0.00	0.00	20.82	50.75	68.50	80.15	116.93	1381	1350	1350	CONC	0.12	12.0	1848.9303	1.2917	0.1548	0.747
					0.00	20.17	0.00	0.00	0.00	5.22			0.00	0.00			0.00	0.00	14.03														
	36	37	1.58	0.70	3.07	23.24			0.00	5.22			0.00	0.00			0.00	0.00	20.98	50.51	68.18	79.78	116.38	1530	1350	1350	CONC	0.15	58.5	2067.1669	1.4442	0.6751	0.740
	37	HW			0.00	23.24			0.00	5.22			0.00	0.00			0.00	0.00	21.65	49.52	66.82	78.19	114.05	1499	1350	1350	CONC	0.14	30.0	1997.0730	1.3952	0.3584	0.751
Trunk 3																																	
	56	57			0.00	0.00	0.48	0.70	0.93	0.93			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	450	450	PVC	0.21	80.5	130.6520	0.8215	1.6332	0.745
	57	58			0.00	0.00	0.24	0.70	0.47	1.40			0.00	0.00			0.00	0.00	11.63	71.06	96.29	112.84	164.89	135	600	600	CONC	0.14	98.5	229.7421	0.8125	2.0204	0.587
To Trunk 2, Pipe 58 - 61						0.00				1.40				0.00				0.00	13.65														
Trunk 2																																	
			0.49	0.70	0.95	0.95			0.00	0.00			0.00	0.00			0.00	0.00															
	46	47	2.38	0.80	5.29	6.25			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	480	825	825	CONC	0.20	70.5	641.9463	1.2009	0.9784	0.747
	47	50	0.36	0.70	0.70	6.95			0.00	0.00			0.00	0.00			0.00	0.00	10.98	73.24	99.29	116.37	170.08	509	825	825	CONC	0.23	73.5	688.4108	1.2878	0.9512	0.739
					0.00	6.95	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	12.19														
					0.00	6.95	0.24	0.70	0.47	0.47			0.00	0.00			0.00	0.00															
					0.00	6.95	0.26	0.70	0.51	0.97			0.00	0.00			0.00	0.00															
			0.70	0.70	1.36	8.31			0.00	0.97			0.00	0.00			0.00	0.00															
	50	51	1.75	0.80	3.89	12.20			0.00	0.97			0.00	0.00			0.00	0.00	12.19	69.30	93.88	109.99	160.72	937	1050	1050	CONC	0.21	45.0	1251.3755	1.4452	0.5190	0.749
					0.00	12.20	0.00	0.00	0.00	0.97			0.00	0.00			0.00	0.00	15.92														
					0.00	12.20	0.12	0.70	0.23	1.21			0.00	0.00			0.00	0.00															
					0.00	12.20	0.16	0.70	0.31	1.52			0.00	0.00			0.00	0.00															
	51	54	2.88	0.70	5.60	17.81			0.00	1.52			0.00	0.00			0.00	0.00	15.92	59.68	80.70	94.49	137.96	1185	1200	1200	CONC	0.17	45.5	1607.4877	1.4213	0.5335	0.737
					0.00	17.81	0.00	0.00	0.00	1.52			0.00	0.00			0.00	0.00	12.48														
			0.79	0.80	1.76	19.56			0.00	1.52			0.00	0.00			0.00	0.00															
			0.86	0.70	1.67	21.24			0.00	1.52			0.00	0.00			0.00	0.00															
	54	55	1.06	0.80	2.36	23.59			0.00	1.52			0.00	0.00			0.00	0.00	16.45	58.53	79.13	92.65	135.26	1501	1350	1350	CONC	0.15	26.5	2067.1669	1.4442	0.3058	0.726
	55	58	0.13	0.70	0.25	23.85			0.00	1.52			0.00	0.00			0.00	0.00	16.76	57.90	78.27	91.63	133.77	1500	1500	1500	CONC	0.10	75.5	2235.3724	1.2650	0.9948	0.671

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

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
APR 22, 2019
PROVINCE OF ONTARIO

Designed: A.K.	PROJECT: Kanata West - 195 Huntmar Drive		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2	File Ref: 12-624	Date: April, 2019	Sheet No. SHEET 1 OF 3

624_STM3.xlsx

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

Ottawa

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
Contribution From Trunk 3, Pipe 57 - 58						0.00				1.40				0.00				0.00	13.65														
			0.28	0.70	0.54	24.39			0.00	2.92			0.00	0.00			0.00	0.00															
	58	61	2.73	0.80	6.07	30.46			0.00	2.92			0.00	0.00			0.00	0.00	17.76	55.95	75.60	88.49	129.16	1925	1500	1500	CONC	0.14	111.0	2644.9283	1.4967	1.2360	0.728
					0.00	30.46	0.00	0.00	0.00	2.92			0.00	0.00			0.00	0.00	12.17														
			0.47	0.70	0.91	31.38			0.00	2.92			0.00	0.00			0.00	0.00															
	61	62	3.19	0.80	7.09	38.47			0.00	2.92			0.00	0.00			0.00	0.00	18.99	53.71	72.55	84.91	123.90	2278	1650	1650	CONC	0.10	74.0	2882.2416	1.3479	0.9150	0.790
	62	63	0.06	0.70	0.12	38.59			0.00	2.92			0.00	0.00			0.00	0.00	19.91	52.18	70.46	82.45	120.31	2219	1650	1650	CONC	0.10	74.5	2882.2416	1.3479	0.9212	0.770
	63	HW	2.00	0.80	4.45	43.04			0.00	2.92			0.00	0.00			0.00	0.00	20.83	50.74	68.49	80.14	116.91	2384	1650	1650	CONC	0.11	65.5	3022.9205	1.4137	0.7722	0.788
Trunk 6																																	
					0.00	0.00			0.00	0.00	0.43	0.70	0.84	0.84			0.00	0.00															
	419	420	0.66	0.80	1.46	1.46			0.00	0.00			0.00	0.84			0.00	0.00	10.00	76.81	104.19	122.14	178.56	215	675	675	CONC	0.12	100.5	291.1883	0.8137	2.0584	0.737
					0.00	1.46			0.00	0.00	0.39	0.70	0.76	1.60			0.00	0.00															
	420	421	0.93	0.80	2.07	3.53			0.00	0.00			0.00	1.60			0.00	0.00	12.06	69.71	94.45	110.67	161.70	423	900	900	CONC	0.10	119.0	572.4707	0.8999	2.2040	0.739
	421	422			0.00	3.53			0.00	0.00	1.34	0.70	2.61	4.20			0.00	0.00	14.26	63.56	86.02	100.75	147.14	648	900	900	CONC	0.21	42.5	829.5888	1.3040	0.5432	0.781
	422	423			0.00	3.53			0.00	0.00	0.33	0.70	0.64	4.85			0.00	0.00	14.81	62.23	84.19	98.60	143.99	698	975	975	CONC	0.14	118.5	838.5253	1.1231	1.7585	0.832
	423	424			0.00	3.53			0.00	0.00	0.26	0.70	0.51	5.35			0.00	0.00	16.56	58.31	78.82	92.28	134.72	700	975	975	CONC	0.14	93.0	838.5253	1.1231	1.3801	0.835
	424	403			0.00	3.53			0.00	0.00	0.32	0.70	0.62	5.97			0.00	0.00	17.94	55.59	75.11	87.92	128.33	722	975	975	CONC	0.15	69.0	867.9562	1.1625	0.9892	0.831
To Trunk 5, Pipe 403 - 404						3.53				0.00				5.97				0.00	18.93														
Trunk 5																																	
					0.00	0.00			0.00	0.00	0.11	0.70	0.21	0.21			0.00	0.00															
					0.00	0.00			0.00	0.00	0.26	0.70	0.51	0.72			0.00	0.00															
	401	402			0.00	0.00			0.00	0.00	0.31	0.70	0.60	1.32			0.00	0.00	10.00	76.81	104.19	122.14	178.56	162	450	450	PVC	0.93	111.5	274.9464	1.7288	1.0750	0.588
					0.00	0.00	-0.09	0.70	-0.18	-0.18			0.00	1.32			0.00	0.00															
	402	403			0.00	0.00			0.00	-0.18	0.09	0.70	0.18	1.50			0.00	0.00	11.07	72.91	98.84	115.84	169.30	156	450	450	PVC	0.86	84.5	264.3966	1.6624	0.8472	0.591
Contribution From Trunk 6, Pipe 424 - 403						3.53				0.00				5.97				0.00	18.93														
	403	404			0.00	3.53			0.00	-0.18	0.58	0.70	1.13	8.60			0.00	0.00	18.93	53.81	72.68	85.07	124.14	909	1050	1050	CONC	0.17	64.0	1125.9068	1.3003	0.8203	0.807
	404	405			0.00	3.53			0.00	-0.18	0.21	0.70	0.41	9.01			0.00	0.00	19.75	52.43	70.80	82.85	120.89	919	1050	1050	CONC	0.18	82.5	1158.5486	1.3380	1.0277	0.793
					0.00	3.53			0.00	-0.18	0.11	0.70	0.21	9.22			0.00	0.00															
	405	406			0.00	3.53	7.49	0.60	12.49	12.32			0.00	9.22			0.00	0.00	20.78	50.81	68.58	80.25	117.07	1764	1200	1200	CONC	0.35	78.5	2306.5199	2.0394	0.6415	0.765
					0.00	3.53	0.19	0.70	0.37	12.69			0.00	9.22			0.00	0.00															
	406	407			0.00	3.53	0.46	0.70	0.90	13.58			0.00	9.22			0.00	0.00	21.42	49.85	67.27	78.71	114.82	1816	1200	1200	CONC	0.36	64.0	2339.2382	2.0683	0.5157	0.776
	407	408			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	21.94	49.11	66.26	77.53	113.08	1789	1200	1200	CONC	0.35	64.0	2306.5199	2.0394	0.5230	0.775
	408	409			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	22.46	48.38	65.27	76.36	111.38	1762	1350	1350	CONC	0.18	92.0	2264.4679	1.5820	0.9692	0.778
	409	410			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	23.43	47.09	63.52	74.31	108.36	1715	1350	1350	CONC	0.17	92.0	2200.6672	1.5374	0.9973	0.779
	410	411			0.00	3.53			0.00	13.58			0.00	9.22			0.00	0.00	24.43	45.85	61.82	72.31	105.44	1669	1500	1500	CONC	0.11	92.0	2344.4784	1.3267	1.1557	0.712
					0.00	3.53			0.00	13.58	0.51	0.80	1.13	10.36			0.00	0.00															
					0.00	3.53	1.62	0.80	3.60	17.19			0.00	10.36			0.00	0.00															
					0.00	3.53			0.00	17.19	2.29	0.70	4.46	14.81			0.00	0.00															
	411	412	5.88	0.80	13.08	16.61			0.00	17.19			0.00	14.81			0.00	0.00	25.58	44.49	59.98	70.15	102.27	2809	1500	1500	CONC	0.27	97.5	3673.0917	2.0785	0.7818	0.765
	412	430			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	26.37	43.63	58.80	68.76	100.24	2754	1500	1500	CONC	0.26	23.0	3604.4298	2.0397	0.1879	0.764
	430	413			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	26.55	43.42	58.52	68.44	99.77	2741	1800	1800	CONC	0.26	74.5	5861.2002	2.3033	0.5391	0.468
	413	4C10			0.00	16.61			0.00	17.19			0.00	14.81			0.00	0.00	27.09	42.85	57.75	67.53	98.43	2705	1800	1800	CONC	0.25	97.5	5747.3797	2.2586	0.7195	0.471
To Trunk 4, Pipe 418 - 230						16.61				17.19				14.81				0.00	27.81														
Trunk 4																																	
	416	417			0.00	0.00	4.57	0.40	5.08	5.08			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	529	675	675	CONC	0.76	58.0	732.8078	2.0478	0.4720	0.723
					0.00	0.00	1.21	0.40	1.35	6.43			0.00	0.00			0.00	0.00															
	417	4C10	6.83	0.80	15.19	15.19			0.00	6.43			0.00	0.00			0.00	0.00	10.47	75.04	101.76	119.28	174.36	1794	1050	1050	CONC	0.77	100.0	2396.2016	2.7673	0.6023	0.749
Contribution From Trunk 5, Pipe 413 - 418						16.61				17.19				14.81				0.00	27.81														
					0.00	31.80			0.00	23.61	1.03	0.70	2.00	16.82			0.00	0.00															
	4C10	4C11			0.00	31.80	5.04	0.80	11.21	34.82			0.00	16.82			0.00	0.00	27.81	42.12	56.75	66.35	96.71	4431	1950	1950	CONC	0.40	259.0	8999.7165	3.0135	1.4324	0.492
					0.00	31.80	0.71	0.70	1.38	36.20			0.00	16.82			0.00	0.00															
	4C11	4C21a			0.00	31.80	6.46	0.80	14.37	50.57			0.00	16.82			0.00	0.00	29.24	40.73	54.86	64.15	93.48	5149	2250	2250	CONC	0.20	198.0	9320.5509	2.3442	1.4078	0.552

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

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
APR 22, 2019
PROVINCE OF ONTARIO

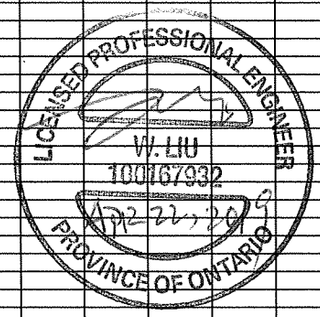
Designed: A.K.	PROJECT: Kanata West - 195 Huntmar Drive
Checked: W.L.	LOCATION: City of Ottawa
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2	File Ref: 12-624 / Date: April, 2019 / Sheet No. SHEET 2 OF 3

624_STM3.xlsx

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
					0.00	31.80	0.48	0.70	0.93	51.51			0.00	16.82			0.00	0.00															
					0.00	31.80	0.96	0.80	2.14	53.64			0.00	16.82			0.00	0.00															
	4C21a	4C21b			0.00	31.80	7.19	0.80	15.99	69.63			0.00	16.82			0.00	0.00	30.65	39.47	53.15	62.13	90.53	6001	2250	2250	CONC	0.30	116.0	11415.2969	2.8710	0.6734	0.526
	4C21b	4C26a(HW)			0.00	31.80	15.57	0.80	34.63	104.26			0.00	16.82			0.00	0.00	31.33	38.89	52.37	61.21	89.18	7726	2250	2250	CONC	0.40	259.0	13181.2494	3.3151	1.3021	0.586
SWM POND 7 OUTFALL																																	
					0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00						277									
	100	101			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	277	750	750	CONC	0.10	25.0	352.0491	0.7969	0.5229	0.787
	101	102			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.52	74.85	101.51	118.98	173.92	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	102	103			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	12.56	68.19	92.36	108.21	158.10	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	103	104			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	14.60	62.72	84.87	99.39	145.16	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	104	105			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	16.64	58.15	78.61	92.03	134.35	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	105	106			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	18.68	54.26	73.29	85.78	125.18	277	750	750	CONC	0.10	97.5	352.0491	0.7969	2.0392	0.787
	106	107			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	20.72	50.90	68.71	80.40	117.30	277	750	750	CONC	0.10	57.0	352.0491	0.7969	1.1922	0.787
	107	108			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	21.91	49.15	66.32	77.59	113.18	277	750	750	CONC	0.10	45.0	352.0491	0.7969	0.9412	0.787
	108	109			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	22.85	47.85	64.55	75.52	110.14	277	750	750	CONC	0.10	75.5	352.0491	0.7969	1.5791	0.787
	109	HW	(CULVERT)		0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	24.43	45.84	61.82	72.31	105.43	277	750	750	CONC	0.10	77.0	352.0491	0.7969	1.6105	0.787



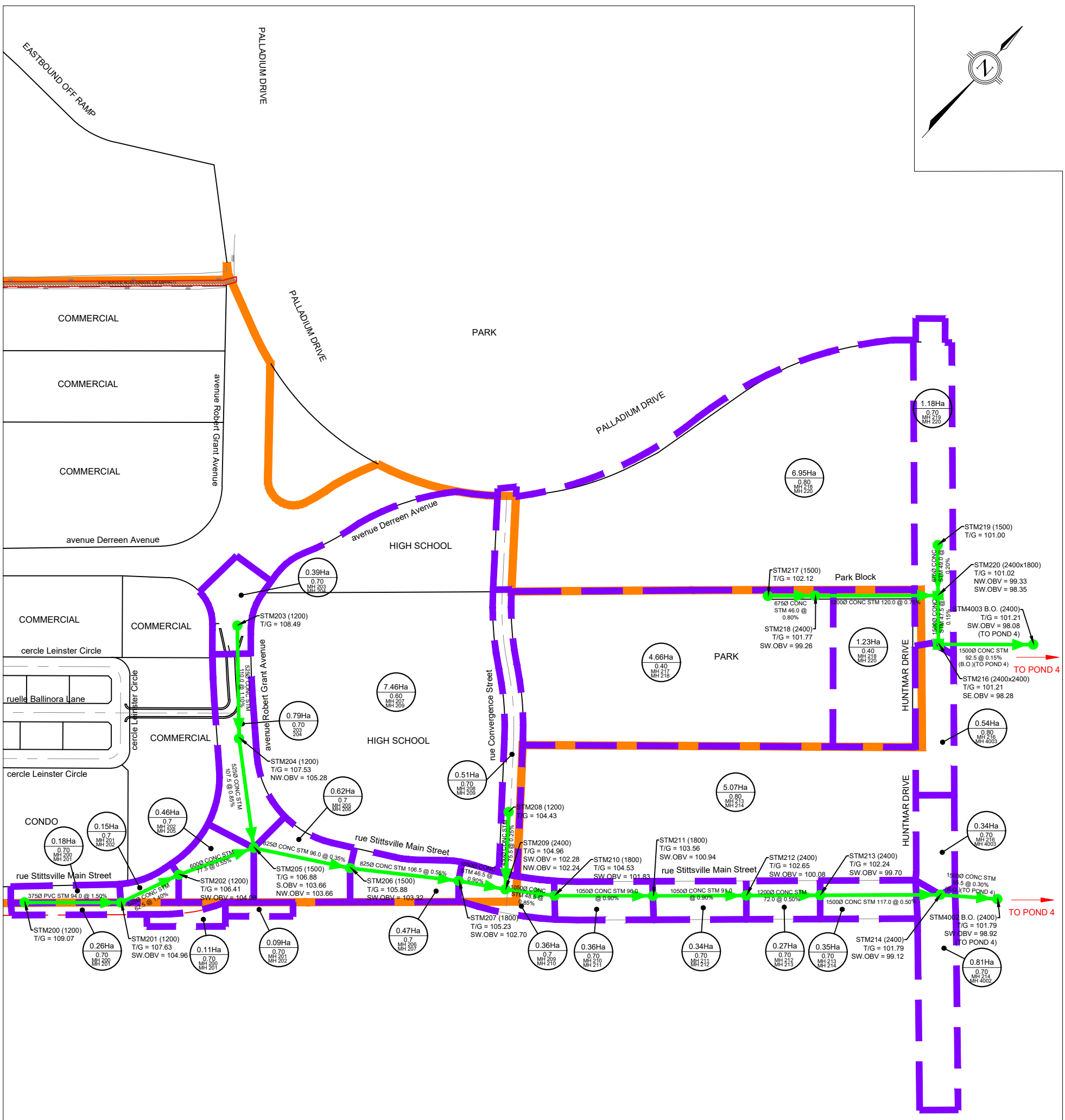
Definitions:
Q = 2.78 AIR, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient

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

Designed: A.K.
Checked: W.L.
Dwg. Reference: Storm Drainage plan, Dwgs. No. 2

PROJECT: **Kanata West - 195 Huntmar Drive**
LOCATION: **City of Ottawa**
File Ref: **12-624** Date: **April, 2019** Sheet No. **SHEET 3 OF 3**

624_STM3.xlsx



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,
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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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Engineers - Ingénieurs
380 LAURIER STREET, ROCKLAND, ONTARIO K4K 1G2
TEL.: (613) 446-7423 FAX: (613) 446-7425

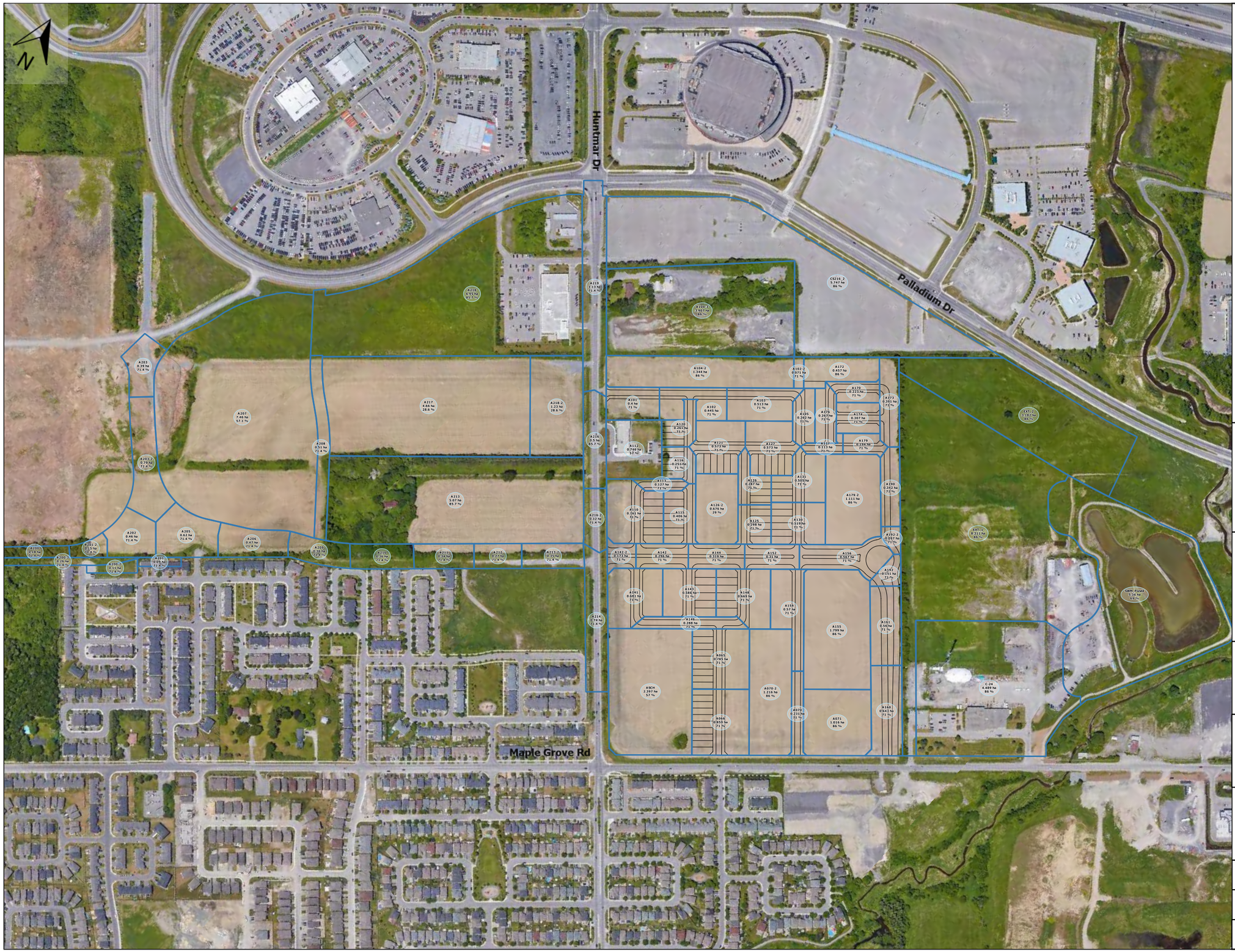
SCALE : 1:5500

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:	BL
DATE:	October 2020



Legend

Proposed Subcatchments

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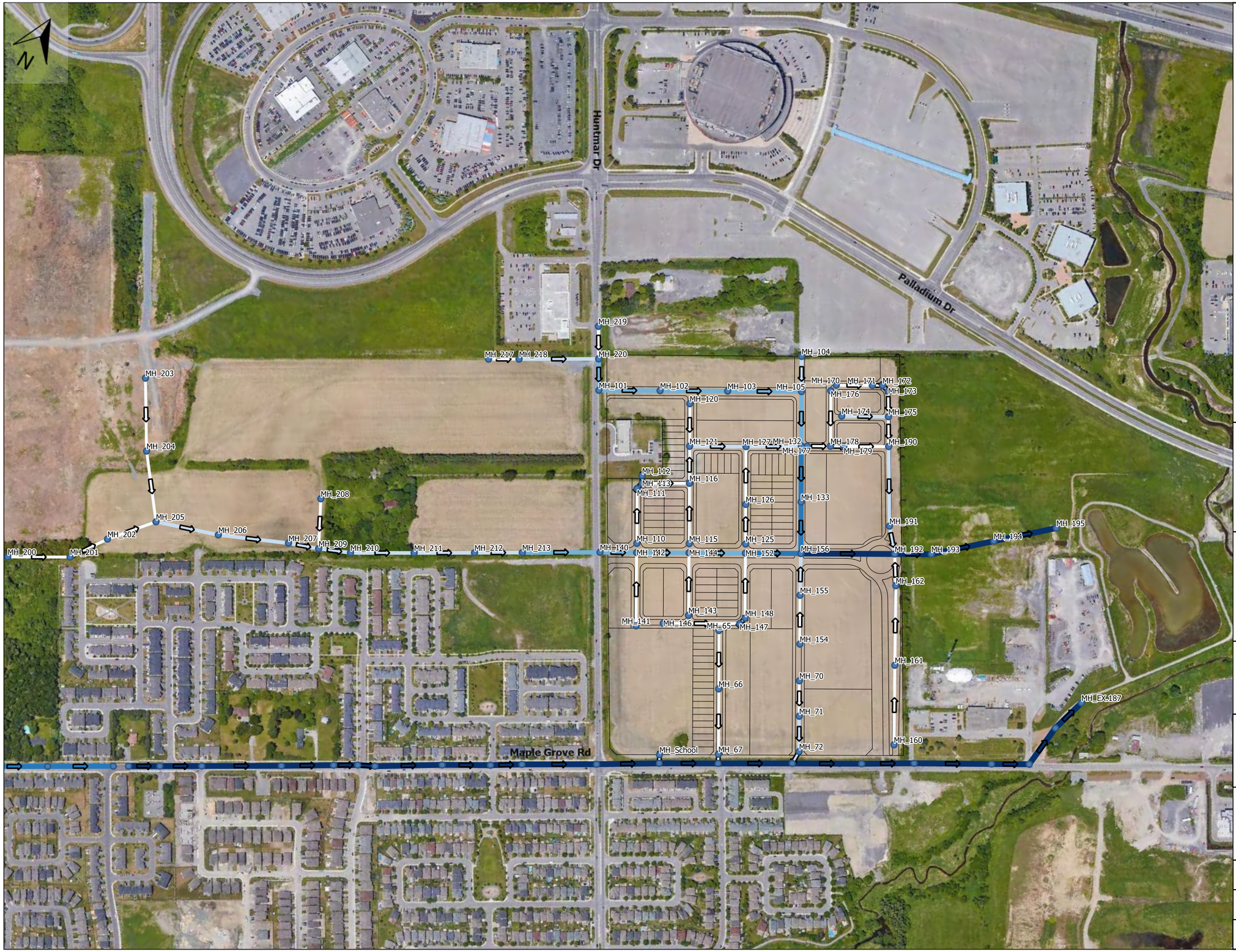
SCALE : 1:5500

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:	BL
DATE:	October 2020



Legend

Storm Sewers

- 0.3000 - 0.7500
- 0.7500 - 1.2000
- 1.2000 - 1.6500
- 1.6500 - 2.1000
- 2.1000 - 2.5500

Manholes

J.F. Sabourin and Associates Inc.
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SCALE : 1:5500

0 50 100 150 200 250 300 m

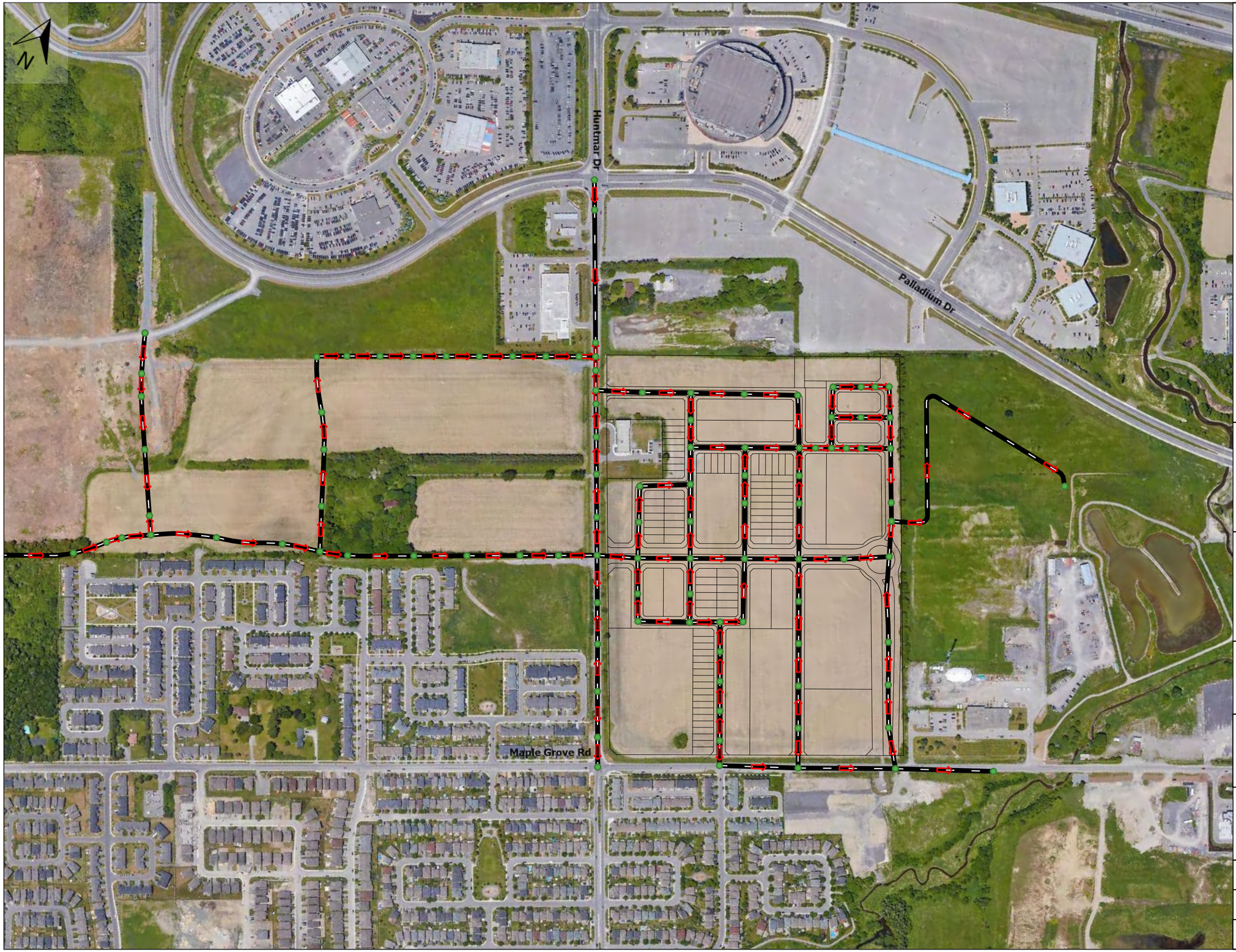
PROJECT :

130 Huntmar Drive /
Preliminary Kanata West Pond 4 Sizing

TITLE :

Figure B3: Proposed Minor System

PROJECT	1801-19
DRAWN:	BL
DATE:	October 2020



Legend

- Major System Junctions
- Major System Conduits

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SCALE : 1:5500

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:	BL
DATE:	October 2020

Table B1 - Subcatchment Parameters

NAME	AREA (ha)	IMPERV (%)	WIDTH (m)	SLOPE (%)	IMPERV (n)	PERV (n)	Dstor-IMP (mm)	Dstor-Perv (mm)	ZERO IMP (25%)	ROUTING	ROUTED (%)	CURVE NO	DRYTIME
MH_155	1.80	86	164	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_156	0.57	71	92	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_170	0.39	71	29	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_176	0.46	86	133	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_104	0.07	71	16	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_104-3	3.91	86	242	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_173	0.27	71	33	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_133	0.19	71	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_171	0.31	71	48	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_175	0.22	71	33	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_127	0.57	71	93	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_103	0.51	71	88	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_105	0.26	71	33	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_132	0.11	71	25	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_116	0.25	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_120	0.26	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_102	0.44	71	45	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_121	0.57	71	93	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_131	0.51	71	87	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_133-2	1.11	86	129	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_165	0.10	71	24	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_166	0.34	71	30	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_125-2	0.68	29	101	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_125	0.30	71	52	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_126	0.29	71	52	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_130	0.52	71	88	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_144	0.32	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_152	0.31	71	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_115	0.41	71	52	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_113	0.13	71	17	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_112	0.75	57	106	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_110	0.76	71	107	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_214-2	0.17	71	41	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_142	0.30	71	39	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_178-2	7.88	86	344	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_178	3.18	86	218	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_104-2	1.34	86	142	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_101	0.40	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_064	0.11	71	19	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_151	0.83	71	111	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_154	0.46	71	51	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_186	4.92	86	272	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 (25%)	ROUTING	ROUTED (%)	CURVE NO	DRYTIME
MH_160	0.57	71	92	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_060	0.68	71	101	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_062	0.13	71	20	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_063	0.47	71	64	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_070	0.35	71	18	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_071	1.02	86	123	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_162	0.15	71	32	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_161	0.64	71	98	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_179	2.40	57	190	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_065	0.79	71	109	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_066	0.86	71	113	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_070-2	1.22	86	135	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_202	0.46	71.4	61	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_209	0.36	71.4	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_206	0.47	71.4	44	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_205	0.62	71.4	96	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_201-2	0.15	71.4	25	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_213-2	0.35	71.4	37	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_216-2	0.32	71.4	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_203	0.39	71.4	41	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_203-2	0.79	71.4	109	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_200-3	0.26	71.4	13	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_212	0.27	71.4	38	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_211	0.34	71.4	37	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_210	0.36	71.4	37	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_207	7.46	57.1	335	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_200	0.18	71.4	17	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_201	0.09	71.4	14	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_200-2	0.11	71.4	14	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_218-2	1.23	28.6	136	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_216	0.50	85.7	34	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_219	1.13	71.4	130	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_214	0.74	71.4	105	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_217	4.66	28.6	264	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_218	6.95	85.7	323	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_213	5.07	85.7	276	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
MH_208	0.51	71.4	87	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
CS216_2	5.75	86	294	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7
SWM	5.36	69	284	0.5	0.013	0.25	1.57	4.67	25	OUTLET	100	87	7

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	A213	Commercial	5.07	0.80	340 L/s/ha	100Yr Onsite	490	97
	A207	School	7.46	0.60	5YrCHI3hr	100Yr Onsite	1058	142
	A217	Park	4.66	0.40	5YrCHI3hr	100Yr Onsite	490	105
	A218-2	Park	1.23	0.40	5YrCHI3hr	100Yr Onsite	175	142
	A218	Commercial	6.95	0.80	5YrCHI3hr	100Yr Onsite	1267	182
East Huntmar	A104	Commercial	3.91	0.80	220 L/s/ha	$50m^3/ha$	196	50
	A112	School	0.74	0.60	220 L/s/ha	100Yr Onsite	93	126
	A126	Park	0.68	0.40	115 L/s/ha	100Yr Onsite	47	69
	ASCH	School	2.40	0.60	220 L/s/ha	100Yr Onsite	207	86
	A071	Commercial	1.02	0.80	250 L/s/ha	$50m^3/ha$	51	50
	A155	Commercial	1.80	0.80	250 L/s/ha	$50m^3/ha$	90	50
	A070	Commercial	1.22	0.80	250L/s/ha	$50m^3/ha$	61	50
External	EXT_2	Commercial	3.16	0.80	220 L/s/ha	$50m^3/ha$	158	50
	EXT_1	Commercial	8.31	0.80	220 L/s/ha	$50m^3/ha$	416	50
	C-24	Commercial	4.489	0.80	85 L/s/ha	$50m^3/ha$	224	50
	C-25	Commercial	0.703	0.80	85 L/s/ha	$50m^3/ha$	35	50
	A-8	Residential	1.0189	0.73	230 L/s/ha	$40m^3/ha$	41	40

C-1
A= 24.12 ha.
C= 0.60
I= 2050 L/s
MNR= N701a
MJR= 701
INF=104 mm/yr

C-2
A= 1.94 ha.
C= 0.60
I= 165 L/s
MNR= P7
MJR= 702

C-3
A= 3.89 ha.
C= 0.80
I= 331 L/s
MNR= N704b
MJR= 703
INF=73 mm/yr

D-3
A= 0.31 ha.
C= 0.70
I= 93 L/s
MNR= N204
MJR= 203
INF=73 mm/yr

C= 0.80
I= 272 L/s
MNR= N202
MJR= 201
INF=73 mm/yr

MNR= N202
MJR= 202
INF=73 mm/yr

INF=73 mm/yr

D-4
A= 0.15 ha.
C= 0.70
I= 48 L/s
MNR= N204
MJR= 204
INF=73 mm/yr

MJR= 207
INF=73 mm/yr

MNR= N203
MJR= 206
INF=73 mm/yr

A= 0.86 ha
C= 0.80
MNR= P2
MJR= 208

P3

E-5
A= 0.81 ha.
C= 0.60
I= 69 L/s
MNR= N304
MJR= 305
INF=73 mm/yr

E-9
A= 0.92 ha
C= 0.80
MNR= P3
MJR= 309

E-6
A= 8.71 ha.
C= 0.60
I= 740 L/s
MNR= N306
MJR= 306
INF=73 mm/yr

MJR= 304
INF=73 mm/yr

E-8
A= 0.77 ha.
C= 0.70
I= 172 L/s
MNR= N308
MJR= 308
INF=73 mm/yr

C-10
A= 1.03 ha.
C= 0.70
I= 279 L/s
MNR= N4C10
MJR= 4C10
INF=73 mm/yr

C-11
A= 0.71 ha.
C= 0.70
I= 184 L/s
MNR= N4C11
MJR= 4C11
INF=73 mm/yr

COREL CENTRE

C-5
A= 2.49 ha.
C= 0.30
I= 212 L/s
MNR= N4C05
MJR= 705
INF=104 mm/yr

C-4
A= 1.64 ha.
C= 0.70
I= 392 L/s
MNR= N704a
MJR= 704
INF=73 mm/yr

C-6
A= 11.36 ha.
C= 0.60
I= 966 L/s
MNR= N4C06
MJR= 4C06
INF=104 mm/yr

C-7
A= 5.18 ha.
C= 0.30
I= 440 L/s
MNR= N4C06
MJR= 4C07
INF=104 mm/yr

C-8
A= 1.29 ha.
C= 0.70
I= 329 L/s
MNR= N4C07
MJR= 4C08
INF=73 mm/yr

C-9
A= 14.44 ha.
C= 0.80
I= 1228 L/s
MNR= N4C08
MJR= 4C09
INF=73 mm/yr
SEE NOTE #1

RAPID TRANSIT

C-13
A= 6.46 ha.
C= 0.80
I= 549 L/s
MNR= N4C11
MJR= 4C13
INF=73 mm/yr

C-12
A= 5.04 ha.
C= 0.80
I= 428 L/s
MNR= N4C10
MJR= 4C12
INF=73 mm/yr
SEE NOTE #1

C-20
A= 0.96 ha.
C= 0.80
I= 82 L/s
MNR= N4C18
MJR= 4C20
INF=73 mm/yr

C-21
A= 15.57 ha.
C= 0.80
I= 1323 L/s
MNR= N4C21b
MJR= 4C21
INF=73 mm/yr

SILVER SEVEN ROAD

PALLADIUM DRIVE

P4

C-14
A= 19.31 ha.
C= 0.60
I= 1641 L/s
MNR= N4C14a
MJR= N4C14
INF=104 mm/yr

C-15
A= 11.75 ha.
C= 0.80
I= 999 L/s
MNR= N4C15
MJR= 4C15
INF=73 mm/yr
SEE NOTE #1

C-16
A= 3.44 ha.
C= 0.70
I= 777 L/s
MNR= N4C17
MJR= 4C16
INF=73 mm/yr

C-17
A= 1.62 ha.
C= 0.80
I= 138 L/s
MNR= N4C17
MJR= 4C17
INF=73 mm/yr
SEE NOTE #1

C-18
A= 7.19 ha.
C= 0.80
I= 611 L/s
MNR= N4C18
MJR= 4C18
INF=73 mm/yr
SEE NOTE #1

C-19
A= 0.48 ha.
C= 0.70
I= 143 L/s
MNR= N4C18
MJR= NC19
INF=73 mm/yr

C-23
A= 1.52 ha.
C= 0.70
I= 412 L/s
MNR= N4A08b
MJR= 4C23
INF=73 mm/yr

0.53 ha of the 2.34 ha was designed to drain to Maple Grove and is within the proposed project.

C-22
A= 2.00 ha.
C= 0.70
I= 451 L/s
MNR= N4A08b
MJR= 4C20
INF=73 mm/yr

1.25 ha of the 2.00 ha was designed to drain to Maple Grove and now redirected north to the north trunk sewer

C-26
A= 3.24ha
C= 0.80
MNR= P4
MJR= 4C26

A-1
A= 22.56 ha.
C= 0.60
I= 1981 L/s
MNR= N4A01
MJR= 4A01
INF=104 mm/yr

A-6
A= 22.59 ha.
C= 0.60
I= 1920 L/s
MNR= N4A04b
MJR= 4A06
INF=73 mm/yr

A-7
A= 1.14 ha.
C= 0.70
I= 307 L/s
MNR= N4A07
MJR= 4A07
INF=73 mm/yr

A-8
A= 2.34 ha.
C= 0.70
I= 537 L/s
MNR= N4A07
MJR= 4A08
INF=73 mm/yr

HUNTMAR ROAD

A-9
A= 10.67 ha.
C= 0.80
I= 907 L/s
MNR= N4A07
MJR= 4A09
INF=73 mm/yr
SEE NOTE #1

C-24
A= 2.58 ha.
C= 0.80
I= 219 L/s
MNR= N4A08b
MJR= NC24
INF=73 mm/yr

B-1
A= 1.10 ha.
C= 0.60
I= 94 L/s
MNR= N503
MJR= 501
INF=73 mm/yr

MAPLE GROVE ROAD

Allowable flow to Maple Grove:
A-8: 0.53ha x 230 L/s/ha = 121.90 L/s
A-9: 10.67ha x 85 L/s/ha = 906.95 L/s
C-22: 1.25 ha x 226 L/s/ha = 282.50 L/s
C-23: 1.52 ha x 271 L/s/ha = 411.92 L/s
Total = 1723.27 L/s

A-12
A= 1.08 ha.
C= 0.70
I= 271 L/s
MNR= N4A12
MJR= 4A12
INF=73 mm/yr

A-11
A= 9.65 ha.
C= 0.60
I= 820 L/s
MNR= N4A12
MJR= 4A11
INF=73 mm/yr

A-10
A= 1.26 ha.
C= 0.60
I= 107 L/s
MNR= N4A11
MJR= 4A10
INF=73 mm/yr

C-25
A= 0.68 ha.
C= 0.80
I= 58 L/s
MNR= N4A08b
MJR= 4C25
INF=73 mm/yr

B-3
A= 5.80 ha.
C= 0.60
I= 493 L/s
MNR= N503
MJR= 503
INF=73 mm/yr

B-2
A= 0.69 ha.
C= 0.70
I= 204 L/s
MNR= N502
MJR= 502
INF=73 mm/yr

B-4
A= 2.20ha
C= 0.80
MNR= P5
MJR= 504

P5

A-2
A= 29.41 ha.
C= 0.45
I= 2667 L/s
MNR= N4A02
MJR= 4A02
INF= -

ALON STREET

JOHN STREET

A-4
A= 15.76 ha.
C= 0.60
I= 1340 L/s
MNR= N4A04a
MJR= 4A04
INF=73/104 mm/yr*

A-5
A= 20.68 ha.
C= 0.60
I= 1758 L/s
MNR= N4A05
MJR= 4A05
INF=73 mm/yr

A-13
A= 14.98 ha.
C= 0.60
I= 1273 L/s
MNR= N4A13
MJR= 4A13
INF=73 mm/yr

POOLE CREEK

B-6
A= 0.14 ha.
C= 0.70
I= 43 L/s
MNR= N505a
MJR= 506
INF=73 mm/yr

B-5
A= 8.51 ha.
C= 0.60
I= 723 L/s
MNR= N505a
MJR= 505
INF=73 mm/yr

B-10
A= 1.17 ha.
C= 0.70
I= 311 L/s
MNR= N510
MJR= 510
INF=73 mm/yr

B-9
A= 0.36 ha.
C= 0.70
I= 106 L/s
MNR= N508a
MJR= 509
INF=73 mm/yr

B-8
A= 12.36 ha.
C= 0.60
I= 1051 L/s
MNR= N508a
MJR= 508
INF=73 mm/yr

B-7
A= 4.47 ha.
C= 0.60
I= 380 L/s
MNR= N507b
MJR= 507
INF=73 mm/yr

RIVIER CARR RIVER

A-3
A= 4.23 ha.
C= 0.45
I= unrestricted
MNR= N003a
MJR= 003
INF=

B-12
A= 0.39 ha.
C= 0.70
I= 118 L/s
MNR= N512
MJR= 512
INF=73 mm/yr

B-11
A= 7.33 ha.
C= 0.60
I= 623 L/s
MNR= N512
MJR= 511
INF=73 mm/yr

B-17
A= 0.16 ha.
C= 0.70
I= 50 L/s
MNR= N510
MJR= 517
INF=73 mm/yr

B-18
A= 3.84 ha.
C= 0.60
I= 326 L/s
MNR= N510
MJR= 518
INF=73 mm/yr

B-19
A= 16.32 ha.
C= 0.90
I= 1387 L/s
MNR= N520
MJR= 519
INF=73 mm/yr

B-13
A= 1.38 ha.
C= 0.60
I= 115 L/s
MNR= N512
MJR= 513
INF=104 mm/yr

B-14
A= 6.25 ha.
C= 0.90
I= 531 L/s
MNR= N523
MJR= 514
INF=73 mm/yr

B-15
A= 8.35 ha.
C= 0.90
I= 710 L/s
MNR= N523
MJR= 515
INF=73 mm/yr

B-16
A= 1.00 ha.
C= 0.70
I= 287 L/s
MNR= N516
MJR= 516
INF=73 mm/yr

B-21
A= 0.96 ha.
C= 0.70
I= 273 L/s
MNR= N510
MJR= 521
INF=73 mm/yr

B-23
A= 0.78 ha.
C= 0.70
I= 222 L/s
MNR= N523
MJR= 523
INF=104 mm/yr

B-22
A= 3.95 ha.
C= 0.70
I= 880 L/s
MNR= N516
MJR= 522
INF=104 mm/yr

B-20
A= 3.50 ha.
C= 0.70
I= 771 L/s
MNR= N520
MJR= 502
INF=73 mm/yr

N

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Legend

KANATA-WEST CONCEPT PLAN BOUNDARY

POND DRAINAGE BOUNDARY

STORM SEWER DRAINAGE LIMIT

A-1
A= 72.31 ha.
C= 0.60
I= 246 L/s
MNR= N4A01
MJR= 4A01
INF=73 mm/yr

DRAINAGE AREA IDENTIFICATION
AREA IN HECTARES
RUNOFF COEFFICIENT
100yr. INLET CAPACITY (L/s)
MINOR SYSTEM NODE NUMBER
MAJOR SYSTEM SEGMENT NUMBER
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 350m³/ha, OR IN SUFFICIENT QUANTITY TO DEMONSTRATE COMPLETE CONTAINMENT OF THE 100yr EVENT. (i.e. NO MAJOR SYSTEM FLOW IN THE 1:100yr EVENT)

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1770 WOODWARD DR., OTTAWA (613)591-1311

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
	Revision	By	Appd.	Date

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

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

Table B3 - 130 Huntmar Flows to Maple Grove Sewer

Name	Area (ha)	Assumed Rate (L/s/ha)	Peak Flow (L/s)
ASCH	2.40	220	527
A065	0.79	340	267
A066	0.86	340	292
A070-2	1.22	250	304
A070	0.23	340	79
A071	1.02	250	254
Total	**6.50**	**265**	**1723**

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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, 2020)		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	32,737	0	13,023	0	-6,123	0
93.25	0.05	19,720	986	38,872	1,943	33,002	1,643	13,282	658	-5,870	-300
93.30	0.10	20,072	1,981	39,447	3,901	33,260	3,300	13,188	1,319	-6,187	-601
93.35	0.15	20,354	2,991	39,910	5,885	33,519	4,969	13,165	1,978	-6,392	-916
93.40	0.20	20,640	4,016	40,376	7,892	33,778	6,652	13,138	2,636	-6,598	-1,240
93.45	0.25	20,991	5,057	40,950	9,925	34,038	8,347	13,046	3,290	-6,913	-1,578
93.50	0.30	20,997	6,107	40,957	11,973	34,757	10,056	13,760	3,949	-6,200	-1,917
93.55	0.35	21,435	7,167	41,329	14,030	35,032	11,800	13,597	4,633	-6,297	-2,230
93.60	0.40	21,870	8,250	42,077	16,115	35,307	13,559	13,437	5,309	-6,771	-2,557
93.65	0.45	22,065	9,348	42,453	18,229	35,582	15,331	13,517	5,983	-6,871	-2,898
93.70	0.50	22,383	10,459	43,013	20,365	35,858	17,117	13,475	6,658	-7,155	-3,248
93.75	0.55	22,626	11,585	43,430	22,526	36,134	18,917	13,509	7,332	-7,295	-3,609
93.80	0.60	22,868	12,722	43,877	24,709	36,411	20,730	13,543	8,008	-7,466	-3,979
93.85	0.65	23,112	13,872	44,304	26,914	36,688	22,558	13,576	8,686	-7,616	-4,356
93.90	0.70	23,356	15,033	44,748	29,140	36,965	24,399	13,610	9,366	-7,782	-4,740
93.95	0.75	23,600	16,207	45,188	31,388	37,243	26,255	13,643	10,047	-7,944	-5,134
94.00	0.80	23,846	17,393	45,628	33,659	37,522	28,124	13,675	10,730	-8,106	-5,535
94.05	0.85	24,171	18,594	46,223	35,955	37,801	30,007	13,629	11,413	-8,422	-5,948
94.10	0.90	24,378	19,807	46,600	38,275	38,080	31,904	13,702	12,096	-8,520	-6,372
94.15	0.95	24,842	21,038	47,450	40,627	38,360	33,815	13,518	12,777	-9,091	-6,812
94.20	1.00	24,843	22,280	47,761	43,007	38,640	35,740	13,797	13,460	-9,121	-7,267
94.25	1.05	25,663	23,543	49,339	45,434	38,932	37,679	13,269	14,136	-10,407	-7,755
94.30	1.10	26,368	24,843	50,046	47,919	39,217	39,633	12,849	14,789	-10,829	-8,286
94.35	1.15	26,531	26,166	50,303	50,428	39,503	41,601	12,972	15,435	-10,800	-8,827
94.40	1.20	27,023	27,505	50,992	52,960	39,789	43,583	12,766	16,078	-11,202	-9,377
94.45	1.25	27,438	28,866	51,564	55,524	40,076	45,580	12,639	16,713	-11,488	-9,944
94.50	1.30	27,607	30,242	51,863	58,110	40,364	47,591	12,757	17,348	-11,499	-10,519
94.55	1.35	27,767	31,627	52,128	60,709	40,652	49,616	12,884	17,989	-11,476	-11,093
94.60	1.40	27,984	33,020	52,536	63,326	40,940	51,656	12,955	18,635	-11,596	-11,670
94.65	1.45	28,293	34,427	52,782	65,959	41,229	53,710	12,935	19,283	-11,553	-12,249
94.70	1.50	28,315	35,843	53,212	68,609	45,005	55,779	16,690	19,936	-8,208	-12,830
94.75	1.55	28,379	37,260	53,324	71,272	45,363	58,038	16,984	20,778	-7,960	-13,234
94.80	1.60	29,146	38,698	53,674	73,947	45,730	60,315	16,584	21,617	-7,944	-13,632
94.85	1.65	29,974	40,176	54,922	76,662	46,102	62,611	16,128	22,435	-8,820	-14,051
94.90	1.70	30,921	41,698	56,239	79,441	46,480	64,926	15,559	23,227	-9,759	-14,515
94.95	1.75	31,457	43,258	56,952	82,271	46,864	67,259	15,408	24,001	-10,088	-15,011
95.00	1.80	32,733	44,862	58,804	85,164	48,965	69,655	16,232	24,792	-9,839	-15,510
95.05	1.85	33,894	46,528	60,125	88,137	51,092	72,156	17,198	25,628	-9,033	-15,982

*Active Storage Only

FIGURE C1:
SWM POND 4 - STAGE/STORAGE COMPARISON

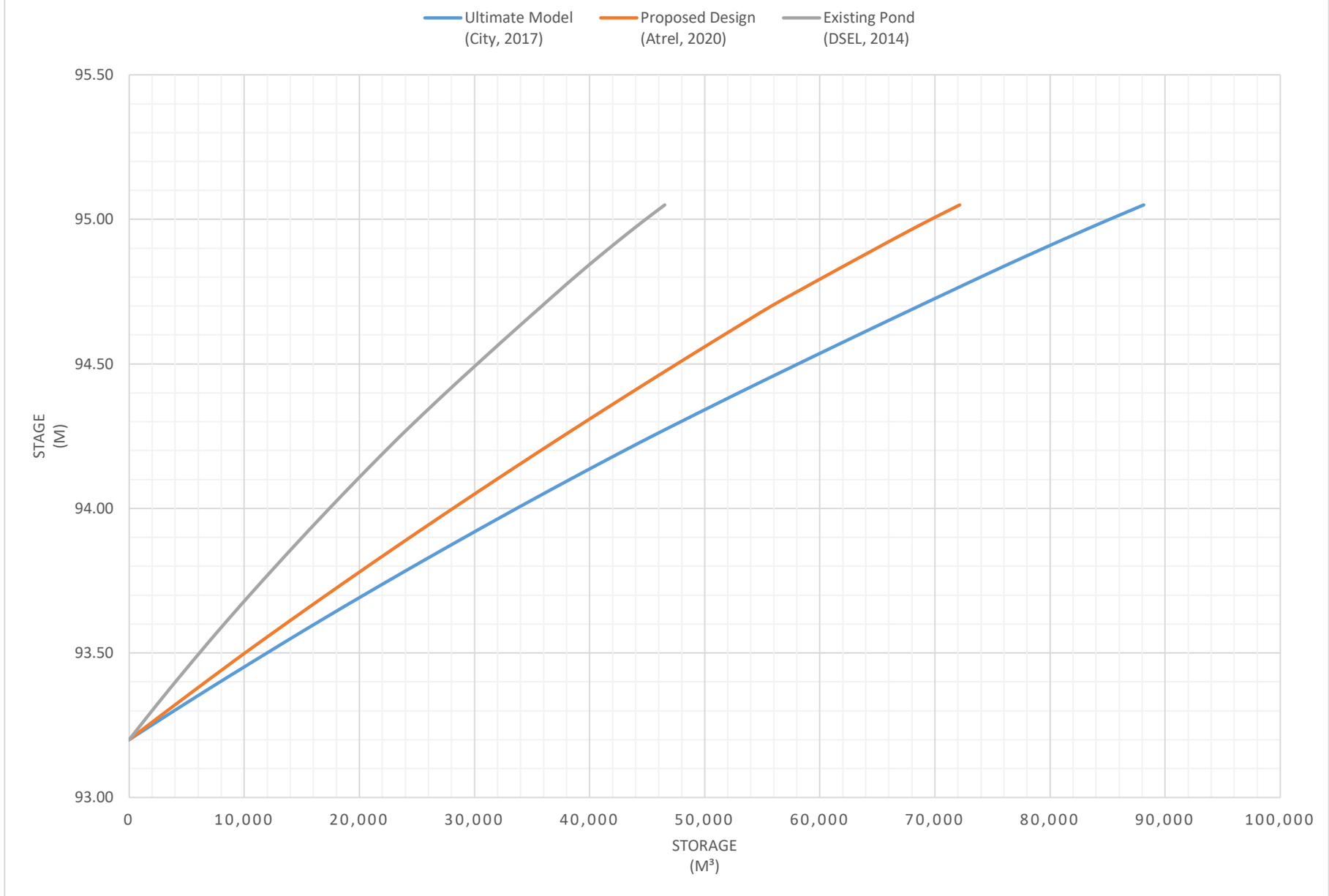


Table C2: SWM Pond Inflow, Outflow and Storage Summary

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 Main	South Bypass					
25mm/3hr Chicago	4.662	6.705	0.000	0.000	11.760	0.267	94.09	31,670
2yr/12hr SCS	5.973	10.380	0.731	0.000	16.840	3.619	94.34	41,020
5yr/12hr SCS	8.365	9.334	3.262	0.000	20.740	8.302	94.44	45,300
10yr/12hr SCS	10.100	9.623	4.918	0.001	24.830	11.370	94.50	47,660
25yr/12hr SCS	11.960	9.648	7.030	0.066	29.440	16.420	94.59	51,160
50yr/12hr SCS	12.970	9.710	8.371	0.586	32.360	20.850	94.65	53,560
100yr/12hr SCS	14.020	10.060	9.484	1.027	36.000	25.500	94.70	55,660

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	239.305	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]	18347	47717	2.60	32737	93.200
Quality Control [2]	9572	10056	1.05	N/A	93.500
Extended Detention [3]	N/A	35740	N/A	N/A	94.200
Forebay (20% PP)	3669	N/A	N/A	4855	92.900
PP - Forebay	14677	N/A	N/A	27882	93.200
			Area Ratio (%) [6] =	15	

[1] Required PP volume based on Table B-1 (218.00 - 40 = 178.00 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)	32736.86	m^2	Diameter	0.200	m	Diameter	0.350	m
Volume	47716.61	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**	**32736.86**	**0.00**				**0**	**PP Elev**
93.25	1643.47	33001.96	0.05	5302	47.20	1.97	0.01	
93.30	3300.01	33260.04	0.10	5232	66.92	2.79	0.01	
93.35	4969.48	33518.68	0.15	5212	82.17	3.42	0.02	
93.40	**6651.89**	**33777.86**	**0.20**	**5205**	**95.13**	**3.96**	**0.03**	**FA Elev**
93.45	8347.27	34037.56	0.25	5203	107.45	4.48	0.05	
93.50	**10055.65**	**34757.05**	**0.30**	**6734**	115.40	**4.81**	**0.07**	**QC Elev**
93.55	11800.37	35031.89	0.35	6557	121.43	5.06	0.09	
93.60	13558.84	35306.88	0.40	6425	126.29	5.26	0.11	
93.65	15331.06	35582.25	0.45	6323	130.39	5.43	0.13	
93.70	17117.06	35858.03	0.50	6242	133.94	5.58	0.15	
93.75	18916.87	36134.38	0.55	6177	137.09	5.71	0.17	
93.80	20730.50	36410.93	0.60	6123	139.93	5.83	0.19	
93.85	22557.97	36688.09	0.65	6079	142.54	5.94	0.20	
93.90	24399.30	36965.44	0.70	6041	144.97	6.04	0.22	
93.95	26254.52	37243.48	0.75	6009	147.27	6.14	0.23	
94.00	28123.65	37521.70	0.80	5981	149.45	6.23	0.24	
94.05	30006.70	37800.56	0.85	5957	151.54	6.31	0.26	
94.10	31903.71	38079.93	0.90	5937	153.55	6.40	0.27	
94.15	33814.69	38359.60	0.95	5919	155.48	6.48	0.28	
94.20	**35739.67**	**38639.87**	**1.00**	**5903**	157.36	**6.56**	**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	1643		0.050	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.164
93.30	3300		0.100	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.330
93.35	4969		0.150	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.497
93.40	**6652**	**FA Elev**	**0.200**	**0.027**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.027**	**0.665**
93.45	8347		0.250	0.033	0.050	0.016	0.000	0.000	0.000	0.000	0.033	0.835
93.50	**10056**	**QC Elev**	**0.300**	**0.039**	**0.100**	**0.032**	**0.000**	**0.000**	**0.000**	**0.000**	**0.039**	**1.006**
93.55	11800		0.350	0.043	0.150	0.047	0.000	0.000	0.000	0.000	0.043	1.180
93.60	13559		0.400	0.047	0.200	0.063	0.000	0.000	0.000	0.000	0.047	1.356
93.65	15331		0.450	0.051	0.250	0.079	0.000	0.000	0.000	0.000	0.051	1.533
93.70	17117		0.500	0.055	0.300	0.095	0.000	0.000	0.000	0.000	0.055	1.712
93.75	18917		0.550	0.058	0.350	0.111	0.000	0.000	0.000	0.000	0.058	1.892
93.80	20730		0.600	0.061	0.400	0.125	0.000	0.000	0.000	0.000	0.061	2.073
93.85	22558		0.650	0.064	0.450	0.139	0.000	0.000	0.000	0.000	0.064	2.256
93.90	24399		0.700	0.067	0.500	0.151	0.000	0.000	0.000	0.000	0.067	2.440
93.95	26255		0.750	0.070	0.550	0.162	0.000	0.000	0.000	0.000	0.070	2.625
94.00	28124		0.800	0.072	0.600	0.172	0.000	0.000	0.000	0.000	0.072	2.812
94.05	30007		0.850	0.075	0.650	0.182	0.000	0.000	0.000	0.000	0.075	3.001
94.10	31904		0.900	0.077	0.700	0.191	0.000	0.000	0.000	0.000	0.077	3.190
94.15	33815		0.950	0.080	0.750	0.200	0.000	0.000	0.000	0.000	0.080	3.381
94.20	**35740**	**Ext. Det.**	**1.000**	**0.082**	**0.800**	**0.209**	**0.000**	**0.000**	**0.000**	**0.000**	**0.082**	**3.574**
94.25	37679		1.050	0.084	0.850	0.217	0.050	0.746	0.000	0.000	0.830	3.768
94.30	39633		1.100	0.086	0.900	0.225	0.100	2.112	0.000	0.000	2.198	3.963
94.35	41601		1.150	0.088	0.950	0.233	0.150	3.885	0.000	0.000	3.973	4.160
94.40	43583		1.200	0.090	1.000	0.240	0.200	5.989	0.000	0.000	6.080	4.358
94.45	45580		1.250	0.093	1.050	0.247	0.250	8.381	0.000	0.000	8.474	4.558
94.50	47591		1.300	0.095	1.100	0.254	0.300	11.032	0.000	0.000	11.127	4.759
94.55	49616		1.350	0.096	1.150	0.261	0.350	13.921	0.000	0.000	14.017	4.962
94.60	51656		1.400	0.098	1.200	0.268	0.400	17.031	0.000	0.000	17.129	5.166
94.65	53710		1.450	0.100	1.250	0.274	0.450	20.349	0.050	0.806	20.449	5.371
94.70	55779		1.500	0.102	1.300	0.280	0.500	23.865	0.100	2.283	23.967	5.578
94.75	58038		1.550	0.104	1.350	0.286	0.550	27.569	0.150	4.199	27.673	5.804
94.80	60315		1.600	0.106	1.400	0.292	0.600	31.455	0.200	6.472	31.560	6.032
94.85	62611		1.650	0.107	1.450	0.298	0.650	35.515	0.250	9.056	35.622	6.261
94.90	64926		1.700	0.109	1.500	0.304	0.700	39.743	0.300	11.920	39.852	6.493
94.95	67259		1.750	0.111	1.550	0.310	0.750	44.135	0.350	15.039	44.246	6.726
95.00	69655		1.800	0.112	1.600	0.315	0.800	48.685	0.400	18.397	48.798	6.965
95.05	**72156**	**Top Berm**	**1.850**	**0.114**	**1.650**	**0.321**	**0.850**	**53.391**	**0.450**	**21.979**	**53.505**	**7.216**

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)	94.695	Max Water Level	(m)	94.695
						Head of Water	(m)	0.495	Head of Water	(m)	0.095
Max Water Level	(m)	94.695	Max Water Level	(m)	94.695	Q_w	(m^3/s)	23.194	Q_w	(m^3/s)	2.108
Head of Water	(m)	1.495	Head of Water	(m)	1.295	Note:			Note:		
Q_o	(m^3/s)	0.102	Q_o	(m^3/s)	0.280	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 =	9.623	m^3/s
d =	2.94	m
Vf =	0.5	m/s

L_{min} = 52.37 m

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

Minimum Length of Forebay Required	65 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 =	9.623	m^3/s	
d =	2.94	m	
W_{avg} =	20	m	(14 m bottom, 26 m permanent pool)

V = 0.16 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 =	10.100	m^3/s	
d =	2.92	m	
Vf =	0.5	m/s	

L_{min} = 55.34 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 =	10.100	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

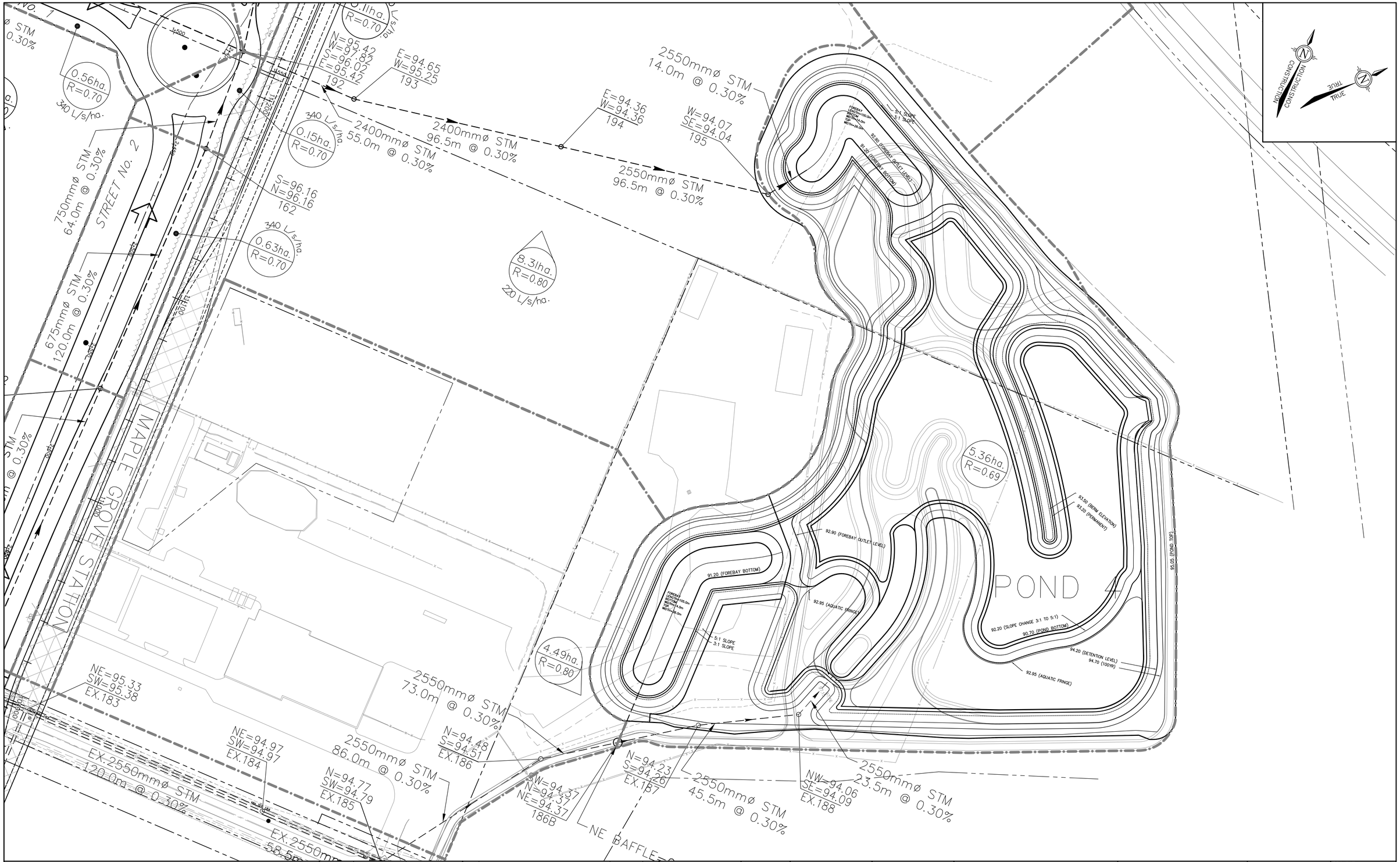
Table C-11 : Drainage Area to SWM Facility

Name	Area (ha)	Imperv. (%)	Imp x Area
A065	0.79	71.00	55.76
A066	0.86	71.00	60.97
A070	0.23	71.00	16.43
A070-2	1.22	86.00	104.53
A071	1.02	86.00	87.38
A101	0.40	71.00	28.37
A102	0.44	71.00	31.57
A102-2	0.07	71.00	5.07
A103	0.51	71.00	36.44
A104-2	1.34	86.00	115.58
A104-3	3.91	86.00	335.98
A105	0.26	71.00	18.62
A110	0.76	71.00	54.05
A112	0.75	57.00	42.49
A113	0.13	71.00	9.05
A115	0.41	71.00	28.84
A116	0.25	71.00	17.81
A120	0.26	71.00	18.54
A121	0.57	71.00	40.71
A125	0.30	71.00	21.14
A126	0.29	71.00	20.36
A126-2	0.68	29.00	19.60
A127	0.57	71.00	40.65
A130	0.52	71.00	36.86
A131	0.51	71.00	35.87
A141	0.68	71.00	48.37
A142	0.30	71.00	21.04
A142-2	0.17	71.00	12.28
A143	0.59	71.00	41.62
A144	0.32	71.00	22.65
A146	0.29	71.00	20.46
A148	0.67	71.00	47.48
A152	0.31	71.00	21.98
A154	0.57	71.00	40.46
A155	1.80	86.00	154.70
A156	0.57	71.00	40.28
A160	0.64	71.00	45.62
A161	0.56	71.00	39.79
A170	0.22	71.00	15.85
A172	0.46	86.00	39.26
A173	0.39	71.00	27.75
A174	0.31	71.00	21.76
A176	0.27	71.00	18.97
A177	0.11	71.00	8.04
A179	0.19	71.00	13.75
A179-2	1.11	86.00	95.56
A190	0.34	71.00	24.30
A192	0.15	71.00	10.72
A192-2	0.10	71.00	6.92
A200	0.18	71.40	12.85

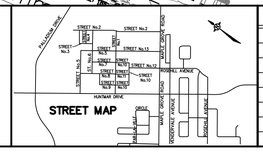
Table C-11 : Drainage Area to SWM Facility

Name	Area (ha)	Imperv. (%)	Imp x Area
A200-2	0.11	71.40	7.85
A200-3	0.26	71.40	18.56
A201	0.09	71.40	6.43
A201-2	0.15	71.40	10.71
A202	0.46	71.40	32.84
A203	0.39	71.40	27.85
A203-2	0.79	71.40	56.41
A205	0.62	71.40	44.27
A206	0.47	71.40	33.56
A207	7.46	57.10	425.97
A208	0.51	71.40	36.41
A209	0.36	71.40	25.70
A210	0.36	71.40	25.70
A211	0.34	71.40	24.28
A212	0.27	71.40	19.28
A213	5.07	85.70	434.50
A213-2	0.35	71.40	24.99
A214	0.74	71.40	52.84
A216	0.50	85.70	42.85
A216-2	0.32	71.40	22.85
A217	4.66	28.60	133.28
A218	6.95	85.70	595.62
A218-2	1.23	28.60	35.18
A219	1.13	71.40	80.68
A-8	1.02	71.00	72.34
ASCH	2.40	57.00	136.65
C-21	0.93	86.00	79.93
C-24	4.49	86.00	386.05
C-25	0.70	86.00	60.47
EXT_1	8.31	86.00	714.76
EXT_2	3.18	86.00	273.62
HM49	0.56	71.00	39.82
HM51	1.12	71.00	79.41
HM52	0.27	71.00	19.32
PS212	25.28	58.22	1471.44
PS223	3.86	58.77	226.85
PS230	25.70	69.43	1784.21
PS236	1.68	28.30	47.49
PS241_1	18.73	57.69	1080.67
PS241_2	29.29	45.36	1328.50
PS246	5.06	28.30	143.18
PS249	3.38	28.30	95.69
PS252	17.36	40.87	709.48
PS256	4.94	49.86	246.46
PS259	4.04	58.10	234.88
PS260	5.71	53.91	307.84
PS263	4.02	28.30	113.78
SWM_Pond4	5.36	69.00	369.83
Total	**239.305**	**60.08**	**14376.420**

(1) Refer to Drainage Area Figure for details



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

SCALE

DESIGN	AGS
CHECKED	JMD
DRAWN	CED
CHECKED	AGS
APPROVED	JMD

LICENSED PROFESSIONAL ENGINEER
A. G. Y. SAUVE
100142393
Oct 7, 2020
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
J. M. DECOEUR
Oct 7, 2020
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

PLAN
STORMWATER MANAGEMENT POND

DRAWING No. 191002-SWMP

C-1
A= 24.12 ha.
C= 0.60
I= 2050 L/s
MNR= N701a
MJR= 701
INF=104 mm/yr

C-2
A= 1.94 ha.
C= 0.60
I= 165 L/s
MNR= P7
MJR= 702

C-3
A= 3.89 ha.
C= 0.80
I= 331 L/s
MNR= N704b
MJR= 703
INF=73 mm/yr

D-3
A= 0.31 ha.
C= 0.70
I= 93 L/s
MNR= N204
MJR= 203
INF=73 mm/yr

C= 0.80
I= 272 L/s
MNR= N202
MJR= 201
INF=73 mm/yr

MNR= N202
MJR= 202
INF=73 mm/yr

INF=73 mm/yr

D-4
A= 0.15 ha.
C= 0.70
I= 48 L/s
MNR= N204
MJR= 204
INF=73 mm/yr

MJR= 207
INF=73 mm/yr

MNR= N203
MJR= 206
INF=73 mm/yr

A= 0.86 ha
C= 0.80
MNR= P2
MJR= 208

P3

E-5
A= 0.81 ha.
C= 0.60
I= 69 L/s
MNR= N304
MJR= 305
INF=73 mm/yr

E-9
A= 0.92 ha
C= 0.80
MNR= P3
MJR= 309

E-6
A= 8.71 ha.
C= 0.60
I= 740 L/s
MNR= N306
MJR= 306
INF=73 mm/yr

MJR= 304
INF=73 mm/yr

E-8
A= 0.77 ha.
C= 0.70
I= 172 L/s
MNR= N308
MJR= 308
INF=73 mm/yr

C-10
A= 1.03 ha.
C= 0.70
I= 279 L/s
MNR= N4C10
MJR= 4C10
INF=73 mm/yr

C-11
A= 0.71 ha.
C= 0.70
I= 184 L/s
MNR= N4C11
MJR= 4C11
INF=73 mm/yr

COREL CENTRE

C-5
A= 2.49 ha.
C= 0.30
I= 212 L/s
MNR= N4C05
MJR= 705
INF=104 mm/yr

C-4
A= 1.64 ha.
C= 0.70
I= 392 L/s
MNR= N704a
MJR= 704
INF=73 mm/yr

C-6
A= 11.36 ha.
C= 0.60
I= 966 L/s
MNR= N4C06
MJR= 4C06
INF=104 mm/yr

C-7
A= 5.18 ha.
C= 0.30
I= 440 L/s
MNR= N4C06
MJR= 4C07
INF=104 mm/yr

C-8
A= 1.29 ha.
C= 0.70
I= 329 L/s
MNR= N4C07
MJR= 4C08
INF=73 mm/yr

C-9
A= 14.44 ha.
C= 0.80
I= 1228 L/s
MNR= N4C08
MJR= 4C09
INF=73 mm/yr
SEE NOTE #1

RAPID TRANSIT

C-13
A= 6.46 ha.
C= 0.80
I= 549 L/s
MNR= N4C11
MJR= 4C13
INF=73 mm/yr

C-12
A= 5.04 ha.
C= 0.80
I= 428 L/s
MNR= N4C10
MJR= 4C12
INF=73 mm/yr
SEE NOTE #1

C-20
A= 0.96 ha.
C= 0.80
I= 82 L/s
MNR= N4C18
MJR= 4C20
INF=73 mm/yr

C-21
A= 15.57 ha.
C= 0.80
I= 1323 L/s
MNR= N4C21b
MJR= 4C21
INF=73 mm/yr

SILVER SEVEN ROAD

PALLADIUM DRIVE

P4

C-14
A= 19.31 ha.
C= 0.60
I= 1641 L/s
MNR= N4C14a
MJR= N4C14
INF=104 mm/yr

C-15
A= 11.75 ha.
C= 0.80
I= 999 L/s
MNR= N4C15
MJR= 4C15
INF=73 mm/yr
SEE NOTE #1

C-16
A= 3.44 ha.
C= 0.70
I= 777 L/s
MNR= N4C17
MJR= 4C16
INF=73 mm/yr

C-17
A= 1.62 ha.
C= 0.80
I= 138 L/s
MNR= N4C17
MJR= 4C17
INF=73 mm/yr
SEE NOTE #1

C-18
A= 7.19 ha.
C= 0.80
I= 611 L/s
MNR= N4C18
MJR= 4C18
INF=73 mm/yr
SEE NOTE #1

C-19
A= 0.48 ha.
C= 0.70
I= 143 L/s
MNR= N4C18
MJR= NC19
INF=73 mm/yr

C-23
A= 1.52 ha.
C= 0.70
I= 412 L/s
MNR= N4A08b
MJR= 4C23
INF=73 mm/yr

0.53 ha of the 2.34 ha was designed to drain to Maple Grove and is within the proposed project.

C-22
A= 2.00 ha.
C= 0.70
I= 451 L/s
MNR= N4A08b
MJR= 4C20
INF=73 mm/yr

1.25 ha of the 2.00 ha was designed to drain to Maple Grove and now redirected north to the north trunk sewer

C-26
A= 3.24ha
C= 0.80
MNR= P4
MJR= 4C26

A-1
A= 22.56 ha.
C= 0.60
I= 1981 L/s
MNR= N4A01
MJR= 4A01
INF=104 mm/yr

A-6
A= 22.59 ha.
C= 0.60
I= 1920 L/s
MNR= N4A04b
MJR= 4A06
INF=73 mm/yr

A-7
A= 1.14 ha.
C= 0.70
I= 307 L/s
MNR= N4A07
MJR= 4A07
INF=73 mm/yr

A-8
A= 2.34 ha.
C= 0.70
I= 537 L/s
MNR= N4A07
MJR= 4A08
INF=73 mm/yr

HUNTMAR ROAD

A-9
A= 10.67 ha.
C= 0.80
I= 907 L/s
MNR= N4A07
MJR= 4A09
INF=73 mm/yr
SEE NOTE #1

C-24
A= 2.58 ha.
C= 0.80
I= 219 L/s
MNR= N4A08b
MJR= NC24
INF=73 mm/yr

B-1
A= 1.10 ha.
C= 0.60
I= 94 L/s
MNR= N503
MJR= 501
INF=73 mm/yr

MAPLE GROVE ROAD

Allowable flow to Maple Grove:
A-8: 0.53ha x 230 L/s/ha = 121.90 L/s
A-9: 10.67ha x 85 L/s/ha = 906.95 L/s
C-22: 1.25 ha x 226 L/s/ha = 282.50 L/s
C-23: 1.52 ha x 271 L/s/ha = 411.92 L/s
Total = 1723.27 L/s

A-12
A= 1.08 ha.
C= 0.70
I= 271 L/s
MNR= N4A12
MJR= 4A12
INF=73 mm/yr

A-11
A= 9.65 ha.
C= 0.60
I= 820 L/s
MNR= N4A12
MJR= 4A11
INF=73 mm/yr

A-10
A= 1.26 ha.
C= 0.60
I= 107 L/s
MNR= N4A11
MJR= 4A10
INF=73 mm/yr

C-25
A= 0.68 ha.
C= 0.80
I= 58 L/s
MNR= N4A08b
MJR= 4C25
INF=73 mm/yr

B-3
A= 5.80 ha.
C= 0.60
I= 493 L/s
MNR= N503
MJR= 503
INF=73 mm/yr

B-2
A= 0.69 ha.
C= 0.70
I= 204 L/s
MNR= N502
MJR= 502
INF=73 mm/yr

B-4
A= 2.20ha
C= 0.80
MNR= P5
MJR= 504

P5

A-2
A= 29.41 ha.
C= 0.45
I= 2667 L/s
MNR= N4A02
MJR= 4A02
INF= -

ALON STREET

JOHN STREET

A-4
A= 15.76 ha.
C= 0.60
I= 1340 L/s
MNR= N4A04a
MJR= 4A04
INF=73/104 mm/yr*

A-5
A= 20.68 ha.
C= 0.60
I= 1758 L/s
MNR= N4A05
MJR= 4A05
INF=73 mm/yr

A-13
A= 14.98 ha.
C= 0.60
I= 1273 L/s
MNR= N4A13
MJR= 4A13
INF=73 mm/yr

POOLE CREEK

B-6
A= 0.14 ha.
C= 0.70
I= 43 L/s
MNR= N505a
MJR= 506
INF=73 mm/yr

B-5
A= 8.51 ha.
C= 0.60
I= 723 L/s
MNR= N505a
MJR= 505
INF=73 mm/yr

B-10
A= 1.17 ha.
C= 0.70
I= 311 L/s
MNR= N510
MJR= 510
INF=73 mm/yr

B-9
A= 0.36 ha.
C= 0.70
I= 106 L/s
MNR= N508a
MJR= 509
INF=73 mm/yr

B-8
A= 12.36 ha.
C= 0.60
I= 1051 L/s
MNR= N508a
MJR= 508
INF=73 mm/yr

B-7
A= 4.47 ha.
C= 0.60
I= 380 L/s
MNR= N507b
MJR= 507
INF=73 mm/yr

RIVIER CARR RIVER

A-3
A= 4.23 ha.
C= 0.45
I= unrestricted
MNR= N003a
MJR= 003
INF=

B-12
A= 0.39 ha.
C= 0.70
I= 118 L/s
MNR= N512
MJR= 512
INF=73 mm/yr

B-11
A= 7.33 ha.
C= 0.60
I= 623 L/s
MNR= N512
MJR= 511
INF=73 mm/yr

B-17
A= 0.16 ha.
C= 0.70
I= 50 L/s
MNR= N510
MJR= 517
INF=73 mm/yr

B-18
A= 3.84 ha.
C= 0.60
I= 326 L/s
MNR= N510
MJR= 518
INF=73 mm/yr

B-19
A= 16.32 ha.
C= 0.90
I= 1387 L/s
MNR= N520
MJR= 519
INF=73 mm/yr

B-13
A= 1.38 ha.
C= 0.60
I= 115 L/s
MNR= N512
MJR= 513
INF=104 mm/yr

B-14
A= 6.25 ha.
C= 0.90
I= 531 L/s
MNR= N523
MJR= 514
INF=73 mm/yr

B-15
A= 8.35 ha.
C= 0.90
I= 710 L/s
MNR= N523
MJR= 515
INF=73 mm/yr

B-16
A= 1.00 ha.
C= 0.70
I= 287 L/s
MNR= N516
MJR= 516
INF=73 mm/yr

B-21
A= 0.96 ha.
C= 0.70
I= 273 L/s
MNR= N510
MJR= 521
INF=73 mm/yr

B-23
A= 0.78 ha.
C= 0.70
I= 222 L/s
MNR= N523
MJR= 523
INF=104 mm/yr

B-22
A= 3.95 ha.
C= 0.70
I= 880 L/s
MNR= N516
MJR= 522
INF=104 mm/yr

B-20
A= 3.50 ha.
C= 0.70
I= 771 L/s
MNR= N520
MJR= 502
INF=73 mm/yr

N

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Legend

KANATA-WEST CONCEPT PLAN BOUNDARY

POND DRAINAGE BOUNDARY

STORM SEWER DRAINAGE LIMIT

A-1
A= 72.31 ha.
C= 0.60
I= 246 L/s
MNR= N4A01
MJR= 4A01
INF=73 mm/yr

DRAINAGE AREA IDENTIFICATION
AREA IN HECTARES
RUNOFF COEFFICIENT
100yr. INLET CAPACITY (L/s)
MINOR SYSTEM NODE NUMBER
MAJOR SYSTEM SEGMENT NUMBER
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 350m³/ha, OR IN SUFFICIENT QUANTITY TO DEMONSTRATE COMPLETE CONTAINMENT OF THE 100yr EVENT. (i.e. NO MAJOR SYSTEM FLOW IN THE 1:100yr EVENT)

CCL/IBI
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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
	Revision	By	Appd.	Date

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

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