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FUNCTIONAL SERVICING REPORT

FOR

CAIVAN COMMUNITIES

BRAZEAU LANDS

CITY OF OTTAWA

PROJECT NO.: 18-1030

DECEMBER 14, 2018
1ST SUBMISSION

FUNCTIONAL SERVICING REPORT
FOR
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FUNCTIONAL SERVICING REPORT
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BRAZEAU LANDS

CITY OF OTTAWA
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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained to prepare a Functional Servicing Report (FSR) in support of the Brazeau Lands development area on behalf of Caivan Communities (CC).

The proposed Brazeau Lands development area is located at 3809 Borrisokane Road within the Barrhaven South Urban Expansion Area (***BSUEA***). As illustrated in ***Figure 1*** (see ***Appendix A***) it is located north of Barnsdale Road, east of Highway 416 (and Borrisokane Road), south of Cambrian Road and west of the future new Greenbank Road alignment. The current zoning is Mineral Extraction (ME) and is proposed to be amended to permit low-rise residential uses. The western portion of the property is outside of the urban boundary and will remain at the current zoning while the eastern side (approximately 24.5 ha) is within the urban boundary and will be rezoned as noted above. The lands are planned to be developed with a mix of detached single homes, townhomes, park blocks, SWM blocks, open space and a road network (see ***Figure 2*** Concept Plan in ***Appendix A***).

The objective of this report is to provide sufficient detail to demonstrate that the proposed development area can be supported by municipal services.

1.1 Existing Conditions

The Brazeau Lands property is currently an aggregate extraction pit and is operated in accordance with the Ontario Aggregate Resources Act and Regulations.

The property ground surface is significantly disturbed as a result of the mineral extraction activities that have occurred over the years with stockpiles of materials at various locations and elevations. The eastern portion of the site adjacent to the New Greenbank Road future alignment range in elevations from approximately 108.0m to 104.5m. On-site elevations vary due to the various stockpiles of materials but are general averaging about 99.0m. Drainage is generally conveyed westward towards Borrisokane Road.

The property is within the Jock River watershed and is under the jurisdiction of the RVCA.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following studies were utilized in the preparation of this report.

- Ottawa Sewer Design Guidelines,
  City of Ottawa, *SDG002,* October 2012
  (City Standards)

  - Technical Bulletin ISDTB-2014-01, Revisions to Ottawa Design Guidelines - Sewer
    City of Ottawa, February 5, 2014.
    (ISDTB-2014-01)

  - Technical Bulletin PIEDTB-2016-01, Revisions to Ottawa Design Guidelines – Sewer
    City of Ottawa, September 6, 2016.
    (PIEDTB-2016-01)

- Ottawa Design Guidelines – Water Distribution
  City of Ottawa, July 2010.
  (Water Supply Guidelines)

  - Technical Bulletin ISD-2010-2
    City of Ottawa, December 15, 2010.
    *(*ISDTB-2010-2*)*

  - Technical Bulletin ISDTB-2014-02
    City of Ottawa, May 27, 2014.
    *(*ISDTB-2014-02*)*

- Design Guidelines for Sewage Works,
  Ministry of the Environment, Conservation and Parks, 2008. (formerly MOECC)
  (MECP Design Guidelines*)*

- Stormwater Planning and Design Manual,
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)

- City of Ottawa Official Plan,
  adopted by Council 2003.
  (Official Plan)
- South Nepean Collector: Phase 2 Hydraulics Review / Assessment Technical Memorandum
  Novatech, August 2015
  (Novatech SNC Memo)
- Master Servicing Study – Barrhaven South Urban Expansion Area, J.L. Richards & Associates Limited, Revision 2, May 2018
  (JLR MSS)
- Servicing Brief – Quinn's Pointe Residential Stages 2, 3 & 4, J.L. Richards & Associates Limited, Revision 1, October 2018 (File No. 26610-001.1)
  (Quinn's Pointe Brief)
- Jock River Reach One Subwatershed Study
  Stantec, 2007
  (Jock River SWS)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The ***JLR MSS*** provided an overview of the existing watermain infrastructure associated with the BSUEA. An assessment of the water supply for the area was completed to examine the feasibility of the extension of existing infrastructure that would meet the required City and MECP criteria for the whole of the development area.

The 'Master Watermain" plan (Drawing MWM) from the ***JLR MSS*** is provided in ***Appendix B*** and illustrates the existing watermains in proximity to the Brazeau Lands:

- 300 mm diameter watermain terminating at Dundonald Drive and the future New Greenbank Road
- 300mm diameter watermain on Kilbirnie Drive
- 250 mm diameter watermain at the current south termination of Fameflower Street
- 400 mm diameter watermain on Cambrian Road

The above noted connection points will be made in accordance with the JLR MSS.

3.2 Water Supply Servicing Design

The ***JLR MSS*** presents overall watermain infrastructure details for the BSUEA. The subject property was deemed serviceable and the ***MSS*** reviewed a number of servicing scenarios (i.e. existing and built-out conditions) that confirmed that the area could be adequately serviced conforming to relevant City and MECP Guidelines and Policies. At the time of detailed design any required easements or land crossing permissions will be obtained to support the water supply infrastructure.

The proposed water servicing is presented in ***Figure 3*** in ***Appendix B***. The ***JLR MSS*** detailed various scenarios for the watermain network and at the time of detailed design, detailed hydraulic modelling will be undertaken to verify that the proposed on-site, and any off-site, watermains are in conformance with all relevant criteria for the development area as a whole or based on any phased development. This would include consideration given to the advancement of the Minto Quinn's Pointe development to the south of the Brazeau Lands based on the current submission to the City of the "Servicing Brief – Quinn's Pointe Residential Stages 2, 3 & 4" prepared by J.L. Richards (October 2018) in support of the proposed Minto draft plan. The proposed phasing and watermain layout are found in the "*BSUEA Conceptual Watermain*" Drawing CWM found in ***Appendix B***.

The water analysis contained in the ***JLR MSS*** and the Quinn's Pointe design report utilized system level water demands as developed by the City due to the fact that the number of units and densities resulted in an overall population that would exceed 3,000. The system level demands listed in Table 7-1 of the ***MSS*** can be found in ***Appendix B*** and are summarized as follows:

Table 1A: Water Supply Design Criteria (System Level Demands)

Land Use Type	Consumption Rate
JLR BSUEA MSS, May 2018 for Population Exceeding 3000 Persons	
Single Family Residential	180 L/cap/day
Multi-unit Residential (Townhouse / Back to Back)	198 L/cap/day
Apartment Residential	219 L/cap/day
Commercial	50,000 L/ha/day
Institutional	50,000 L/ha/day
Outdoor Water Demand	1049 L/unit/day (single detached)

At the detailed design stage, if desired by the City, the typical Water Supply Design Criteria be used, as summarized in the following table:

Table 1B: Water Supply Design Criteria (Typical)

Design Parameter	Value
Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010)	
Residential – Detached Single	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – Apartment	1.8 p/unit
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m top of watermain to finished grade
Normal operating conditions desired operating pressures	350 kPa and 480kPa
During fire flow operating pressure must not drop below	140 kPa

The estimate water demands within the ***JLR MSS*** were summarized in Table 7-2 (excerpt found in ***Appendix B***). The table summarized a total population of 1,194 for the Brazeau Lands development area along with some commercial and institutional components. Based on the current development concept the water demand table would need to be refined to reflect a revised residential unit count and the removal of the commercial, institutional and high density components. Based on frontages for the proposed development concept, a maximum of 415 single family homes and 260 towns is conservatively anticipated with populations of 1,411 and 702 respectively. The adjusted water demands are summarized as follows:

Table 1C: Estimated Water Demands - Brazeau Land Updates

Design Parameter	Area (ha)	Units	Pop.	ADD SFH [1]	ADD MLT [2]	ADD APT [3]	ADD COM [4]	ADD INS [5]	Total BSDY	OWD	Total MXDY
From Table 7-2 of MSS	12.72	398	1194	1.56	0.87	0.17	0.39	0.85	3.84	2.67	6.51
Revised per Updated Concept Plan	24.39	675[6]	2113	2.93	1.61	0	0	0	4.54	5.03	9.57
		+277	+919						**+0.7**	+2.36	**+3.06**

1 Daily Demand, Single Family Homes, L/s
2 Average Daily Demand, Multi-Units (Townhouses and Back to Back Unit) L/s
3 Average Daily Demand, Apartment Units, L/s
4 Average Daily Demand, Commercial, L/s
5 Average Daily Demand, Institutional, L/s
6 Comprised of 415 Singles Family Homes and 260 Townhouses (maximum yield based on roadway frontages)

From Table 7-2 the overall Total BSDY increased by 0.70 L/s (to 19.36 L/s) which is a 3.8% increase over the previous 18.66 L/s. The total MXDY increases by 3.06 L/s which is a 9.7% increase.

Fire Flow requirements are to be confirmed in accordance with Local Guidelines (Fire Underwriters Survey), City of Ottawa Water Supply Guidelines, and the Ontario Building Code, upon development of detailed concepts for the detached singles, townhomes, and the parks.

3.3 Water Supply Conclusion

The subject lands have been reviewed within the ***JLR MSS*** for the BSUEA development areas. In the ultimate condition the Brazeau lands can be serviced by City of Ottawa infrastructure. At the time of detailed design the site will be subject to detailed watermain analysis that will consider any adjacent system expansions (i.e. Quinn's Pointe development area) and confirmation of any staged infrastructure that may be required to facilitate development of the Brazeau Lands. The proposed water supply design will conform to all relevant City and MECP Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

Sanitary flows from the BSUEA are all planned to outlet to the existing 900 mm diameter Greenbank Road sanitary trunk sewer. The existing South Nepean Collector (SNC) will provide the sanitary outlet for the entire Barrhaven South Community, which includes the BSUEA development area.

Trunk sanitary sewers exist north of the Brazeau Lands area and are located along Cambrian Road (see JLR's *Master Sanitary Drainage Area* plan 'MSAN' in ***Appendix C***). The outlet connection point to existing for the Brazeau Lands is as follows:

- Existing 500 mm / 600 mm / 750 mm diameter sanitary trunk running east on Cambrian Road then extending north along existing Greenbank Road and east to the South Nepean Collector (SNC). The current sewer termination is at the New Greenbank Road alignment.

As per the ***JLR MSS***, the subject property is tributary to the existing sanitary trunk sewer along Cambrian Road via the New Greenbank Road alignment.

4.2 Wastewater Design

The subject property is planned to be serviced by an internal gravity sanitary sewer system that will generally follow the local road network with select servicing easements and land crossing permissions as required to achieve efficiencies in servicing and grading designs. The wastewater servicing plan (***Drawing 3***), design sheets and background JLR MSS information can all be found in ***Appendix C***.

The proposed wastewater servicing design will tie into the off-site Cambrian Road trunk sewer at existing sanitary 'EX MH57A' as identified in the *Master Sanitary Drainage Area* plan 'MSAN' provided in the ***JLR MSS*** provided in ***Appendix C***.

A total of 24.1 ha is proposed to drain from the subject property into the future New Greenbank Road sewer that is tributary to Cambrian Road. The New Greenbank Road sewer is sized to accommodate the BSUEA development areas and the excerpted ***JLR MSS*** design sheets demonstrate the relevant calculations.

In the ***JLR MSS***, Table 6-3 summarized the anticipated flows from the Brazeau Lands. With a detailed development concept the site statistics are refined and the sanitary design sheet found in ***Appendix C*** more accurately reflects the anticipated sanitary flow. Within the design sheet the areas of single family homes were conservatively applied with a population of 85 persons/ha while townhome areas were 100 persons/ha. Applying the City of Ottawa wastewater design criteria to the 25ha development area, the estimated peak sanitary flows from the Brazeau property are projected to be

approximately 30.44L/s versus the 21.50L/s (+8.94L/s) previously summarized in the JLR's Table 6-3. Note that the design sheet also accounts for Mattamy land flows and potential future flows from the Drummond Lands therefore shows a total of 45.76L/s.

Table 6-1 in the ***JLR MSS*** identified critical residual capacities in existing trunk sanitary sewers associated with the BSUEA area. Specifically, the Cambrian Road sewer is the outlet for the Brazeau Lands property and has a limiting pipe reach from existing MH13A to MH15A with a residual capacity of approximately 51.4L/s. The additional 8.94L/s of anticipated sanitary flows uses 17.3% of the residual capacity leaving 42.46L/s. Review of the ***JLR MSS*** sanitary design sheet indicates that there are no other sanitary sewer constraints up to the SNC.

Table 1 summarizes the City design guidelines and criteria applied in the preliminary sanitary design information above and detailed in ***Appendix C***.

Table 1: Wastewater Design Criteria

Design Parameter	Value
Current Design Guidelines	
Residential - Single Family / Townhome	3.4 p/unit & 2.7 p/unit respectively
Residential – Apartment	1.8 p/unit
Average Daily Demand	280 L/d/person
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Commercial / Institutional Flows	28,000 L/ha/day
Commercial / Institutional Peak Factor	1.5
Infiltration and Inflow Allowance	0.33 L/s/ha
Park Flows	28,000 L/ha/d
Park Peaking Factor	1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, and recent residential subdivisions in City of Ottawa.	

4.3 Wastewater Servicing Conclusion

The subject property will be serviced by local sanitary sewers which will outlet to future sanitary sewers along New Greenbank Road and existing sewers along Cambrian Road as demonstrated in the JLR MSS. There is residual capacity in the downstream sewers providing sufficient capacity for the peak sanitary flows for the subject property.

5.0 STORMWATER CONVEYANCE

5.1 Existing Stormwater Drainage

The BSUEA is tributary to three sub-watersheds as depicted in the 'Figure 3-1' excerpt from the ***JLR MSS*** provided in ***Appendix D***. The Brazeau Lands are within the Jock River Subwatershed.

Due to the current land use for mineral extraction the majority of the land area is lower than the surrounding topography. As identified in the ***JLR MSS***, the BSUEA *Existing Condition Report* identified that the original drainage pattern for the development area was northwards via overland flow paths with no defined channels. Per the existing topography characterized within available City of Ottawa base mapping, flows from the subject property will now be ultimately conveyed to the Jock River by storm systems (pipes and ditches as required) along Borrisokane Road.

5.2 Proposed Stormwater Management Strategy

The future flows from the land area are planned to meet the following criteria per the ***JLR MSS***:

- Meet the existing flow in the downstream system;
- Meet the quality control target of 80% TSS removal as per the Jock River Reach One Subwatershed Study (Stantec, 2007); and,
- Preserve pre-infiltration condition levels

In order to provide drainage conveyance to a Borrisokane Road storm outlet, the site grading will be adjusted to convey flows westward. As noted in the ***JLR MSS***, the Existing Conditions Report (ECR) for the BSUEA identified that the culvert downstream of the aggregate properties receives a pre-development flow of 1,300 L/s during the 1:100 year event (see Figure 3-1, and Tables 5-2 and 5-5 in ***Appendix D*** from the ECR noting the constrained culvert CVR-C1). During detailed design, servicing of both properties will be developed such that the downstream pre-development flow is not exceeded. Any downstream system should have sufficient capacity for the pre-development flow.

The JLR MSS conceptualized the following requirements for the BSUEA:

- The design of the storm drainage system has been undertaken using the dual-drainage approach. The ***JLR MSS*** sets out the design criteria for future draft plan and site plan applications for the BSUEA.

- Two (2) separate storm servicing solutions were developed; one conventional servicing strategy and one that incorporates the Etobicoke Exfiltration System (EES), which was recommended (see ***JLR MSS*** Drawing MST-2 for details).
- The downstream boundary conditions or flow criteria to achieve are developed in the ***MSS*** and are used in the design constraints.
- Allowable minor system release rates were set at the required storm event and future design should maintain the same release rate criteria.
- Stormwater management facilities have been identified in the stormwater management solution for the aggregate extraction areas.

The stormwater management designs will consist of:

- A storm sewer system designed to capture at least the minimum design capture events required under PIETB-2016-01;
- One Stormwater Management (SWM) Pond designed to provide Enhanced Level of Protection (80% total suspended solids (TSS) removal) per MECP guidelines, via treatment of the stormwater captured by the storm sewer network. The SWM pond will provide controls to levels which respect any downstream pre-development levels;
- An on-site road network designed to maximize the available storage in the on-site road network for the 100-year design event, where possible, with controlled release of stormwater to the minor storm system; and
- An overland flow route designed to safely convey stormwater runoff flows in excess of the on-site road storage.

5.3 Post-Development Stormwater Management Targets

Stormwater management requirements for the proposed alternative Stormwater management scheme have been adopted from the ***Jock River SWS***, ***City Standards***, and the ***MECP SWMP Manual***.

Given the general criteria mentioned above, the following specific standards are expected to be required for stormwater management within the subject property:

- Enhanced quality treatment will be provided for stormwater runoff from the subject property, corresponding to a long-term average TSS removal efficiency of 80%, as defined by the MECP prescribed treatment levels;
- Downstream receiving drainage features, culverts, and sewers will be assessed for responses to planned stormwater management outflows, and infrastructure rehabilitation or capacity improvement measures will be planned, as required;

- Storm sewers on local roads are to be designed to provide at least a 2-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01;
- Storm sewers on collector roads are to be designed to provide at least a 5-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01;
- For less frequent storms (i.e. larger than 2-year or 5-year), the minor system sewer capture will be restricted with the use of inlet control devices to prevent excessive hydraulic surcharges;
- Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 6.0 m/s;
- For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets, rearyards, public space and parking areas shall not exceed 0.35 m at the gutter;
- The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within the public ROW, or adjacent to the ROW, provided the water level does not touch any part of the building envelope; must remain below all building openings during the stress test event (100-year + 20%); and must maintain 15 cm vertical clearance between spill elevation on the street and the ground elevation at the nearest building envelope;
- Flow across road intersections shall not be permitted for minor storms (generally 5-year or less);
- When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas. A minimum of 30 cm of vertical clearance is required between the rear yard spill elevation and the ground elevation at the adjacent building envelope; and
- The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

5.3.1 Quality Control

Per the ***Jock River SWS,*** Enhanced quality treatment will be provided for stormwater runoff from the subject property, corresponding to a long-term average Total Suspended Solid removal efficiency of 80%, as described by the MECP prescribed treatment levels.

5.3.2 Quantity Control

As noted in the ***Jock River SWS***, quantity control is not required for the Jock River; however, based on past reports (***JLR MSS*** and Existing Condition Report), the limited capacity of the infrastructure along Borrisokane Road will require that the stormwater management facilities provide a storage volume for quantity control.

5.4 Stormwater Management Design

As shown on ***Drawing 1***, the proposed stormwater management design consists of a proposed new stormwater management (SWM) pond to treat stormwater prior to discharge along Borrisokane Road. The pond will be located within the portion of the quarry land that is between the residential area to be developed and Borrisokane Road. The facility will be sized to meet MECP Enhanced Level of Protection criteria.

The SWM pond outlet is proposed to be to a new 900mm and 1200mm storm sewer installation along the east side of Borrisokane Road which extends to Cambrian Road where it discharges to the roadside ditch. The sewer installation is proposed due to property constraints along the Borrisokane right of way.

5.5 Proposed Minor System

The subject property is expected to be serviced by an internal gravity storm sewer system that is to generally follow the local road network and servicing easements as required. The drainage will be conveyed within the underground piped sewer system to the SWM pond outlet.

Street catchbasins will collect drainage from the streets and front yards, while rear yard catchbasins will capture drainage from backyards. Perforated catch basin leads will be provided in rear yards, except the last segment where it connects to the right-of-way which will be solid pipe, per City standards.

The preliminary rational method design of the minor system captures drainage for storm events up to and including the 2-year (local) and 5-year (collector) event assuming the use of inlet control devices (ICD) for all catchbasins within the subject property. ***Table 2*** summarizes the standards that will be employed in the detailed design of the storm sewer network. The preliminary drainage area information can be found in ***Drawing 1*** and rational method design sheets are provided in ***Appendix D***.

Table 2: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding 1:5 year (PIEDTB-2016-01) for collector roads, without ponding
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A=732.951 | B=6.199 | C=0.810 5-year storm event: A = 998.071 | B = 6.053 | C = 0.814	$i = \frac{A}{(t_c + B)^C}$

Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n' for pipe flow	0.013
Minimum Depth of Cover	1.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s
Clearance from 100-Year Hydraulic Grade Line to Building Opening	0.30 m
Max. Allowable Flow Depth on Municipal Roads	35 cm above gutter (PIEDTB-2016-01)
Extent of Major System	To be contained within the municipal right-of-way or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100-year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016-01)
Stormwater Management Model	DDSWMM (release 2.1), SWMHYMO (v. 5.02) and XPSWMM (v. 10)
Design Parameter	**Value**
Model Parameters	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm
Imperviousness	Based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Design Storms	Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes.
Historical Events	July 1st, 1979, August 4th, 1988 and August 8th, 1996
Climate Change Street Test	20% increase in the 100-year, 3-hour Chicago storm
Extracted from City of Ottawa Sewer Design Guidelines, October 2012, and ISSU, and based on recent residential subdivisions in City of Ottawa.	

The peak design flows are calculated based on an average predicted runoff coefficient (C-value) of 0.72 for the development areas and 0.25 for the grassed areas. As detailed design progresses, the runoff coefficients will be refined to reflect the proposed building envelopes, driveways and other details.

5.6 Hydraulic Grade Line Analysis

A detailed hydraulic grade line (HGL) modelling analysis will be completed for the proposed system at the detailed design level, based on the 100-year 3-hour Chicago, 12-hour SCS, and 24-hour SCS design storms, including historical design storms and climate change stress test as required. Detailed grading design and storm sewer design will be modified as required to achieve the freeboard requirements set out in Section 5.3 (per PIEDTB-2016-01).

5.7 Proposed Major System

Major system conveyance, or overland flow (OLF), will be provided to accommodate flows in excess of the minor system capacity. OLF is accommodated by generally storing stormwater up to the 100-year design event in road sags then routing additional surface flow along the road network and service easements towards the proposed drainage features to the Jock River, as shown in ***Drawing 1***.

The grading design described in Section 5.8, and shown in ***Drawing 2 (Appendix E),*** includes a saw-toothed-road design with 0.10% minimum grade from highpoint to highpoint in order to maximize available surface storage for management of flows up to the 100-year design event where possible.

5.8 Proposed Grading Scheme

A site grading scheme has been developed to optimize earthworks and provide major system conveyance to the receiving outlet, which eventually outlet to the Borrisokane Road right of way and then to the Jock River. Connections to the future New Greenbank Road will be coordinated with that future design. The proposed grading plan can be seen in ***Drawing 2*** and will conform to City of Ottawa guidelines.

The geotechnical review of the site will provide additional information about the suitability of the site for the proposed services and grading scheme. At the time of detailed design, detailed review and signoff by a licensed Geotechnical Engineer will be required.

5.9 Stormwater Servicing Conclusions

The stormwater runoff is designed to be captured by an internal gravity sewer system that is to convey flows to the SWM ponds for quality control treatment. An Enhanced Level of Protection will be provided for stormwater runoff from the subject property before being discharged to the Jock River. Quantity control is not required for the Jock River. Notwithstanding, some quantity control by on-site and SWM pond storage will be provided due to downstream infrastructure constraints.

6.0 CONCLUSION AND RECOMMENDATIONS

This report provides details on the planned on-site municipal services for the subject property and demonstrates that adequate municipal infrastructure capacity is expected to be available for the planned development of the subject property.

- The subject lands have been reviewed by the JLR MSS and has shown that water supply to the property can be provided. The water supply network will be expanded through neighbouring properties to meet the water demands of the proposed concept plan, via the trunk watermain network and local watermains identified. Detailed modelling will confirm phasing of the extensions of trunk watermains and sizing of the local watermain network.

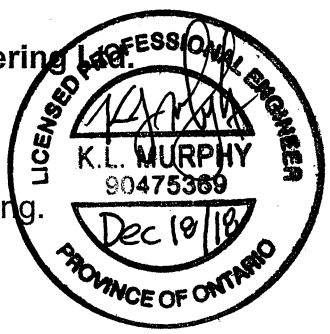
- Sanitary service is to be provided to the subject property via connection to the sanitary sewer located along Cambrian Road. With the inclusion of the subject property, the existing sewers have sufficient capacity to accommodate the subject property's proposed sanitary flows.

- Stormwater service is to be provided by capturing stormwater runoff by an internal gravity sewer system that is to convey flows to a proposed SWM pond for quality control treatment. An Enhanced Level of Protection will be provided for stormwater runoff from the subject property before being discharged to the Jock River. Quantity control is not required for the Jock River. Notwithstanding, some quantity control by on-site and SWM pond storage will be provided due to downstream infrastructure constraints.

- A detailed Hydraulic Grade Line (HGL) modelling analysis will be completed for the proposed system at the detailed design level.

- Prior to detailed design of the infrastructure presented in this report, this report will require approval under the Planning Act as supporting information for the Plan of Subdivision application. Project-specific approvals are also expected to be required for the infrastructure presented in this report from the City of Ottawa, MECP, and Rideau Valley Conservation Authority, among other agencies.

Prepared by,
David Schaeffer Engineering Ltd.



Per: Kevin L. Murphy, P.Eng.

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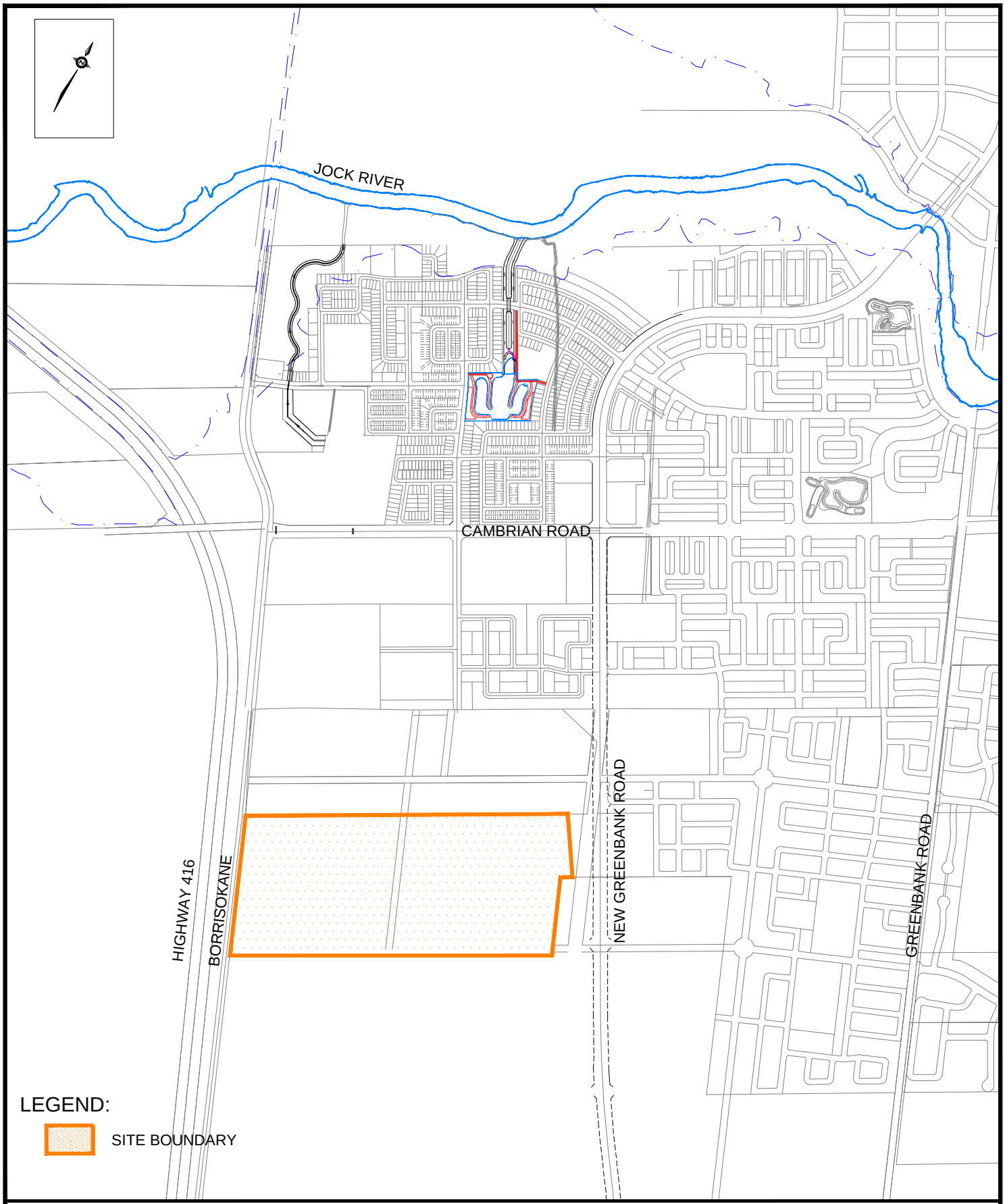
APPENDIX A



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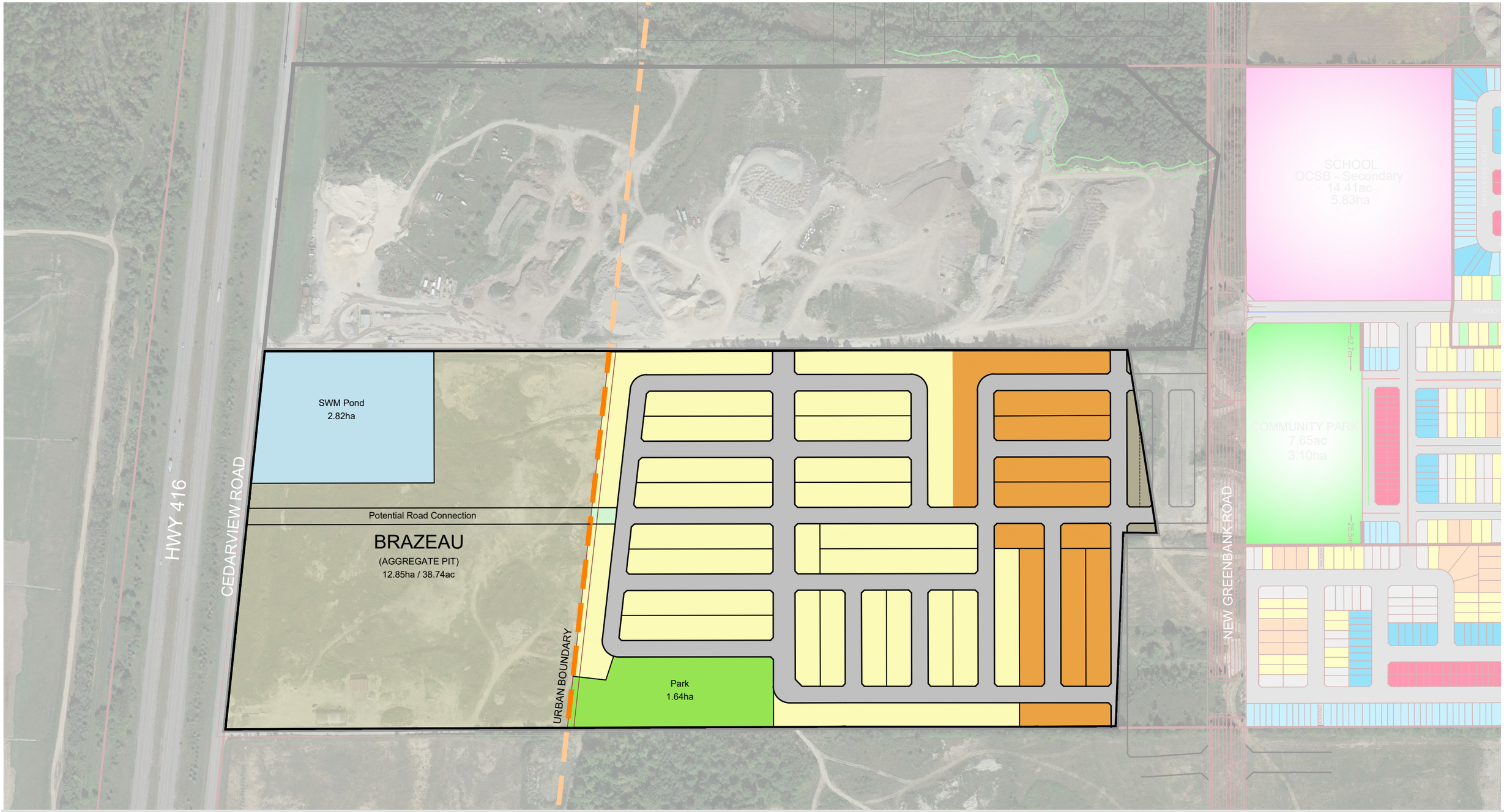
CAIVAN - BRAZEAU

KEY PLAN

CITY OF OTTAWA

DATE:	DEC 2018
SCALE:	1:15,000
PROJECT No.:	18-1030
FIGURE:	1



DRAFT

- All Units In Metric Unless Otherwise Noted.
- Base Information Obtained From Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification by Appropriate Agency.
- Aerial Photo: Google Earth, Approx. Fall 2016

GERRARD DESIGN

CAIVAN DRUMMOND/BRAZEAU | Ottawa, Ontario

PRELIMINARY DEVELOPMENT CONCEPT

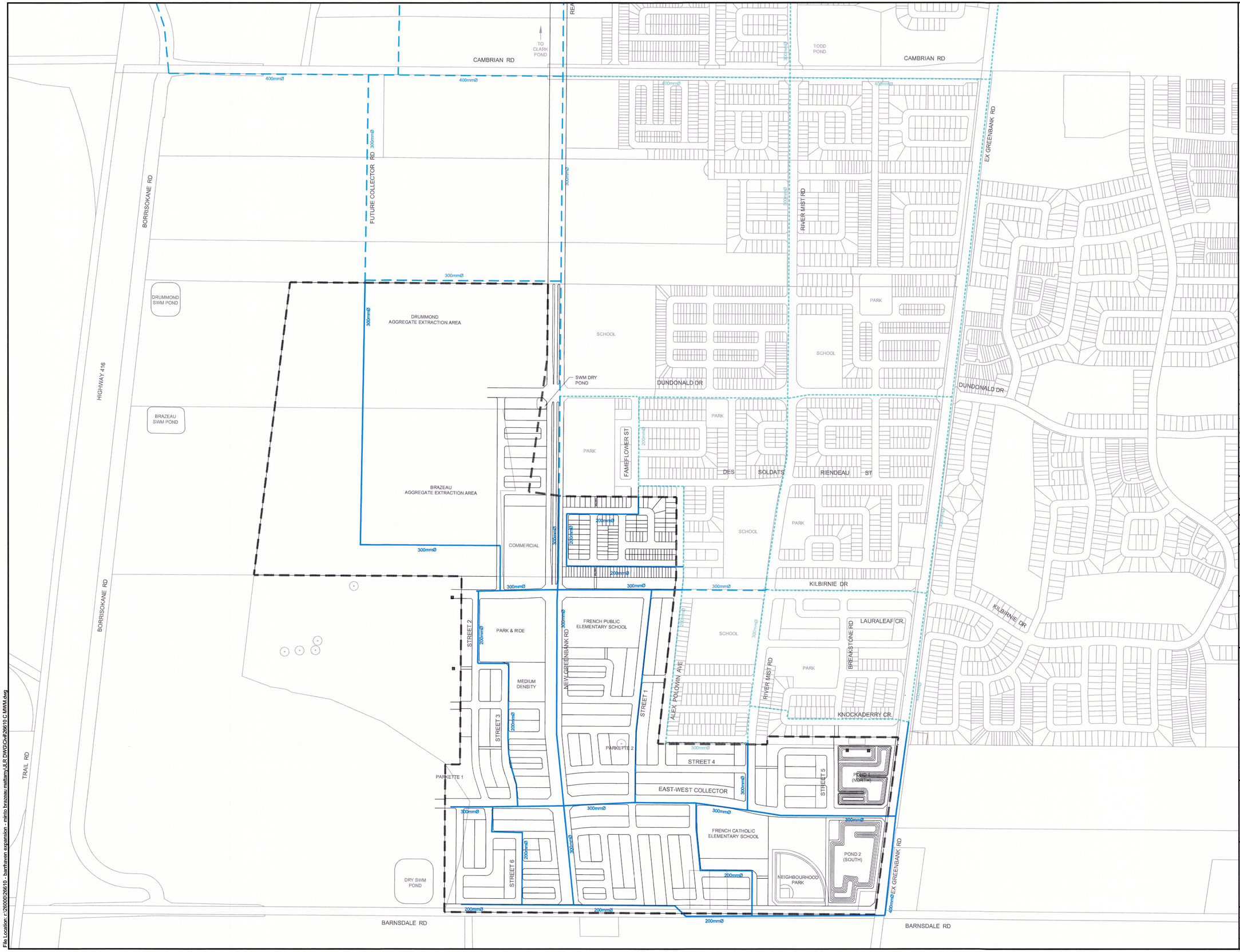
FIGURE 2

OCTOBER 30, 2018

PROJECT 1807

SCALE 1:4000

APPENDIX B



LEGEND

- PROPOSED WATERMAIN, PER 2018 BSUEA MSS
- FUTURE WATERMAIN PER 2014 BS MSS
- EXISTING WATERMAIN
- LIMIT OF STUDY AREA FOR BSUEA

No.	ISSUE / REVISION	DD/MM/YY
4	ISSUED FOR PLANNING COMMITTEE APPROVAL	04/05/18
3	ADDRESS COMMENTS, RE-ISSUE BSUEA MSS 2ND SUBMISSION	26/02/18
2	ISSUED AS PART OF DRAFT MSS	20/09/17
1	ISSUED FOR PRE-TAC WORKING MEETING	31/08/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:4000

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

LICENCED PROFESSIONAL ENGINEER
M. N. L. DALRYMPLE
May 4/18
PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

-

DRAWING:

MASTER WATERMAIN

DESIGN: JW	
DRAWN: CJM	DRAWING #: MWM
CHECKED: LD	
JLR #: 26610	

PLOT DATE: May 4, 2018 8:43:40 AM

File Location: r:\26000\26610 - barrhaven expansion - minto brazeau mattamy\JLR DWG\Civil\26610 C MWM.dwg

BRAZEAU
AGGREGATE EXTRACTION AREA

FUTURE DEVELOPMENT
(BY OTHERS)

COMMERCIAL

FAME

DES SOLDATS

RIENDEAU ST

SCHOOL

PARK

EXISTING RESIDENTIAL

KILBIRNIE DR

EXISTING RESIDENTIAL
QUINN'S POINTE STAGE 1

SCHOOL

LAURALEAF CR.

BREAKSTONE RD

PARK

RIVER MIST RD

KNOCKADERRY CR.

ALEX POLOWIN AVE

STREET 23

PARK & RIDE

MEDIUM
DENSITY

NEW GREENBANK RD

FRENCH PUBLIC
ELEMENTARY SCHOOL

STREET 3

LIMIT OF DRAFT
PLAN APPLICATION

STREET 26

PARKETTE 2

STREET 9

PARKETTE 1

EAST-WEST COLLECTOR

STREET 12

POND 1
(NORTH)

LIMIT OF DRAFT
PLAN APPLICATION

STREET 20

DRY SWM
POND

FRENCH CATHOLIC
ELEMENTARY SCHOOL

NEIGHBOURHOOD
PARK

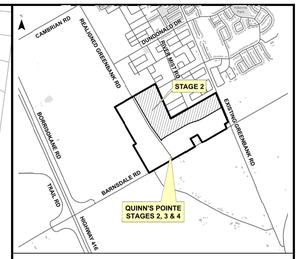
POND 2
(SOUTH)

EX GREENBANK RD

BARNSDALE RD

BARNSDALE RD

300mmØ
200mmØ
400mmØ



KEY PLAN

LEGEND

- PROPOSED WATERMAIN, PER 2018 BSUEA MSS
- FUTURE WATERMAIN PER 2014 BS MSS
- EXISTING WATERMAIN
- LIMIT OF STUDY AREA FOR BSUEA

No.	ISSUE / REVISION	DD/MM/YY
2	ISSUED FOR SERVICING BRIEF - 2nd SUBMISSION	12/09/18
1	ISSUED WITH SERVICING BRIEF - 1st SUBMISSION	07/08/18

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:2000

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

PROJECT NORTH

PROJECT:

MINTO COMMUNITIES INC.
QUINN'S POINTE STAGES 2, 3 & 4

DRAWING:

BSUEA
CONCEPTUAL WATERMAIN

DESIGN:	AT
DRAWN:	CJM
CHECKED:	LD
JLR #:	26610-001.1

DRAWING #: CWM

File Location: V:\26600\26610 - Barrhaven Expansion - Minto Brazeau Mattamy\26610-001.1 Quinn's Pointe Phase 2\3-JLR DWG\1-Civil\Conceptual\26610-001 C MWM.dwg

PLOT DATE: September 13, 2018 9:22:03 AM

- Feedermains, which have been provided primarily for the purpose of redundancy, shall meet, at a minimum, the basic day plus fire flow demand.

In addition to the above targets, servicing should be carried out to minimize dead-ends.

7.2.2 Domestic Water Demand

The water demands presented in this section are based on the same unit and population estimates as per the wastewater servicing flows described in Section 6.2.1, which reflects the CDP unit count. The zone/system level criteria for water demands are based on land use type and are in Table 7-1 below. The water demand criteria are consistent with those used in Stantec's Revised Potable Water Servicing Analysis (October 19, 2016). Calculations are summarized below.

Basic Day (BSDY) demands are calculated from the system level water demands for residential, commercial and institutional land uses. Maximum Day (MXDY) demands are calculated by adding an Outdoor Water Demand (OWD) also shown in Table 7-1 below. Peak hour demands result from applying the 72-hour diurnal patterns developed by the City to each type of MXDY demand. The 72-hour diurnal patterns are unique to each type of land use to reflect the different use patterns. The maximum hourly demand observed within the 72-hour patterns is the Peak Hour (PKHR) demand.

The review of the Demonstration Plan (Figure 4-2) has revealed that the number of units and associated densities will result in an overall population that will exceed 3,000. As a result, the water supply analysis presented herein is to be conducted using system level water demands as developed by the City. These system level demands are summarized in Table 7-2.

Table 7-1: Theoretical Water Consumption Rate

Land Use Type	Consumption Rate	Units
Single Family Residential	180	L/cap/day
Multi-unit Residential (Townhouse / Back to Back)	198	
Apartment Residential	219	
Commercial	50,000	L/ha/day
Institutional	50,000	
Outside Water Demand	1,049	L/SFH/day

The above system level demands were applied to each of the blocks depicted on the Demonstration Plan. As previously noted, the Brazeau and Drummond aggregate properties have now been accounted as residential usage. It was assumed that residential densities for both properties would be consistent with those for the BSUEA. Based on this exercise, overall water demands of 18.66 L/s and 31.48 L/s were calculated for the basic day (BSDY) and maximum day

(MXDY), respectively. It should be noted that MXDY of 31.48 L/s includes an outside water usage of 10.15 L/s.

Table 7-2: Estimated Water Demands

Land Use	Area (ha)	Units	Pop.	ADD SFH[4]	ADD MLT[5]	ADD APT[6]	ADD COM[7]	ADD INS[8]	Total BSDY	OWD[9]	Total MXDY
Minto and Mattamy Lands											
Schools	4.55							2.63	2.63		2.63
Commercial	2.13						1.23		1.23		1.23
Medium-Low Density Residential	32.90	1080	3378	4.68	2.60				7.27	8.01	15.29
High Density Residential	0.90	120	216			0.55			0.55		0.55
Total	**40.48**	**1200**	**3594**	**4.68**	**2.60**	**0.55**	**1.23**	**2.63**	**11.69**	**8.01**	**19.71**
Brazeau Aggregate Extraction Area											
Schools	1.47							0.85	0.85		0.85
Commercial	0.67						0.39		0.39		0.39
Medium-Low Density Residential	10.30	360	1126	1.56	0.87				2.42	2.67	5.10
High Density Residential	0.28	38	68			0.17			0.17		0.17
Total	**12.72**	**398**	**1194**	**1.56**	**0.87**	**0.17**	**0.39**	**0.85**	**3.84**		**6.51**
Drummond Aggregate Extraction Area											
Schools	1.25							0.72	0.72		0.72
Commercial	0.57						0.33		0.33		0.33

[4] Daily Demand, Single Family Homes, L/s
[5] Average Daily Demand, Multi-Units (Townhouses and Back to Back Unit) L/s
[6] Average Daily Demand, Apartment Units, L/s
[7] Average Daily Demand, Commercial, L/s
[8] Average Daily Demand, Institutional, L/s

Medium-Low Density Residential	8.72	288	900	1.25	0.69				1.94	2.14	4.07
High Density Residential	0.24	32	58			0.15			0.15		0.15
Total	**10.78**	**320**	**958**	**1.25**	**0.69**	**0.15**	**0.33**	**0.72**	**3.14**	**2.14**	**5.28**
Barrhaven South Urban Expansion Area Totals											
Total	**63.98**	**1918**	**5746**	**7.48**	**4.16**	**0.87**	**1.95**	**4.21**	**18.66**	**10.15**	**31.48**

7.2.3 Watermain Sizing and Roughness

The overall watermain layout for the BSUEA is shown on Drawing MWM. Watermain roughness coefficients were determined using the friction factors presented in Section 4.2.12 of the Design Guidelines and summarized in Table 7-3 below. The internal pipe diameters were modelled based on Section 4.3.5 of the Design Guidelines, as summarized in Table 7-4 below.

Table 7-3: Watermain Roughness Coefficients

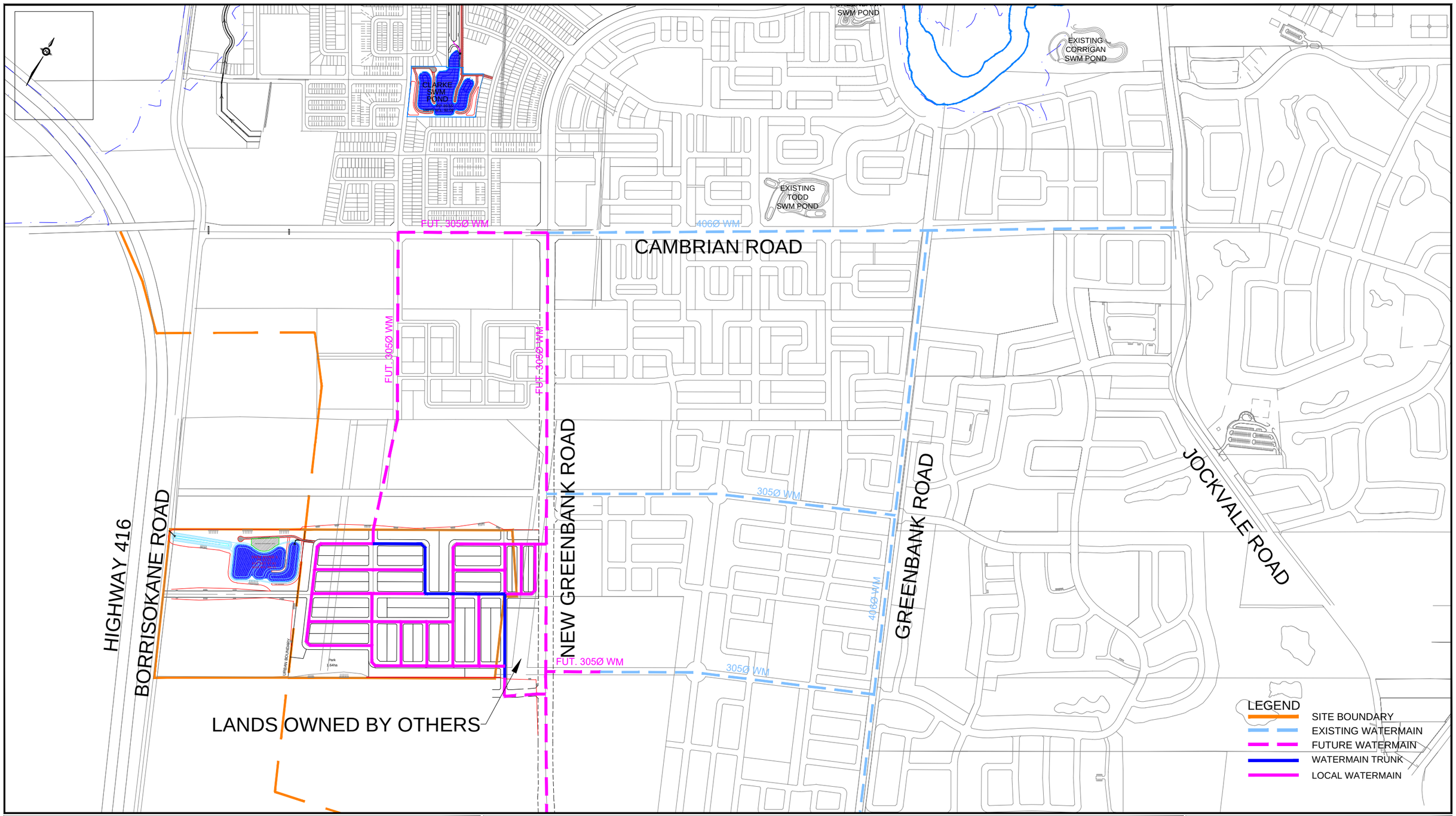
Watermain Diameter	C-Factor
150 mm	100
200 to 250 mm	110
300 to 600 mm	120
Over 600 mm	130

Table 7-4: PVC Watermain Internal Diameters

Nominal Diameter	Inside Diameter
150 mm	155 mm
200 mm	204 mm
300 mm	297 mm
400 mm	393 mm

7.2.4 Fire Flow

The City standard in regard to fire protection is the Fire Underwriters Survey and Technical Bulletin ISDTB-2014-02. To evaluate the proposed water distribution system, a fire flow of 13,000 L/min (217 L/s) was used in this system level analysis in accordance with the recommendations of the 2013 Water Master Plan.



david schaeffer engineering ltd

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
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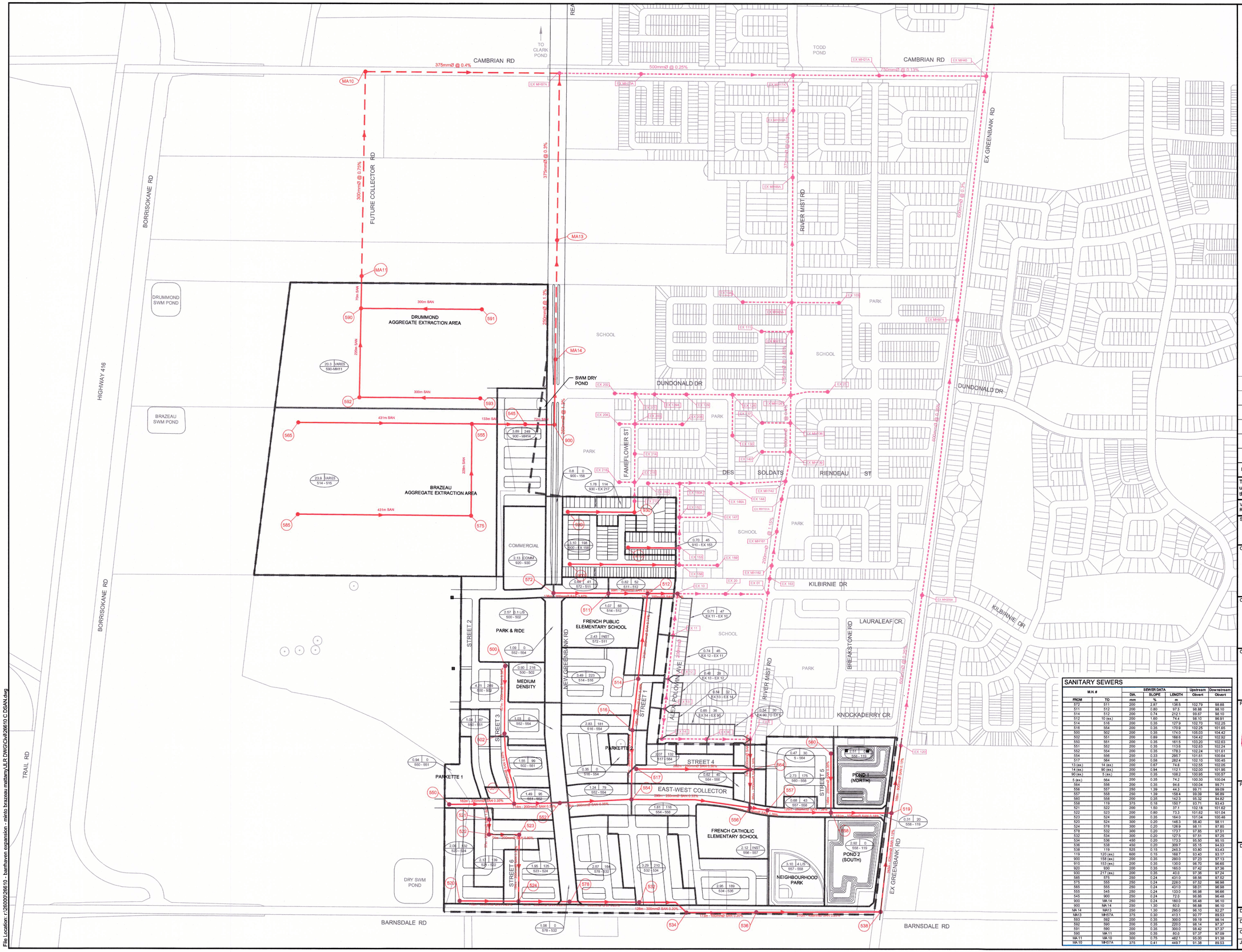
FAX: (613) 836-7183
www.DSEL.ca

CAIVAN - BRAZEAU
WATERMAIN SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	18-1030
SCALE:	1:10,000
DATE:	DECEMBER 2018
FIGURE:	3

APPENDIX C



LEGEND

- PROPOSED SANITARY, PER 2018 BSUEA MSS
- FUTURE SANITARY, PER 2014 BS MSS
- EXISTING SANITARY
- DRAINAGE BOUNDARY
- LIMIT OF STUDY AREA FOR BSUEA
- AREA IN HECTARES
- POPULATION
- PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE
- COMM — COMMERCIAL
- INST — INSTITUTIONAL
- VARIES — SEE DESIGN SHEET FOR CONTRIBUTING FLOWS

SANITARY SEWERS

M.H. #		SEWER DATA			Upstream	Downstream
		DIA.	SLOPE	LENGTH	Obvert	Obvert
FROM	TO	mm	%	m		
572	511	200	2.87	136.5	102.79	98.88
511	512	200	0.80	97.3	98.88	98.10
514	512	200	0.74	212.1	99.67	98.10
512	10 (ex.)	200	1.60	74.4	98.10	96.91
514	516	200	0.35	127.9	102.70	102.25
516	554	200	0.35	170.9	102.25	101.65
500	502	200	0.35	174.0	105.03	104.42
502	551	200	0.89	166.6	104.42	102.92
550	551	200	0.35	161.5	103.20	102.63
551	552	200	0.35	113.6	102.63	102.24
552	554	200	0.35	178.3	102.24	101.61
554	556	250	0.33	295.7	101.61	100.64
517	564	200	0.58	282.4	102.10	100.45
13 (ex.)	14 (ex.)	200	0.87	74.8	102.55	102.05
14 (ex.)	90 (ex.)	200	0.94	112.1	102.00	101.95
90 (ex.)	5 (ex.)	200	0.35	108.2	100.95	100.57
5 (ex.)	564	200	0.35	74.2	100.30	100.04
564	556	200	0.35	94.8	100.04	99.71
556	557	250	1.39	44.3	99.71	99.09
557	558	250	1.39	158.4	99.09	96.89
560	558	200	0.25	142.3	95.32	94.82
558	119	375	0.18	150.7	93.71	93.43
521	522	200	1.50	37.1	102.18	101.62
522	523	200	0.80	73.3	101.62	101.04
523	524	200	0.35	164.0	101.04	100.46
520	524	200	0.20	148.3	98.40	98.11
524	578	300	0.20	126.9	98.11	97.85
578	532	300	0.20	173.7	97.85	97.51
532	534	300	0.20	127.5	97.51	97.23
534	536	450	0.20	173.3	95.50	95.15
536	538	450	0.20	309.7	95.15	94.53
538	119	525	0.15	245.3	93.80	93.43
119	120 (ex.)	600	0.15	168.7	93.43	93.17
900	158 (ex.)	200	0.35	280.0	97.23	97.13
910	153 (ex.)	200	0.35	130.0	98.70	98.65
920	930	200	0.35	165.0	97.42	97.36
930	217 (ex.)	200	0.35	40.0	97.36	97.24
585	575	250	0.24	431.0	98.56	97.52
575	555	250	0.24	228.0	97.52	96.98
585	555	250	0.24	431.0	98.01	96.98
555	545	250	0.24	133.0	96.98	96.66
545	900	250	0.24	72.0	96.66	96.48
900	MA14	250	0.24	160.0	96.48	96.10
900	MA14	250	1.30	60.0	96.88	96.10
MA14	MA13	250	1.30	295.0	96.10	92.27
MA13	MH57A	375	0.30	413.1	90.77	89.53
593	592	200	0.35	300.0	99.19	98.14
592	590	200	0.35	220.0	98.14	97.37
591	590	200	0.35	300.0	98.42	97.37
590	MA11	300	0.35	80.0	97.37	97.09
MA11	MA10	300	0.75	482.1	95.00	91.38
MA10	MH57A	375	0.41	449.7	91.38	89.53

No.	ISSUE / REVISION	DD/MM/YY
4	ISSUED FOR PLANNING COMMITTEE APPROVAL	04/05/18
3	ADDRESS COMMENTS, RE-ISSUE BSUEA MSS 2ND SUBMISSION	26/02/18
2	ISSUED AS PART OF DRAFT MSS	20/09/17
1	ISSUED FOR PRE-TAC WORKING MEETING	31/08/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:4000

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER — M. N. L. DALRYMPLE — May 4/18 — PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

-

DRAWING:

MASTER SANITARY DRAINAGE AREA

DESIGN:	JW
DRAWN:	CJM
CHECKED:	LD
JLR #:	26610

DRAWING #: MSAN

PLOT DATE: May 3, 2018 4:34:47 PM

File Location: r:\26000\26610 - barrhaven expansion - minto brazeau mattamy\JLR DWG\Cw\26610 C DSAN.dwg

was assumed to have 4 washbasins that deliver 375 L/d and four (4) water closets that generate 150 L/hr for 10 hr/day resulting in a total flow of 7500 L/day.

Table 6-3: Land Use and Theoretical Wastewater Flows

Land Use	Flow Rate	Area (ha)	Units	Pop.	Average Flow (L/S)	Peak Factor	Infiltration	Total Flows (L/s)
Minto and Mattamy Lands								
Schools	28,000 L/ha/d	4.55			1.50	1.5	1.50	3.8
Park Block	4 L/s	4.39			4.0	1	1.45	5.5
Commercial	28,000 L/ha/d	2.13			0.70	1.5	0.70	1.8
Low-Medium density Residential	280 l/c/d	35.26	1080	3378	11.0	2.92	11.64	43.6
High Density Residential	280 l/c/d	0.90	120	216	0.7	3.51	0.30	2.8
Roads	-	27.00				1	8.91	8.9
Park and Ride		2.57			0.1	1	0.85	1.0
Total		**76.8**	**1200**	**3594**	**17.95**		**25.35**	**67.4**
Brazeau Aggregate Extraction Area								
Schools	28,000 L/ha/d	1.47			0.48	1.5	0.49	1.2
Commercial	28,000 L/ha/d	0.67			0.22	1.5	0.22	0.6
Low-Medium Density Residential	280 l/c/d	10.27	360	1126	3.65	3.21	3.39	15.1
High Density Residential	280 l/c/d	0.28	38	68	0.22	3.63	0.09	0.9
Roads	-	7.95				1	2.62	2.6
Park Block	-	1.48				1	0.49	0.5
Pond Blocks	-	1.78				1	0.59	0.6
Total		**23.9**		**1194**	**4.57**		**7.89**	**21.5**
Drummond Aggregate Extraction Area								
Schools	28,000 L/ha/d	1.25			0.41	1.5	0.41	1.0
Commercial	28,000 L/ha/d	0.57			0.18	1.5	0.19	0.5
Low-Medium Density Residential	280 l/c/d	8.72	288	900	2.92	3.26	2.88	12.4
High Density Residential	280 l/c/d	0.24	32	58	0.19	3.64	0.08	0.8
Roads	-	6.75				1	2.23	2.2

Land Use	Flow Rate	Area (ha)	Units	Pop.	Average Flow (L/S)	Peak Factor	Infiltration	Total Flows (L/s)
Park Blocks	-	1.26				1	0.42	0.4
Pond Blocks	-	1.51				1	0.50	0.5
Total		**20.3**		**958**	**3.70**		**6.71**	**17.8**
Barrhaven South Urban Expansion Area Totals								
Total		**121.0**		**5746**	**26.22**		**40.0**	**106.7**

Based on the land uses presented on the Demonstration Plan (Figure 4-2), the BSUEA would generate a peak wastewater flow of approximately 106.7 L/s.

6.3 Wastewater Collection System Strategy

6.3.1 Proposed Sewer System Layout and Sizing

A trunk sanitary sewer system layout was developed based on the ROW corridors identified on the BSUEA Demonstration Plan for the purposes of demonstrating the feasibility of providing wastewater servicing for the BSUEA lands, refer to the Key Servicing Plans. Proposed trunk sanitary sewers were sized based on the aforementioned design criteria and the drainage areas depicted on the Master Sanitary Drainage Area Drawing MSAN, refer to the BSUEA Sanitary Sewer Design Sheet (Appendix J) for detailed calculations. Final configuration and sizing of the wastewater collection system will be confirmed at detailed design of each subdivision stage. At such time, refinements may be implemented.

The proposed BSUEA trunk sanitary sewers will discharge to existing/planned sanitary sewers at the following six (6) locations, as shown on Figure 6-2:

1. The Future Collector Road
2. New Greenbank Road
3. Flameflower Street
4. Alex Polowin Avenue
5. Kilbirnie Drive
6. Greenbank Road

6.0 Wastewater Servicing

6.1 Background

The wastewater collection system for the BSUEA has been designed to convey wastewater to existing or planned gravity sanitary sewers in the BSC, which all eventually outlet to the Greenbank Road 900 mm diameter trunk sanitary sewer. The Greenbank Road trunk sanitary sewer ultimately discharges to the South Nepean Collector (SNC) and to the West Rideau Collector (WRC) which, in turn, outlets to the Robert O. Pickard Environmental Centre (ROPEC) where wastewater is processed and treated prior to discharge into the Ottawa River.

The existing BSC is currently serviced by existing trunk sanitary sewers located along Greenbank Road, Cambrian Road and River Mist Road, as shown on Figure 6-1. There are also trunk sanitary sewers that have yet to be constructed in the BSC, in accordance with the Draft 2014 BSMSSA. These planned sewers are located along the future Cambrian Road extension, New Greenbank Road, and the Future Collector Road located west of New Greenbank Road, as shown on Figure 6-1.

The wastewater servicing strategy for the BSUEA was developed to respect the integrity of the existing downstream system in regard to the known minimum residual capacities in the downstream trunk sanitary sewers. These critical residual capacities are summarized in Table 6-1 in terms of the three main trunk sewers in the BSC.

Table 6-1: Critical Residual Capacity in Existing Trunk Sanitary Sewers

Existing Trunk Sanitary Sewer	Limiting Pipe Reach	Residual Capacity
Cambrian Road	MH 13A to MH15A	51.4 L/s
River Mist Road	MH 102A to MH 17A	14.4 L/s
Greenbank Road	MH 45 to MH 435A	295.4 L/s

Section B7.1.1 of the Existing Conditions Report (Appendix B) should be reviewed for additional information regarding the existing and planned trunk sanitary sewers in the BSC.

6.2 Wastewater System Servicing

6.2.1 Design Criteria

Trunk sanitary sewers servicing the BSUEA were designed in accordance with the following criteria:

- Residential average flow rate 280 L/capita/day
- Commercial/Institutional average flow rate 28,000 L/ha/day
- Residential peaking factor Harmon formula

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

BARRHAVEN SOUTH URBAN EXPANSION (BSUEA)

BSUEA SANITARY SEWER DESIGN SHEET

CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 26610

Designed by: A.T
Checked by: H.M
Date : May 2018

DESIGN PARAMETERS			
Residential Population Density	63.9 pers/ha**	q =	280 L/cap/day
		I =	0.330 L/s/ha
		Inst. =	28000 L/ha/day
Manning's Coeff. N =	0.013	ICI Peaking Factor* =	1.0/1.5

*ICI Peaking Factor = 1.5 if ICI in contributing area is >20%, 1.0 if ICI in contributing area is <20%

Portion of Contributing Flows from Existing Quinn's Pointe Stage 1 Subdivision

STREET	M.H. #		RESIDENTIAL											COMMERCIAL				INSTITUTIONAL			(Infiltration)			PEAK DES.	SEWER DATA					RESIDUAL	UPSTREAM				DOWNSTREAM				ICI Peaking Factor	
			NUMBER OF UNITS							CUMULATIVE		PEAKING	POPUL.		CUMM.	INST.		CUMM.	INST.	PEAK EXTR.	PLUG			DIA.	SLOPE	CAPAC.	VEL.	LENGTH	CAP.	Center	Obvert	Invert	Cover	Center	Obvert	Invert	Cover	ICI	P.F
	FROM	TO	SING.	MULT.	APT.	Infiltration Area (ha)	Residential Area ha	Total Area ha	POPUL. peop.	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	AREA ha	AREA ha	FLOW l/s	AREA ha	AREA ha	FLOW l/s	FLOW l/s	FLOW l/s		FLOW l/s		mm	%	l/s	m/s	m	l/s	Line				Line				TOTAL	
MINTO LANDS WITHIN BSUEA (OUTLETS TO RIVER MIST.)																																								
Kilbirnie Dr.	572	511					0.64	0.64	41	41	0.64	3.67	0.49		0.00	0.00	2.43	2.43	1.18	1.01		2.68	200	2.87	57.9	1.79	136.50	55.23	107.40	102.79	102.59	4.61	103.50	98.88	98.68	4.62	0.79	1.50
Kilbirnie Dr.	511	512					0.82	0.82	52	93	1.46	3.60	1.09	0.00	0.00	0.00	0.00	2.43	1.18	1.28		3.55	200	0.80	30.6	0.94	97.52	27.05	103.50	98.88	98.68	4.62	103.40	98.10	97.90	5.30	0.62	1.50
Street 1	514	512					1.07	1.07	68	68	1.07	3.63	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.35		1.15	200	0.74	29.4	0.91	212.06	28.28	105.60	99.67	99.47	5.93	103.40	98.10	97.90	5.30	0.00	1.00
Kilbirnie Dr.	512	10 (ex.)							0	161	2.53	3.54	1.85	0.00	0.00	0.00	0.00	2.43	1.18	1.64		4.67	200	1.60	43.3	1.33	74.41	38.61	103.40	98.10	97.90	5.30	101.18	96.91	96.71	4.27	0.49	1.50
Alex Polowin Ave.	13(ex.)	12(ex.)	5				0.46	0.46	29	29	0.46	3.69	0.35		0.00	0.00		0.00	0.00	0.15		0.50	200	1.01	34.4	1.06	74.36	33.89	105.52	101.76	101.56	3.76	104.96	101.01	100.81	3.97	0.00	1.00
Alex Polowin Ave.	12(ex.)	11(ex.)	8				0.74	0.74	45	74	1.20	3.62	0.87		0.00	0.00		0.00	0.00	0.40		1.26	200	2.14	50.1	1.54	107.77	48.79	104.98	101.00.	100.80	3.98	102.80	98.69	98.49	4.11	0.00	1.00
Alex Polowin Ave.	11(ex.)	10(ex).	9				0.71	0.71	47	121	1.910	3.58	1.40		0.00	0.00		0.00	0.00	0.63		2.03	200	1.65	44.0	1.36	103.97	41.92	102.80	96.67	98.47	4.13	101.20	96.95	96.75	4.25	0.00	1.00
MINTO LANDS WITHIN BSUEA (OUTLETS TO EXISTING GREENBANK)																																								
Street 1	514	516					3.49	3.49	223	223	3.49	3.50	2.53		0.00	0.00		0.00	0.00	1.15		3.68	200	0.35	20.2	0.62	127.86	16.56	105.60	102.70	102.50	2.90	105.40	102.25	102.05	3.15	0.00	1.00
Street 1	516	554				0.35	2.83	3.18	181	404	6.67	3.42	4.47		0.00	0.00		0.00	0.00	2.20		6.67	200	0.35	20.2	0.62	170.90	13.57	105.40	102.25	102.05	3.15	105.20	101.65	101.45	3.55	0.00	1.00
Street 3	500	502			120	2.57	5.11	7.68	485	485	7.68	3.38	5.32		0.00	0.00		0.00	0.00	2.53	0.10	7.95	200	0.35	20.2	0.62	174.02	12.29	108.10	105.03	104.827	3.07	107.90	104.42	104.218	3.48	0.00	1.00
Street 3	502	551					1.55	1.55	99	584	9.23	3.35	6.34		0.00	0.00		0.00	0.00	3.05		9.49	200	0.89	32.3	1.00	168.60	22.79	107.90	104.42	104.218	3.48	105.90	102.92	102.717	2.98	0.00	1.00
East-West Collector	550	551				0.94	1.04	1.98	67	67	1.98	3.63	0.79		0.00	0.00		0.00	0.00	0.65		1.44	200	0.35	20.2	0.62	161.54	18.80	105.50	103.20	103.00	2.30	105.90	102.63	102.43	3.27	0.00	1.00
East-West Collector	551	552					1.49	1.49	95	746	12.70	3.30	7.98		0.00	0.00		0.00	0.00	4.19		12.28	200	0.35	20.2	0.62	113.56	7.97	105.90	102.63	102.43	3.27	106.15	102.24	102.03	3.91	0.00	1.00
East-West Collector	552	554				2.12	1.24	3.36	79	825	16.06	3.28	8.77		0.00	0.00		0.00	0.00	5.30		14.17	200	0.35	20.2	0.62	178.26	6.07	106.15	102.24	102.03	3.91	105.20	101.61	101.41	3.59	0.00	1.00
East-West Collector	554	556					1.81	1.81	116	1345	24.54	3.17	13.82		0.00	0.00		0.00	0.00	8.10		22.02	250	0.33	35.6	0.70	295.67	13.62	105.20	101.61	101.36	3.59	103.55	100.64	100.38	2.91	0.00	1.00
Street 4	517	564					2.07	2.07	132	132	2.07	3.57	1.53		0.00	0.00		0.00	0.00	0.68		2.21	200	0.58	26.2	0.81	282.43	23.94	105.30	102.10	101.90	3.20	103.65	100.45	100.25	3.20	0.00	1.00
Alex Polowin Ave.	13 (ex.)	14 (ex.)	5				0.54	0.54	32	32	0.54	3.68	0.38		0.00	0.00		0.00	0.00	0.18		0.56	200	0.67	28.0	0.86	74.56	27.45	105.00	102.55	102.35	2.45	105.52	102.05	101.85	3.47	0.00	1.00
Alex Polowin Ave.	14 (ex.)	90 (ex.)	7				0.65	0.65	36	68	1.19	3.63	0.80		0.00	0.00		0.00	0.00	0.39		1.19	200	0.94	33.2	1.02	112.06	31.98	105.00	102.00	101.80	3.00	103.96	101.95	101.75	2.01	0.00	1.00
Russet Terrace	90 (ex.)	5 (ex.)	6				0.54	0.54	30	98	1.73	3.60	1.14		0.00	0.00		0.00	0.00	0.57		1.71	200	0.35	20.2	0.62	108.16	18.53	103.93	100.95	100.75	2.98	103.80	100.57	100.37	3.23	0.00	1.00
River Mist Rd.	5 (ex.)	564					0.47	0.47	30	128	2.20	3.57	1.48		0.00	0.00		0.00	0.00	0.73		2.21	200	0.35	20.2	0.62	74.22	18.04	103.90	100.30	100.10	3.60	103.80	100.04	99.84	3.76	0.00	1.00
River Mist Rd.	564	556					0.62	0.62	0 40	300	4.89	3.46	3.37		0.00	0.00		0.00	0.00	1.61		4.98	200	0.35	20.2	0.62	94.59	15.26	103.65	100.04	99.84	3.61	103.55	99.71	99.51	3.84	0.00	1.00
East-West Collector	556	557							0	1645	29.43	3.12	16.63		0.00	0.00	2.12	2.12	0.69	10.41		27.83	250	1.39	73.1	1.44	44.25	45.31	103.55	99.71	99.46	3.84	102.78	99.09	98.84	3.69	0.07	1.00
East-West Collector	557	558					0.68	0.68	43	1688	30.11	3.11	17.03		0.00	0.00	3.12	5.24	1.70	11.67	4.00	34.50	250	1.39	73.1	1.44	158.35	38.65	102.78	99.09	98.84	3.69	99.90	96.89	96.64	3.01	0.15	1.00
Street 5	560	558					2.73	2.73	175	175	2.73	3.53	2.00		0.00	0.00		0.00	0.00	0.90		2.91	200	0.35	20.2	0.62	142.27	17.34	98.80	95.32	95.12	3.48	99.90	94.82	94.62	5.08	0.00	1.00
East-West Collector	558	119				5.43	0.31	5.74	20	1883	38.58	3.08	18.82		0.00	0.00		5.24	1.70	14.46		39.08	375	0.18	77.6	0.68	150.71	38.52	99.90	93.71	93.32	6.20	99.55	93.43	93.05	6.12	0.12	1.00
Street 6	521	522					2.17	2.17	139	139	2.17	3.56	1.60		0.00	0.00		0.00	0.00	0.72		2.32	200	1.50	41.9	1.29	37.09	39.59	105.18	102.18	101.98	3.00	104.50	101.62	101.42	2.88	0.00	1.00
	522	523								139	2.17	3.56	1.60		0.00	0.00		0.00	0.00	0.72		2.32	200	0.80	30.6	0.94	73.27	28.28	104.50	101.62	101.42	2.88	105.11	101.04	100.83	4.07	0.00	1.00
	523	524					1.95	1.95	125	264	4.12	3.48	2.98		0.00	0.00		0.00	0.00	1.36		4.34	200	0.35	20.2	0.62	164.00	15.90	105.11	101.04	100.83	4.07	103.50	100.46	100.26	3.04	0.00	1.00
Adjacent to Barnsdale Rd	520	524					2.06	2.06	132	132	2.06	3.57	1.53		0.00	0.00		0.00	0.00	0.68		2.21	300	0.20	45.1	0.62	146.25	42.91	102.80	98.40	98.10	4.40	103.50	98.11	97.80	5.39	0.00	1.00
Adjacent to Barnsdale Rd	524	578							0	396	6.18	3.42	4.39		0.00	0.00		0.00	0.00	2.04		6.43	300	0.20	45.1	0.62	126.92	38.69	103.50	98.11	97.80	5.39	104.92	97.85	97.55	7.07	0.00	1.00
Adjacent to Barnsdale Rd	578	532				1.06	2.57	3.63	164	560	9.81	3.36	6.10		0.00	0.00		0.00	0.00	3.24		9.33	300	0.20	45.1	0.62	173.72	35.78	104.92	97.85	97.55	7.07	103.80	97.51	97.20	6.29	0.00	1.00
Adjacent to Barnsdale Rd	532	534					3.29	3.29	210	770	13.10	3.30	8.23		0.00	0.00		0.00	0.00	4.32		12.55	300	0.20	45.1	0.62	127.45	32.57	103.80	97.51	97.20	6.29	103.00	97.25	96.95	5.75	0.00	1.00
Adjacent to Barnsdale Rd	534	536					2.95	2.95	189	959	16.05	3.25	10.10		0.00	0.00		0.00	0.00	5.30		15.39	450	0.20	133.0	0.81	173.27	117.62	103.00	95.50	95.04	7.50	101.56	95.15	94.70	6.41	0.00	1.00
Easement (Barnsdale to E-W Collector)	536	538							0	959	16.05	3.25	10.10		0.00	0.00		0.00	0.00	5.30		15.39	450	0.20	133.0	0.81	309.73	117.62	101.56	95.15	94.70	6.41	99.75	94.53	94.08	5.22	0.00	1.00
	538	119							0	959	16.05	3.25	10.10		0.00	0.00		0.00	0.00	5.30		15.39	525	0.15	173.8	0.78	245.34	158.37	99.75	93.80	93.26	5.95	99.55	93.43	92.89	6.12	0.00	1.00
Ex. Greenbank Rd.	119	120 (ex.)							0	2842	54.630	2.97	27.35		0.00	0.00		5.24	1.70	19.76		52.91	600	0.15	248.1	0.85	168.66	195.18	99.55	93.43	92.82	6.12		93.17	92.57		0.09	1.00
																							600	0.25															
MATTAMY LANDS EAST OUTLETS TO DUNDONALD DR. & DES SOLDATS									54.63	**2842**																														
	900	158 (ex.)				0.8	3.10	3.90	198	198	3.90	3.52	2.26	0.00	0.00	0.00		0.00	0.00	1.29		3.55	200	0.35	20.2	0.62	280.00	16.70	106.62	97.23	97.02	9.39	101.03	97.13	97.13	3.90	0.00	1.00
	910	153 (ex.)					0.70	0.70	45	45	0.70	3.66	0.53	0.00	0.00	0.00		0.00	0.00	0.23		0.76	200	0.35	20.2	0.62	130.00	19.48	104.00	96.70	96.49	7.30	100.35	96.65	96.65	3.70	0.00	1.00
	920	930					1.78	1.78	114	114	1.78	3.58	1.32	2.13	2.13	1.04		0.00	0.00	1.29		3.65	200	0.35	20.2	0.62	165.00	16.59	106.07	97.42	97.21	8.65	101.70	97.36	97.16	4.34	0.54	1.50
	930	217 (ex.)								114	1.78	3.58	1.32	0.00	2.13	1.04		0.00	0.00	1.29		3.65	200	0.35	20.2	0.62	40.00	16.59	101.70	97.36	97.16	4.34	101.70	97.24	97.04	4.46	0.54	1.50
BRAZEAU AGGREGATE EXTRACTION AREA OUTLETS TO NEW GREENBANK ROAD*																																							
	585	575			38			21.75	1194	1194	21.75	3.20	12.38	0.67	0.67	0.22	1.47	1.47	0.48	7.88		20.96	250	0.24	30.4	0.60	431.00	9.44		98.56	98.30			97.52	97.27		0.09	1.00
	575	555							0	1194	21.75	3.20	12.38		0.67	0.22		1.47	0.48	7.88		20.96	250	0.24	30.4	0.60	228.00	9.44		97.52	97.27			96.98	96.72		0.09	1.00
	565	555							0	0	0.00	3.80	0.00	0.00	0.00	0.00		0.00	0.00	0.00		0.00	250	0.24	30.4	0.60	431.00	30.39		98.01	97.76			96.98	96.72		0.00	1.00
	555	545							0	1194	21.75	3.20	12.38		0.67	0.22		1.47	0.48	7.88		20.96	250	0.24	30.4	0.60	133.00	9.44		96.98	96.72			96.66	96.40		0.09	1.00
	545	900							0	1194	21.75	3.20	12.38		0.67	0.22		1.47	0.48	7.88		20.96	250	0.24	30.4	0.60	72.00	9.44	104.31	96.66	96.40	7.65	103.00	96.48	96.23	6.52	0.09	1.00
	900	MA 14																					250	0.24	30.4	0.60	160.00	30.39		96.48	96.23			96.10	95.85			
MATTAMY LANDS WEST OUTLETS TO NEW GREENBANK RD																																							
Realigned Greenbank Rd.	900	MA 14					3.89	3.89	249	249	3.89	3.49	2.82	0.00	0.67	0.33	0.00	1.47	0.71	1.99		5.85	250	1.30	70.7	1.40	60.00	64.89	104.31	96.88	96.63	7.43	103.00	96.10	95.85	6.90	0.35	1.50
	MA 14	MA13						0.00	0	249	3.89	3.49	2.82	0.00	0.67	0.33	0.00	1.47	0.71	1.99		5.85	250	1.30	70.7	1.40	295.00	64.84	103.00	96.10	95.85	6.90	95.20	92.27	92.02	2.93	0.35	1.50
	MA13	MH57A								249	3.89	3.49	2.82		0.67	0.33		1.47	0.71	1.99		5.85	375	0.30	100.2	0.88	413.10	94.34	92.27	90.77	90.39	1.50	93.60	89.53	89.15	4.07	0.35	1.50
DRUMMOND AGGREGATE EXTRACTION AREA OUTLETS TO PROPOSED COLLECTOR RD.*																																							
	593	592																					200	0.35	20.2	0.62	300.00	20.24		99.19	98.99			98.14	97.94			1.00
	592	590																					200	0.35	20.2	0.62	220.00	20.24		98.14	97.94			97.37	97.17			1.00
	591	590																					200	0.35	20.2	0.62	300.00	20.24		98.42	98.22			97.37	97.17			1.00
	590	MA 11			32			18.48	958	958	18.48	3.25	10.09	0.57	0.57	0.18	1.25	1.25	0.41	6.70		17.38	300	0.35	59.7	0.82	80.00	42.31		97.37	97.07		100.00	97.09	96.79	2.91	0.09	1.00
	MA 11	MA 10							0	958	18.48	3.25	10.09		0.57	0.18		1.25	0.41	6.70		17.38	300	0.75	87.4	1.20	482.10	69.99	100.00	95.00	94.69	5.00	93.50	91.38	91.08	2.12	0.09	1.00
	MA 10	MH57A							0	958	18.48	3.25	10.09		0.57	0.18		1.25	0.41	6.70		17.38	375	0.41	117.3	1.03	449.70	99.94	93.50	91.38	91.00	2.12	93.60	89.53	89.15	4.07		1.00

*ONLY FLOW CONTRIBUTIONS FROM BSUEA ARE SHOWN, FOR SANITARY FLOWS FROM OTHER CONTRIBUTING AREAS TRIBUTARY TO CAMBRIAN ROAD, SEE OVERALL SANITARY SPREADSHEET
**RESIDENTIAL POPULATION DENSITY IS MULTIPLIED BY RESIDENTIAL AREA TO OBTAIN POPULATION,SINGLE FAMILY HOMES SHOWN ARE FROM EXISTING QUINN'S POINTE STAGE 1 SUBDIVISION

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 26610

BARRHAVEN SOUTH SANITARY SEWER DESIGN SHEET

Designed by: AT
Checked by:HM

Date: May 2018

PROPOSED AND BSUEA DESIGN PARAMETERS					
Single Family	3.4	pers/unit	q =	280	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.330	L/s/ha
Apt Units	1.8	pers/unit	Inst./Comm. =	28000	L/ha/day
Manning's Coeff. N =	0.013		Commerial PF*=	1.0/1.5	

*1.5 if ICI in contributing area is >20%, 1.0 if ICI in contributing area is <20%

Sources:	
	Half Moon Bay South Subdivision - Phase 4 - Excluding Arterials- Sanitary sewer design sheet prepared by Stantec (2015)
	Quinn's Pointe - Excluding Arterials-Sanitary sewer design sheet prepared by J.L Richards (2015)
	Barrhaven South Master Servicing Study Addendum - Sanitary sewer design sheet prepared Stantec (2014)

Legend	
	Proposed
	Proposed by Others
	Existing

STREET	SOURCE	M.H. #		RESIDENTIAL								COMMERCIAL			INSTITUTIONAL			GREEN/UNUSED		PEAK EXTR.	PLUG	PEAK DES.	SEWER DATA						RESIDUAL		ICI*
				NUMBER OF UNITS			AREA	POPULATION	CUMULATIVE		PEAKING	POPUL.	AREA	CUMM.	INST.	AREA	CUMM.	INST.	AREA	CUMM.												
		FROM	TO	SING.	MULT.	APT.	TOTAL ha	TOTAL peop.	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	ha	AREA ha	FLOW l/s	ha	AREA ha	FLOW l/s	AREA ha	AREA ha	FLOW l/s	FLOW l/s	FLOW l/s	DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CAP. l/s	ICI/ TOTAL	Peaking Factor
CAMBRIAN ROAD OUTLET VIA FUTURE REALIGNED GREENBANK AND FUTURE COLLECTOR																															
Drummond Aggregate Extraction Area		545	MA11			32.00	18.48	958	958	18.48	3.25	10.09	0.57	0.57	0.18	1.25	1.25	0.41		0.00	6.70		17.38	300	0.75	87.4	1.20	300.00	69.99	0.09	1.00
Future Collector Road	Stantec (2014)	MA11	MA10				14.23	1523	2481	32.71	3.01	24.19		0.57	0.18	2.80	4.05	1.31	2.50	2.50	13.14		38.83	300	0.75	87.4	1.20	482.10	48.53	0.12	1.00
Cambrian Rd.	Stantec (2014)	MA10	MH57A				12.81	1371	3852	45.52	2.88	35.93		0.57	0.18	7.22	11.27	3.65	14.49	16.99	24.54		64.30	375	0.40	115.7	1.01	449.70	51.38	0.16	1.00
Brazeau Aggregate Extraction Area + Mattamy Lands		900	MA14			38.00	25.65	1443	1443	25.65	3.15	14.75	0.67	0.67	0.22	1.47	1.47	0.48		0.00	9.17		24.6	250	1.30	70.7	1.40	350.00	46.12	0.08	1.00
New Greenbank Road	Stantec (2014)	MA14	MA13				4.79	513	1956	30.44	3.07	19.49		0.67	0.33	7.45	8.92	4.34		0.00	13.21		37.36	250	1.30	70.7	1.40	295.00	33.37	0.24	1.50
New Greenbank Road	Stantec (2014)	MA13	MH57A				10.99	1176	3132	41.43	2.94	29.85		0.67	0.22		8.92	2.89	0.53	0.53	17.01		49.97	375	0.30	100.2	0.88	413.10	50.21	0.19	1.00
Cambrian Road	Stantec	MH57A	MH13A				4.29	458	7442	91.24	2.66	64.27	3.44	4.68	1.52	0.00	20.19	6.54		17.52	44.10		116.42	500	0.25	197.0	0.97	216.50	80.54	0.19	1.00
Cambrian Road	Stantec	MH13A	MH15A				6.21	634	8076	97.45	2.64	69.02		4.68	1.52	0.00	20.19	6.54		17.52	46.15		123.22	500	0.20	176.2	0.87	165.20	52.94	0.18	1.00
Cambrian Road	Stantec	MH15A	MH17A				5.61	870	8946	103.06	2.60	75.44		4.68	1.52	0.00	20.19	6.54		17.52	48.00		131.50	600	0.13	231.0	0.79	202.00	99.46	0.17	1.00
QUINN'S POINTE OUTLET TO MH163 RIVER MIST RD.							103.06	8946					4.68							17.52											
Kilbirnie Drive		572	511				0.64	41	41	0.64	3.67	0.49		0.00	0.00	2.43	2.43	1.18		0.00	1.01		2.68	200	2.87	57.9	1.79	136.50	55.22	0.79	1.50
Kilbirnie Drive		511	512				0.82	52	93	1.46	3.60	1.09		0.00	0.00		2.43	1.18		0.00	1.28		3.55	200	0.80	30.6	0.94	97.50	27.05	0.62	1.50
Future Collector Road		514	512				1.07	68	68	1.07	3.63	0.80		0.00	0.00		0.00	0.00		0.00	0.35		1.15	200	0.74	29.4	0.91	212.10	28.28	0.00	1.00
Kilbirnie Drive		512	EX10				0.00	0	161	2.53	3.54	1.85		0.00	0.00		2.43	1.18		0.00	1.64		4.67	200	1.60	43.3	1.33	74.00	38.61	0.49	1.50
River Mist Road		EX5	EX4	12			0.55	41	41	0.55	3.67	0.49		0.00	0.00		0.00	0.00		0.00	0.18		0.67	200	0.33	19.8	0.61	74.90	19.10	0.00	1.00
Boddington Street		EX101	EX100	14			0.72	48	48	0.72	3.65	0.57		0.00	0.00		0.00	0.00		0.00	0.24		0.81	200	0.98	33.8	1.04	90.13	33.00	0.00	1.00
Boddington Street		EX100	EX4	8			0.44	27	75	1.16	3.62	0.88		0.00	0.00		0.00	0.00		0.00	0.38		1.26	200	0.91	32.6	1.01	91.40	31.34	0.00	1.00
River Mist Road		EX4	EX3	12			0.53	41	157	2.24	3.55	1.81		0.00	0.00		0.00	0.00		0.00	0.74		2.54	200	0.32	19.4	0.60	74.95	16.82	0.00	1.00
Clonfadda Terrace		EX111	EX110	13			0.62	44	44	0.62	3.66	0.52		0.00	0.00		0.00	0.00		0.00	0.20		0.73	200	1.04	34.8	1.07	76.25	34.10	0.00	1.00
Clonfadda Terrace		EX110	EX3	15			0.64	51	95	1.26	3.60	1.11		0.00	0.00		0.00	0.00		0.00	0.42		1.52	200	0.83	31.2	0.96	108.32	29.67	0.00	1.00
River Mist Road		EX3	EX2	3			0.32	10	262	3.82	3.48	2.96		0.00	0.00		0.00	0.00		0.00	1.26		4.22	200	0.35	20.2	0.62	100.22	16.00	0.00	1.00
River Mist Road		EX2	EX1		14		0.55	38	300	4.37	3.46	3.37		0.00	0.00		0.00	0.00		0.00	1.44		4.81	200	1.77	45.5	1.40	112.11	40.65	0.00	1.00
Alex Polowin Avenue		EX13	EX12	5			0.46	29	29	0.46	3.69	0.35		0.00	0.00		0.00	0.00		0.00	0.15		0.50	200	1.01	34.4	1.06	74.36	33.87	0.00	1.00
Alex Polowin Avenue		EX12	EX11	8			0.74	45	74	1.20	3.62	0.87		0.00	0.00		0.00	0.00		0.00	0.40		1.26	200	2.14	50.1	1.54	107.77	48.83	0.00	1.00
Alex Polowin Avenue		EX11	EX10	9			0.71	47	121	1.91	3.58	1.40		0.00	0.00		0.00	0.00		0.00	0.63		2.03	200	1.65	44.0	1.36	103.97	41.98	0.00	1.00
Kilbirnie Drive		EX10	EX20		14		0.57	38	320	5.01	3.45	3.58		0.00	0.00		2.43	1.18		0.00	2.46		7.22	200	0.32	19.3	0.60	118.98	12.12	0.33	1.50
Block 251 (School)		Stub	EX20				0.00	0	0	0.00	3.80	0.00		0.00	0.00	2.83	2.83	1.38		0.00	0.93		2.31	200	0.32	19.3	0.60	11.00	16.99	1.00	1.50
Kilbirnie Drive		EX20	EX1		15		0.54	41	361	5.55	3.43	4.02		0.00	0.00		5.26	2.56		0.00	3.57		10.14	200	0.32	19.4	0.60	106.01	9.21	0.49	1.50
River Mist Road		EX1	MH163				0.08	0	661	10.00	3.33	7.13		0.00	0.00		5.26	2.56		0.00	5.04		14.72	200	0.32	19.3	0.60	39.41	4.63	0.34	1.50
MH163 TO MH17A RIVERMIST ROAD OUTLETS VIA CAMBRIAN ROAD							10.00	661																							
River Mist Road	Stantec (2015)	MH163	EX162				0.08	0	661	10.08	3.33	7.13		0.00	0.00		5.26	2.56		0.00	5.06		14.75	250	0.85	57.2	1.13	36.30	42.45	0.34	1.50
River Mist Road		EX162	EX161				0.20	0	661	10.28	3.33	7.13		0.00	0.00		5.26	2.56		0.00	5.13		14.81	250	1.15	66.5	1.31	44.40	51.72	0.34	1.50
River Mist Road		EX161A	EX161				0.00	0	0	0.00	3.80	0.00		0.00	0.00		0.00	0.00	0.91	0.91	0.30		0.30	150	1.00	15.9	0.87	14.00	15.59	0.00	1.00
River Mist Road		EX161	151				0.19	0	661	10.47	3.33	7.13		0.00	0.00		5.26	2.56		0.91	5.49		15.18	250	1.15	66.5	1.31	57.70	51.35	0.32	1.50
River Mist Road		EX151A	151				0.00	0	0	0.00	3.80	0.00		0.00	0.00	2.77	2.77	1.35		0.00	0.91		2.26	150	1.00	15.9	0.87	12.70	13.63	1.00	1.50
River Mist Road		151	EX151				0.09	0	661	10.56	3.33	7.13		0.00	0.00		8.03	3.90		0.91	6.44		17.47	300	1.40	119.4	1.64	17.90	101.90	0.41	1.50
River Mist Road		EX151	MH142				0.00	0	661	10.56	3.33	7.13		0.00	0.00		8.03	3.90		0.91	6.44		17.47	300	1.40	119.4	1.64	44.40	101.90	0.41	1.50
Buffalograss Cres.	Stantec (2015)	EX159	EX158		24		0.56	65	65	0.56	3.63	0.77		0.00	0.00		0.00	0.00		0.00	0.18		0.95	200	0.40	21.6	0.67	95.50	20.69	0.00	1.00
Mattamy Lands East		900	EX158				3.90	198	198	3.90	3.52	2.26		0.00	0.00		0.00	0.00		0.00	1.29		3.55	200	0.35	20.2	0.62	280.00	16.46	0.00	1.00
Alex Polowin ave.		EX158	EX153	0	0		0.13	0	263	4.59	3.48	2.97		0.00	0.00		0.00	0.00		0.00	1.51		4.48	200	0.40	21.6	0.67	45.00	17.16	0.00	1.00
Mattamy Lands East		910	EX153				0.70	45	45	0.70	3.66	0.53		0.00	0.00		0.00	0.00		0.00	0.23		0.76	200	0.35	20.2	0.62	130.00	19.48	0.00	1.00
Alex Polowin ave.		EX153	EX152				0.12	0	308	5.41	3.46	3.45		0.00	0.00		0.00	0.00		0.00	1.79		5.24	200	0.80	30.6	0.94	70.00	25.37	0.00	1.00
Alex Polowin ave.		EX152	EX150				0.00	0	308	5.41	3.46	3.45		0.00	0.00		0.00	0.00		0.00	1.79		5.24	200	0.80	30.6	0.94	85.70	25.37	0.00	1.00
Rue Des Soldats Riendeau St.		EX165	EX150	17			0.67	58	58	0.67	3.64	0.68		0.00	0.00		0.00	0.00		0.00	0.22		0.91	200	1.50	41.9	1.29	101.20	41.00	0.00	1.00
Rue Des Soldats Riendeau St.	Stantec (2015)	EX150	EX146	6			0.30	20	386	6.38	3.42	4.28		0.00	0.00		0.00	0.00		0.00	2.11		6.39	200	0.80	30.6	0.94	72.00	24.22	0.00	1.00

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 26610

BARRHAVEN SOUTH SANITARY SEWER DESIGN SHEET

Designed by: AT
Checked by:HM

PROPOSED AND BSUEA DESIGN PARAMETERS					
Single Family	3.4	pers/unit	q =	280	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.330	L/s/ha
Apt Units	1.8	pers/unit	Inst./Comm. =	28000	L/ha/day
Manning's Coeff. N =	0.013		Commerial PF*=	1.0/1.5	

*1.5 if ICI in contributing area is >20%, 1.0 if ICI in contributing area is <20%

Sources:
- Half Moon Bay South Subdivision - Phase 4 - Excluding Arterials- Sanitary sewer design sheet prepared by Stantec (2015)
- Quinn's Pointe - Excluding Arterials-Sanitary sewer design sheet prepared by J.L Richards (2015)
- Barrhaven South Master Servicing Study Addendum - Sanitary sewer design sheet prepared Stantec (2014)

Legend
- Proposed
- Proposed by Others
- Existing

Date: May 2018

STREET	SOURCE	M.H. #		RESIDENTIAL								COMMERCIAL			INSTITUTIONAL			GREEN/UNUSED											ICI*
				NUMBER OF UNITS			AREA	POPULATION	CUMULATIVE		PEAKING	POPUL.	AREA	CUMM.	INST.	AREA	CUMM.	INST.	AREA	CUMM.	PEAK EXTR.	PLUG	PEAK DES.	SEWER DATA					RESIDUAL		Peaking
		FROM	TO	SING.	MULT.	APT.	TOTAL ha	TOTAL peop.	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	ha	AREA ha	FLOW l/s	ha	AREA ha	FLOW l/s	ha	AREA ha	FLOW l/s	FLOW l/s	FLOW l/s	DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CAP. l/s	ICI/ TOTAL	Factor
Remora Way		EX147	EX146	20			0.94	68	68	0.94	3.63	0.80		0.00	0.00		0.00	0.00		0.00	0.31		1.11	200	1.00	34.2	1.06	78.20	33.11	0.00	1.00
Rue Des Soldats Riendeau St.		EX146	EX145	2			0.08	7	461	7.40	3.39	5.07		0.00	0.00		0.00	0.00		0.00	2.44		7.51	200	0.50	24.2	0.75	19.30	16.68	0.00	1.00
Rue Des Soldats Riendeau St.		EX145	EX144				0.07	0	461	7.47	3.39	5.07		0.00	0.00		0.00	0.00		0.00	2.47		7.54	200	0.50	24.2	0.75	35.90	16.66	0.00	1.00
Rue Des Soldats Riendeau St.		EX144	EX143	9			0.54	31	492	8.01	3.38	5.39		0.00	0.00		0.00	0.00		0.00	2.64		8.04	200	0.50	24.2	0.75	114.90	16.16	0.00	1.00
Rue Des Soldats Riendeau St.		EX143	MH142				0.00	0	492	8.01	3.38	5.39		0.00	0.00		0.00	0.00		0.00	2.64		8.04	200	0.40	21.6	0.67	21.50	13.60	0.00	1.00
River Mist Road		MH142	EX139	3			0.26	10	1163	18.83	3.21	12.08		0.00	0.00		8.03	3.90		0.91	9.16		25.15	300	0.40	63.8	0.87	74.80	38.65	0.29	1.50
		EX140	EX139	7			0.40	24	24	0.40	3.70	0.29		0.00	0.00		0.00	0.00		0.00	0.13		0.42	200	0.65	27.6	0.85	67.70	27.17	0.00	1.00
River Mist Road		EX139	EX136	10			0.47	34	1221	19.70	3.19	12.64		0.00	0.00		8.03	3.90		0.91	9.45		25.99	300	0.41	64.6	0.89	64.70	38.60	0.28	1.50
		EX137	EX136	15			0.84	51	51	0.84	3.65	0.60		0.00	0.00		0.00	0.00		0.00	0.28		0.88	200	0.65	27.6	0.85	67.80	26.71	0.00	1.00
River Mist Road		EX136	MH126	4			0.29	14	1286	20.83	3.18	13.26		0.00	0.00		8.03	3.90		0.91	9.82		26.99	300	0.41	64.6	0.89	78.90	37.61	0.27	1.50
Mattamy Lands East		920	930				1.78	114	114	1.78	3.58	1.32	2.13	2.13	1.04		0.00	0.00		0.00	1.29		3.65	200	0.35	20.2	0.62	165.00	15.50	0.54	1.50
Mattamy Lands East		930	EX217					0	114	1.78	3.58	1.32		2.13	1.04		0.00	0.00		0.00	1.29		3.65	200	0.36	20.5	0.63	40.00	15.50	0.54	1.50
Flameflower St.		EX217	EX215				0.05	0	114	1.83	3.58	1.32		2.13	1.04		0.00	0.00		0.00	1.31		3.67	200	2.00	48.4	1.49	34.50	44.72	0.54	1.50
Flameflower St.	Stantec (2015)	EX216	EX215		5		0.19	14	14	0.19	3.72	0.17		0.00	0.00		0.00	0.00		0.00	0.06		0.23	200	0.65	27.6	0.85	45.20	27.35	0.00	1.00
Flameflower St.		EX215	EX214		15		0.34	41	169	2.36	3.54	1.94		2.13	1.04		0.00	0.00		0.00	1.48		4.46	200	2.00	48.4	1.49	72.00	43.93	0.47	1.50
Flameflower St.		EX214	EX203		15		0.35	41	210	2.71	3.51	2.39		2.13	1.04		0.00	0.00		0.00	1.60		5.02	200	2.00	48.4	1.49	73.50	43.37	0.44	1.50
Devario Cres.		EX204	EX203				0.54	62	62	0.54	3.64	0.73		0.00	0.00		0.00	0.00	3.10	3.10	1.20		1.93	200	1.50	41.9	1.29	36.50	39.97	0.00	1.00
Devario Cres.		EX208	EX203				2.50	187	187	2.50	3.53	2.14		0.00	0.00		0.00	0.00		0.00	0.83		2.96	200	0.40	21.6	0.67	120.00	18.68	0.00	1.00
Flameflower St.		EX203	EX201				0.12	0	459	5.87	3.39	5.05		2.13	0.69		0.00	0.00		3.10	3.66		9.40	200	0.40	21.6	0.67	73.70	12.24	0.19	1.00
Dundonald Dr.		EX202	EX201	4			0.53	14	14	0.53	3.72	0.17		0.00	0.00		0.00	0.00		0.00	0.17		0.34	200	3.25	61.7	1.90	50.00	61.34	0.00	1.00
Dundonald Dr.		EX201	EX129A	3			0.21	10	483	6.61	3.39	5.30		2.13	0.69		0.00	0.00		3.10	3.91		9.90	200	0.40	21.6	0.67	47.80	11.74	0.18	1.00
Dundonald Dr.		EX129A	EX129	18			0.75	61	544	7.36	3.36	5.93		2.13	0.69		0.00	0.00		3.10	4.15		10.78	200	0.40	21.6	0.67	100.90	10.86	0.17	1.00
Dundonald Dr.		EX129	EX128	11			0.58	37	581	7.94	3.35	6.31		2.13	0.69		0.00	0.00		3.10	4.35		11.35	200	0.40	21.6	0.67	91.70	10.29	0.16	1.00
Lamprey St.		EX130	EX128				1.16	85	85	1.16	3.61	0.99		0.00	0.00		0.00	0.00	0.40	0.40	0.51		1.51	200	0.50	24.2	0.75	96.50	22.69	0.00	1.00
Dundonald Dr.		EX128	EX127	9			0.37	31	697	9.47	3.32	7.49		2.13	0.69		0.00	0.00		3.50	4.98		13.16	200	0.50	24.2	0.75	49.80	11.03	0.14	1.00
Dundonald Dr.		EX127	MH126	13			0.66	44	741	10.13	3.30	7.93		2.13	0.69		0.00	0.00		3.50	5.20		13.83	200	0.32	19.4	0.60	97.80	5.53	0.14	1.00
Dundonald Dr.		EX23	MH126				1.06	71	71	1.06	3.63	0.83		0.00	0.00		0.00	0.00		0.00	0.35		1.18	200	1.47	41.5	1.28	89.30	40.30	0.00	1.00
School		EX123A	EX123				0.00	0	0	0.00	3.80	0.00		0.00	0.00	2.06	2.06	1.00		0.00	0.68		1.68	250	0.89	58.5	1.16	15.80	56.85	1.00	1.50
River Mist. Dr.		MH126	EX123		5		0.29	14	2112	32.31	3.05	20.90		2.13	1.04		8.03	3.90		4.41	15.47		41.31	375	0.45	122.7	1.08	122.00	81.39	0.22	1.50
River Mist. Rd.		EX123	MH112		7		0.34	19	2131	32.65	3.05	21.07		2.13	1.04		10.09	4.90		4.41	16.26		43.28	375	0.42	118.5	1.04	90.30	75.26	0.25	1.50
White Arctic Ave.		EX111	MH112				3.39	378	378	3.39	3.43	4.20		0.00	0.00		0.00	0.00		0.00	1.12		5.32	200	0.32	19.4	0.60	74.80	14.04	0.00	1.00

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 26610

BARRHAVEN SOUTH SANITARY SEWER DESIGN SHEET

Designed by: AT
Checked by:HM

Date: May 2018

PROPOSED AND BSUEA DESIGN PARAMETERS					
Single Family	3.4	pers/unit	q =	280	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.330	L/s/ha
Apt Units	1.8	pers/unit	Inst./Comm. =	28000	L/ha/day
Manning's Coeff. N =	0.013		Commerial PF*=	1.0/1.5	

*1.5 if ICI in contributing area is >20%, 1.0 if ICI in contributing area is <20%

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Legend
- Proposed
- Proposed by Others
- Existing

STREET	SOURCE	M.H. #		RESIDENTIAL								COMMERCIAL			INSTITUTIONAL			GREEN/UNUSED																ICI*
				NUMBER OF UNITS			AREA	POPULATION	CUMULATIVE		PEAKING	POPUL.	AREA	CUMM.	INST.	AREA	CUMM.	INST.	AREA	CUMM.	PEAK EXTR.	PLUG	PEAK DES.	SEWER DATA					RESIDUAL		ICI/	Peaking
		FROM	TO	SING.	MULT.	APT.	TOTAL ha	TOTAL peop.	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	ha	AREA ha	FLOW l/s	ha	AREA ha	FLOW l/s	ha	AREA ha	FLOW l/s	FLOW l/s	FLOW l/s	DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CAP. l/s	TOTAL	Factor
River Mist. Rd.		MH112	EX102				0.14	0	2509	36.18	3.01	24.44		2.13	1.04		10.09	4.90		4.41	17.43		47.81	375	0.31	101.8	0.89	68.00	54.03	0.23	1.50
Dutchmans Way		EX103	EX102	18			0.80	61	61	0.80	3.64	0.72		0.00	0.00		0.00	0.00		0.00	0.26		0.98	200	2.02	48.6	1.50	120.00	47.65	0.00	1.00
Song Sparrow St.		EX104	EX102				3.83	386	386	3.83	3.42	4.28		0.00	0.00		0.00	0.00		0.00	1.26		5.55	200	0.44	22.7	0.70	114.60	17.15	0.00	1.00
River Mist Road	Stantec (2015)	EX102	EX101				0.07	0	2956	40.88	2.96	28.34		2.13	1.04		10.09	4.90		4.41	18.98		53.26	375	0.29	98.5	0.86	34.00	45.24	0.21	1.50
	Stantec (2014)	EX101	MH43A				0.00	0	2956	40.88	2.96	28.34		2.13	1.04		10.09	4.90		4.41	18.98		53.26	375	0.30	100.2	0.88	38.00	46.93	0.21	1.50
		MH43A	MH44A				6.56	352	3308	47.44	2.92	31.35		2.13	0.69		10.09	3.27		4.41	21.14		56.46	375	0.30	100.2	0.88	81.00	43.73	0.19	1.00
		MH44A	MH45A				0.00	0	3308	47.44	2.92	31.35		2.13	0.69		10.09	3.27		4.41	21.14		56.46	375	0.30	100.2	0.88	64.00	43.73	0.19	1.00
		MH45A	MH46A				0.00	0	3308	47.44	2.92	31.35		2.13	0.69		10.09	3.27		4.41	21.14		56.46	375	0.30	100.2	0.88	85.00	43.73	0.19	1.00
		MH46A	MH47A				8.40	562	3870	55.84	2.88	36.08		2.13	0.69		10.09	3.27	1.60	6.01	24.44		64.48	375	0.30	100.2	0.88	41.00	35.70	0.16	1.00
		MH47A	MH101A				0.00	0	3870	55.84	2.88	36.08		2.13	0.69		10.09	3.27		6.01	24.44		64.48	375	0.30	100.2	0.88	64.00	35.70	0.16	1.00
		MH101A	MH102A				0.00	0	3870	55.84	2.88	36.08		2.13	0.69		10.09	3.27		6.01	24.44		64.48	375	0.30	100.2	0.88	64.00	35.70	0.16	1.00
River Mist Road	Stantec (2014)	MH102A	MH17A				5.24	420	4290	61.08	2.84	39.55		2.13	0.69		10.09	3.27		6.01	26.17		69.68	375	0.30	100.2	0.88	81.00	30.50	0.15	1.00
CAMBRIAN RD. FROM MH17A TO MH45A							61.08	4290																									
Cambrian Rd.	Stantec (2014)	MH17A	MH21A				26.01	1956	15192	190.15	2.77	136.51		6.81	2.21	2.96	33.24	10.77	5.10	28.63	75.97		225.45	750	0.13	419.5	0.92	204.30	194.05	0.15	1.00
Cambrian Rd.	Stantec (2014)	MH21A	MH45				7.04	408	15600	197.19	2.76	139.59		6.81	2.21		33.24	10.77	0.00	28.63	78.29		230.86	750	0.13	419.5	0.92	277.80	188.64	0.15	1.00
MINTO LANDS WITHIN BSUEA OUTLETS TO 120 (QUINN'S POINTE) EXISTING GREENBANK RD.							197.19																										
Future Collector		514	516				3.49	223	223	3.49	3.50	2.53		0.00	0.00	0.00	0.00	0.00		0.00	1.15		3.68	200	0.35	20.2	0.62	127.90	16.56	0.00	1.00
Future Collector		516	554				3.18	181	404	6.67	3.42	4.47		0.00	0.00	0.00	0.00	0.00		0.00	2.20		6.67	200	0.35	20.2	0.62	170.90	13.57	0.00	1.00
Future Collector																0.00																	
Future Collector		500	502			120	7.68	485	485	7.68	3.38	5.32		0.00	0.00	0.00	0.00	0.00		0.00	2.53	0.10	7.95	200	0.35	20.2	0.62	174.00	11.41	0.00	1.00
Future Collector		502	551				1.55	99	584	9.23	3.35	6.34		0.00	0.00	0.00	0.00	0.00		0.00	3.05	0.10	9.49	200	0.88	32.1	0.99	171.30	20.22	0.00	1.00
East-West Collector		550	551				1.98	67	67	1.98	3.63	0.79		0.00	0.00	0.00	0.00	0.00		0.00	0.65		1.44	200	0.35	20.2	0.62	99.90	18.73	0.00	1.00
East-West Collector		551	552				1.49	95	746	12.70	3.30	7.98		0.00	0.00	0.00	0.00	0.00		0.00	4.19	0.10	12.28	200	0.35	20.2	0.62	175.00	7.97	0.00	1.00
East-West Collector		552	554				3.36	79	825	16.06	3.28	8.77		0.00	0.00	0.00	0.00	0.00		0.00	5.30	0.10	14.17	200	0.35	20.2	0.62	178.30	3.37	0.00	1.00
East-West Collector		554	556				1.81	116	1345	24.54	3.17	13.82		0.00	0.00	0.00	0.00	0.00		0.00	8.10	0.10	22.02	250	0.33	35.6	0.70	295.60	9.15	0.00	1.00
Future Collector		517	564				2.07	132	132	2.07	3.57	1.53		0.00	0.00	0.00	0.00	0.00		0.00	0.68		2.21	200	0.59	26.3	0.81	280.00	24.06	0.00	1.00
Alex Polowin Ave.		13	14	5	0		0.54	32	32	0.54	3.68	0.38		0.00	0.00	0.00	0.00	0.00		0.00	0.18		0.56	200	0.67	28.0	0.86	74.56	27.46	0.00	1.00
Alex Polowin Ave.		14	90	7	0		0.65	36	68	1.19	3.63	0.80		0.00	0.00	0.00	0.00	0.00		0.00	0.39		1.19	200	0.94	33.1	1.02	112.06	31.93	0.00	1.00
Alex Polowin Ave.		90	5	6	0		0.54	30	98	1.73	3.60	1.14		0.00	0.00	0.00	0.00	0.00		0.00	0.57		1.71	200	0.35	20.3	0.63	108.16	18.57	0.00	1.00
River Mist Road		5	563	0			0.00	0	98	1.73	3.60	1.14		0.00	0.00	0.00	0.00	0.00		0.00	0.57		1.71	200	0.42	22.2	0.68	80.00	20.46	0.00	1.00
River Mist Road		563	564	0			0.47	30	128	2.20	3.57	1.48		0.00	0.00	0.00	0.00	0.00		0.00	0.73		2.21	200	0.42	22.2	0.68	50.00	19.97	0.00	1.00
River Mist Road		564	556				0.62	40	300	4.89	3.46	3.37		0.00	0.00		0.00	0.00		0.00	1.61		4.98	200	0.35	20.2	0.62	95.00	15.26	0.00	1.00
East-West Collector		556	557						1645	29.43	3.12	16.63		0.00	0.00	2.12	2.12	0.69		0.00	10.41	0.10	27.83	300	1.39	118.9	1.63	44.30	84.53	0.07	1.00
East-West Collector		557	558				0.68	43	1688	30.11	3.11	17.03		0.00	0.00	3.12	5.24	1.70		0.00	11.67	4.00	34.50	300	1.39	118.9	1.63	158.40	80.38	0.15	1.00
Future Collector		560	558				2.73	175	175	2.73	3.53	2.00		0.00	0.00		0.00	0.00		0.00	0.90		2.91	200	0.35	20.2	0.62	150.00	17.34	0.00	1.00
East-West Collector		558	119				5.74	20	1883	38.58	3.08	18.82		0.00	0.00		5.24	1.70		0.00	14.46	4.10	39.08	450	0.13	107.2	0.65	150.00	63.75	0.12	1.00
Future Collector		521	522				2.17	139	139	2.17	3.56	1.60		0.00	0.00		0.00	0.00		0.00	0.72		2.32	200	1.26	38.4	1.18	230.00	36.10	0.00	1.00
		522	523						139	2.17	3.56	1.60		0.00	0.00		0.00	0.00		0.00	0.72		2.32								
		523	524				1.95	125	264	4.12	3.48	2.98		0.00	0.00		0.00	0.00		0.00	1.36		4.34							0.00	1.00
Future Collector		520	524				2.06	132	132	2.06	3.57	1.53		0.00	0.00		0.00	0.00		0.00	0.68		2.21	200	0.26	17.4	0.54	72.20	15.24	0.00	1.00
Future Collector		524	578				0.00	0	396	6.18	3.42	4.39		0.00	0.00		0.00	0.00		0.00	2.04		6.43	300	0.20	45.1	0.62	200.90	38.69	0.00	1.00
Future Collector		578	532				3.63	164	560	9.81	3.36	6.10		0.00	0.00		0.00	0.00		0.00	3.24		9.33	300	0.20	45.1	0.62	173.70	35.78	0.00	1.00
Future Collector		532	534				3.29	210	770	13.10	3.30	8.23		0.00	0.00		0.00	0.00		0.00	4.32		12.55	300	0.20	45.1	0.62	127.45	32.57	0.00	1.00
Future Collector		534	536				2.95	189	959	16.05	3.25	10.10		0.00	0.00		0.00	0.00		0.00	5.30		15.39	450	0.20	133.0	0.81	173.27	117.62	0.00	1.00
Future Collector		536	538				0.00	0	959	16.05	3.25	10.10		0.00	0.00	0.00	0.00	0.00		0.00	5.30		15.39	450	0.20	133.0	0.81	309.73	117.62	0.00	1.00
		538	119	0			0.00	0	959	16.05	3.25	10.10		0.00	0.00		0.00	0.00		0.00	5.30		15.39	525	0.15	173.8	0.78	245.34	158.37	0.00	1.00
Greenbank Rd.		119	EX120					0	2842	54.63	2.97	27.35		0.00	0.00		5.24	1.70		0.00	19.76		52.91	600	0.15	248.1	0.85	168.66	187.53	0.09	1.00
QUINN'S POINTE OUTLETS TO MH205A EXISTING GREENBANK RD.							54.63		2842																								
Greenbank Road		EX120	EX121				0.22	0	2842	54.85	2.97	27.35		0.00	0.00	0.00	5.24	1.70		0.00	19.83		52.98	600	0.16	259.0	0.89	58.09	206.06	0.09	1.00
Greenbank Road		EX121	EX122				0.28	0	3225	61.68	2.93	30.65		0.00	0.00	0.00	6.81	2.21		0.00	22.60		59.55	600	0.33	369.2	1.27	75.27	309.66	0.10	1.00

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 26610

BARRHAVEN SOUTH SANITARY SEWER DESIGN SHEET

Designed by: AT
Checked by:HM

PROPOSED AND BSUEA DESIGN PARAMETERS					
Single Family	3.4	pers/unit	q =	280	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.330	L/s/ha
Apt Units	1.8	pers/unit	Inst./Comm. =	28000	L/ha/day
Manning's Coeff. N =	0.013		Commerial PF*=	1.0/1.5	

*1.5 if ICI in contributing area is >20%, 1.0 if ICI in contributing area is <20%

Sources:
- Half Moon Bay South Subdivision - Phase 4 - Excluding Arterials- Sanitary sewer design sheet prepared by Stantec (2015)
- Quinn's Pointe - Excluding Arterials-Sanitary sewer design sheet prepared by J.L Richards (2015)
- Barrhaven South Master Servicing Study Addendum - Sanitary sewer design sheet prepared Stantec (2014)

Legend
- Proposed
- Proposed by Others
- Existing

Date: May 2018

STREET	SOURCE	M.H. # FROM	M.H. # TO	RESIDENTIAL NUMBER OF UNITS SING.	MULT.	APT.	RESIDENTIAL AREA TOTAL ha	RESIDENTIAL POPULATION TOTAL peop.	RESIDENTIAL CUMULATIVE POPUL. peop.	RESIDENTIAL CUMULATIVE AREA ha	PEAKING FACTOR	POPUL. FLOW l/s	COMMERCIAL AREA ha	COMMERCIAL CUMM. AREA ha	COMMERCIAL INST. FLOW l/s	INSTITUTIONAL AREA ha	INSTITUTIONAL CUMM. AREA ha	INSTITUTIONAL INST. FLOW l/s	GREEN/UNUSED AREA ha	GREEN/UNUSED CUMM. AREA ha	PEAK EXTR. FLOW l/s	PLUG FLOW l/s	PEAK DES. FLOW l/s	SEWER DATA DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	RESIDUAL CAP. l/s	ICI/ TOTAL	ICI* Peaking Factor
Greenbank Road		EX122	EX123R				0.45	0	3225	62.13	2.93	30.65		0.00	0.00	0.00	6.81	2.21		0.00	22.75		59.70	600	0.21	291.1	1.00	121.02	231.39	0.10	1.00
Easement		EX44	EX123R				0.00	0	259	2.62	3.48	2.93		0.00	0.00	0.00	0.00	0.00		0.00	0.86		3.79	300	0.35	59.9	0.82	19.00	56.12	0.00	1.00
Greenbank Road		EX123R	MH205A				0.43	0	3484	65.18	2.91	32.85		0.00	0.00	0.00	6.81	2.21		0.00	23.76		62.91	600	0.25	319.2	1.09	120.80	256.31	0.09	1.00
Kilbirnie Drive	JLR (2016)	EX24	MH205A		3		0.11	8	224	2.15	3.50	2.54		0.00	0.00	0.00	0.00	0.00		0.00	0.71		3.25	200	0.71	28.8	0.89	28.70	25.59	0.00	1.00
Existing Greenbank Road		MH205A	EX98A					0	3708	67.33	2.89	34.73		0.00	0.00	0.00	6.81	2.21		0.00	24.47		70.50	600	0.25	320.3	1.10	126.00	249.78	0.09	1.00
EXISTING GREENBANK RD. FROM MH 98A TO MH45A							6.15	484																							
Existing Greenbank Road	IBI	EX98A	MH99A				0.00	0	3708	67.33	2.89	34.73		0.00	0.00		6.81	2.21		0.00	24.47		70.50	600	0.25	320.3		125.00	249.78	0.09	1.00
Existing Greenbank Road	IBI	MH99A	MH100A				0.00	0	3708	67.33	2.89	34.73		0.00	0.00		6.81	2.21		0.00	24.47		70.50	600	0.25	320.3		108.00	249.78	0.09	1.00
Existing Greenbank Road	IBI	MH100A	MH204A				0.00	0	3708	67.33	2.89	34.73		0.00	0.00		6.81	2.21		0.00	24.47		70.50	600	0.25	320.3		105.00	249.78	0.09	1.00
Existing Greenbank Road	IBI	MH204A	MH206A				0.00	0	3708	67.33	2.89	34.73		0.00	0.00		6.81	2.21		0.00	24.47		70.50	600	0.25	320.3		103.00	249.78	0.09	1.00
Existing Greenbank Road	IBI	MH206A	MH97A				0.00	0	3708	67.33	2.89	34.73		0.00	0.00		6.81	2.21		0.00	24.47		70.50	600	0.25	320.3		125.00	249.78	0.09	1.00
Existing Greenbank Road	IBI	MH97A	MH96A				19.95	1631	5339	87.28	2.77	48.01		0.00	0.00		6.81	2.21	0.81	0.81	31.32		90.63	600	0.30	350.8		98.00	260.21	0.07	1.00
Existing Greenbank Road	IBI	MH96A	MH95A				0.00	0	5339	87.28	2.77	48.01		0.00	0.00		6.81	2.21		0.81	31.32		90.63	600	0.30	350.8		129.00	260.21	0.07	1.00
Existing Greenbank Road	IBI	MH95A	MH201A				0.00	0	5339	87.28	2.77	48.01		0.00	0.00		6.81	2.21		0.81	31.32		90.63	600	0.30	350.8		123.00	260.21	0.07	1.00
Existing Greenbank Road	IBI	MH201A	MH201B				12.13	787	6126	99.41	2.73	54.19		0.00	0.00		6.81	2.21		0.81	35.32		100.82	600	0.30	350.8		124.00	250.03	0.06	1.00
Existing Greenbank Road	IBI	MH201B	MH200A				0.00	0	6126	99.41	2.73	54.19		0.00	0.00		6.81	2.21		0.81	35.32		100.82	600	0.30	350.8		68.00	250.03	0.06	1.00
Existing Greenbank Road	IBI	MH200A	MH200C				0.00	0	6126	99.41	2.73	54.19		0.00	0.00		6.81	2.21		0.81	35.32		100.82	600	0.50	452.9		48.00	352.12	0.06	1.00
Existing Greenbank Road	IBI	MH200C	MH45				0.00	0	6126	99.41	2.73	54.19		0.00	0.00		6.81	2.21		0.81	35.32		100.82	600	0.12	221.9		26.00	121.08	0.06	1.00
Existing Greenbank Road	Stantec (2014)	MH45	MH435A				5.12	548	22274	301.72	2.28	164.90		6.81	2.21		40.05	12.98	0.00	29.44	124.75		313.94	900	0.10	597.2		296.00	283.29	0.12	1.00
North																															
		MA9	MA8				22.23	2378	2378	22.23	3.02	23.28	0.00	0.00	0.00	2.45	2.45	0.79	9.54	9.54	11.29		35.37	450	0.11	98.4		507.50	63.03	0.07	1.00
		MA8	MA7				2.88	308	2686	25.11	2.99	25.99	0.00	0.00	0.00	0.00	2.45	0.79	0.78	10.32	12.50		39.29	450	0.11	98.4		317.10	59.11	0.06	1.00
		MA7	MA6				18.50	1979	4665	43.61	2.82	42.61	0.00	0.00	0.00	0.00	2.45	0.79	0.00	10.32	18.61		62.01	450	0.11	98.4		573.10	36.39	0.04	1.00
Realigned Greenbank Road		MA6	MA5				21.68	2320	6985	65.29	2.69	60.80	0.00	0.00	0.00	0.00	2.45	0.79	0.00	10.32	25.76		87.36	525	0.10	140.5		473.90	53.14	0.03	1.00
Realigned Greenbank Road		MA5	MA4				9.53	1020	8005	74.82	2.64	68.49	0.00	0.00	0.00	0.00	2.45	0.79	0.00	10.32	28.90		98.19	525	0.10	140.5		439.40	42.31	0.03	1.00
Realigned Greenbank Road		MA4	MH521A				8.07	863	8868	82.89	2.61	74.87	0.00	0.00	0.00	0.00	2.45	0.79	2.42	12.74	32.37		108.03	525	0.10	140.5		530.70	32.47	0.02	1.00
		MH521A	MH522A				3.80	231	9099	86.69	2.60	76.56	0.00	0.00	0.00	0.00	2.45	0.79	0.02	12.76	33.63		110.98	600	0.10	201.5		49.90	90.52	0.02	1.00
		MH522A	MH435A				0.00	0	9099	86.69	2.60	76.56	0.00	0.00	0.00	0.00	2.45	0.79	0.00	12.76	33.63		110.98	600	0.10	201.5		11.10	90.52	0.02	1.00
		MH435A	MH501A				0.00	0	31373	388.41	2.17	220.28	0.00	6.81	2.21	0.00	42.50	13.77	0.00	42.20	158.37		403.73	900	0.10	597.0		13.30	193.27	0.10	1.00

LEGEND

- SITE BOUNDARY
- SANITARY TRUNK (AS PER BSUEA MSS - JLR, MAY 2018)
- SANITARY DRAINAGE AREA (2.0Ha / 0.000108)
- SANITARY TRIBUTARY BOUNDARY
- UNIT FLOW VALUE (m3/s/ha)
- SANITARY TRUNK
- PROPOSED SANITARY MANHOLE
- SANITARY SYSTEM FLOW DIRECTION
- SANITARY SEWER COVER (4.70m)
- PROPOSED SANITARY MANHOLE TOP OF GRADE (92.44TG)
- PROPOSED SANITARY OBVERT (87.740BV)
- SANITARY DRAINAGE AREA (8.4Ha)
- POPULATION PER HECTARE (70)
- TOTAL POPULATION (588)

HIGHWAY 416

BORRISOKANE

URBAN BOUNDARY

NEW GREENBANK ROAD

SWM POND 1
PP 97.55
EXT DET 97.85
MAX W/L 98.35

Park
1.64ha

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

CAIVAN - BRAZEAU
SANITARY SERVICING PLAN
CITY OF OTTAWA

PROJECT No. :	18-1030
SCALE:	1:2,000
DATE:	DECEMBER 2018
DRAWING No.	3

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

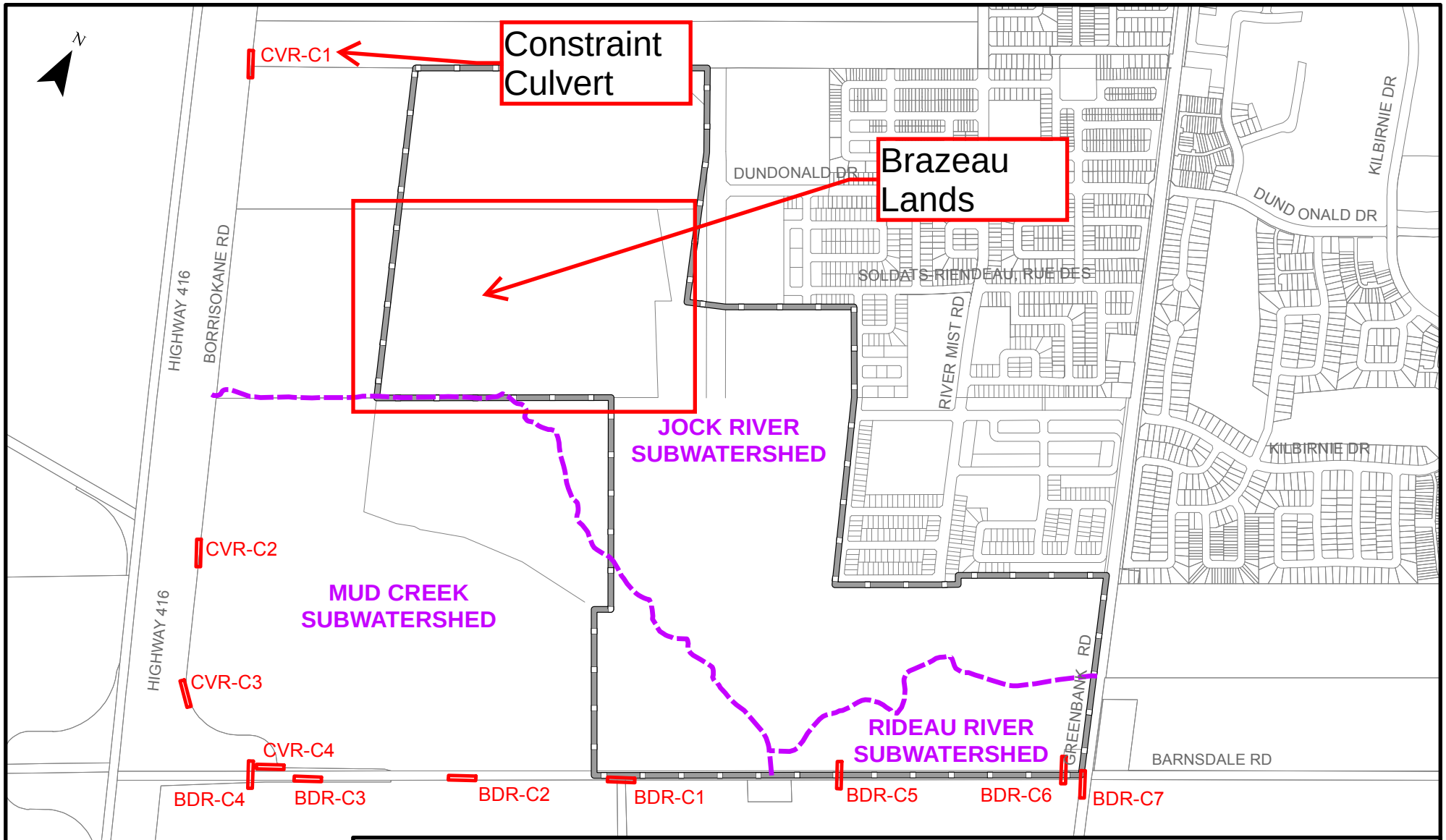
LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION							PIPE				
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (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)
Unknown Road5 - 05																												
		20.30		958	20.30	958				0.00		0.00		0.00			20.30	20.30		0.02								
	211A	212A				20.30	958	3.0	9.47		0.00		0.00		0.00	0.00	0.00	20.30	6.70	16.18	36.3	250	0.65	47.96	0.34	0.98	0.88
	212A	215A	1.25		107	21.55	1065	3.0	10.44		0.00		0.00		0.00	0.00	1.25	21.55	7.11	17.57	72.8	300	0.20	43.26	0.41	0.61	0.58
	215A	222A	2.83		241	24.38	1306	3.0	12.60		0.00		0.00		0.00	0.00	2.83	24.38	8.05	20.67	72.8	450	0.12	98.78	0.21	0.62	0.49
To Unknown Road1 - 01, Pipe 222A - 223A						24.38	1306				0.00		0.00		0.00			24.38		0.02								
Unknown Road1 - 01																												
Contribution From Unknown Road5 - 05, Pipe 215A - 222A						24.38	1306				0.00		0.00		0.00		24.38	24.38		0.02								
	222A	223A	5.34		453	29.72	1759	2.9	16.55		0.00		0.00	1.64	1.64	0.18	6.98	31.36	10.35	27.09	74.3	525	0.10	136.02	0.20	0.63	0.49
	223A	229A	0.51		43	30.23	1802	2.9	16.91		0.00		0.00		1.64	0.18	0.51	31.87	10.52	27.63	74.3	525	0.10	136.02	0.20	0.63	0.49
	229A	256A	2.09		179	32.32	1981	2.9	18.43		0.00		0.00		1.64	0.18	2.09	33.96	11.21	29.83	72.8	525	0.10	136.02	0.22	0.63	0.50
To Unknown Road8 - 08, Pipe 256A - 259A						32.32	1981				0.00		0.00		1.64			33.96		0.02								
Unknown Road3 - 03																												
	237A	240A	1.25		106	1.25	106	3.4	1.16		0.00		0.00		0.00	0.00	1.25	1.25	0.41	1.58	72.8	250	0.25	29.73	0.05	0.61	0.32
	240A	241A	1.06		90	2.31	196	3.3	2.11		0.00		0.00		0.00	0.00	1.06	2.31	0.76	2.87	72.8	300	0.20	43.25	0.07	0.61	0.34
To Unknown Road8 - 08, Pipe 241A - 256A						2.31	196				0.00		0.00		0.00			2.31										
Unknown Road8 - 08																												
Contribution From Unknown Road3 - 03, Pipe 240A - 241A						2.31	196				0.00		0.00		0.00		2.31	2.31										
		0.16		14	2.47	210				0.00		0.00		0.00			0.16	2.47										
	241A	256A	2.01		171	4.48	381	3.2	3.98		0.00		0.00		0.00	0.00	2.01	4.48	1.48	5.46	72.8	375	0.15	67.91	0.08	0.61	0.37
Contribution From Unknown Road1 - 01, Pipe 229A - 256A						32.32	1981				0.00		0.00		1.64		33.96	38.44		0.02								
		1.79		179	38.59	2541				0.00		0.00		0.00			1.79	40.23										
	256A	259A	4.97		495	43.56	3036	2.8	27.06		0.00		0.00		1.64	0.18	4.97	45.20	14.92	42.17	72.8	525	0.10	136.02	0.31	0.63	0.55
	259A	260A	1.22		122	44.78	3158	2.7	28.03		0.00		0.00		1.64	0.18	1.22	46.42	15.32	43.54	64.9	525	0.10	136.02	0.32	0.63	0.56
	260A	261A				44.78	3158	2.7	28.03		0.00		0.00		1.64	0.18	0.00	46.42	15.32	43.54	11.2	525	0.10	136.02	0.32	0.63	0.56
	261A	262A	0.70		70	45.48	3228	2.7	28.58		0.00		0.00		1.64	0.18	0.70	47.12	15.55	44.33	69.1	525	0.10	136.02	0.33	0.63	0.56
	262A	263A	0.45		45	45.93	3273	2.7	28.94		0.00		0.00		1.64	0.18	0.45	47.57	15.70	44.83	68.8	525	0.10	136.02	0.33	0.63	0.56
To Unknown Road14 - 13, Pipe 263A - 264A						45.93	3273				0.00		0.00		1.64			47.57		0.02								
Unknown Road14 - 13																												
Contribution From Unknown Road8 - 08, Pipe 262A - 263A						45.93	3273				0.00		0.00		1.64		47.57	47.57		0.02								
	263A	264A	0.24		24	46.17	3297	2.7	29.12		0.00		0.00		1.64	0.18	0.24	47.81	15.78	45.10	46.0	525	0.10	136.02	0.33	0.63	0.56
	264A	267A	0.22		22	46.39	3319	2.7	29.30		0.00		0.00		1.64	0.18	0.22	48.03	15.85	45.34	44.2	525	0.10	136.02	0.33	0.63	0.56
To Unknown Road11 - 1001, Pipe 267A - 269A						46.39	3319				0.00		0.00		1.64			48.03		0.02								
Unknown Road11 - 1001																												
Contribution From Unknown Road14 - 13, Pipe 264A - 267A						46.39	3319				0.00		0.00		1.64		48.03	48.03		0.02								
	267A	SAN MH900	0.38		38	46.77	3357	2.7	29.60		0.00		0.00		1.64	0.18	0.38	48.41	15.98	45.76	28.5	525	0.10	136.02	0.34	0.63	0.56

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 =	1.00				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed:	PROJECT:		
Checked:	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No.	File Ref:	Date: **17 Dec 2018**	Sheet No. 1 of 1

APPENDIX D



Legend

- Culvert
- Subwatershed Limits
- **Study Area**

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA
OTTAWA, ONTARIO

DRAWING:

BSUEA EXTENTS, DRAINAGE DIVIDE AND CULVERTS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN:	BP
DRAWN:	KTK
CHECKED:	GF
JLR #:	26610

DRAWING #:

FIGURE 3-1

File Location: R:\26000\26610 - Barrhaven Expansion - Minto Brazeau Mattamy\JLR DWG\GIS\26610 C BSUEA EXTENTS.mxd

Plot Date: September 12, 2017 8:45:23 AM

Table 5-1: Inventory of Model Boundary Water Crossings

Culvert ID	Location	Type	Size (mm)
CR-C1	On Cambrian Road, 910 m east of Borrisokane Road, carries Clarke West Municipal Drain	Circ. CSP	1650
CR-C2	On Cambrian Road at Borrisokane Road	Circ. CSP	N/A
BDR-C4	On Barnsdale Road, 50 m west of Borrisokane Road	Circ. CSP	1200
BDR-C5	On Barnsdale Road, 500 m west of the existing Greenbank Road	Circ. CSP	500
BDR-C6	On Barnsdale Road, 60 m west of the existing Greenbank Road	Circ. CSP	400

It should be noted that culvert CR-C2 was not included as part of the topographical survey and size is currently unknown.

The 2014 Barrhaven South Master Servicing Study Draft Addendum (Draft 2014 BSMSSA) prepared by Stantec, notes that water crossing CR-C1 is to be replaced with storm sewers when the Clarke West Municipal Drain is enclosed as part of the adjacent development and the Clarke Stormwater Management Facility is constructed. The Draft 2014 BSMSSA also indicated that culvert CR-C2 is to be maintained, and will accommodate flows from the existing catchment area south of Cambrian Road up to the 1:100 year event. Should future development occur south of the woodlot draining to CR-C2, grading and servicing from the future development area in the vicinity of the woodlot should be developed to maximize overland sheet flow drainage (not channelized) towards the woodlot.

Table 5-2: Inventory of Model Water Crossings (Internal)

Culvert ID	Location	Type	Size (mm)
CVR-C1	East of Borrisokane Road along the north corner of the BSUEA	Circ. CSP	500
CVR-C2	East of Borrisokane Road at Field Entrance	Circ. CSP	450
CVR-C3	East of Borrisokane Road at Field Entrance	Circ. CSP	400
CVR-C4	Borrisokane Road Crossing north of Barnsdale Road	Circ. CSP	1200
BDR-C1	Viewbank Road Crossing	Circ. CSP	400
BDR-C2	Field Entrance Crossing South of Barnsdale Road	Circ. CSP	400
BDR-C3	Field Entrance Crossing South of Barnsdale Road	Circ. CSP	500
BDR-C7	Barnsdale Road Crossing close to the existing Greenbank Road Intersection	Circ. CSP	500

Table 5-2, above, summarizes the various culvert crossings within the BSUEA. As shown above, all the culverts are 500 mm in diameter or less with the exception of CVR-C4, which is 1200 mm in diameter.

B5.5.1 Storm Distribution

The hydrological response of the BSUEA and abutting lands was simulated under a 6 hour, 12 hour and 24 hour SCS Type II storm distribution. The SCS Type II storm distribution was developed by the American Soil Conservation Service and is generally used for estimating flows in rural areas. The critical storm event under pre-development conditions, with the highest peak runoff, was found to occur under the 12 hour SCS Type II storm distribution.

B5.6 Modeling Results

The pre-development SWMHYMO simulation results, predicting flows at each of the culverts for the critical storm event, are shown in Table 5-5, below. The estimated capacity and level of service of each culvert is also provided. The details of culvert CR-C2, crossing Cambrian Road at Borrisokane Road, could not be obtained in the field due to obstructions and/or structural failure. Hence, the capacity and level of service at this culvert could not be confirmed.

Table 5-5: Hydrological Simulation Results at Culvert Locations (12 hour SCS Type II storm)

Culvert ID	Flow (m^3/s) at culvert location for return period (recurrence)						Estimated Culvert Capacity (m^3/s)	Estimated Level of Service (years)
	1:2 yr	1:5 yr	1:10 yr	1:25 yr	1:50 yr	1:100 yr		
CR-C1	0.3	0.7	1.0	1.6	2.0	2.5	5.5	1:100
CR-C2	0.2	0.4	0.7	1.0	1.3	1.6	N/A	N/A
CVR-C1	0.1	0.3	0.5	0.8	1.0	1.3	0.4	1:5
CVR-C2	0.0	0.1	0.1	0.2	0.2	0.3	0.2	1:25
CVR-C3	0.0	0.1	0.2	0.2	0.3	0.4	0.3	1:50
CVR-C4	0.2	0.4	0.6	0.9	1.1	1.4	2.6	1:100
BDR-C1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	1:100
BDR-C2	0.0	0.1	0.1	0.1	0.2	0.2	0.2	1:50
BDR-C3	0.1	0.1	0.1	0.2	0.2	0.3	0.5	1:100
BDR-C4	0.2	0.4	0.6	0.9	1.2	1.5	2.6	1:100
BDR-C5	0.0	0.0	0.0	0.0	0.0	0.1	0.3	1:100
BDR-C6	0.0	0.0	0.1	0.1	0.2	0.2	0.2	1:100
BDR-C7	0.1	0.1	0.1	0.2	0.3	0.4	0.3	1:50
Total Flow to Thomas Baxter Municipal Drain	0.2	0.5	0.7	1.1	1.3	1.6	N/A	N/A

OUTLET TRUNK STORM SEWER TO JOCK RIVER
DISTANCE FROM MH205 TO JOCK RIVER 1:100 YR FLOOD PLAIN LIMIT IS APPROXIMATELY 815 M
INVERT AT MH205 = 93.42 M
INVERT AT JOCK RIVER 100 YR FLOOD PLAIN = APPROXIMATELY 92.0 M
OUTLET SEWER = 825 MM DIA. @ 0.17 %

CAMBRIAN RD
TO CLARK POND
TODD POND
OUTLET
FUTURE COLLECTOR RD
BORRISOKANE RD
HIGHWAY 416
TRAIL RD
RIVER MIST RD
EX GREENBANK RD
DUNDONALD DR
DES SOLDATS
RIENDEAU ST
FAMEFLOWER ST
KILBIRNIE DR
LAURALEAF CR.
BREAKSTONE RD
KNOCKADERRY CR.
ALEX PATTERSON AVE
NEW GREENBANK RD
BARNSDALE RD
DRUMMOND SWM POND
DRUMMOND AGGREGATE EXTRACTION AREA
BRAZEAU SWM POND
BRAZEAU AGGREGATE EXTRACTION AREA
SWM DRY POND
DRY SWM POND
PARK & RIDE
FRENCH PUBLIC ELEMENTARY SCHOOL
FRENCH CATHOLIC ELEMENTARY SCHOOL
NEIGHBOURHOOD PARK
COMMERCIAL
MEDIUM DENSITY
PARKETTE 1
PARKETTE 2
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
EAST WEST COLLECTOR
POND 1 (NORTH)
POND 2 (SOUTH)
SOUTH POND
710 HDS
825 HDS
SCHOOL
PARK

LEGEND

- PROPOSED STORM (EES SYSTEM), PER 2018 BSUEA MSS
- PROPOSED STORM (CONVENTIONAL), PER 2018 BSUEA MSS
- FUTURE STORM, PER 2014 BS MSS
- EXISTING STORM
- DRAINAGE BOUNDARY
- LIMIT OF STUDY AREA FOR BSUEA
- 710 HDS — HYDROLOGY DYNAMIC SEPARATOR
- AREA IN HECTARES* / RUNOFF COEFFICIENT* (5.48 | 0.64 | 318 - 364)
- PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE

* IF RED, AREAS DESIGNATED AS COMMERCIAL, SCHOOLS OR PARKS

NOTE:

ROADWAYS WITHIN A DRAINAGE AREA WHICH IS TRIBUTARY TO AN EES SEWER, ARE TO BE DESIGNED WITH EES SEWERS. CONVERSELY, ROADWAYS WITHIN A DRAINAGE AREA WHICH IS TRIBUTARY TO A CONVENTIONAL SEWER, ARE TO BE DESIGNED WITH CONVENTIONAL SEWERS.

No.	ISSUE / REVISION	DD/MM/YY
4	ISSUED FOR PLANNING COMMITTEE APPROVAL	04/05/18
3	ADDRESS COMMENTS, RE-ISSUE BSUEA MSS 2ND SUBMISSION	26/02/18
2	ISSUED AS PART OF DRAFT MSS	20/09/17
1	ISSUED FOR PRE-TAC WORKING MEETING	31/08/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:4000

CLIENT:

CONSULTANT: www.jlrichards.ca

J.L.Richards ENGINEERS · ARCHITECTS · PLANNERS

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER M. N. L. DALRYMPLE PROVINCE OF ONTARIO May 4/18

PROJECT NORTH

PROJECT:

BARRHAVEN SOUTH URBAN EXPANSION AREA (BSUEA)

-

DRAWING:

MASTER STORM DRAINAGE PLAN EES

DESIGN: JW
DRAWN: CJM
CHECKED: LD
JLR #: 26610

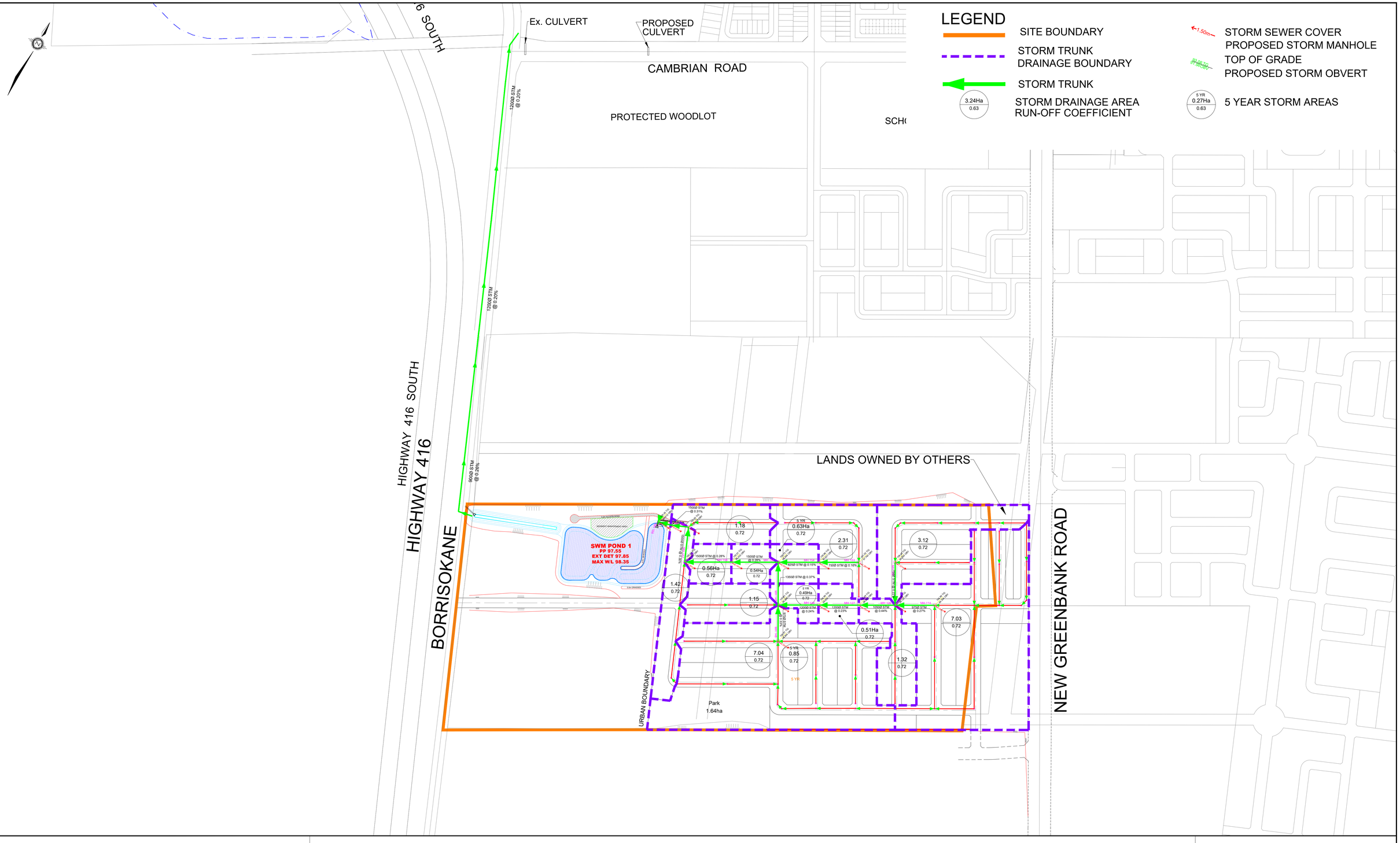
DRAWING #: MST-2

PLOT DATE: May 4, 2018 8:44:19 AM

File Location: n:\26000\26610 - barrhaven expansion - minto brazeau nattamy\JLR DWG\civil\26610 C-MST-2.dwg

ETOBICOKE EXFILTRATION SYSTEM STORM SEWERS

Maintenance Hole Number		SEWER DATA			Upstream	Downstream
		Dia	Slope	Length	Obvert	Obvert
FROM	TO	(mm)	(%)	(m)		
DI-1	170	900	1.05	56.1	107.04	106.45
170	172	900	1.05	186.5	106.45	104.47
172	174	1350	0.30	184.4	104.47	103.92
174	176	1350	0.30	156.7	103.92	103.45
176	152	1350	0.30	161.4	103.45	102.96
150	152	675	0.15	264.6	102.30	101.90
177	152	675	0.15	237.4	102.00	101.65
152	154	1500	0.35	175.8	101.45	100.82
154	156	1500	0.55	311.7	100.53	98.82
705 (ex.)	163	525	0.42	41.5	100.82	100.65
163	156	750	0.15	118.5	100.65	100.47
156	158	1500	0.55	202.6	97.86	96.74
158	159	1500	0.55	108.1	96.20	95.60
158	158A	1500	0.95	40.0	96.74	97.13
159	159A	1500	3.54	43.0	95.60	97.13
DI-2	300	900	1.05	121.1	105.68	104.39
300	302	900	0.35	168.1	104.39	103.81
302	304	900	0.94	162.6	102.02	100.49
304	321	1200	0.15	63.3	100.49	100.39
321	322	1200	0.15	88.2	100.39	100.28
322	323	1200	0.15	75.4	100.28	100.15
323	324	1200	0.35	140.8	100.15	99.82
320	324	825	0.15	139.2	99.83	99.62
324	330	1500	0.15	183.6	99.82	99.38
330	332	1500	0.15	144.2	99.38	99.16
332	334	1650	0.15	131.1	99.16	98.96
334	336	1650	0.15	173.3	98.96	98.70
336	337	1650	0.15	168.8	97.58	97.33
337	P2-N	1650	0.15	36.0	97.33	97.29
159	825HDS	1050	0.35	26.2	95.15	95.05
825HDS	822	1200	0.12	160.8	95.05	94.86
314	318	1050	0.15	170.2	101.68	101.43
316	318	1200	0.15	96.0	101.43	101.28
318	364	1200	0.58	266.2	101.28	99.62
364	362	1200	0.70	88.2	99.10	98.48
362	190	1200	0.70	177.7	97.78	96.54
351	190	600	0.67	134.4	95.83	94.93
754	190	1800	0.13	15.0	94.99	94.93
190	190A	1200	0.07	30.0	94.32	94.30
190A	190B	1200	0.09	52.7	94.30	94.25
190B	755	600	0.13	15.3	93.64	93.62
110	111	450	2.70	89.4	102.90	100.49
111	112	675	0.90	101.2	100.49	99.58
313	112	525	0.74	140.0	100.60	99.56
112	710	675	1.30	73.3	99.56	98.61
112	710	675	1.30	73.3	99.56	98.61
712	711	375	2.56	104.3	102.031	99.361
711	710	450	1.32	104.4	99.407	98.027
710	720	750	0.61	118.2	98.102	97.397
753	754	1800	0.11	54.9	95.008	94.949
754	755	1800	0.13	74.9	94.939	94.839
755	822	1800	0.13	79.5	94.84	94.74
EX.822	EX.821	1800	0.14	123.1	94.07	93.90
EX.821	EX.820	1800	0.15	121.9	93.90	93.71
EX.748	EX.747	600	0.20	83.1	95.95	95.79
EX.747	EX.745	600	0.99	12.1	95.72	95.60
EX.746	EX.744	600	0.20	69.4	95.58	95.44
EX.743	EX.744	450	1.31	81.4	95.92	94.92
EX.744	EX.820	675	0.32	12.4	93.75	93.70
EX.820	EX.102	1800	0.16	121.7	93.71	93.52
270	265	1500	0.15	100.0	99.40	99.30
265	260	1500	0.15	357.3	98.00	97.47
260	245	1500	0.15	227.8	97.47	97.12
250	245	1500	0.15	345.0	97.84	97.12
245	240	2100	0.15	84.9	97.12	97.00
240	Brazeau SWM Pond	2100	0.15	241.7	97.00	96.63
Brazeau SWM Pond	235	675	0.17	37.0	95.19	95.12
230	225	1500	0.15	450.0	97.56	96.99
225	215	1500	0.15	220.1	96.99	96.66
220	215	1500	0.15	408.7	97.27	96.66
215	Drummond SWM Pond	2100	0.15	350.0	96.66	96.13
Drummond SWM Pond	210	675	0.15	25.0	94.69	94.65
235	210	675	0.17	272.0	95.12	94.65
210	205	825	0.17	223.0	94.65	94.26
205	Flood Plain	825	0.17	617.0	94.26	92.94
900	227 (ex.)	975	0.15	120.0	97.83	97.75



DSEL
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CAIVAN - BRAZEAU
STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No. :	18-1030
SCALE:	1:3,000
DATE:	DECEMBER 2018
DRAWING No.	1

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)	FLOW (min.)	Q/Q full
Unknown Road8 - 08																																
					0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	13.40														
	122	126	3.12	0.72	6.24	6.24			0.00	0.00			0.00	0.00			0.00	0.00	13.40	65.82	89.11	104.38	152.47	411	750	750	CONC	0.22	78.8	522.17	1.18	1.11	0.79
To Unknown Road1 - 01, Pipe 126 - 127						6.24				0.00				0.00				0.00	14.51														
Unknown Road1 - 01																																
					0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	13.52														
	114	126	7.03	0.72	14.07	14.07			0.00	0.00			0.00	0.00			0.00	0.00	13.52	65.49	88.66	103.86	151.71	922	975	975	CONC	0.27	72.8	1164.49	1.56	0.78	0.79
Contribution From Unknown Road8 - 08, Pipe 122 - 126						6.24				0.00				0.00				0.00	14.51														
					0.00	20.32	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	11.85														
	126	127	1.32	0.72	2.64	22.96			0.00	0.00			0.00	0.00			0.00	0.00	14.51	62.94	85.17	99.74	145.67	1445	1050	1050	CONC	0.44	66.8	1811.36	2.09	0.53	0.80
	127	128	0.51	0.72	1.02	23.98			0.00	0.00			0.00	0.00			0.00	0.00	15.04	61.66	83.41	97.68	142.65	1479	1200	1200	CONC	0.23	74.3	1869.77	1.65	0.75	0.79
	128	146			0.00	23.98	0.49	0.72	0.98	0.98			0.00	0.00			0.00	0.00	15.79	59.96	81.08	94.94	138.62	1517	1200	1200	CONC	0.24	74.3	1909.98	1.69	0.73	0.79
To Unknown Road5 - 05, Pipe 146 - 155						23.98				0.98				0.00				0.00	16.53														
Unknown Road5 - 05																																
					0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	14.72														
					0.00	0.00	0.85	0.72	1.70	1.70			0.00	0.00			0.00	0.00															
	148	146	7.04	0.72	14.09	14.09			0.00	1.70			0.00	0.00			0.00	0.00	14.72	62.44	84.47	98.93	144.47	1024	975	975	CONC	0.33	66.8	1287.39	1.72	0.65	0.80
Contribution From Unknown Road1 - 01, Pipe 128 - 146						23.98				0.98				0.00				0.00	16.53														
					0.00	38.07	0.00	0.00	0.00	2.68			0.00	0.00			0.00	0.00	11.79														
	146	155	1.15	0.72	2.30	40.37			0.00	2.68			0.00	0.00			0.00	0.00	16.53	58.38	78.93	92.41	134.91	2569	1350	1350	CONC	0.37	78.8	3246.61	2.27	0.58	0.79
To Unknown Road4 - 04, Pipe 155 - 156						40.37				2.68				0.00				0.00	17.11														
Unknown Road4 - 04																																
					0.00	0.00	0.00	0.00	0.00	0.00			0.00	0.00			0.00	0.00	12.30														
	153	154	2.31	0.72	4.62	4.62			0.00	0.00			0.00	0.00			0.00	0.00	12.30	68.99	93.45	109.49	159.98	319	750	750	CONC	0.16	74.3	445.31	1.01	1.23	0.72
	154	155			0.00	4.62	0.63	0.72	1.26	1.26			0.00	0.00			0.00	0.00	13.52	65.49	88.65	103.84	151.69	415	825	825	CONC	0.15	74.3	555.94	1.04	1.19	0.75
Contribution From Unknown Road5 - 05, Pipe 146 - 155						40.37				2.68				0.00				0.00	17.11														
	155	156	0.54	0.72	1.08	46.08			0.00	3.94			0.00	0.00			0.00	0.00	17.11	57.21	77.32	90.52	132.13	2941	1500	1500	CONC	0.28	86.1	3740.49	2.12	0.68	0.79
	156	157	0.56	0.72	1.12	47.20			0.00	3.94			0.00	0.00			0.00	0.00	17.78	55.89	75.52	88.41	129.04	2936	1500	1500	CONC	0.28	86.1	3740.49	2.12	0.68	0.78
To Unknown Road2 - 02, Pipe 157 - 166						47.20				3.94				0.00				0.00	18.46														
Unknown Road2 - 02																																
Contribution From Unknown Road4 - 04, Pipe 156 - 157						47.20				3.94				0.00				0.00	18.46														
					0.00	47.20	0.00	0.00	0.00	3.94			0.00	0.00			0.00	0.00	11.85														
	157	166	1.42	0.72	2.84	50.04			0.00	3.94			0.00	0.00			0.00	0.00	18.46	54.64	73.82	86.40	126.10	3025	1500	1500	CONC	0.30	64.8	3871.78	2.19	0.49	0.78
To Unknown Road11 - 1001, Pipe 166 - 167						50.04				3.94				0.00				0.00	18.95														
Unknown Road11 - 1001																																
Contribution From Unknown Road2 - 02, Pipe 157 - 166						50.04				3.94				0.00				0.00	18.95														
					0.00	50.04	0.00	0.00	0.00	3.94			0.00	0.00			0.00	0.00															
	166	167	1.18	0.72	2.36	52.40			0.00	3.94			0.00	0.00			0.00	0.00	18.95	53.78	72.63	85.01	124.05	3104	1500	1500	CONC	0.31	33.4	3935.78	2.23	0.25	0.79
	167	168			0.00	52.40			0.00	3.94			0.00	0.00			0.00	0.00	19.20	53.35	72.05	84.32	123.04	3080	1500	1500	CONC	0.31	23.2	3935.78	2.23	0.17	0.78
	168	169			0.00	52.40			0.00	3.94			0.00	0.00			0.00	0.00	19.38	53.05	71.65	83.85	122.35	3063	1500	1500	CONC	0.30	4.5	3871.78	2.19	0.03	0.79

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:	PROJECT:		
Checked:	LOCATION: City of Ottawa		
Dwg. Reference:	File Ref:	Date: 17 Dec 2018	Sheet No. SHEET 1 OF 1

APPENDIX E

LEGEND:

- SITE BOUNDARY
- STORM OVERLAND FLOW ARROW
- 192.85 PROPOSED CENTERLINE ELEVATION
- 192.50 / 193.50 PROPOSED ELEVATION
- EXISTING ELEVATION
- 244.50 EXISTING CONTOUR ELEVATION

CUT-FILL DEPTH ALONG CENTER LINE:

CUT DEPTH (m)	FILL DEPTH (m)
0 - 1.0	0 - 1.0
1.0 - 2.0	1.0 - 2.0
2.0 - 3.0	2.0 - 3.0
> 3.0	> 3.0

HIGHWAY 416

BORRISOKANE

NEW GREENBANK ROAD

MATCH EXISTING

SWM POND 1
PP 97.55
EXT DET 97.85
MAX W/L 98.35

SEDIMENT MANAGEMENT AREA

ACCESS ROAD

URBAN BOUNDARY

Park
1.64ha

3:1 SLOPE

RETAINING WALL

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CAIVAN - BRAZEAU
PRELIMINARY GRADING PLAN
CITY OF OTTAWA

PROJECT No. :	18-1030
SCALE:	1:2,000
DATE:	DECEMBER 2018
DRAWING No.	2