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FUNCTIONAL SERVICING REPORT

FOR

SUMMERSIDE WEST – PHASE 4/5/6
2464 TENTH LINE ROAD

MATTAMY HOMES

CITY OF OTTAWA

PROJECT NO.: 15-766

MAY 18, 2018
2ND SUBMISSION
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FUNCTIONAL SERVICING REPORT
FOR
SUMMERSIDE WEST – PHASE 4/5/6
2564 TENTH LINE ROAD

MATTAMY HOMES

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MATTAMY HOMES

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1.0 INTRODUCTION

This Functional Servicing Report (FSR) is submitted in support of Summerside West (SSW) Phase 4, 5 and 6 development on behalf of Mattamy Homes.

SSW Phase 4, 5 and 6 is located south of the existing SSW Phase 1, 2 and 3 development east of Mer Bleue Road and west of Tenth Line Road, as depicted on ***Figure 1***.

A Community Design Plan (CDP) for an urban expansion area south of the site is underway. The CDP area is known as Mer Bleue Urban Expansion Area 10 and referenced throughout this report.

The subject site is approximately 36 ha in size and will be comprised of a mix of residential dwellings (398 detached single homes and 318 townhomes), one (1) neighbourhood park, one (1) partial park area and one (1) school, as depicted on ***Figure 2***.

This FSR is prepared to demonstrate conformance with the design criteria of the City of Ottawa, background studies, including the Mer Bleue Urban Expansion Area 10 Master Servicing Study ***(Mer Bleue MSS)***, and general industry practice.

1.1 Existing Conditions

SSW Phase 4, 5 and 6 is comprised of approximately 36 ha of vacant land with grades between 86.0 m and 87.0 m, slightly below the elevation of Mer Bleue Road and Tenth Line Road. SSW is located within the McKinnon's Creek Watershed and is subject to regulations of the South Nation Conservation (SNC).

McKinnon's Creek currently bisects SSW, with Phase 4 to the east of the watercourse and Phases 5 and 6 to the west of the watercourse. Several shallow drainage ditches exist across the site for agricultural drainage purposes.

A geotechnical investigation has been undertaken by Paterson Group. The soil profile underlying the site consists primarily of an agriculturally disturbed organic layer overlying a stiff brown silty clay crust, followed by a deep, firm, grey, silty clay deposit. Based on the all of the information collected to date, including some surcharge test piles

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fitted with settling plates, the preliminary grade raise restriction has been recommended as 1.3 m for lots and 1.5 m for roads across the site.

1.2 Summary of Pre-consultation

The following provides a summary of the pre-consultation to date:

1.2.1 City of Ottawa

A pre-consultation was held at the City of Ottawa on February 28, 2017 regarding the draft plan submission requirements for SSW Phase 4, 5 and 6. A copy of the pre-consultation minutes is enclosed in ***Appendix A*** for reference.

1.3 Existing Permits / Approvals

The existing permits and approvals relating to SSW Phase 4, 5 and 6 are presented in ***Table 1***.

Table 1: Existing Permits/Approvals

Agency	Permit/Approval Required	Remarks
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval #9069-A4YR6E (December 8, 2015) for SSW Phase 1 Sewers	The SSW Phase 1 sanitary sewers provide the outlet for SSW Phase 4. A copy of the ECA is enclosed in ***Appendix B***.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval #7375-A8QGEU (April 12, 2016) for the Tenth Line Pump Station	The Tenth Line Pump station provides the outlet for SSW Phase 4, 5 and 6. A copy of the ECA is enclosed in ***Appendix B***.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval #1339-A28J6Z (October 2, 2015) for the Avalon West, Neighbourhood 5 SWM Facility.	The Avalon West N5 Pond provides the outlet for SSW Phase 4 (with revisions). A copy of the ECA is enclosed in ***Appendix B***.

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1.4 Required Permits / Approvals

The required permits and approvals relating to SSW Phase 4, 5 and 6 are presented in ***Table 2***:

Table 2: Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
City of Ottawa	Commence Work Notification (CWN)	Construction of new sanitary and storm sewers throughout the subdivision.	The City of Ottawa will issue a commence work notification for construction of the sanitary and storm sewers once an ECA is issued by the MOECC.
City of Ottawa	MOE Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains throughout the subdivision.	The City of Ottawa to review the watermains on behalf of the MOE through Form 1 – Record of Watermains Authorized as a Future Alteration.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval	Construction of new sanitary and storm sewers throughout the subdivision.	The MOECC will review the sanitary and storm sewer design through the City of Ottawa transfer of review process.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval Amendment	Construction of modifications to the existing Avalon West (N5) SWM Facility.	The MOECC will review the stormwater management pond design through the City of Ottawa transfer of review process.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval	Construction of a new stormwater management pond (North SWM Pond per Mer Bleue MSS)	The MOECC will review the stormwater management pond design through the City of Ottawa transfer of review process.
Ministry of the Environment and Climate Change (MOECC)	Environmental Compliance Approval Amendment	Construction of new sanitary sewers to the Tenth Line Pump Station.	The MOECC will review the sanitary pump station design through the City of Ottawa transfer of review process.
Ministry of the Environment and Climate Change (MOECC)	Permit To Take Water (PTTW)	Any construction activity which requires pumping greater than 50,000 L/day.	

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Agency	Permit/Approval Required	Trigger	Remarks
South Nation Conservation (SNC)	Permit under Ontario Regulation 170/06, SNC's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation.	Any work associated with McKinnon's Creek, construction of new pond outlet and infilling of existing tributaries.	The SNC will be required to sign off on the pond modifications prior to MOECC approval. Subsequently, the RVCA will review the pond outlet through the permit application review.
South Nation Conservation (SNC)	Permit required to complete with within the regulatory floodplain.	Any work within the current regulatory floodplain.	The SNC will be review and issue a permit to allow works within the regulatory floodplain. Once the grading work is compete, the updated analysis will be coordinated with the SNC and the mapping will be updated, accordingly.
Department of Fisheries and Oceans (DFO)	Self-assessment and potential request for review based on works associated with McKinnon's Creek or infill of any tributaries.	Any work within McKinnon's Creek or any infilling of existing tributaries.	The project biologist will coordinate and consult with the DFO to determine whether a request for review will be required. The request for review will determine if any compensation works are required.

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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, October 2012
  (City Standards)
  - **Technical Bulletin ISDTB-2014-01**
    City of Ottawa, February 5, 2014
    (ITSB-2014-01)
  - **Technical Bulletin PIEDTB-2016-01**
    City of Ottawa, September 6, 2016
    (PIEDTB-2016-01)
  - **Technical Bulletin ISTB-2018-01**
    City of Ottawa, March 21, 2018
    (ISTB-2018-01)
- **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)
  - **Technical Bulletin ISDTB-2018-02**
    City of Ottawa, March 21, 2018
    (ISTB-2018-02)
- **Stormwater Management Planning and Design Manual**
  Ministry of Environment, March 2003
  (*SWMP Design Manual)*
- **Erosion & Sediment Control Guidelines for Urban Construction**
  Greater Golden Horseshoe Area Conservation Authorities, December 2006
  (E&S Guidelines)
- **Geotechnical Investigation, Proposed Residential Development**,
  Summerside West – Phase 4 and 5 and 6 (PG4049-2)
  Paterson Group, May 14, 2018
  (Geotechnical Investigation)

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- **Mer Bleue Urban Expansion Area 10, Master Servicing Study**
  IBI Group, December 2017
  (Mer Bleue MSS)
- **Design Brief for Summerside West – Phase 1**
  DSEL, August 7, 2015
  (SSW Phase 1 Design Brief)

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3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

SSW Phase 4, 5 and 6 is located within Zone 2E of the City's water distribution system, which is fed by two booster pumping stations and the Innes Road elevated storage tank at Belcourt Boulevard, providing balancing, fire and emergency storage. As noted in the Mer Bleue MSS, there is a strong network of watermains which services the Neighbourhood 4 community to the northeast of the study area.

In the vicinity of the site, there is an existing waterman on Tenth Line Road, which is 152 mm in diameter and an existing watermain on Mer Bleue Road, which is 406 mm in diameter. There are also be existing watermains to the north within SSW Phase 1, 2 and 3. The existing watermains are depicted on ***Figure 3***.

3.2 Proposed Water Supply

As noted in the ***Mer Bleue MSS***, water supply to the site will be provided by connection to the municipal water system at Tenth Line Road, Mer Bleue Road and to SSW Phase 1, 2 and 3 to the north. Refer to the ***Figure 8.1A - Recommended Water Distribution System for Updated Demonstration Plan*** from the ***Mer Bleue MSS***, contained in ***Appendix C***.

The proposed development will be serviced internally by 152 mm, 203 mm and 305 mm diameter watermains designed in accordance with the ***Water Supply Guidelines*** as summarized in ***Table 3***. The proposed watermains are depicted on ***Figure 3***.

Table 3: Water Supply Design Criteria

Design Parameter	Value
Residential - Single Family	3.4 p/unit
Residential - Townhome	2.7 p/unit
Residential – Average Daily Demand	350 L/p/day
Residential - Maximum Daily Demand	2.5 x Average Daily Demand
Residential - Maximum Hourly Demand	2.2 x Maximum Daily Demand
Minimum Watermain Size	152 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
Peak hourly demand operating pressure	276 kPa and 552 kPa
Fire flow operating pressure minimum	140 kPa
Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010)	

The recommended system for the overall Mer Bleue Urban Expansion (MBESA) Area 10 was hydraulically modelled by Stantec and contained within the ***Mer Bleue MSS***. Based on the existing hydraulic grade line (HGL) in Zone 2E, operating pressures in the MBESA development are not anticipated to drop below 276 kPa (40 psi) or exceed 552

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kPa (80 psi). Hydraulic modeling results show that water supply is available during basic day and peak hour conditions as well as under emergency conditions while providing fire flow.

At the time of detailed design of SSW Phase 4, 5 and 6, a hydraulic analysis will be prepared for the proposed water distribution network to confirm that water supply is available within the required pressure range under the anticipated demand during average day, peak hour and fire flow conditions. SSW Phase 4 will connect to existing SSW Phase 1 and will be looped to the existing watermain on Tenth Line Road. SSW Phase 5 will connect to existing SSW Phase 2 and 3. SSW Phase 6 will connect to Phase 2, 3 and 5 and loop to the existing watermain on Mer Bleue Road.

3.2.1 Fire Flow Demand

At the time of detailed design, detailed fire flow demand will be calculated in accordance with the Fire Underwriters Survey's Water Supply for Public Fire Protection Guideline (1999). If required, the City of Ottawa's cap of 10,000 L/min (167 L/s) as outlined in ISDTB-2014-02 will be applied. Firewalls will be implemented, as required, to meet the fire flow demand.

The existing and proposed watermains are presented in ***Figure 3***.

3.2.2 Boundary Conditions

Preliminary boundary conditions for the large study area were provided in the ***Mer Bleue MSS***; however, boundary conditions will be requested at the time of detailed design for specific locations and demands. Boundary conditions in the form of Hydraulic Grade Line (HGL) will be provided by the City of Ottawa for Peak Hour, Maximum Day Plus Fire Flow and Maximum HGL (high pressure check).

3.2.3 Water Demand Calculations

A summary of preliminary water demands for SSW Phase 4, 5 and 6 is presented in ***Table 3.1.***

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Table 3.1: Summary of Water Demands

	Singles	Towns	Pop	Average Day		Max Day		Peak Hour		Min Hour	
						2.5 x Avg Day		2.2 x Max Day		0.5 x Avg Day	
				L/cap/ day	L/s	L/cap/ day	L/s	L/cap/ day	L/s	L/cap/ day	L/s
Phase 4	148	127	846	350	3.43	875	8.57	1925	18.85	175	1.71
Phase 5	256	0	870	350	3.52	875	8.81	1925	19.38	175	1.76
Phase 6	0	247	667	350	2.70	875	6.75	1925	14.86	175	1.35
Totals:	**404**	**374**	**2383**		**9.65**		**24.13**		**53.09**		**4.82**

3.3 Master Servicing Study

The proposed watermain network conforms to the ***Mer Bleue MSS*** aside from minor changes due to the updated road network. Refer to the ***Figure 8.1A - Recommended Water Distribution System for Updated Demonstration Plan*** from the ***Mer Bleue MSS***, contained in ***Appendix C***.

3.4 Water Supply Conclusion

SSW Phase 4, 5 and 6 will be serviced internally by 152 mm, 203 mm and 305 mm watermains, which will be looped to trunk watermains in Tenth Line Road and Mer Bleue Road, as well as to connections to SSW Phase 1, 2 and 3 to the north.

At the time of detailed design, a detailed hydraulic analysis will be completed to confirm that the proposed water network can deliver all domestic and fire flows as per the Ministry of the Environment and Climate Change, City of Ottawa and Fire Underwriters criteria.

The proposed water supply conforms to the design in the ***Mer Bleue MSS*** aside from minor changes due to the updated road network.

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4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The proposed sanitary outlet for SSW Phase 4, 5 and 6 is the Tenth Line Road Pump Station (TLPS), which in turn outlets by forcemain to the Esprit Drive Collector. The TLPS is located above the north east corner of SSW Phase 1, at Tenth Line Road.

As noted in the ***Mer Bleue MSS***, Section 4.2.2, the TLPS is currently operating under interim conditions and is currently fitted up to accommodate approximately 50% of its approved capacity. The opportunity exists to upgrade the TLPS to full capacity to service these expansion lands. Noted further in Section 5.5.2.2, Stantec was commissioned by IBI Group to update their previous assessment of the TLPS. Stantec concluded that, with upgrading the pumps, the Mer Bleue Expansion Area 10 could be serviced by the TLPS. The ***Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment*** by Stantec dated August 26, 2016 is enclosed in ***Appendix D***.

As noted in the ***Mer Bleue MSS***, Section 5.5.2.2, the existing sanitary sewer catchment tributary to the TLPS is provided with emergency sanitary overflows, to minimize the risk of basement flooding in the event of a catastrophic failure within the TLPS.

Through the design of SSW Phase 1, SSW Phase 4 flows were included as external tributary flows. The current approval of the sanitary sewer through Phase 1, as well as the current tributary area to the TLPS includes SSW Phase 4. The current sanitary overflow configuration also accounts for the drainage from SSW Phase 4. Refer to ***Figure 4*** for a depiction of the existing sewers. The drainage area plan and design sheet for SSW Phase 1 is enclosed in ***Appendix E***.

4.2 Wastewater Design

SSW Phase 4, 5 and 6 will be serviced by new gravity sewers designed in accordance with City of Ottawa design criteria and will outlet through to the TLPS.

The proposed sanitary sewer layout and drainage areas are depicted on ***Figure 4***. Trunk 1B services SSW Phase 4 through existing SSW Phase 1 to the TLPS. Trunk 2 services SSW Phase 5 and 6 by crossing McKinnon's Creek to a trunk on Tenth Line Road, also outletting to the TLPS.

Table 4 summarizes the ***City Standards*** which have been used in the design of the proposed wastewater sewer system.

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Table 4: Wastewater Design Criteria

Design Parameter	Value
Low Density Residential	3.4 p/unit
Medium Density Residential	2.7 p/unit
Peak Wastewater Generation per Person	280 L/p/d
Peaking Factor Applied	Harmon's Equation (2.0 min, 4.0 max)
Harmon – Correction Factor	0.80
Commercial / Institutional Flows	28,000 L/ha/day
Commercial / Institutional Peak Factor	1.5 (ICI in contributing area is > 20%)
Infiltration and Inflow Allowance	0.33 L/s/ha
Park Flows	9,300 L/ha/day
Park Peaking Factor	1.5
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	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012	

The sanitary drainage area plans and design sheets for SSW Phase 4, 5 and 6 are enclosed in ***Appendix E***.

The peak sanitary flow from Trunk 1B (SSW Phase 4) to the existing SSW Phase 1 system is 17.08 L/s. As shown on the sanitary drainage area plan and design sheet from SSW Phase 1, this is generally the same flow that was anticipated in the downstream sewers. Additionally, the downstream sanitary sewers have significant residual capacity.

The peak sanitary flow from Trunk 2 to the future 750 mm Tenth Line Road trunk sewer is 59.95 L/s.

As noted in ***Section 4.1***, the ***Mer Bleue MSS*** has confirmed that with pump upgrades, the entire Mer Bleue Expansion Area 10 could be serviced by the TLPS. SSW Phase 4 has already been designed and approved under the current approvals for the TLPS. There is potential that SSW Phase 5 and 6 could also discharge to the TLPS without pump upgrades, given that the City of Ottawa is currently updating their demand criteria. Further analysis is required once the City of Ottawa releases the Technical Bulletin.

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4.3 Master Servicing Study

The wastewater design generally conforms to the ***Mer Bleue MSS***. Refer to ***Figure 8.2A: Recommended Waste Water System for Updated Demonstration Plan*** and the ***Sanitary Sewer Design Sheet*** from the ***Mer Bleue MSS***, contained in ***Appendix E***. The peak flows anticipated from SSW Phase 5 and 6 in the MSS are 71.91 L/s.

4.4 Wastewater Servicing Conclusion

SSW Phase 4 outlets to the TLPS via SSW Phase 1, where downstream infrastructure including the pump station and overflows were sized for the flows. SSW Phase 5, 6 is serviced by a trunk sewer under McKinnon's Creek to a sanitary trunk sewer on Tenth Line Road and ultimately to the TLPS.

An analysis by Stantec is contained in the ***Mer Bleue MSS*** which confirms that with pump upgrades the entire Mer Bleue Expansion Area 10 could be serviced by the TLPS. SSW Phase 5 and 6 will require further analysis to confirm that the TLPS has capacity for the flows without pump upgrades.

The sanitary sewers have been designed in accordance with City of Ottawa standards and conform to the ***Mer Bleue MSS***.

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5.0 STORMWATER CONVEYANCE

5.1 Existing Conditions

SSW Phase 4, 5 and 6 is comprised of approximately 36 ha of vacant land with grades between 86.0 m and 87.0 m, slightly below the elevation of Mer Bleue Road and Tenth Line Road. SSW is located within the McKinnon's Creek Watershed and is subject to regulations of the South Nation Conservation (SNC).

McKinnon's Creek currently bisects SSW, with Phase 4 to the east of the watercourse and Phases 5 and 6 to the west of the watercourse. Several shallow drainage ditches exist across the site for agricultural drainage purposes.

5.2 Proposed Stormwater Management Strategy

This FSR proposes to have stormwater flows conveyed through SSW Phase 4, 5 and 6 by way of an underground sewer network. The stormwater runoff will be treated to provide an Enhanced Level of Protection (80% TSS removal) before ultimately being released into McKinnon's Creek. The proposed stormwater management design is shown on ***Figure 5***.

The stormwater management designs consists of:

- A storm sewer system designed to capture at least the minimum design capture events required under PIETB-2016-01;
- Expansion of the existing Avalon West SWM Facility for SSW Phase 4 to provide an Enhanced Level of Protection per MOECC guidelines, via treatment of the stormwater captured by the storm sewer network;
- A new Mer Bleue Northern SWM Facility for SSW Phase 5 and 6 to provide an Enhanced Level of Protection per MOECC guidelines via treatment of the stormwater captured by the storm sewer network;
- 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.
- Quantity control in downstream sections of McKinnon's Creek (downstream of Wall Road) to pre-development levels.

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5.3 Post-Development Stormwater Management Targets

Stormwater management requirements for the stormwater management scheme have been adopted from the ***Mer Bleue MSS***, ***City Standards***, and the ***MOECC 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 Total Suspended Solid removal efficiency of 80%, as defined by the MOECC prescribed treatment levels.
- Downstream receiving watercourses will be assessed for responses to planned stormwater management outflows, and stabilization mitigation measures will be planned as required.
- 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.
- Storm sewers on arterial roads are to be designed to provide at least 1 10-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- For arterial roads, the lateral spread during a 100-year even should keep one late free of ponding in each direction.
- 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. The preferred maximum velocity is 3.0 m/s, with an allowance of up to 6.0 m/s on an exceptional basis only.
- For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets, rear yards, public space and parking areas shall not exceed 0.35 m at the gutter.

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- 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 right-of-way provided that the water level must 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.
- 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.
- 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 Targets

Per the ***Mer Bleue MSS***, it is recommended that SWM facilities tributary to McKinnon's Creek be designed to provide an Enhanced Level of Protection, or 80% removal of Total Suspended Solids (TSS) in accordance with the MOE Stormwater Management Planning and Design Manual (March, 2003).

5.3.2 Quantity Control Targets

Per the Mer Bleue MSS, McKinnon's Creek is the recipient of surface runoff from the subject site and McKinnon's Creek also accommodates flows from existing external stormwater management systems within Avalon South (N4) and Avalon West (N5) developments.

It is recommended that the proposed SWM system for the Mer Bleue Expansion Study Area control peak flows in the downstream sections of McKinnon's Creek (downstream of Wall Road) to pre-development levels. An excerpt from the ***Mer Bleue MSS***, Table 7.6, shows the pre-development peak flow rates is enclosed in ***Appendix F***. The corresponding pre-development drainage area plan ***Figure 5.3 – Pre-Development Drainage Area Plan*** is also enclosed in ***Appendix F***.

5.4 Stormwater Management Design

The stormwater runoff from SSW Phase 4 is proposed to be treated by the expansion of the Avalon West SWM Facility, which will provide an Enhanced Level of Protection (80% TSS removal) and discharges to McKinnon's Creek.

The stormwater runoff from SSW Phase 5 and 6 is proposed to be treated by a new Mer Bleue Northern SWM Facility, which will provide an Enhanced Level of Protection (80% TSS removal) and discharges to McKinnon's Creek.

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The proposed stormwater management design is shown in ***Figure 5***.

5.5 Proposed Minor System

SSW Phase 4, 5 and 6 will be serviced by a conventional storm sewer system designed in accordance with City of Ottawa standards that is to generally follow the local road network and proposed servicing easements. The drainage will be conveyed within the underground piped sewer system to stormwater management facilities.

It is noted in the ***Mer Bleue MSS*** Section 8.3.3 that a portion of the subject property obtained special status to proceed in advance of the CDP and MSS and have identified the existing pond as its outlet to allow the development to proceed in advance of the downstream works. Refer to ***Mer Bleue MSS Figure 8.3.10.1 – Potential Development in Advance of McKinnon's Creek Enhancement***, enclosed in ***Appendix F***, which identifies SSW Phase 4 as a potential development in advance of McKinnon's Creek enhancement.

The SSW Phase 4 storm sewers will outlet to the expanded Avalon West (N5) SWM Facility and the SSW Phase 5 and 6 sewers will outlet to a new SWM pond identified in the ***Mer Bleue MSS***.

The proposed inlet from SSW Phase 4 to the expanded Avalon West (N5) SWM Facility is submerged for approximately 200 m as the inverts for the 1800 mm trunk are lower than the permanent pool elevation of 83.15 m. At the inlet, the 1800 mm trunk is submerged by approximately 35% and this is reduced as the inverts are higher as you go upstream. At the time of detailed design, the submergence will be modelled to consider the standard sedimentation requirement. The guidelines require that the modelling be completed to address the 10-year hydraulic grade line plus 25% sediment accumulation.

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 current City standards.

The preliminary rational method design of the minor system captures drainage for storm events up to and including the 2-year (local), 5-year (collector) event and 10-year (arterial) event, assuming the use of inlet control devices (ICD) for all catch basins within the subject property. ***Table 5*** summarizes the standards that will be employed in the detailed design of the storm sewer network.

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Table 5: 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 1:10 year (PIEDTB-2016-01) for arterial roads, without ponding
Major System Design Return Period	
Intensity Duration Frequency Curve (IDF) 5-year storm event. A = 998.071 B = 6.053 C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Initial Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.0 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	3.0 m/s
Extracted from Sections 5 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012	

The paved area and grassed area runoff coefficients of 0.9 and 0.2, respectively, were used to calculate average runoff coefficients that were applied across the site.

The storm drainage area plan and storm sewer design sheet are enclosed in ***Appendix G*** for reference. The peak flow based on the Rational Method from the Trunk 2 (SSW Phase 4) to the SWM Facility is 2273 L/s. The peak flow based on the Rational method from Trunk 4 (SSW Phase 5 and 6) to the new Mer Bleue Northern SWM Facility is 4612 L/s.

Inlet control devices (ICDs) will be employed to ensure that storm flows entering the minor system are limited to the 2-year peak storm flow. At the time of detailed design, a hydraulic grade line (HGL) analysis has been completed and underside of footing elevations will be set at a minimum of 0.30 m above the HGL elevation.

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

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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 outlets, as shown in ***Figure 5***. A composite servicing plan is shown on ***Figure 6***.

The grading design shown in ***Figure 7*** will include 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.

Given the elements above and the minor storm system described in ***Section 5.5***, the proposed drainage systems are expected to safely capture and convey all storms up to and including the 100-year event in accordance with the requirements of the City standards.

The overland flows from SSW Phase 4 are conveyed along the road to the Avalon West SWM Facility. The overland flows from SSW Phase 5 and 6 are conveyed along the road to the new Mer Bleue Northern SWM Facility.

5.8 Conceptual SWM Facilities

5.8.1 Avalon West SWM Facility Expansion

Per the ***Mer Bleue MSS***, the Mer Bleue Expansion Lands southeast of the existing Avalon West SWM Facility (SSW Phase 4) would require a separate inlet into the facility. It is proposed that the minor flow from these lands be conveyed to the facility via an 1800 mm diameter storm sewer, entering at the existing eastern sediment forebay, on its south side. The wet pond portion of the facility would be expanded south and the current outlet structure would be removed and a new outlet be designed and constructed. The facility will discharge into McKinnon's Creek approximately 275 m downstream of its current outlet. Refer to ***Figure 8.3.1.4 Conceptual Avalon West SWM Facility Expansion Plan View*** from the ***Mer Bleue MSS***, contained in ***Appendix H***.

5.8.2 Mer Bleue Northern SWM Facility

Per the ***Mer Bleue MSS***, the proposed Mer Bleue Northern SWM Facility is proposed to service 100 ha of the Mer Bleue Expansion lands, including SSW Phase 5 and 6. Refer

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to ***Figure 8.3.12 Drainage Area Plan*** from the ***Mer Bleue MSS***, contained in ***Appendix H.*** This facility is a new wet pond which will provide an Enhanced Level of Protection (80% TSS removal). Minor storm sewer flow wil be conveyed to the facility via two separate trunks. SSW Phase 5 and 6 will be conveyed via the northern trunk. The facility will discharge into a storm sewer which will eventually discharge to McKinnon's Creek.

As part of the recommended storm system in the Mer Bleue MSS, it was determined that McKinnon's Creek channel improvements were required between approximately Point B to Point D1. The McKinnon's Creek channel improvements are not required for the development of SSW Phase 4.

5.9 Master Servicing Study

The stormwater conveyance design generally conforms to the stormwater design included in the ***Mer Bleue MSS***. Refer to ***Figure 8.3A Recommended Storm Trunk Servicing for Updated Demonstration Plan*** from the ***Mer Bleue MSS*** and ***Storm Sewer Design Sheet,*** contained in ***Appendix G***. The peak flows based on the Rational Method from Trunk 2 (SSW Phase 4) to the SWM Facility is 2346 L/s. The peak flow based on the Rational method from Trunk 4 (SSW Phase 5 and 6) to the new Mer Bleue Northern SWM Facility is 4445 L/s. Detailed modelling at the time of detailed design will confirm capacity in the trunk sewers and the SWM facilities.

5.10 Stormwater Conclusions

The major and minor flows from SSW Phase 4 are conveyed to the Avalon West SWM Facility, which requires expansion. The major and minor flows from SSW Phase 5 and 6 are conveyed to the new Mer Bleue Northern SWM Facility.

The stormwater design has been completed with conformance to the MOECC and City of Ottawa Guidelines. The minor system is designed capture the minimum 2-year flow, 5-year flow and 10-year flow on local roads, collector roads and arterial roads, respectively.

An Enhanced Level of Protection (80% TSS removal) will be provided for stormwater runoff from the subject property before being discharged to McKinnon's Creek. The peak flows will be controlled in the downstream sections of McKinnon's Creek (downstream of Wall Road) to pre-development levels.

The design of the stormwater conveyance system generally conforms to the ***Mer Bleue MSS***.

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6.0 SITE GRADING

6.1 Master Grading

SSW Phase 4, 5 and 6 is constrained by grade raise restrictions, downstream infrastructure (outlets), existing grades on surrounding properties and roads.

The site is subject to grade raise restrictions of 1.3 m for lots and 1.5 m for roads based on the information provided in the ***Geotechnical Investigation*** by Paterson Group, dated May 14, 2018, which has been increased from the recommendations in the ***Mer Bleue MSS***.

The detailed grading plans will be forwarded to the geotechnical consultant for review and recommendations. Final signoff for SSW Phase 4, 5 and 6 detailed grading plans will be provided by the Geotechnical Engineer.

6.2 Grading Criteria

The following grading criteria and guidelines will be applied at the time of detailed design as per City of Ottawa Guidelines:

- Driveway slopes will have a maximum slope of 6%;
- Grading in grassed / landscaped areas to range from 2% to 3:1, with terracing required for flops larger than 7%;
- Swales are to be 0.15 m deep with 3:1 side slopes unless otherwise indicated on the drawings; and
- Perforated pipe will be required for drainage swales if they are less than 1.5% in slope.
- Swales are to be 0.15m deep with 3:1 side slopes unless otherwise indicated on the drawings;

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7.0 EROSION AND SEDIMENT CONTROL

Soil erosion occurs naturally and is a function of soil type, climate and topography. The extent of erosions losses is exaggerated during construction where the vegetation has been removed and the top layer of soil is disturbed.

Prior to topsoil stripping, earthworks or underground construction, erosion and sediment controls will be implemented and will be maintained throughout construction

The following recommendations to the contractor will be included in contract documents:

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install filter cloth between catch basins and frames.
- Installation of mud mats at construction accesses.
- Construction of temporary sedimentation ponds to treat water prior to outletting to existing wetlands and watercourses.
- Plan construction at proper time to avoid flooding.

A detailed erosion and sediment control plan will be implemented for the SSW Phase 4, 5 and 6 prior to construction to ensure there are no negative impacts on the natural areas, including McKinnon's Creek.

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8.0 CONCLUSION AND RECOMMENDATIONS

A summary of the Functional Servicing Report for SSW Phase 4, 5 and 6 is as follows:

- Pre-Consultation with the City of Ottawa, South Nation Conservation and Ministry of the Environment and Climate Change will be required. Approvals will be required from the City of Ottawa and MOECC and SNC.
- Watermains are designed as per the City of Ottawa guidelines and connect to a watermain on Tenth Line Road and Mer Bleue Road, as well as to existing watermains in SSW Phase 1, 2 and 3. A detailed hydraulic analysis will be completed at the time of detailed design to confirm that the proposed water network can deliver all domestic and fire flows as per the MOECC, City of Ottawa and Fire Underwriters criteria.
- Sanitary sewers are designed as per the City of Ottawa guidelines. Sanitary sewers will discharge to the Tenth Line Road Pump Station (TLPS). SSW Phase 4 will discharge through SSW Phase 1 to the TLPS. The downstream infrastructure was designed and approved for the SSW Phase 4 lands. SSW Phase 5 and 6 will discharge via a new trunk under McKinnon's Creek and up Tenth Line Road to the TLPS. Upgrades to the TLPS are not required for SSW Phase 4 and further analysis will be completed to confirm that they are also not required for Phase 5 and 6.
- Storm sewers are designed as per the City of Ottawa guidelines and will outlet to SWM facilities prior to discharge to McKinnon's Creek. The major overland flows will also be conveyed to the SWM facilities.
- SSW Phase 4 discharges to an expanded Avalon West SWM Facility where the stormwater runoff is treated for quality and quantity control. SSW Phase 5 and 6 discharges to the proposed Mer Bleue Northern SWM Facility where stormwater runoff is treated for quality control and quantity control.
- The SWM facilities will be designed to provide an Enhanced Level of Protection (80% TSS removal). There is also a requirement to control peak flows downstream of Wall Road in McKinnon's Creek to pre-development levels.
- The watermain design, wastewater design and stormwater management design all conform to the Mer Bleue MSS.
- The site is subject to a grade raise restriction of 1.3 m in the lots and 1.5 m in the roads. Detailed grading plans will be reviewed by a geotechnical engineer and recommendations will be made, as required.
- Erosion and sediment control measures will be implemented and maintained throughout construction. McKinnon's Creek will be protected from any negative impacts from construction.

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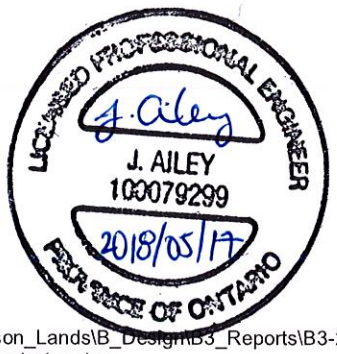
- The design for SSW Phase 4, 5 and 6 will be completed in general conformance with the City of Ottawa Design Guidelines and criteria presented in other background study documents.



Prepared by,
David Schaeffer Engineering Ltd.

Per: Jennifer Ailey, P.Eng.

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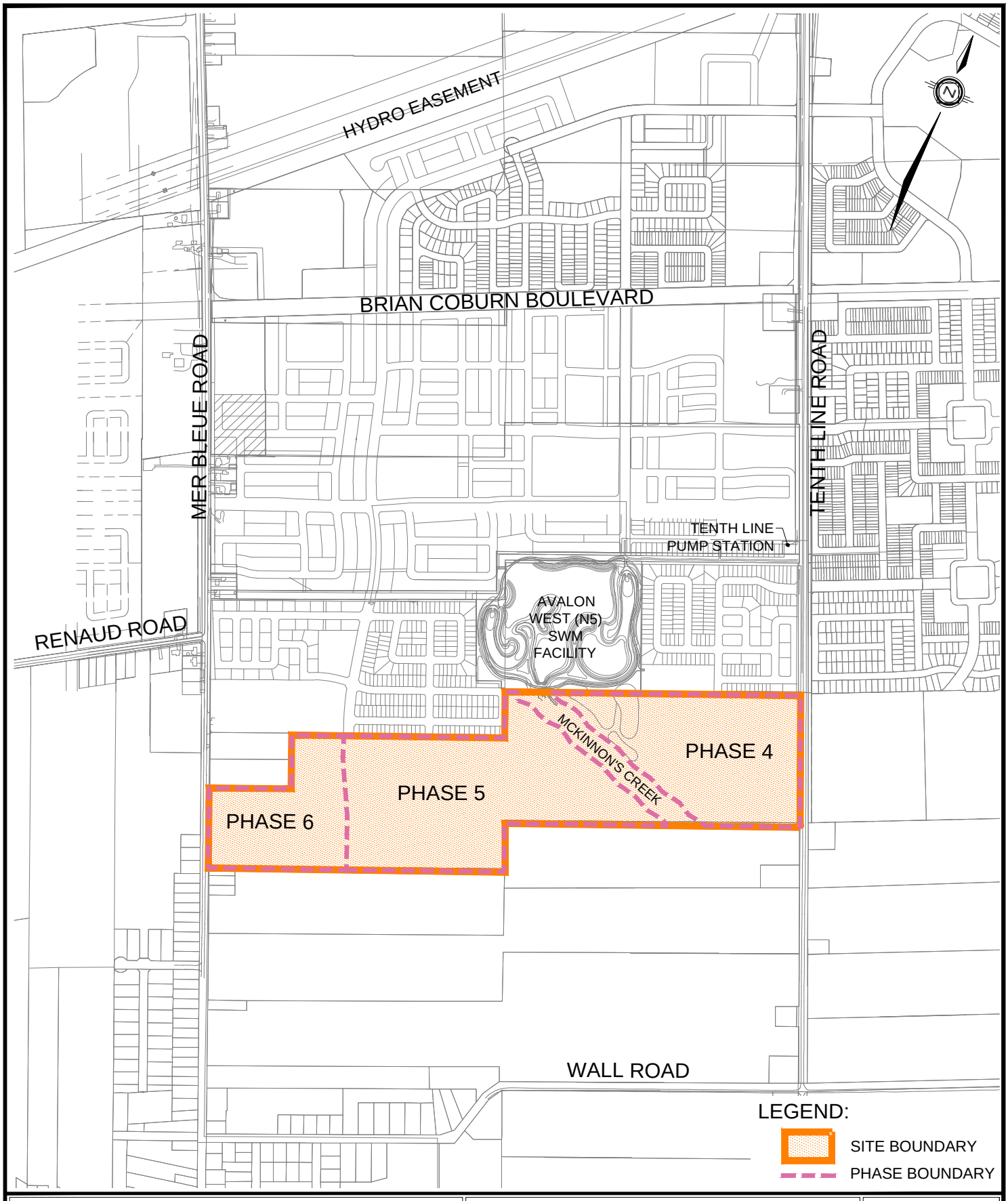

SUMMERSIDE WEST PHASES 4, 5 & 6

KEY PLAN

david schaeffer engineering ltd
120 Iber Road, Unit 203
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TEL: (613) 836-0856
FAX: (613) 836-7183
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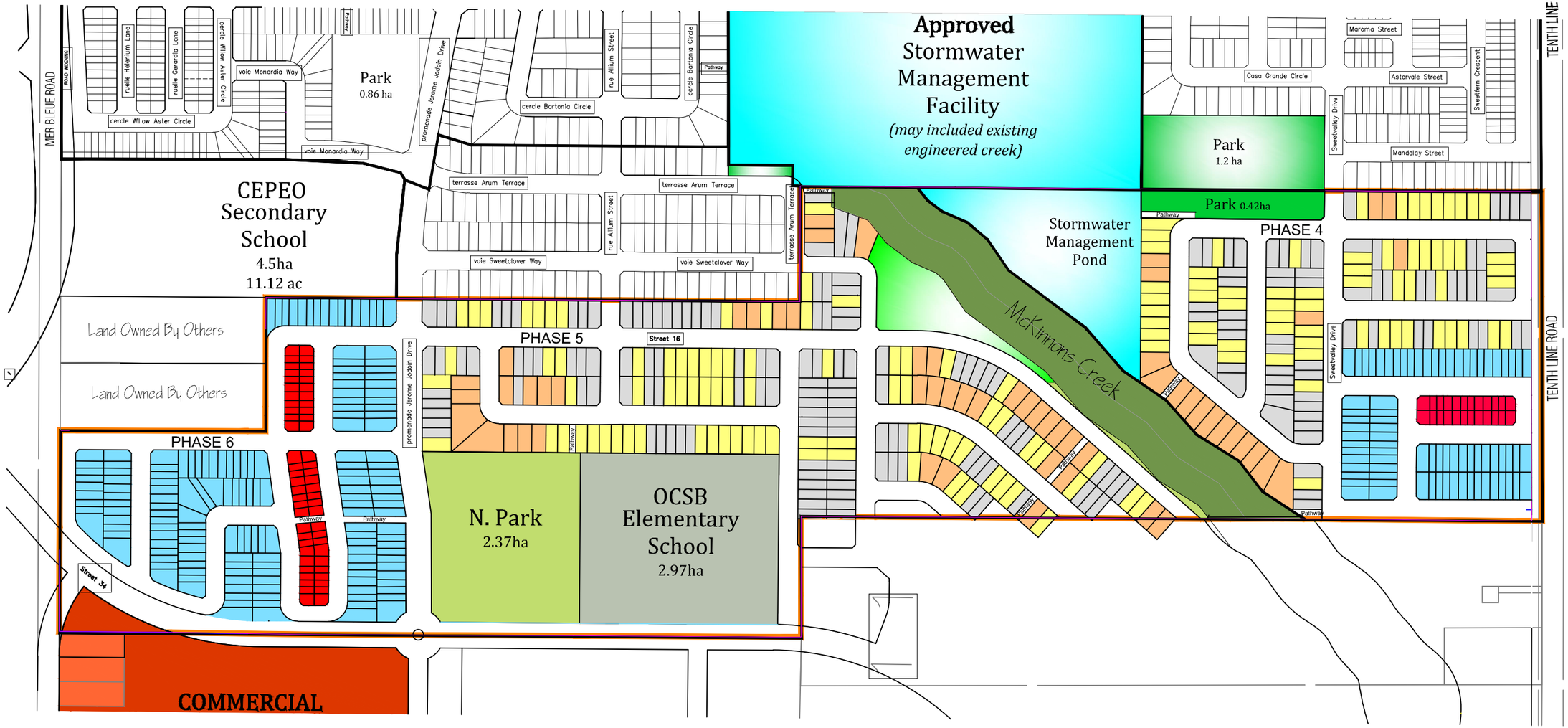
DATE: MAY. 2018

SCALE: 1:12000

PROJECT No.: 15-766

FIGURE: 1



LEGEND:

SITE BOUNDARY

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SUMMERSIDE WEST PHASES 4, 5 & 6
SUBDIVISON PLAN
CITY OF OTTAWA

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DATE:	MAY 2018
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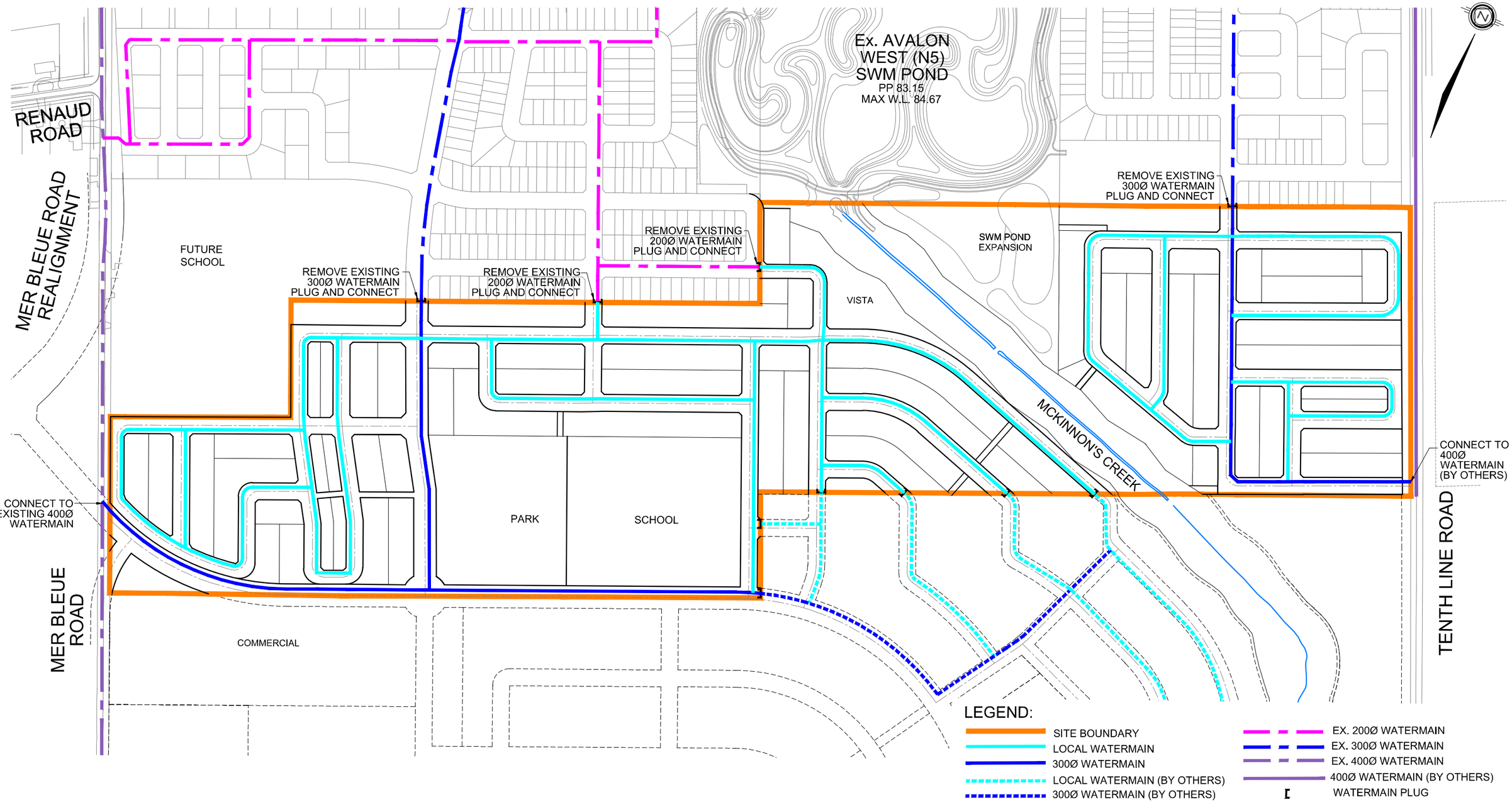

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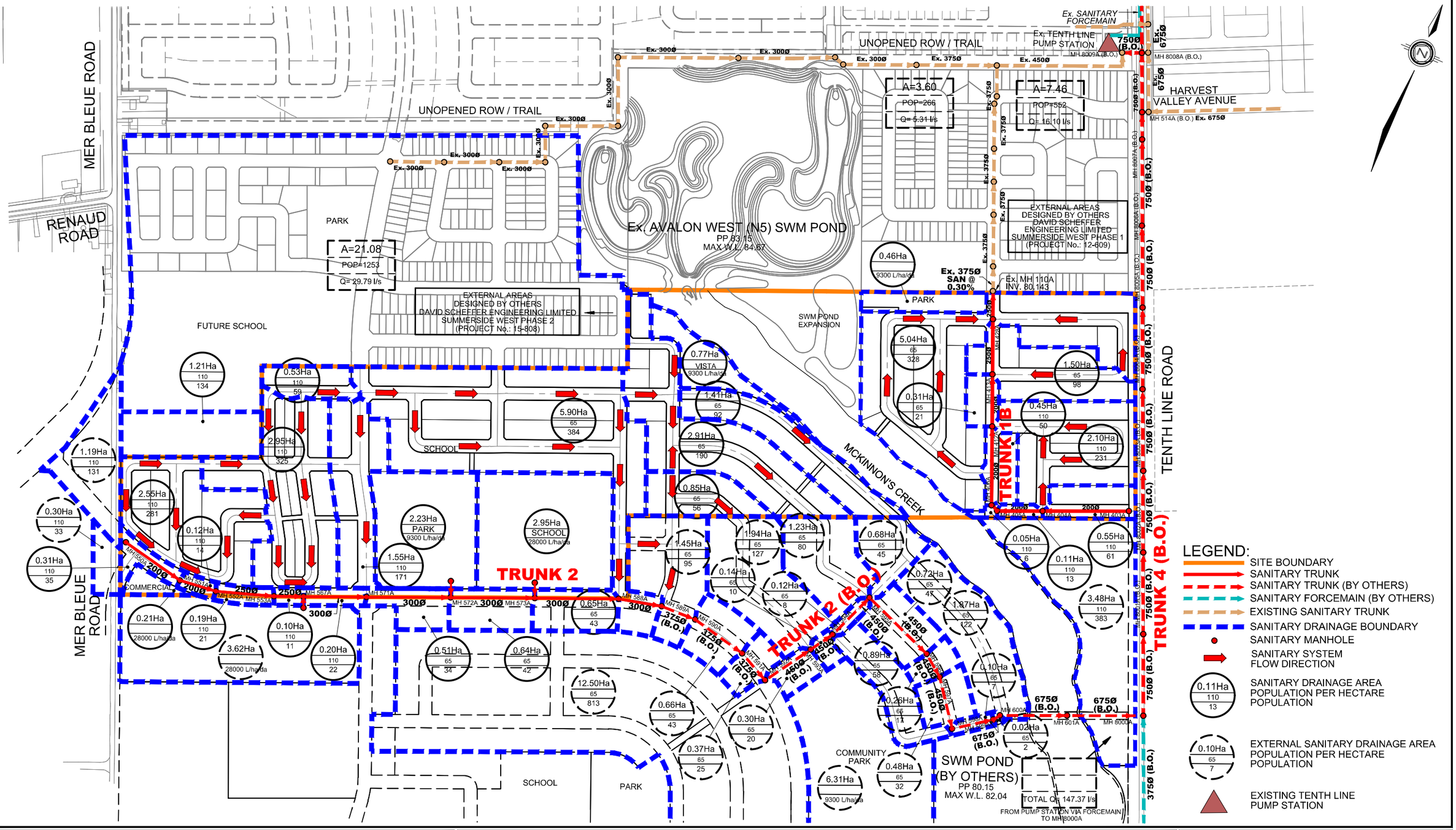
SUMMERSIDE WEST PHASES 4, 5 & 6
WATER SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:4000
DATE:	MAY 2018
FIGURE:	3



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SUMMERSIDE WEST PHASES 4, 5 & 6
CONCEPTUAL SANITARY SERVICING
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:5000
DATE:	MAY 2018
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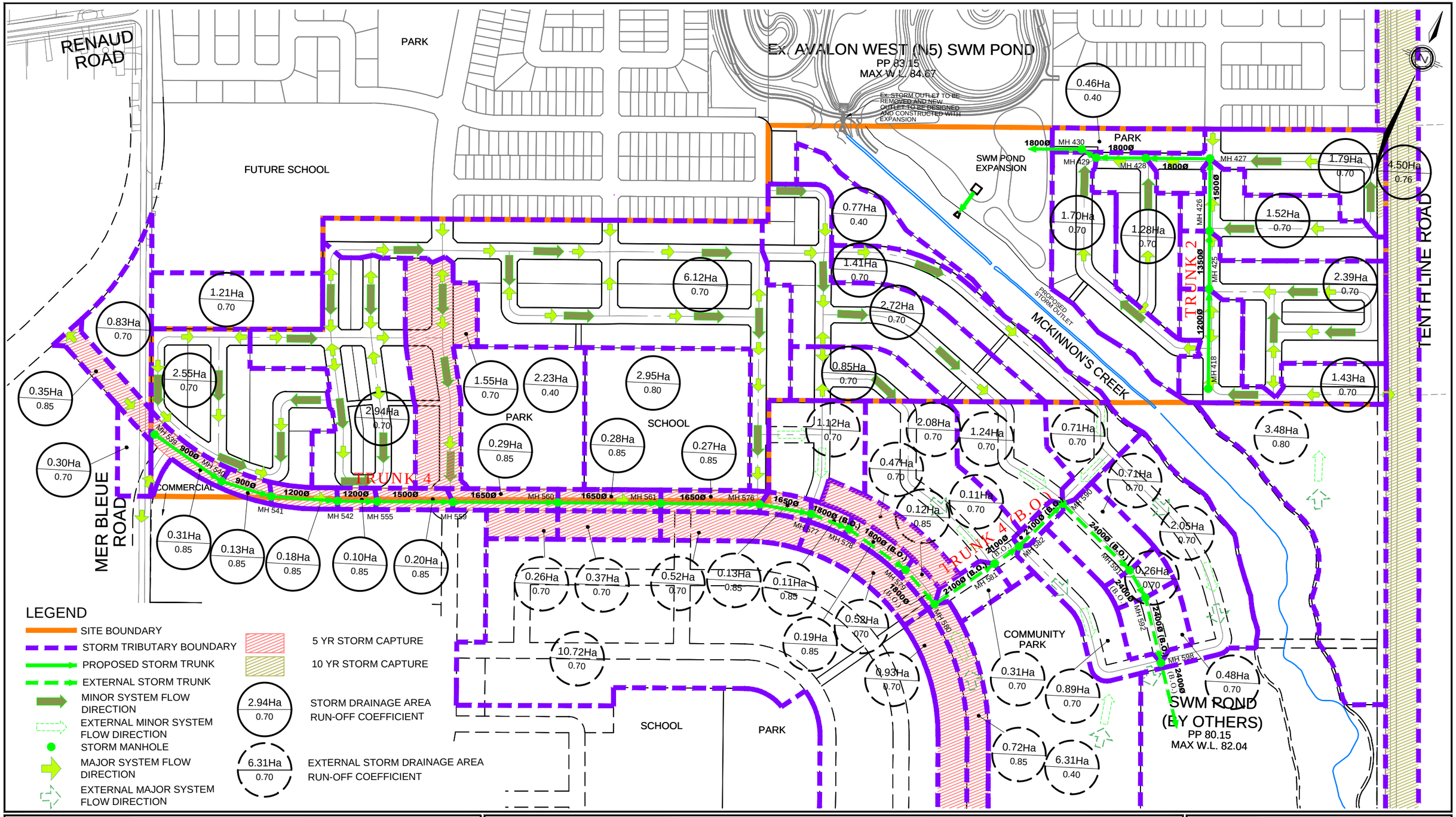

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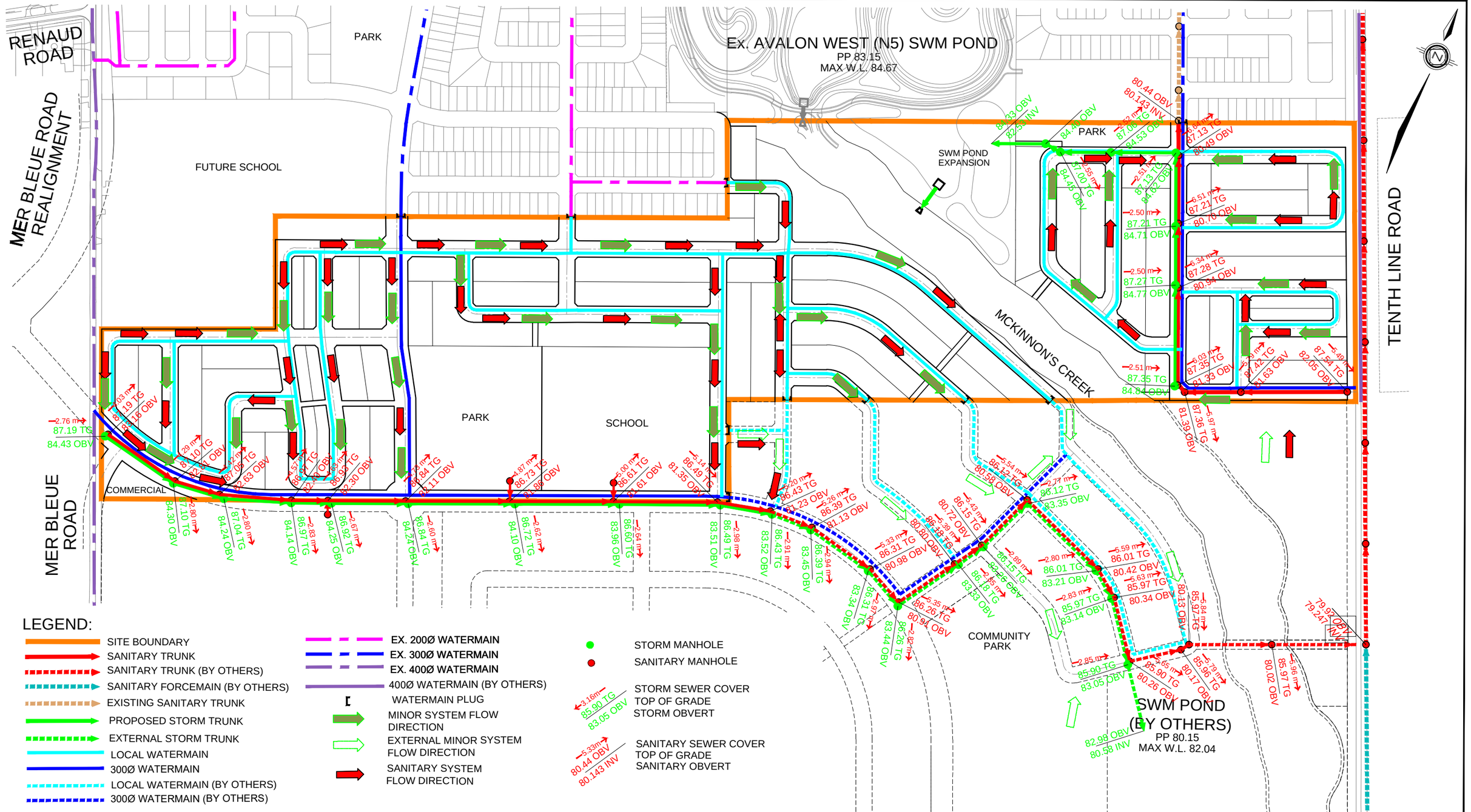
SUMMERSIDE WEST PHASES 4, 5 & 6
STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:4000
DATE:	MAY 2018
FIGURE:	5



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SUMMERSIDE WEST PHASES 4, 5 & 6
COMPOSITE SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:4000
DATE:	MAY 2018
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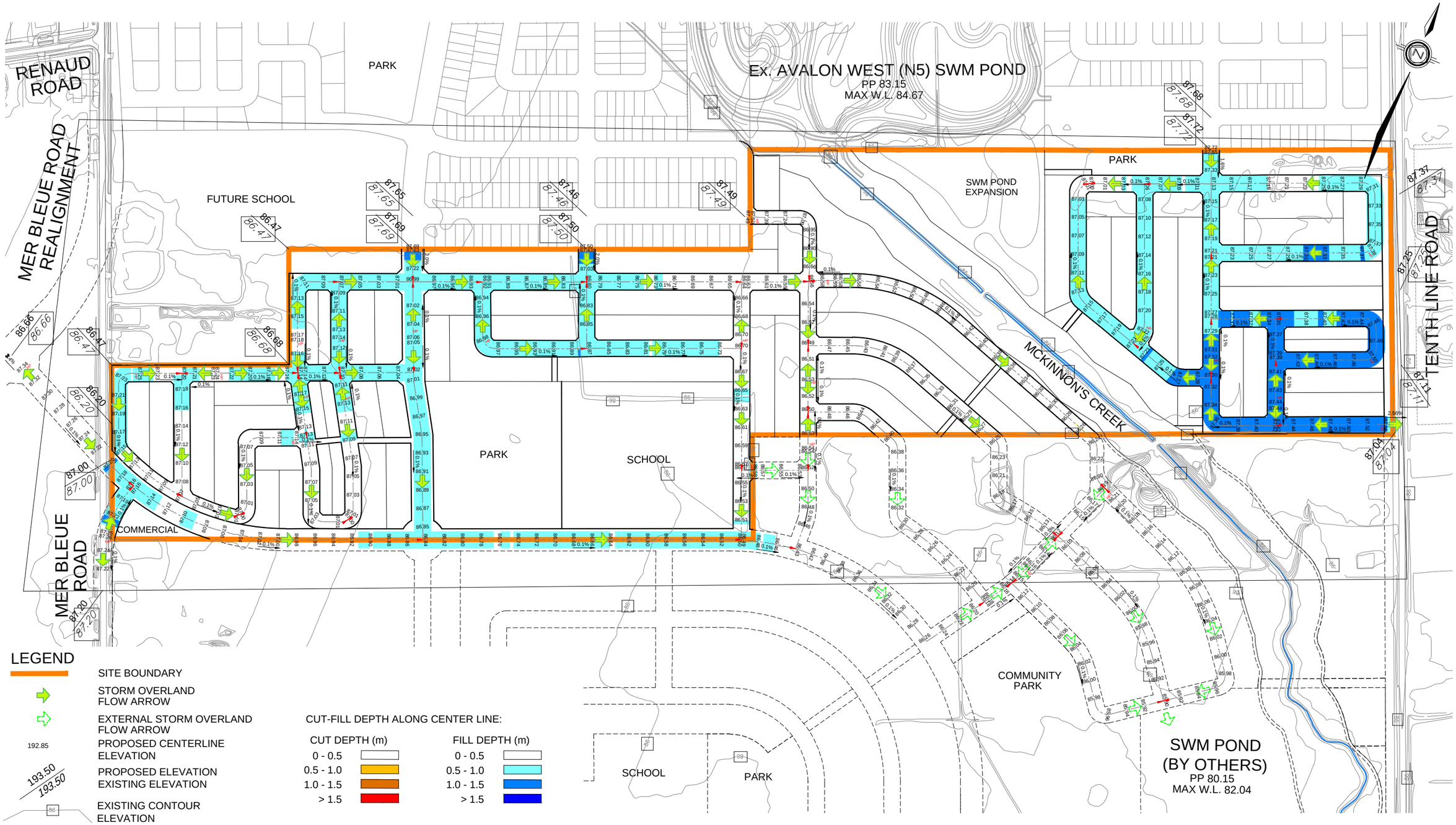

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SUMMERSIDE WEST PHASES 4, 5 & 6
PRELIMINARY GRADING PLAN
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:4000
DATE:	MAY 2018
FIGURE:	7

APPENDIX A

PRE-CONSULTATION MEETING MINUTES

FINAL

February 28, 2017

Summer Side West – Phase 4 & 5 meeting

Present: Shoma Murshid, Asad Yousfani, Taavi Siitam, Sami Rehman, Mark Young, Max Walker, Isaac Wong, Alain Miguelez, Julie Lebrun, Frank Cairo, Christopher Gordon, Sarah Button, Vicky Villeneuve, Jillian Normand, Micaela Butron-Gutierrez, Julie Carrara, Jeff McEwen;

Regrets: Mark Richardson, Ingrid Coney, Michael Boughton, Wendy Tse, William Curry; Andrew Finnson

- ACTION ITEMS

Community Design Plan (CDP) background detailed by Taavi Siitam. CDP Concept plan has been evolving over the last one and half years. So, demonstration concept plan has changed from that available on City website which shows the December 2015, open house version. Modifications have continued to take place, for example, since November 2016 when the last full landowners meeting was held and in January/February of this year. We need to review those changes and have them reflected in the draft subdivision plan for Summerside West Phase 4 and 5. Mer Bleue Expansion CDP and related OP amendment approval at Planning Committee were originally estimated to be Q1 2017 but have now been re-targeted for early Q2 2017 until issues primarily related to geo-fluvial, geotechnical (Grade raise constraints and hydraulics), McKinnon's Creek headwater issue (SNCA), and the Drainage Act process are resolved.

Concern was raised by City Staff that client was ready to invest so much, in terms of development application submission requirements for the Zoning By-law Amendment and Subdivision applications, before CDP/OP Amendment was Council approved. CDP Project (and OP amendment) is still in review mode and has yet to be approved.

Client recognised and appreciates our concerns and embraces the opportunity to meet and discuss.

Client would like to see a concept plan dialogue format that will be facilitated. Alain Miguelez recommends that key team stakeholders be involved in a series of focus group discussions to resolve each of the following topics (per focus group):

- McKinnons Creek and the public street along it and street network
- School sites
- Parks and the possibility to return some of the dry pond areas to development
- Street layout issues including how to configure back-to-back blocks.
- Location of various types of dwelling types

Stakeholders should, for example, include:

- BBSS
- OC Transpo / LRT
- School Boards
- Development Review Branch
- Parks

School boards are actively involved at BBSS due to their operational requirements.

Copy of the Summerside draft subdivision plan provided to attendees of this meeting. Wendy Nott has been provided a lot of the policy requirements from Alain and Taavi in order to revise the draft concept for the CDP and this should be reflected in the draft subdivision plan.

- Taavi will forward to Shoma Murshid the chain of discussions that took place with Urban Designers.
- Area to the north of Summerside West Ph 4 and 5, subdivision (registration) has been approved but several changes were not made to accommodate School Boards operational requirements or aligned with principles of the CDP or BBSS. Under this current subdivision's concept plan and overall CDP, we must maximize all frontage options for school blocks.
- Where there are back lots and side lots along proposed collectors, have these residential lots re-oriented to face/front (front yards) onto the collector...
- Focus on achieving more of a grid pattern throughout this area in order to maximize unit output and minimize suburban circuitous routes.
- Mixing up narrow width lots with wide width lots on the same block maximizes on-street parking potential.
- Single loading along McKinnon's Creek, with a ROW abutting the creek, to create community identify and improve use/safety.
- Repetition of narrow lots – issues with parking

Julie Cararra mentioned that CDP is a high level exercise of land use planning but from this current discussion that policy (Alain and Taavi) are presenting, there seems to be specific details that must be heeded at the subdivision draft plan stage. Carrarra's question: is the City changing the role of a CDP's level of detail into draft planning subdivisions? Answer: The BBSS principles are being worked into the Mer Bleue Area CDP.

Client: detailing plan around single loading / concern around concept, this would be challenging for all of us to achieve an excellent final product.

CDP approvals targeting – May / June 2017 to Planning Committee / pushing for Council approval.

- Master Servicing Study has outstanding issues with Headwater/SNCA (geofluvial peer review almost complete)
- Geotechnical (peer review almost complete)
- Environmental Master Plan is currently being conducted – which will further detail setback requirements to McKinnon's Creek and refine scope of the required EIS under subdivision process.
- Drainage Act (average 2 year process), and must be completed before Draft Plans of Subdivision applications can be approved.
- CDP concept Plan is still evolving meanwhile does not match this proposal – implementation of BBSS is required. The current concept plan for this subdivision does not depict the BBSS principles.

-Some of the parks that are shown on the subdivision's concept draft plan may be superfluous to City requirements (i.e. the southwest parkette), but without the CDP or the Master Servicing Studies being completed, identification of appropriate location and size of parks and information on how to design the parks and its resulting parks management plan within this subdivision cannot be informed. Therefore, CDP must be completed/approved first.

-OC Transpo – must be involved to ensure smooth transition service provided and wants client to ensure there is a vehicular or pedestrian connection between the two proposed phases within this draft plan of subdivision.

Mattamy wants to get subdivision and zoning by-law amendment applications filed with City in order to begin receiving comments to expedite timelines. Mattamy would like the subdivision and zoning by-law amendment applications deemed complete immediately following CDP approval/OP Amendment.

Concept Plan:

- Increase school block (OCSB) and park frontages along ROWs: Remove residential lots along north side of OCSB elementary school; Have unobstructed street frontage for CEPEO high school on its southern boundary (to facilitate school bus drive in and drop off)
- Move towards adding more public access to McKinnons Creek; Mattamy is arguing that there is not that much value to having a single loaded road in this location given that the Creek is not a typical river, like it is downstream. They have created vistas in the concept plan instead.
- Alain Miguelez noted that the Back to back blocks along Tenth Line and the townhouse blocks in the other sections of draft plan should be reconfigured, however, Mark Young indicated that the proposed layout is good design as it allows for street parking adjacent to the Tenth Line ROW and the back-to-backs prevent the need for a noise wall.
- Ensure there are pedestrian and biking connection throughout subdivision, especially towards park and school blocks

Taavi brought up that the Drainage Act needs to be approved prior to the OPA amendment/CDP approval. F. Cairo clarified that Drainage Act approval is not required for the proposed Phase 4 area of this subdivision as it will use the existing stormwater facility.

Policy has recommended that several focus groups are required to refine the Summerside West Phases 4 and 5 concept plan and prior to Development Services Unit being able to provide the final list of plans and reports required for Subdivision/Zoning submission packages. The focus group is to be composed of subject matters experts and Development Services Unit to discuss the concept design, keeping in mind BBSS initiatives and marketing issues.

OC Transpo (Max Walker) provided a comment that Phase 4 and 5 need road, or at the very least, pedestrian connections, over MacKinnon's Creek.

Some of the Required Studies:
EIS –scope still to be determined, species at risk component will be required, though.
Archeological Assessment – N.B. Not required
Transportation Impact Assessment / Including Area Traffic Management requirements – scope to be determined; TIA has been submitted in support of CDP (Dillon or Justin Dade IBI)
Geotechnical Study –scope to be confirmed
Functional Servicing Report's scope will be established once MSS is completed

The City is open to have more discussion meanwhile we must follow high level principles.

Client was made aware that the required studies and plans to deem the Zoning Amendment and Subdivision applications complete would be identified down the road after the focus group meetings refined the draft subdivision plan, based on the details from 'close to finalization' of the Mer Bleue CDP, master servicing and EMP.

Suggestion to provide to client other studies that was made in the past in the development area;

- Shoma to provide, if & when possible.

Next Steps:

- Policy to schedule the first focus group meeting at the end of March 2017 with certain key members (focus group). McKinnons Creek street frontage was suggested as first topic.
- Suggestion from City to have on board other team members (planning and marketing) from client's firm – opportunity for innovation.
- Draft Plan of Subdivision to be processed as soon as the CDP, Master Servicing and EMP details are more firm*** high level of priority; knowing that final approval is dependent on the completion and approval of the Drainage Act process.
- Shoma will provide a list of studies, reports and subdivision and zoning categories plus applicable City fees, after the draft subdivision concept plan aligns closer to the final CDP and MSS and EMP.

  Other note: Frank Cairo, during several instances throughout the meeting, expressed his desire to have the list of studies, reports and City fees identified for the specific categories of the Zoning Amendment and Subdivision applications. City staff expressed they would provide these to the best of their ability now, i.e. what is typically required, with the caveat that the CDP process, and what it will recommend, has not be completed yet so it's possible some items could be added or modified.

APPENDIX B

EXISTING APPROVALS

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 9069-A4YR6E
Issue Date: December 8, 2015

Mattamy (Mer Bleue) Limited
50 Hines Road, Suite 100
Ottawa, Ontario
K2K 2M5

Site Location: Summerside West Subdivision, Phase 1
2496 Tenth Line Road
City of Ottawa, Ontario

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

sanitary and storm sewers to be constructed in the City of Ottawa, as follows:

- sanitary sewers on Sweetvalley Drive (from Station 0+002.010 to Station 0+440.000), Maroma Street (from Station 0+000.000 to Station 0+050.780), Broadleaf Street (from Station 0+000.000 to Station 0+147.775), Astervale Street (from Station 0+000.000 to Station 0+133.239), Mandalay Street (from Station 0+000.000 to Station 0+180.520), Sweetfern Crescent (from Station 0+000.000 to Station 0+304.890), Casa Grande Circle (from Station 0+000.000 to Station 0+484.090), Block 166 (from Station 0+000.000 to Station 0+042.000), Block 168 (from Station 0+005.680 to Station 0+047.770), Untravelled Road Allowance (from Station 0+732.560 to Station 1+625.000) and Untravelled Road Allowance (from Station 0+000.000 to Station 1+018.500); and
- storm sewers on Sweetvalley Drive (from Station 0+033.930 to Station 0+102.059 and from Station 0+145.435 to Station 0+440.700), Broadleaf Street (from Station 0+001.990 to Station 0+149.770), Astervale Street (from Station 0+002.280 to Station 0+131.250), Mandalay Street (from Station 0+002.210 to Station 0+180.000), Sweetfern Crescent (from Station 0+001.990 to Station 0+172.650), Casa Grande Circle (from Station 0+002.280 to Station 0+485.010), Block 165 (form Station 0-003.000 to Station 0+025.090), Block 167 (from Station 0+002.070 to Station 0+061.560), Pond Block (from Station 0+001.000 to Station 0+065.715) and Untravelled Road Allowance (from Station 1+227.000 to Station 1+660.800);

all in accordance with the application from Mattamy (Mer Bleue) Limited, dated November 17, 2015, including final plans and specifications prepared by David Schaeffer Engineering Ltd.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 4559-9Y3JNZ

issued on July 13, 2015

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 8th day of December, 2015

Gregory Zimmer, P.Eng.
Director

appointed for the purposes of Part II.1 of the
Environmental Protection Act

YH/

c: District Manager, MOECC Ottawa District Office
M. Rick O'Connor, Clerk, City of Ottawa
Charles Warnock, P.Eng., Program Manager, City of Ottawa (File No. D07-16-14-0011)
Linda Carkner, Program Manager, Infrastructure Services, City of Ottawa
Jennifer Ailey, P.Eng., David Schaeffer Engineering Ltd.

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 7375-A8QGEU
Issue Date: April 12, 2016

City of Ottawa
800 Green Creek Drive
Ottawa, Ontario
K1J 1K6

Site Location: Tenth Line Pump Station
2428 Tenth Line Road
Lot Pt. 3, Concession 11
Geographic Township of Cumberland
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

amendment to the wastewater infrastructure Works to include modifications in an existing sewage Works (identified under "Previous Works"), consisting of sanitary sewer, sewage pumping station and forcemain as follows:

Proposed Works:

Revisions to the Tenth Line Pump Station, consisting of the following:

- revised tributary drainage area to include the addition of 32 hectares (ha) of Mattamy Summerside West Lands, 23 ha of Minto Urban Expansion Lands and 15.6 Ha of future development lands (Mer Blue Expansion Area 10);

- installation of a new reversed slope 1050 mm diameter concrete sanitary overflow pipe (from Station 0+000.000 to Station 0+036.141) connecting existing sanitary MH 10128 to proposed storm MH 700, discharging overflow to the existing Avalon West (N5) Stormwater Management Pond;

- installation of a new 2400 mm diameter monitoring manhole for access to a velocity-area type flow meter for overflow monitoring that is connected to the sanitary pumping station and the City of Ottawa SCADA network;

- installation of an ultrasonic depth sensor in the existing sanitary MH 10128 that is connected to the sanitary pumping station and the City of Ottawa SCADA network;

- decommissioning of existing overflows from sanitary MH 512 on Harvest Valley Avenue, sanitary MH 284 on Frank Cauley Way and Sanitary MH 100A at the intersection of Brian Coburn Boulevard and Strasbourg Street;

Previous Works:

Inlet Gravity Sanitary Sewer

A 675 mm diameter inlet gravity concrete sanitary sewer constructed on Tenth Line Road servicing Avalon South Subdivision (N4), from Street 31 (80 m south of the pump station) and a stubbed section of gravity sewer for future connection from Neighbourhood 5 (N5) and the Bilberry Creek Industrial Park (BCIP);

Sewage Pump Station

A sanitary sewage pump station with a rated firm capacity of 425 L/s constructed to serve the N4, N5, and the BCIP, comprising of an in-ground cast-in-place wet well located on East side of Tenth Line Road, 2000 m south of Innes Road consisting of the following:

- A cast-in-place bypass chamber located immediately upstream of the wetwell, equipped with two (2) aluminium air vents, flushing connection, isolation valve, pump rails, and process piping;

- Sewage in-flow to the wetwell is directed through an aluminium trash basket;

- A cast-in-place wetwell equipped with three (3) 45 kW (60 HP) submersible pumps (two duty and one standby) of the non-clog type, each pump is capable of pumping up to 170 L/s in the smallest forcemain at 20 m TDH, complete with soft starters, an ultrasonic transducer for liquid level measurement and pump control together with a Multitrode sensor as backup;

- The wetwell is equipped with two (2) aluminum vents, complete with bird screens and one (1) external blower for ventilation;

- The valve room located in the basement is equipped with a common header, which splits into two forcemains (300 mm and 400 mm), equipped with two (2) electromagnetic flow meters, pressure surge relief valve, and swab launcher for forcemain cleaning;

- A 200 kW diesel engine generator set for standby power during emergencies located within the existing above ground control building, including a 1250 L capacity fuel storage facility located with a spill containment area;

- An offsite overflow connection located at the intersection of Street 6 and Street 31 from sanitary sewer (SAMH511) to the storm sewer (STMH543) with an emergency overflow float alarm at the wetwell;

- The control building has electrical and control equipment, including a new Supervisory Control and Data Acquisition (SCADA) system;

- The station is equipped with a 100 mm diameter watermain complete with backflow prevention for washroom facilities; yard hydrant and flushing connection in the bypass chamber constructed 300 mm above the overflow elevation;

Sewage Forcemains

Two parallel polyvinyl chloride (PVC) sanitary forcemains, 300 mm and 400 mm diameter, constructed from the control building to the west side of Tenth Line Road. The forcemains convey flow north 300 m to Street 45 (Vista Park Drive) in the Avalon South Subdivision, where the sewage outlets to a gravity trunk sewer;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

All in accordance with the submitted Environmental Compliance Approval (ECA) application dated (1) March 03, 2016, including all other supporting documents prepared by David Schaeffer Engineering Ltd., and (2) dated July 5, 2005, including all other supporting documents prepared by Stantec Consulting Limited, forming part of this approval.

For the purpose of this environmental compliance approval, the following definitions apply:

"Act" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

"E. Coli" refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"Emergency Situation" means a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the Sewage Pumping Station or an unforeseen flow condition that may result in:

a) danger to the health or safety of any person; or
b) injury or damage to any property, or serious risk of injury or damage to any property.

"EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

"Event" in the context the Sewage Pumping Station located outside the Sewage Treatment Plant, means an

action or occurrence, at the Sewage Pumping Station that causes a Sewage Pumping Station Overflow. An Event ends when there is no recurrence of a Sewage Pumping Station Overflow in the 12-hour period following the last Sewage Pumping Station Overflow. Two Events are separated by at least 12 hours during which there has been no recurrence of a Sewage Pumping Station Overflow;

"Limited Operational Flexibility" (LOF) means the Modifications that the Owner is permitted to make to the Works under this Approval;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Notice of Modifications" means the form entitled “Notice of Modifications to Sewage Works” included in Schedule "A";

"Owner" means City of Ottawa and includes its successors and assignees;

"Previous Works" means those portions of the sewage Works previously approved under an Approval;

"Professional Engineer" means a person entitled to practise as a Professional Engineer in the Province of Ontario under a licence issued under the Professional Engineers Act;

"Sewage Pumping Station Overflow" means any discharge from a Sewage Pumping Station located outside the Sewage Treatment Plant that does not undergo any treatment or only receives partial treatment before it is discharged to the environment;

"Substantial Completion" has the same meaning as “substantial performance” in the Construction Lien Act;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(3) Where there is a conflict between a provision of any submitted document referred to in this Approval

and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B17 shall be included in the notification to the Director;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the Director.

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the Substantial Completion of the Works, the Owner shall prepare a statement, certified by a Professional Engineer, that the Works are constructed in accordance with this Approval, and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within **one (1) year** of the Substantial Completion of the Works, a set of as-built drawings showing the Works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works for the operational life of the Works.

5. SEWAGE PUMPING STATION OVERFLOW

(1) Any Sewage Pumping Station Overflow is prohibited, except:

(a) in an Emergency Situation;

(b) where the Sewage Pumping Station Overflow is a direct and unavoidable result of a planned maintenance procedure, the Owner notified the Water Supervisor **fifteen (15) days** prior to the Sewage Pumping Station Overflow and the Water Supervisor has given written consent of the Sewage Pumping Station Overflow; or,

(c) where the Sewage Pumping Station Overflow is planned for research or training purposes, the discharger notified the Water Supervisor **fifteen (15) days** prior to the Sewage Pumping Station Overflow and the Water Supervisor has given written consent of the Sewage Pumping Station Overflow.

(2) The Owner shall forthwith notify the Spills Action Centre (SAC) at 1-800-268-6060 or e-mail at moe.sac.moe@ontario.ca and the Medical Officer of Health of every Sewage Pumping Station Overflow Events. This notice shall include, at a minimum, the following information:

(a) the date and time at which the Event(s) started,

(b) duration of the Event(s);

(c) the location of the Event**(s)**;

(d) the measured or estimated volume of the Event(s) (unless the Event(s) is/are ongoing); and

(e) the reason for the Event (s).

(3) The Owner shall submit Sewage Pumping Station Overflow Event Reports to the Ministry's local office on an Annual basis, no later than forty-five (45) days following the end of the calendar year covered by the Event Report. Event Reports may be in an electronic format specified by the Ministry. In each Event Report the Owner shall include, at a minimum, the following information on any Event(s)

that occurred:

(a) the date and time at which the Event(s) started,

(b) duration of the Event(s);

(c) the location of the Event**(s)**;

(d) the measured or estimated volume of the Event(s) (unless the Event(s) is/are ongoing); and

(e) the reason for the Event(s).

(4) The Owner shall use best efforts to collect a representative sample consisting of a minimum of two (2) grab samples of the Sewage Pumping Station Overflow and have it analysed for parameters outlined in Table 1 of Condition 7 (2) using the protocols specified in Condition 7 (3), one at the beginning of the Event and the second approximately near the end of the Event, to best reflect the effluent quality of such Sewage Pumping Station Overflow.

(5) The Owner shall maintain a record of all Sewage Pumping Station Overflow(s), which shall contain, at a minimum, the types of information set out in Condition 5 (2 a) to 5 (2 e) in respect of each Sewage Pumping Station Overflow.

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval and the Act and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual within **six (6) months** of Substantial Completion of the Works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and

procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the Water Supervisor; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

7. MONITORING AND RECORDING

The Owner shall, upon the issuance of this Approval, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analysed for each parameter listed and all results recorded:

Table 1 - Monitoring during a Sewage Pumping Station Overflow Event (Samples to be collected from the Sewage Pumping Station Overflow stream near the Sewage Pumping Station)	
Sample Type	Grab
Parameters	BOD5, Total Suspended Solids, Total Phosphorus, E. Coli

(3) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

8. REPORTING

(1) **Fifteen (15) days** prior to the date of a planned Sewage Pumping Station Overflow being conducted pursuant to Condition 5 and as soon as possible for an unplanned Sewage Pumping Station Overflow, the Owner shall notify the Water Supervisor in writing of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the Sewage Pumping Station Overflow.

(2) In addition to the obligations under Part X of the Environmental Protection Act, (which includes contacting the Spills Action Centre (SAC) at 1-800-268-6060 or e-mail at moe.sac.moe@ontario.ca), the Owner shall, within **ten (10) working days** of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, Bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, (with the exception of a sanitary sewage discharged during an Event), submit a full written report of the occurrence to the Water Supervisor describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(3) The Owner shall prepare and submit a report to the Water Supervisor on an annual basis. The reports shall contain the following information:

(a) a copy of all Notice of Modifications submitted to the Water Supervisor as a result of Schedule A, Section 1 (Limited Operational Flexibility) with a status report on the implementation of each modification;

(b) a report summarizing all modifications completed as a result of Schedule A, Section 3.

9. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works", included under Schedule A of this Approval, as amended.

(2) Sewage works proposed under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the Works that result in an increase of the Rated Capacity of the Works;

(b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall;

(c) Modifications to the Works approved under s.9 of the EPA, and

(d) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, as deemed necessary in consultation with the Water Supervisor, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any alteration made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with including those arising from the Environmental Protection Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, Lake Simcoe Protection Act and Greenbelt Act.

(8) Prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the Water Supervisor.

10. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and erosion control measures.

11. RECORD KEEPING

(1) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

SCHEDULE 'A'

Limited Operational Flexibility Criteria for Modifications to Sewage Works

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Adding or replacing equipment where new equipment is located within an existing sewage pumping station site, provided that the facility Rated Capacity is not exceeded and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:
   i. any effluent from the pilot system is discharged to the inlet of the sewage pumping station or hauled off-site for proper disposal,
   ii. any effluent from the pilot system discharged to the inlet of the sewage pumping station or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
   iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and Water Supervisor three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are not required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Ontario
Ministry of
the Environment

Notice of Modification to Sewage Works

RETAIN COPY OF COMPLETED FORM AS PART OF THE ECA AND SEND A COPY TO THE WATER SUPERVISOR (FOR MUNICIPAL) OR DISTRICT MANAGER (FOR NON-MUNICIPAL SYSTEMS)

Part 1 – Environmental Compliance Approval (ECA) with Limited Operational Flexibility

(Insert the ECA's owner, number, issuance date and notice number, which should start with "01" and consecutive numbers thereafter)

ECA Number	Issuance Date (mm/dd/yy)	Notice number (if applicable)

ECA Owner	Municipality

Part 2: Description of the modifications as part of the Limited Operational Flexibility

(Attach a detailed description of the sewage works)

Description shall include:
1. A detail description of the modifications and/or operations to the sewage works (e.g. sewage work component, location, size, equipment type/model, material, process name, etc.)
2. Confirmation that the anticipated environmental effects are negligible.
3. List of updated versions of, or amendments to, all relevant technical documents that are affected by the modifications as applicable, i.e. submission of documentation is not required, but the listing of updated documents is (design brief, drawings, emergency plan, etc.)

Part 3 – Declaration by Professional Engineer

I hereby declare that I have verified the scope and technical aspects of this modification and confirm that the design:
1. Has been prepared or reviewed by a Professional Engineer who is licensed to practice in the Province of Ontario;
2. Conforms with the Limited Operational Flexibility as per the ECA;
3. Has been designed consistent with Ministry's Design Guidelines, adhering to engineering standards, industry's best management practices, and demonstrating ongoing compliance with s.53 of the Ontario Water Resources Act; and other appropriate regulations.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name (Print)	PEO License Number

Signature	Date (mm/dd/yy)

Name of Employer

Part 4 – Declaration by Owner

I hereby declare that:
1. I am authorized by the Owner to complete this Declaration;
2. The Owner consents to the modification; and
3. These modifications to the sewage works are proposed in accordance with the Limited Operational Flexibility as described in the ECA.
4. The Owner has fulfilled all applicable requirements of the *Environmental Assessment Act*.

I hereby declare that to the best of my knowledge, information and belief the information contained in this form is complete and accurate.

Name of Owner Representative (Print)	Owner representative's title (Print)
Owner Representative's Signature	Date (mm/dd/yy)

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the Works are constructed in accordance with the Approval and that record drawings of the Works "as constructed" are maintained for future references.

5. Conditions 5 and 7 are included to indicate that Sewage Pumping Station Overflow of untreated and/or partially treated sewage to the environment is prohibited, save in certain limited circumstances where the failure to do so could result in greater injury to the public interest than the Sewage Pumping Station Overflow itself, or where the Sewage Pumping Station Overflow can be limited or otherwise mitigated by handling it in accordance with an approved contingency plan. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the *Owner* is aware of the extent and frequency of Sewage Pumping Station Overflow Event(s).

6. Condition 6 is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works.

7. Condition 8 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

8. Condition 9 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These conditions are also included to ensure that a Professional Engineer has reviewed

the proposed Modifications and attests that the Modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed Modifications comply with the Ministry's requirements stipulated in the terms and conditions of this Approval, Ministry policies, guidelines, and industry engineering standards and best management practices.

9. Condition 10 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

10. Condition 11 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 6338-6EVJJ8 issued on August 3, 2005

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 12th day of April, 2016

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MS/

c: District Manager, MOECC Ottawa office
Water Supervisor, MOECC Ottawa Office
Jennifer Ailey, David Schaeffer Engineering Ltd.
Charles Warnock, City of Ottawa
Linda Carkner, Program Manager, City of Ottawa, Infrastructure Services

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 1339-A28J6Z
Issue Date: October 2, 2015

Minto Communities Inc.
180 Kent St, No. 200
Ottawa, Ontario
K1P 0B6

Site Location: Avalon West, Neighbourhood 5
Lot 2 and 3, Part of Lot 4, Concession 11 (Cumberland)
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

an amendment of the stormwater management Works located between Mer Bleue Road and Tenth Line Road, south of Innes Road and the Hydro Easement, serving the Avalon West Neighbourhood 5 residential subdivision in the East Urban Community of the City of Ottawa, providing Enhanced Level water quality control and erosion protection and attenuating post-development peak flows to pre-development levels for all storm events up to and including the 100-year storm event, to increase the drainage area discharging to the existing Avalon West Neighbourhood 5 Pond to accommodate stormwater run-off from an additional approximately 32 hectares from the Mattamy Summerside West Subdivision located to the east of the Avalon West Neighbourhood 5 Pond, south of Brian Coburn Boulevard, west of Tenth Line Road, and draining via McKinnon's Creek, and the South Nation River to the Ottawa River, consisting of the following:

Proposed Works:

stormwater management facility (Avalon West Neighbourhood 5 Pond - catchment area 329.54 hectares):
- an increase in the drainage area discharging to the existing Avalon West Neighbourhood 5 wet pond, having two (2) sediment forebays, a permanent pool volume of 110,786 m^3, an extended detention volume of 23,213 m^3 and a total storage volume of approximately 221,900 m^3, including the permanent pool volume, at a total depth of approximately 3.73 m for the 100 year storm event, receiving inflow from the existing Avalon West Neighbourhood 5 Western Trunk Storm Sewer and the Avalon West Neighbourhood 5 Eastern Trunk Storm Sewer, and discharging via McKinnon's Creek and the South Nation River to the Ottawa River;

Previous Works:

stormwater management facility (Avalon West Neighbourhood 5 Pond - catchment area 297.7 hectares): - one (1) wet pond with two (2) sediment forebays, having a permanent pool volume of 110,786 m^3, an extended detention volume of 19,363 m^3 and a total storage volume of approximately 221,900 m^3, including the permanent pool volume, at a total depth of approximately 3.6 m for the 100 year storm event, receiving inflow from the existing Avalon West Neighbourhood 5 Western Trunk Storm Sewer and the Avalon West Neighbourhood 5 Eastern Trunk Storm Sewer, and discharging to McKinnon's Creek;

grassed swale: - a 300 m long grassed conveyance ditch constructed on municipal land from the outlet of the existing Western Trunk Storm Sewer, designed to accommodate the run-off up to the 100-year storm event from a catchment area of 6.59 hectares, having a maximum ponding depth of 1.61 m, a bottom width of 1 m, a top width of 24 m, and 3:1 side slopes, complete with an inlet rip-rap lined 20 m long and 10 m wide plunge pool, discharging to the sediment forebay of the stormwater management facility;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted supporting documents listed in Schedule "A" forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"Director" means a person appointed by the Minister pursuant to section 5 of the Environmental Protection Act for the purposes of Part II.1 of the Environmental Protection Act;

"District Manager" means the District Manager of the Ottawa office of the Ministry;

"Ministry" means the ministry of the government of Ontario responsible for the Environmental Protection Act and the Ontario Water Resources Act and includes all officials, employees or other persons acting on its behalf;

"Owner" means Minto Communities Inc. and includes their successors and assignees;

"Previous Works" means those portions of the sewage Works previously approved under an Approval;

"Water Supervisor" means the Water Supervisor of the Ottawa office of the Ministry;

"Works" means the sewage works described in the Owner's application(s) and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the Conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) The designation of the City of Ottawa as the operating authority of the site on the application for approval of the Works does not relieve the Owner from the responsibility of complying with any and all of the Conditions of this Approval.

(3) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, and the application for approval of the Works.

(4) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(5) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(6) The Conditions of this Approval are severable. If any Condition of this Approval, or the application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such Condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(7) The issuance of, and compliance with the Conditions of this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

(8) This Approval includes the treatment and disposal of stormwater run-off from approximately 329.54

hectares of existing and proposed development draining to the Avalon West Neighbourhood 5 Pond, assuming an average imperviousness of 42%, including approximately 103.4 hectares of external undeveloped land located to the west of Mer Bleue Road. Any changes within the drainage areas that might increase the flows to or from the stormwater management facility or any structural/physical changes to the stormwater management facility including the inlets or outlets will require an amendment to this Approval.

2. EXPIRY OF APPROVAL

(1) This Approval will cease to apply to those parts of the Works which have not been constructed within **five (5) years** of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B17 shall be included in the notification to the District Manager;

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, other than a change in ownership to the municipal, i.e. assumption of the Works, the Owner shall notify the succeeding owner in writing of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager and the Director.

(3) Notwithstanding any other requirements in this Approval, upon transfer of the ownership of the Works to a municipality, if applicable, any reference to the "District Manager" within the Terms and Conditions of this Approval shall be replaced with "Water Supervisor".

4. OPERATION AND MAINTENANCE

(1) The Owner shall ensure that the design minimum required liquid retention volume in the permanent pool is maintained at all times.

(2) The Owner shall inspect the Works at least **once a year** and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(3) The Owner shall maintain a record of the results of these inspections and identify any cleaning and maintenance operations undertaken, and shall make the record available for inspection by the Ministry. The record shall include the following:

(a) the name of the Works; and

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed.

5. MONITORING AND REPORTING

(1) The Owner shall carry out a monitoring program and evaluate the performance of the stormwater management Works commencing at the initial completion of construction of the Works.

(2) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent streams over the time period being monitored.

(3) Samples shall be collected and analysed at the following sampling points, at the sampling frequencies and using the sample type specified for each parameter listed:

Table 1 - Stormwater Inflow Monitoring (Samples to be collected at the eastern and western first flush inlet structures to the Avalon West Neighbourhood 5 Pond)	
Frequency	Four (4) wet* rainfall events during the period between April 15 and September 15 of each calendar year
Sample Type	Composite**
Parameters	Total Suspended Solids (mg/L) and Total Phosphorus (mg/L)

* A wet rainfall event is defined as a minimum of 15 mm or rain in the previous 24 hours.
** A composite blend of at least four (4) equal volume grab samples of influent flow, with collection of the aliquots distributed throughout the duration of the rainfall event.

Table 2 - Stormwater Effluent Monitoring (Samples to be collected at the rip rap protected outlet zone of the Avalon West Neighbourhood 5 Pond)	
Frequency	Four (4) wet* rainfall events during the period between April 15 and September 15 of each calendar year
Sample Type	Composite**
Parameters	Total Suspended Solids (mg/L) and Total Phosphorus (mg/L)

* A wet rainfall event is defined as a minimum of 15 mm or rain in the previous 24 hours.
** A composite blend of at least four (4) equal volume grab samples of influent flow, with collection of the aliquots distributed throughout the duration of the rainfall event.

(4) The methods and protocols for sampling, analysis, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

(5) The Owner shall submit to the District Manager, **every year**, a copy of the test results as per Condition 5, Subsection (3), above.

(6) The Owner shall submit to the District Manager, **every five (5) years**, a Performance Assessment Report addressing the following:

(a) a description of any operating problems encountered and corrective actions taken during the reporting period and the need for further investigations in the following reporting period for system refinements or ways of improving the performance of the Works;

(b) measurement of the mass of accumulated sediment removed when undertaking maintenance of the Works as per Condition 4, Subsection (3), above;

(7) The measurement frequency specified in Condition 5, Subsection (3) and reporting frequency specified in Condition 5, Subsections (5) and (6), above, may, **after five (5) years** of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(8) The Owner shall copy the District Manager on any and all reports submitted to the City of Ottawa and/or the South Nation Conservation Authority related to the monitoring and maintenance program for the Works.

6. TEMPORARY EROSION AND SEDIMENT CONTROL

(1) The Owner shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every **two (2) weeks** and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

(2) The Owner shall maintain records of inspections and maintenance which shall be made available for inspection by the Ministry, upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures, if any, undertaken to maintain the temporary sediment and

erosion control measures.

7. RECORD KEEPING

The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the operation and maintenance activities required by this Approval.

Schedule "A"

1. Application for Approval of Municipal and Private Sewage Works, dated August 13, 2007, with cover letter and Attachments 2, 3, and 4 from Charles Warnock, Program Manager, Infrastructure Approvals, City of Ottawa, dated October 4, 2007 and received on October 9, 2007;

2. Taggart Realty Management: Neighbourhood 5 - East Urban Community Interim Stormwater Management Report, prepared by IBI Group, dated July 2007 and received on August 14, 2007;

3. Set of engineering drawings for Neighbourhood 5 Interim SWM Facility, (Contract No. 12130), prepared by IBI Group, dated July 2007;

4. Revised Drawing No. 100A, Neighbourhood 5 Interim SWM Facility, (Project No. 12130), prepared by IBI Group, dated April 7, 2008;

5. Letter from Robert W. Wingate of IBI Group to the Ministry, dated November 9, 2007;

6. Letter from Peter Deir of IBI Group to the Ministry, dated November 13, 2007;

7. Letter from Ted Phillips of Taggart Investments to the Ministry, dated December 18, 2007;

8. Written procedure issued March 6, 2008 and cosigned by Robert W. Wingate of IBI Group and Ted Edward Phillips of Taggart Realty;

9. Application for Approval of Municipal and Private Sewage Works, dated November 6, 2009 and received on November 19, 2009, Neighbourhood 5 Phase II Interim Stormwater Management Report, dated August 2009, and drawings and addendum documents prepared and submitted by IBI Group;

10. Application for Approval of Municipal and Private Sewage Works, dated March 1, 2011 and received on March 5, 2011, and final plans and specifications prepared by IBI Group;

11. Application for Amended Environmental Compliance Approval, dated March 19, 2013 and received on March 21, 2013, submitted by the City of Ottawa;

12. Avalon West (Neighbourhood 5) Interim Stormwater Management Report, dated March 2013, prepared by IBI Group;

13. Engineering Drawings 104, dated February 27, 2012, and 700A, dated February 21, 2012, prepared by IBI Group;

14. E-mail from Rikke Brown of IBI Group to the Ministry, dated May 22, 2013;

15. E-mail from Rikke Brown of IBI Group to the Ministry, dated May 23, 2013;

16. Application for Environmental Compliance Approval, dated November 1, 2013 and received on January

7, 2014, submitted by the City of Ottawa;

17. Avalon West (Neighbourhood 5) Stormwater Management Facility Design, Revision 5, dated October 2013, prepared by IBI Group;

18. Set of Engineering Drawings (14 drawings) for Avalon West (Neighbourhood 5) SWM Facility, dated September 19, 2013, prepared by IBI Group;

19. Copy of letter from James Holland of South Nation Conservation to Minto Communities Inc., dated November 25, 2013;

20. E-mail from Peter Deir of IBI Group to the Ministry, dated July 9, 2014;

21. Application for Environmental Compliance Approval, dated June 8, 2015 and received on June 24, 2015, submitted by the City of Ottawa;

22. Stormwater Management Report for Summerside West Phase 1, dated June 2015, prepared by J.F. Sabourin and Associates Inc.;

23. Copy of memorandum from IBI Group to David Schaeffer Engineering Ltd., dated November 3, 2014;

24. Copy of e-mail from Mathieu Leblanc of South Nation Conservation to David Schaeffer Engineering Ltd., dated June 23, 2015;

25. E-mail from Jennifer Ailey of David Schaeffer Engineering Ltd. to the Ministry, dated September 2, 2015;

26. E-mail from Peter Deir of IBI Group to the Ministry, dated September 17, 2015; and

27. E-mail from Jennifer Ailey of David Schaeffer Engineering Ltd. to the Ministry, dated September 30, 2015.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This Condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that any subsequent Owner of the Works is made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to require that the Works be properly operated and maintained such that the environment is protected.

5. Condition 5 is included to enable the Owner to evaluate and demonstrate the performance of the Works on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works do not cause any impairment of the receiving watercourse.

6. Condition 6 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction, until they are no longer required.

7. Condition 7 is included to require that all records are retained for a sufficient time period to adequately evaluate the long-term operation and maintenance of the Works.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 6000-9LTGHZ issued on July 31, 2014.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are

substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of October, 2015

Gregory Zimmer, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

DC/

c: District Manager, MOECC Ottawa office
Water Supervisor, MOECC Ottawa office
Peter Deir, IBI Group
Jennifer Ailey, David Schaeffer Engineering Ltd.

APPENDIX C

FIGURE 8.1A RECOMMENDED WATER DISTRIBUTION FROM THE MER BLEUE MSS (IBI GROUP, APRIL 2017)

N

Multiples
Secondary School
Park
Multiples
Commercial
School
Park
Elementary School
Park
Park
FIRE STATION
400Ø
EXISTING Pump Station
Parkette 0.9ha
300Ø
Approved Stormwater Management Facility 11.1ha
Neighbourhood Park 1.7ha
Existing Residential
CEPEO Elementary School /Secondary School 5.9ha
0.57ha Parkette
Stormwater Management Facility Expansion 4.0ha
OCSB Elementary School 2.4ha
N. Park 1.2ha
Dry Pond 0.8ha
300Ø
300Ø
300Ø
300Ø
McKinnon's Creek
400Ø
MER BLEUE ROAD
OCDSB Elementary School 3.1ha
N. Park 1.5ha
Dry Pond 0.9ha
Community Park 6.5ha
Stormwater Management Facility 5.5ha
TENTH LINE ROAD
300Ø
300Ø
300Ø
300Ø
300Ø
Dry Pond 0.5ha
Existing Residential
CECCE Elem. School 2.1ha
Dry Pond 0.8ha
N. Park 1.4ha
NEW Pump Station
Stormwater Management Facility 4.3ha
Vegetation Community/ Woodlot 5.1ha
NAVAN ROAD
Meters
50 0 50 100
1:4000

LEGEND:

300Ø PROPOSED TRUNK WATERMAIN INCLUDING APPROXIMATE DIAMETER

PROPOSED WATERMAIN

EXISTING WATERMAIN

J:\34739-CumbServReport\5.9 Drawings\59civil\layouts\MSS-Apr2017\Preferred Option\Figure 8.1A Recommended Water Distribution System.dwg Layout Name: Figure 8.1A Recommended Water Distribution System Last Saved By: ddore Last Saved At: Jun. 27, 17

Sheet No.

FIGURE 8.1A
JUNE 2017

Drawing Title

RECOMMENDED WATER DISTRIBUTION SYSTEM FOR UPDATED DEMONSTRATION PLAN

Project Title

MER BLEUE
MASTER SERVICING STUDY

IBI

APPENDIX D

MER BLEUE CDP – TENTH LINE PS & WASTEWATER SERVICING: PUMP STATION CAPACITY ASSESSMENT (STANTEC, AUGUST 26, 2016)

Stantec

Memo

To:	Bob Wingate / Demetrius Yannoulopoulos IBI Group, Ottawa	From:	Marc Telmosse Stantec, Ottawa
File:	1634-01269	Date:	August 26, 2016

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

The existing capacity of the Tenth Line pumping station (TLPS) was previously reviewed and presented in a memo dated October 10, 2014. That memo considered the findings of the 2013 Infrastructure Master Plan (IMP) and provided a discussion on the capacity available under existing and future (2031 and 2060 buildout) conditions at the TLPS and downstream sanitary collection system. The original memo was resubmitted on March 2, 2015. The current version of the memo encompasses further revisions based on City review comments on the March 2, 2015 submission.

A meeting was subsequently held with the City where the peak existing wet weather flow rate was discussed. Higher flows were seen at the TLPS during the June 24-25, 2014 rainfall event than were reported in the 2013 IMP report and the City requested that these be considered. This memo documents the findings of the flow analysis completed and also presents the influence of these on the Mer Bleue and TLPS flow projections.

An assessment of the pump station upgrade capacity was completed and a summary of our findings is included.

BACKGROUND

An update to the community design plan (CDP) for the TLPS servicing area was provided and this was used as a basis to develop updated flow projections. The differences between the 2013 IMP and updated CDP under the 2031 scenario are shown in **Table 1**.

Table 1: Growth Comparison - 2031

Area	Gross Growth Area (ha)	2013 IMP		2016 CDP Update	
		Growth Population (ppl)	Growth ICI	Growth Population (ppl)	Growth ICI
Mer Bleue (10A, 10B, 10C)	213	9,639	607 employees	10,840	17ha school
Minto (10D, 10E)	28	1,276	7 employees	1,819	7 employees
Existing	169	7,624	2,573 employees	7,624	2,573 employees
Total Growth	410	18,539	3,187 employees	20,774	2,580 employees + 1 school

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

The 2013 IMP also included a 2060 scenario which included growth areas beyond the City's current official plan (OP). The 2060 scenario had a reduction in population for the "existing" area. For these reasons, only the 2031 scenario is considered without consideration for areas outside the existing OP (see **Figure 1**).

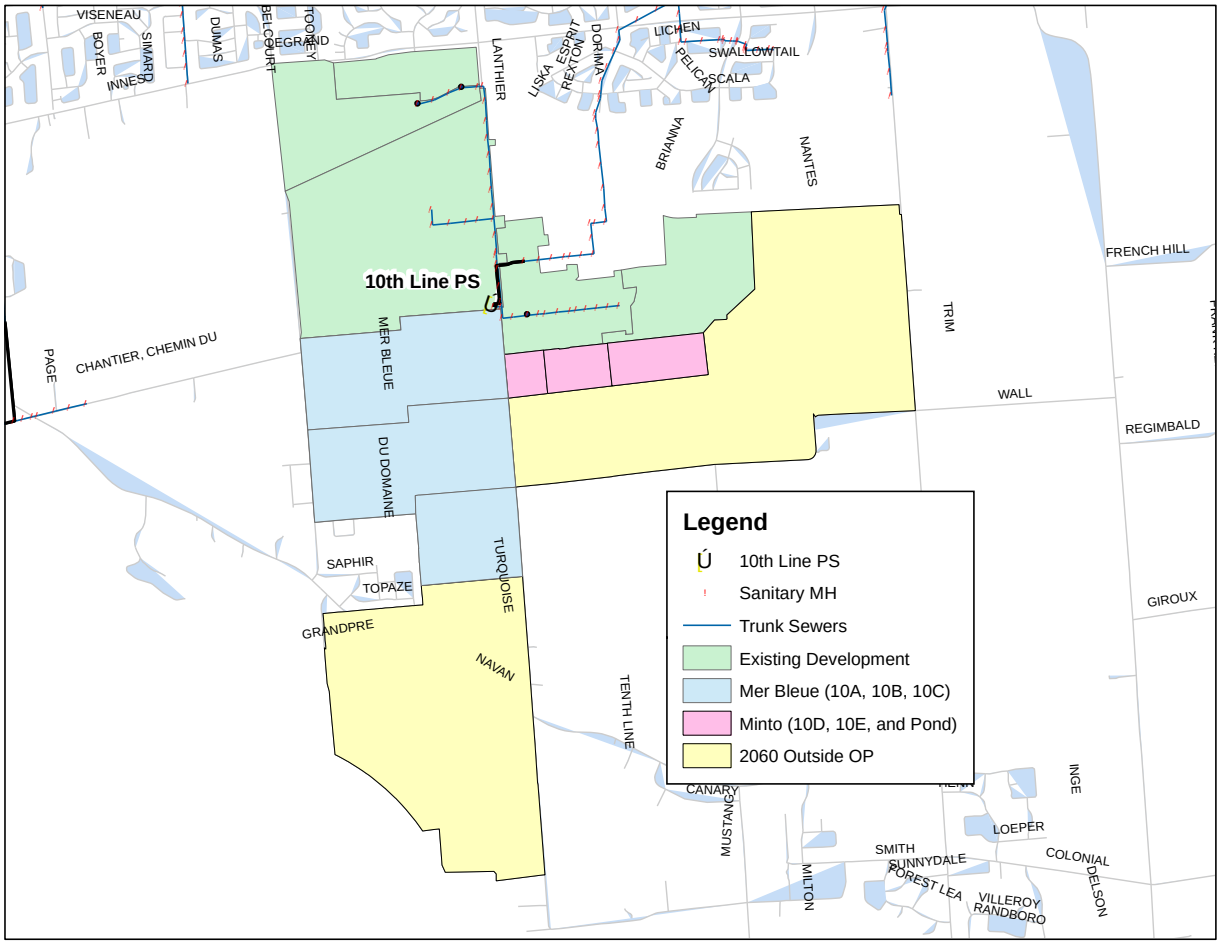

Figure 1: TLPS Servicing Area

Results from the 2013 IMP using the 100 year design storm were considered for the existing flows at the TLPS. This result showed a projected peak wet weather flow of 86L/s. This modeled flow is less than the peak wet weather flow of 108L/s seen at the TLPS during the June 24-25th, 2014 event and the City requested that the higher flow be considered. All design event scenarios are estimates as they are not based on actual system responses. With this consideration in mind, more emphasis was placed on the June 24-25th, 2014 event that was recorded.

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

REVISED FLOW ANALYSIS

The City provided water consumption and flow monitoring data which were used in conjunction with landuse area shapefiles to assess the flows observed at the TLPS. The assessment focused on quantifying and qualifying the I/I observed at the TLPS.

As per Section 4.4 of the Ottawa Sewer Design Guidelines, we adopted the approach suggested in the guidelines:

- Standard Peak Flow Design Parameters: Applied for establishing peak design capacity (used for the design of sewers and pumping stations)
    - (i.e. for Growth related flows)
- Operational Flow Parameters: Derived from monitoring data and used for establishing the range of operational flows (used in sewer analysis and pumping station design)
    - (i.e. for Existing flows using the June 24-25 2014 event flow)

However, in addition to this approach, we also considered the scenario where the City's standard peak flow parameters were applied to existing development.

Dry Weather Flow Analysis

The 2014 water consumption records were assessed and compared to the dry weather flow monitoring data recorded at the TLPS. The goal of this analysis was to confirm that these two data sets were comparable, as well as establish the quantity of ground water infiltration seen in the system.

The annual water consumption data was provided and it was determined that 535,252 m^3 was consumed in 2014 and equates to an approximate average flow rate of 17L/s. The flow monitoring data was also assessed and showed that an approximate average flow of 20L/s was seen during the DWF in June of 2014 as illustrated on

Figure 2. A peak DWF rate of approximately 32L/s was also seen during this same period.

The 3L/s difference between the water consumption records and flow monitoring data average DWF findings is assumed to be the result of dry weather groundwater infiltration (GWI). Taken over the existing 201ha of development, this 3L/s corresponds to a gross unit rate of 0.015L/ha/s. This rate is representative of a new developed area with limited dry weather flow conditions inflow and is also less than the City of Ottawa Design Guideline Operational GWI rate of 0.05-0.08L/ha/s.

Wet Weather Flow Analysis

A wet weather flow analysis was completed on the flow monitoring data collected during the June 24-25 2014 rainfall event. As shown on **Figure 3**, the peak flow seen during the event was approximately 108L/s, with a rainfall derived inflow/infiltration (RDII) component of 81L/s. This rate corresponds to a gross area flow of approximately 0.40L/ha/s over the 201 ha gross area currently serviced by the TLPS.

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

The corresponding operational design RDII flow can be also approximated as 53L/s using the servicing area (201ha) and City's design guideline rate of 0.265L/ha/s (0.28L/ha/s – 0.015L/ha/s). This 53L/s represents the WWF contribution that was considered in developing the flow projection scenarios as the "design/operational" existing WWF.

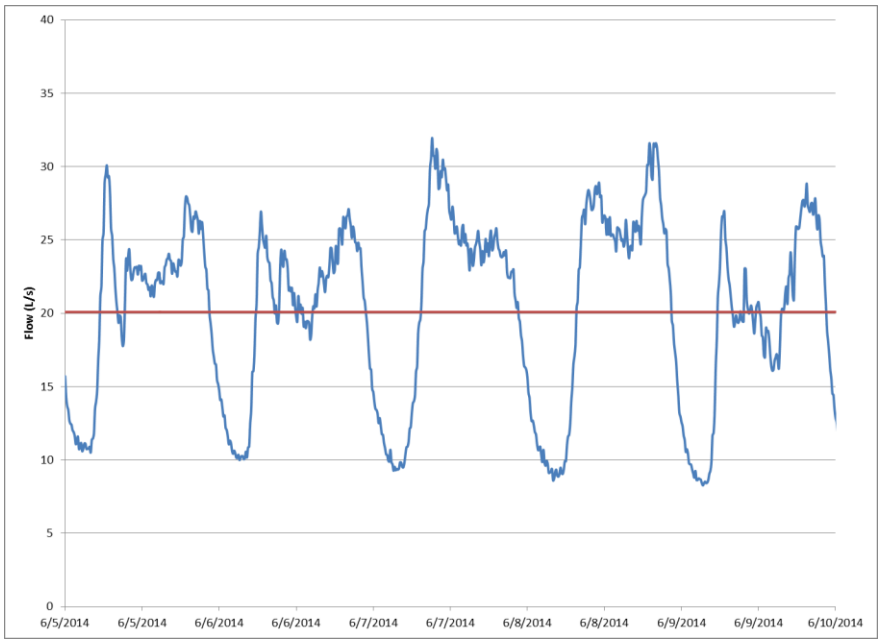

Figure 2: June 2014 TLPS Dry Weather Flow

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

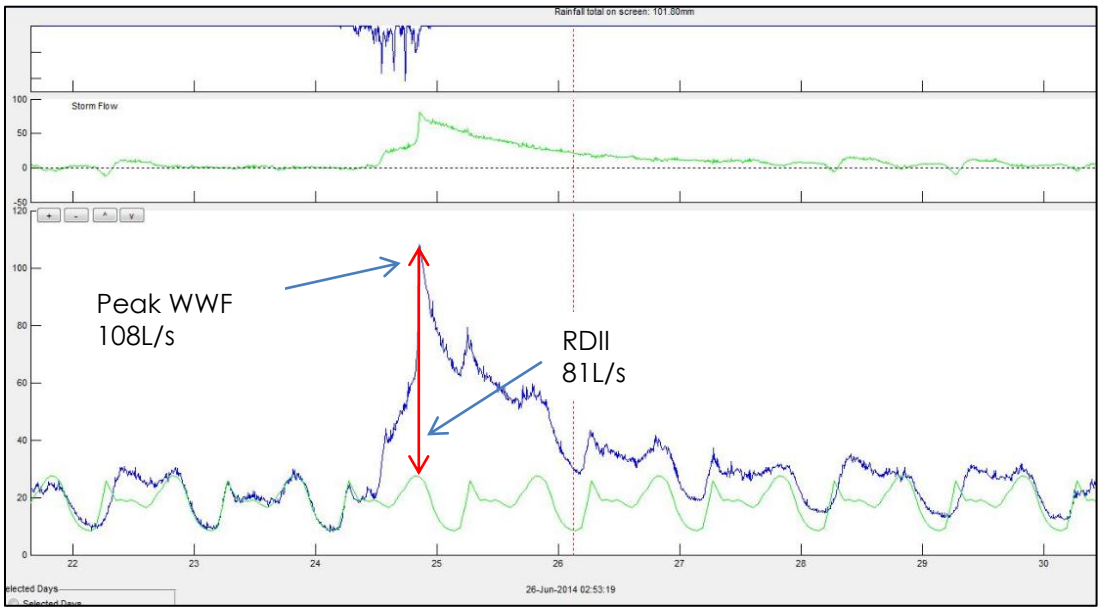

Figure 3: June 24-25, 2014 TLPS Flow

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

Discussion

The RDII rate observed during the June 24-25, 2014 event is significantly higher than the 0.265 L/ha/s operational/design I/I rate specified in the City of Ottawa Sewer Design Guidelines. This high RDII rate is not expected in a newer developed area such as that serviced by the TLPS. This result was discussed with the City and it was agreed that the RDII seen was irregularly high. Several possibilities were suggested as being responsible for such a high rate:

- Foundation excavations of partially constructed houses may have drained to the sanitary collection system through un-capped service laterals. This has occurred in other areas in the City during construction of newer developments.

- The storm water collection system could have influenced the sanitary system. This is unlikely as it is our understanding that backflow preventers (duckbills) are in place.

Although the RDII rate seen is considered irregularly high, it was requested that it be considered in our flow projections as it may be representative of future interim flows.

REVISED TENTH LINE PS PROJECTED FLOWS

The City requested that both design and observed conditions be considered in the TLPS flow projections. Four (4) scenarios were therefore considered involving a combination of observed, operational/design, and design flow conditions.

EXISTING FLOWS

The existing flows were considered based on the flow monitored data provided and considered both the June 24-25, 2014 event and the City's Sewer Design Guideline parameters. The DWF was taken as the 32 L/s observed during the peak overall wet weather flow of the June 24-25, 2014 event for all scenarios. This 32 L/s includes the 0.015 L/ha/s GWI estimated from the flow monitoring data.

The WWF projections considered the peak 108 L/s of which 81 L/s is considered to be due to RDII sources, as well as an Operational/Design Guideline rate approach where a 53 L/s RDII (201 ha x 0.265 L/ha/s) is used and added to the observed peak DWF of 32 L/s for a total of 85 L/s.

GROWTH FLOWS

The growth flows were considered based on the design and operational rates provided in the City's Design Guidelines. Considering both of these sets of parameters provides a range of possible flows and identifies the sensitivity of the area to these parameters. We have adopted these parameters with the exception of using an employee generation rate of 83 L/employee/day for growth in existing areas (taken from the 2013 IMP), as well as maintaining a "K" value of 1 for use with the Harmon equation for all scenarios.

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

From the City of Ottawa Sewer Design Guidelines:

Peak Flow Design Parameters Summary

AVERAGE WASTEWATER FLOWS:
Residential Average Flow: 350 L/c/day

Commercial/Institutional Flow: 50,000 L/gross ha/d

PEAKING FACTORS:
Residential Peak factor: Harmon Equation

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000}\right)^{\frac{1}{2}}} \right) * K$$

Where: P = Population

K = Correction Factor = 1

Commercial/Institutional Peak factor: 1.5

PEAK EXTRANEOUS FLOWS: (design event)
Infiltration Allowance: 0.28 L/s/effective gross ha (for all areas)

Operational Parameters Summary (Example)

AVERAGE WASTEWATER FLOWS:
Residential Average Flow: 300 L/c/day

Commercial Flow: 17,000 L/gross ha/d

Institutional Flow: 10,000 L/gross ha/d

PEAKING FACTORS:
Residential Peak factor: Harmon Equation

$$P.F. = 1 + \left(\frac{14}{4 + \left(\frac{P}{1000}\right)^{\frac{1}{2}}} \right) * K$$

Where: P = Population

K = Correction Factor = 0.4 to 0.6

Commercial/Institutional Peak factor: 1 (non-coincident peak)

EXTRANEOUS FLOWS: (Typical values for separated sewers)

Dry Weather Groundwater infiltration:	0.05-0.08 L/s/gross ha (example range)
Wet Weather Extraneous Flow:	0.15-0.2 L/s/ gross ha (typical events)
(includes Dry weather GWI)	0.28 L/s/effective gross ha (large event – typical of annual event)
	0.30-0.50 L/s/gross ha (extreme event)

ASSESSMENT FINDINGS

The flow projection scenarios were considered using the various flow generation components for existing and growth areas as described above. The various spreadsheets used in the assessment are provided as an attachment to this document, while the overall findings are summarized in **Table 2**, and show that a flow range between 381 L/s and 447 L/s is expected.

Table 2: TLPS Flow Projections (2031) - Scenario Summaries

Scenario	Description	Existing Flow	Growth Flow	Total Flow
A	Existing – June 24-25, 2014 Growth – Operational	108 L/s	296 L/s	404 L/s
B	Existing – Operational/Design Guidelines Growth – Operational	85 L/s	296 L/s	381 L/s
C	Existing – June 24-25, 2014 Growth – Design Guidelines	108 L/s	339 L/s	447 L/s
D	Existing – Operational/Design Guidelines Growth – Design Guidelines	85 L/s	339 L/s	424 L/s

TLPS CAPACITY

The TLPS currently has a firm capacity of approximately 290 L/s and was originally designed for an ultimate peak flow of 425 L/s. The forcemain was extended during construction however and this resulted in the peak ultimate firm capacity being reduced to 405 L/s.

The maximum flow that could be sent through the existing 300/400 mm forcemains is limited to 445 L/s based on keeping velocities under 2.5 m/s. Higher flow would require larger or additional forcemains.

A pump selection of three (3) Xylem NP 3301 MT 3~ 636 pumps (2 duty / 1 standby) would provide 445 L/s at 17.9 m TDH. These MT pumps would replace the existing LT pumps and would fit in the wet well without modification to the benching. An adapter on the pump outlet would be required due to the difference in outlet size (300 mm to 250 mm).

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

Electrical Considerations

The new MT pumps would each require a power input of 52.7 kW for a total of 105.4 kW for two pumps running. Additional electrical considerations are as follows:

- The pump softstarter manufacturer (Benshaw) confirms that the existing two existing 60 HP softstarters internal components are suitable for the proposed larger 70 HP pumps. Some programmed parameters will need to be modified in the softstarter control module to reflect the new pump motor nameplate data. The thermal trip setting on the stoftstarter disconnect switch breaker will also need to be adjusted.

- The existing Distribution Panel 100 A feeder breakers (2) and power cables are suitable for the new larger 70 HP pumps.

- The existing power factor correction capacitors (2) will not be perfectly matched to the proposed larger 70 HP pumps, but will still correct the power factor to above 0.9 which is acceptable to Hydro Ottawa and will still avoid utility billing penalty charges.

- The existing 230 kW standby power generator is sized to feed the existing station base electrical loads and will allow operation of two proposed 70 HP pumps simultaneously (in a 2 duty / 1 standby configuration), without the need for any modifications to the emergency power system.

- The station currently has two sewage pumps. The installation of the third 70 HP sewage pump will require a new softstarter, new capacitor bank, new feeder breaker, new power wiring, and new control/monitoring wiring back to the station RPU.

- The existing station RPU control panel has reserved spare I/O points for the future third sewage pump, and therefore would not require any additional I/O modules.

- During the station upgrade's construction and testing phase, the City SCADA programmers will need to make programming changes to the pump station RPU control panel, as well as on the SCADA HMI pump duty table.

Additional Storage Considerations

The highest flow projected in our flow assessment is 447 L/s from Scenario C and is 2L/s beyond the upgrade conveyance capacity established for the TLPS. Since increasing the conveyance could not be established without essentially replacing the entire pump station and forcemains, the remaining alternative is to add a storage component to offset this conveyance need.

We have assumed the same hydrograph distribution as the June 24-25, 2014 event to estimate this storage volume requirement while maintaining the upgraded conveyance rate at 445 L/s. The required volume is then obtained by calculating the difference between the Scenario C hydrograph and the TLPS conveyance and is estimated as 4 m^3 (see **Figure 4**).

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

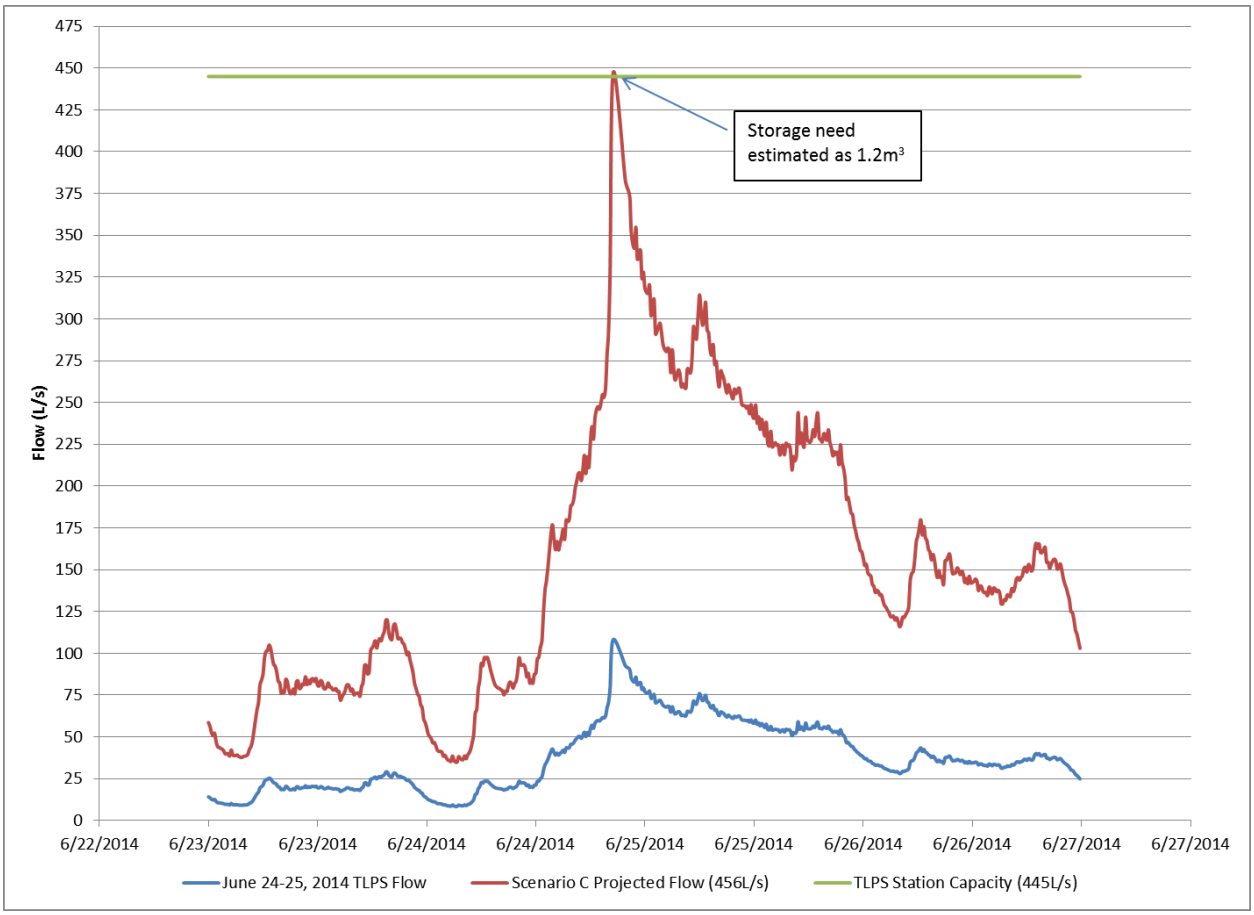

Figure 4: TLPS Estimated Storage Upgrade Need

This storage need is negligibly small and it is assumed that the upstream collection system could handle the backwater condition that could occur without adding additional storage at the TLPS.

SUMMARY & RECOMMENDATIONS

A revision to the flow projections for the TLPS was completed following a meeting with the City. This revision was requested because the monitored peak existing flows into the pump station during the June 24-25, 2014 event were greater than the 100-year design flows previously used and obtained from the City's 2013 IMP wastewater model. We also reviewed the TLPS upgrade potential and identified that a capacity increase to approximately 445 L/s could be achieved by replacing the existing pumps and modifying some electrical components.

The findings of this revision showed that the RDII rate observed during the June 24-25, 2014 event was higher than that provided in the City's Sewer Design Guidelines. We suspect this high rate was due to inflow caused by partially constructed homes where sewer laterals may not have been

Reference: Mer Bleue Community Design Plan – Tenth Line PS & Wastewater Servicing: Pump Station Capacity Assessment

capped. This high RDII rate is not considered to be reflective of normal system responses; however the rate was still considered in our revised flow projections to provide a range of expected flows.

The revised flow projections considered the June 24-25, 2014 event and design rates for existing development and operational and design rates (from the City of Ottawa Sewer Design Guidelines) for growth. A range of flows between 381-447 L/s was obtained using this approach, with the highest estimated flow corresponding to the RDII rates observed during the June 24-25, 2014 event. We have estimated that a negligibly small amount of storage (1.2m^3) could be needed should this highest flow projection be attained while maintaining the 445 L/s capacity at the TLPS. We reiterate that we suspect irregular inflow conditions were responsible for the June 24-25, 2014 event and that the high RDII seen is not typical for newer developments.

Nonetheless, we recommend that a flow monitoring analysis be completed on the TLPS flow data once 50% of the anticipated growth is in place to confirm RDII rates and the projected conveyance and/or storage upgrade needs. This amount of growth corresponds to an additional flow of 170 L/s for a total wet weather flow of 278 L/s (108 L/s+170 L/s) and is within the stations existing capacity of 290 L/s. This flow monitoring analysis will help identify when and confirm what type of upgrades will be needed at the TLPS.

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c. Stephane D'Aoust; James Ricker

Attach: TLPS Scenario Summaries

SCENARIO A

FLOW PROJECTION

Interest	Area	IMP Catch ID	Catchment Area (GIS)	2031 Population	Growth	2031 ICI (ha)	Growth	2031 Employees	Growth	2031 Area (ha)	Growth	Res (300L/c/d)	PF (Harmon)	P_RES	Emp (83L/emp/d)	PF	P_Emp	I/I (90% of area)	Total Growth Flow	
Existing	NW	568	28	0	0	22.3	0	1046	0	28	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	
Existing	NE	601	59.4	1236	1199	0	0	0	0	59.4	18.4	4.2	3.75	15.6	0.0	1	0.0	4.6	20.2	
Existing	NE	602	55.4	2442	-227	0	0	5	0	55.4	0.1	-0.8	#NUM!	0.0	0.0	1	0.0	0.0	0.0	
Existing	NW	603	60.9	8	-1	35.4	35.4	2080	2073	60.9	35.4	0.0	#NUM!	0.0	2.0	1	2.0	8.9	10.9	
Existing	NW	604	177.9	7098	6653	0.1	0	508	500	177.9	115.2	23.1	3.13	72.3	0.5	1	0.5	29.0	101.8	
MER BLEUE	10A	632	88.5		10840	17	17	0	0	78.7	78.7	37.6	2.92	109.9	3.3	1	3.3	19.8	133.1	
	10B	633	88.8			0	0	0	0	79.8	79.8	0.0	4.00	0.0	0.0	1	0.0	20.1	20.1	
	10C	634	44			0	0	0	0	54.6	54.6	0.0	4.00	0.0	0.0	1	0.0	13.8	13.8	
MINTO	10D	635	8.3		1819	0	0	7	7	8.3	8.3	6.3	3.62	22.8	0.0	1	0.0	2.1	24.9	
	POND	636	13.4			0	0	0	0	13.4	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	
	10E	637	19.9			0	0	0	0	19.9	19.9	0.0	4.00	0.0	0.0	1	0.0	5.0	5.0	
Outside OP	S - 2060	647	232.9	86	-9	0	0	90	0	0	0	0.0	#NUM!	0.0	0.0	1	0.0	0.0	0.0	
Outside OP	E - 2060	648	286.4	0	0	0	0	26	0	0	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	Including 108L/s from Existing
		TOTAL	**1,163.80**	**21,855**	**20,274**	**57.7**	**52**	**4,401**	**2,580**	**636.2**	**410**	**70.4**	**2.65**	**186.3**	**5.8**	**1**	**5.8**	**103.4**	**295.5**	**404**

RESIDENTIAL RATE	300 L/c/d	
COMMERCIAL RATE	17000 L/ha/d	or 83L/emp/d
I/I RATE	0.28 L/s/ha	

RESIDENTIAL PEAK FACTOR	Harmon (K=1)
COMMERCIAL PEAK FACTOR	1

SCENARIO B FLOW PROJECTION

Interest	Area	IMP Catch ID	Catchment Area (GIS)	2031 Population	Growth	2031 ICI (ha)	Growth	2031 Employees	Growth	2031 Area (ha)	Growth	Res (300L/c/d)	PF (Harmon)	P_RES	Emp (83L/emp/d)	PF	P_Emp	I/I (90% of area)	Total Growth Flow	
Existing	NW	568	28	0	0	22.3	0	1046	0	28	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	
Existing	NE	601	59.4	1236	1199	0	0	0	0	59.4	18.4	4.2	3.75	15.6	0.0	1	0.0	4.6	20.2	
Existing	NE	602	55.4	2442	-227	0	0	5	0	55.4	0.1	-0.8	#NUM!	0.0	0.0	1	0.0	0.0	0.0	
Existing	NW	603	60.9	8	-1	35.4	35.4	2080	2073	60.9	35.4	0.0	#NUM!	0.0	2.0	1	2.0	8.9	10.9	
Existing	NW	604	177.9	7098	6653	0.1	0	508	500	177.9	115.2	23.1	3.13	72.3	0.5	1	0.5	29.0	101.8	
MER BLEUE	10A	632	88.5		10840	17	17	0	0	78.7	78.7	37.6	2.92	109.9	3.3	1	3.3	19.8	133.1	
	10B	633	88.8			0	0	0	0	79.8	79.8	0.0	4.00	0.0	0.0	1	0.0	20.1	20.1	
	10C	634	44			0	0	0	0	54.6	54.6	0.0	4.00	0.0	0.0	1	0.0	13.8	13.8	
MINTO	10D	635	8.3		1819	0	0	7	7	8.3	8.3	6.3	3.62	22.8	0.0	1	0.0	2.1	24.9	
	POND	636	13.4			0	0	0	0	13.4	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	
	10E	637	19.9			0	0	0	0	19.9	19.9	0.0	4.00	0.0	0.0	1	0.0	5.0	5.0	
Outside OP	S - 2060	647	232.9	86	-9	0	0	90	0	0	0	0.0	#NUM!	0.0	0.0	1	0.0	0.0	0.0	
Outside OP	E - 2060	648	286.4	0	0	0	0	26	0	0	0	0.0	4.00	0.0	0.0	1	0.0	0.0	0.0	Including 85L/s from Existing
		TOTAL	**1,163.80**	**21,855**	**20,274**	**57.7**	**52**	**4,401**	**2,580**	**636.2**	**410**	**70.4**	**2.65**	**186.3**	**5.8**	**1**	**5.8**	**103.4**	**295.5**	**381**

RESIDENTIAL RATE 300 L/c/d
COMMERCIAL RATE 17000 L/ha/d or 83L/emp/d
I/I RATE 0.28 L/s/ha

RESIDENTIAL PEAK FACTOR Harmon (K=1)
COMMERCIAL PEAK FACTOR 1

SCENARIO C

FLOW PROJECTION

Interest	Area	IMP Catch ID	Catchment Area (GIS)	2031 Population	Growth	2031 ICI (ha)	Growth	2031 Employees	Growth	2031 Area (ha)	Growth	Res (350L/c/d)	PF (Harmon)	P_RES	Emp (83L/emp/d)	PF	P_Emp	I/I (90% of area)	Total Growth Flow	
Existing	NW	568	28	0	0	22.3	0	1046	0	28	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	
Existing	NE	601	59.4	1236	1199	0	0	0	0	59.4	18.4	4.9	3.75	18.2	0.0	1.5	0.0	4.6	22.8	
Existing	NE	602	55.4	2442	-227	0	0	5	0	55.4	0.1	-0.9	#NUM!	0.0	0.0	1.5	0.0	0.0	0.0	
Existing	NW	603	60.9	8	-1	35.4	35.4	2080	2073	60.9	35.4	0.0	#NUM!	0.0	2.0	1.5	3.0	8.9	11.9	
Existing	NW	604	177.9	7098	6653	0.1	0	508	500	177.9	115.2	27.0	3.13	84.3	0.5	1.5	0.7	29.0	114.0	
MER BLEUE	10A	632	88.5		10840	17	17	0	0	78.7	78.7	43.9	2.92	128.2	9.8	1.5	14.8	19.8	162.8	
	10B	633	88.8			0	0	0	0	79.8	79.8	0.0	4.00	0.0	0.0	1.5	0.0	20.1	20.1	
	10C	634	44			0	0	0	0	54.6	54.6	0.0	4.00	0.0	0.0	1.5	0.0	13.8	13.8	
MINTO	10D	635	8.3		1819	0	0	7	7	8.3	8.3	7.4	3.62	26.7	0.0	1.5	0.0	2.1	28.8	
	POND	636	13.4			0	0	0	0	13.4	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	
	10E	637	19.9			0	0	0	0	19.9	19.9	0.0	4.00	0.0	0.0	1.5	0.0	5.0	5.0	
Outside OP	S - 2060	647	232.9	86	-9	0	0	90	0	0	0	0.0	#NUM!	0.0	0.0	1.5	0.0	0.0	0.0	
Outside OP	E - 2060	648	286.4	0	0	0	0	26	0	0	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	Including 108L/s from Existing
		TOTAL	**1,163.80**	**21,855**	**20,274**	**57.7**	**52**	**4,401**	**2,580**	**636.2**	**410**	**82.1**	**2.65**	**217.4**	**12.3**	**1.5**	**18.5**	**103.4**	**339.3**	**447**

RESIDENTIAL RATE 350 L/c/d
COMMERCIAL RATE 50000 L/ha/d or 83L/emp/d
I/I RATE 0.28 L/s/ha

RESIDENTIAL PEAK FACTOR Harmon (K=1)
COMMERCIAL PEAK FACTOR 1.5

SCENARIO D

FLOW PROJECTION

Interest	Area	IMP Catch ID	Catchment Area (GIS)	2031 Population	Growth	2031 ICI (ha)	Growth	2031 Employees	Growth	2031 Area (ha)	Growth	Res (350L/c/d)	PF (Harmon)	P_RES	Emp (83L/emp/d)	PF	P_Emp	I/I (90% of area)	Total Growth Flow	
Existing	NW	568	28	0	0	22.3	0	1046	0	28	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	
Existing	NE	601	59.4	1236	1199	0	0	0	0	59.4	18.4	4.9	3.75	18.2	0.0	1.5	0.0	4.6	22.8	
Existing	NE	602	55.4	2442	-227	0	0	5	0	55.4	0.1	-0.9	#NUM!	0.0	0.0	1.5	0.0	0.0	0.0	
Existing	NW	603	60.9	8	-1	35.4	35.4	2080	2073	60.9	35.4	0.0	#NUM!	0.0	2.0	1.5	3.0	8.9	11.9	
Existing	NW	604	177.9	7098	6653	0.1	0	508	500	177.9	115.2	27.0	3.13	84.3	0.5	1.5	0.7	29.0	114.0	
MER BLEUE	10A	632	88.5		10840	17	17	0	0	78.7	78.7	43.9	2.92	128.2	9.8	1.5	14.8	19.8	162.8	
	10B	633	88.8			0	0	0	0	79.8	79.8	0.0	4.00	0.0	0.0	1.5	0.0	20.1	20.1	
	10C	634	44			0	0	0	0	54.6	54.6	0.0	4.00	0.0	0.0	1.5	0.0	13.8	13.8	
MINTO	10D	635	8.3		1819	0	0	7	7	8.3	8.3	7.4	3.62	26.7	0.0	1.5	0.0	2.1	28.8	
	POND	636	13.4			0	0	0	0	13.4	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	
	10E	637	19.9			0	0	0	0	19.9	19.9	0.0	4.00	0.0	0.0	1.5	0.0	5.0	5.0	
Outside OP	S - 2060	647	232.9	86	-9	0	0	90	0	0	0	0.0	#NUM!	0.0	0.0	1.5	0.0	0.0	0.0	
Outside OP	E - 2060	648	286.4	0	0	0	0	26	0	0	0	0.0	4.00	0.0	0.0	1.5	0.0	0.0	0.0	Including 85L/s from Existing
		TOTAL	**1,163.80**	**21,855**	**20,274**	**57.7**	**52**	**4,401**	**2,580**	**636.2**	**410**	**82.1**	**2.65**	**217.4**	**12.3**	**1.5**	**18.5**	**103.4**	**339.3**	**424**

RESIDENTIAL RATE 350 L/c/d
COMMERCIAL RATE 50000 L/ha/d or 83L/emp/d
I/I RATE 0.28 L/s/ha

RESIDENTIAL PEAK FACTOR Harmon (K=1)
COMMERCIAL PEAK FACTOR 1.5

APPENDIX E

SSW PHASE 1 DRAINAGE AREA PLAN AND DESIGN SHEETS (DSEL, AUGUST 7, 2015)

SSW PHASE 4, 5 AND 6 SANITARY DESIGN SHEETS (DSEL, MAY 2018)

FIGURE 8.2A RECOMMENDED WASTEWATER SYSTEM FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

AVALON WEST STAGE 3
REFER TO
ATREL ENGINEERING LTD.
PROJECT No. 131004

AVALON - STAGE 10B
(REG. PLAN 4M-1332)

TENTH LINE ROAD WIDENING
REFER TO
MMM GROUP
CONTRACT No. ISD12-5174

KEY PLAN
SCALE 1:10000

FUTURE PHASE
PHASE 1

LEGEND

SANITARY DRAINAGE BOUNDARY

UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
AREA IN HECTARES — 0.78
POPULATION — 61

UPSTREAM MH TO DOWNSTREAM MH — 43A-44A
AREA IN OTHER PHASES IN HECTARES — 0.78
POPULATION — 61

MAINTENANCE HOLE — 200mm ø SAN MH202A
CAP

REVIEWED BY DEVELOPMENT REVIEW BRANCH

SIGNED _____

DATE _____

PLAN NUMBER _____

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 8-10-989-02. SURVEY DATED AUGUST 27, 2013.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 8-10-989-00 (PHASE 1), RECEIVED ON APRIL 9, 2015.

BENCH MARK No. 01919680229

ELEVATION = 86.120 m

ELEVATIONS SHOWN ON THIS PLAN ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM THE NCC BENCH MARK No. 01919680229 HAVING A PUBLISHED ELEVATION OF 86.120 METRES.

TOWNSHIP: CUMBERLAND

CONCRETE MONUMENT ON THE EAST SIDE OF MER BLEUE ROAD, 0.15KM NORTH OF ROAD INTERSECTION WITH NAVAN ROAD.

No.	DATE	BY	DESCRIPTION
4.	15-08-07	Z.L.	3rd SUBMISSION
3.	15-06-16	Z.L.	MOE SUBMISSION
2.	15-04-30	Z.L.	2nd SUBMISSION
1.	15-02-13	Z.L.	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 12-609

PROFESSIONAL ENGINEER — Z. LI — 15-08-07 — PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

© DSEL

MATTAMY (MER BLEUE) LIMITED

SUMMERSIDE WEST
PHASE 1

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

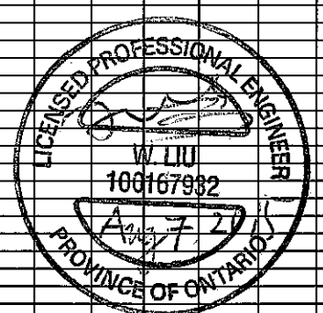
DRAWN BY: C.M/W.L	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		36
SCALE: 1:1000	DATE: JUNE 2015		

CITY FILE No. D07-16-14-0011 CITY PLAN No. 16839

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 Nominal (mm)	DIA Actual (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)
cercle Casa Grande Circle																											
	24A	25A	0.91	21	71.4	0.91	71.4	4.00	1.16								0.91	0.91	0.255	1.42	119.5	200	200	0.65	26.44	0.05	0.84
	25A	26A	0.23	3	10.2	1.14	81.6	4.00	1.32								0.23	1.14	0.319	1.64	13.0	200	200	0.40	20.74	0.08	0.66
	26A	27A	0.43	10	34.0	1.57	115.6	4.00	1.87								0.43	1.57	0.440	2.31	71.5	200	200	0.40	20.74	0.11	0.66
	27A	28A	0.56	13	44.2	2.13	159.8	4.00	2.59								0.56	2.13	0.596	3.19	72.0	200	200	0.40	20.74	0.15	0.66
	28A	29A	0.17	2	6.8	2.30	166.6	4.00	2.70								0.17	2.30	0.644	3.34	12.5	200	200	0.40	20.74	0.16	0.66
	29A	33A	0.11	2	6.8	2.41	173.4	4.00	2.81								0.11	2.41	0.675	3.49	29.0	200	200	1.20	35.93	0.10	1.14
To BLOCK 166 (Servicing & Walkway BLOCK) , Pipe 33A - 52A						2.41	173.4																				
	30A	31A	0.89	23	78.2	0.89	78.2	4.00	1.27								0.89	0.89	0.249	1.52	113.5	200	200	1.10	34.40	0.04	1.09
	31A	32A	0.16	2	6.8	1.05	85.0	4.00	1.38								0.16	1.05	0.294	1.67	13.0	200	200	1.50	40.17	0.04	1.28
	32A	33A	0.10	2	6.8	1.15	91.8	4.00	1.49								0.10	1.15	0.322	1.81	25.5	200	200	2.00	46.38	0.04	1.48
To BLOCK 166 (Servicing & Walkway BLOCK) , Pipe 33A - 52A						1.15	91.8																				
BLOCK 166 (Servicing & Walkway BLOCK)																											
Contribution From cercle Casa Grande Circle, Pipe 29A - 33A						2.41	173.4										2.41	2.41									
Contribution From cercle Casa Grande Circle, Pipe 32A - 33A						1.15	91.8										1.15	3.56									
	33A	52A	0.04	0	0.0	3.60	265.2	4.00	4.30								0.04	3.60	1.008	5.31	42.0	200	200	0.40	20.74	0.26	0.66
To ROAD ALLOWANCE (TRUNK), Pipe 52A - 53A						3.60	265.2																				
croissant Sweetfern Crescent																											
	6A	9A	0.34	16	43.2	0.34	43.2	4.00	0.70								0.34	0.34	0.095	0.80	70.5	200	200	0.65	26.44	0.03	0.84
To rue Mandalay Street, Pipe 9A - 10A						0.34	43.2																				
	1A	7A	0.24	12	32.4	0.24	32.4	4.00	0.53								0.24	0.24	0.067	0.60	86.5	200	200	1.00	32.80	0.02	1.04
	7A	8A	0.05	1	2.7	0.29	35.1	4.00	0.57								0.05	0.29	0.081	0.65	11.0	200	200	1.00	32.80	0.02	1.04
To rue Mandalay Street, Pipe 8A - 9A						0.29	35.1																				
	1A	2A	0.10	5	13.5	0.10	13.5	4.00	0.22								0.10	0.10	0.028	0.25	38.0	200	200	1.00	32.80	0.01	1.04
	2A	3A	0.06	1	2.7	0.16	16.2	4.00	0.26								0.06	0.16	0.045	0.31	11.0	200	200	1.00	32.80	0.01	1.04
	3A	4A	0.12	4	10.8	0.28	27.0	4.00	0.44								0.12	0.28	0.078	0.52	28.5	200	200	1.00	32.80	0.02	1.04
	4A	5A	0.18	4	10.8	0.46	37.8	4.00	0.61								0.18	0.46	0.129	0.74	11.0	200	200	1.00	32.80	0.02	1.04
	5A	6A	0.32	15	40.5	0.78	78.3	4.00	1.27								0.32	0.78	0.218	1.49	62.0	200	200	0.90	31.12	0.05	0.99
To rue Astervale Street, Pipe 6A - 13A						0.78	78.3																				
rue Mandalay Street																											
Contribution From croissant Sweetfern Crescent, Pipe 7A - 8A						0.29	35.1										0.29	0.29									
	8A	9A	0.18	6	16.2	0.47	51.3	4.00	0.83								0.18	0.47	0.132	0.96	36.5	200	200	1.50	40.17	0.02	1.28
Contribution From croissant Sweetfern Crescent, Pipe 6A - 9A						0.34	43.2										0.34	0.81									
			0.03	1	2.7												0.03	0.84									
	9A	10A	0.34	9	30.6	1.18	127.8	4.00	2.07								0.34	1.18	0.330	2.40	67.5	200	200	0.40	20.74	0.12	0.66
	10A	11A	0.43	11	37.4	1.61	165.2	4.00	2.68								0.43	1.61	0.451	3.13	66.5	200	200	0.40	20.74	0.15	0.66
To promenade Sweetvalley Drive, Pipe 11A - 150A						1.61	165.2																				



DESIGN PARAMETERS

Average Daily Flow =	350	l/p/day	Industrial Peak Factor =	as per MOE Graph	
Commercial/Institution Flow =	50000	L/ha/da	Extraneous Flow =	0.280	L/s/ha
Industrial Flow =	35000	L/ha/da	Minimum Velocity =	0.60	m/s
Max Res. Peak Factor =	4.00		Manning's n =	0.013	
Commercial/Institution/Park Peak Factor =	1.50		Townhouse coeff=	2.7	
Park Average Flow =	9300	L/ha/da	Single house coeff=	3.4	

Designed: K.M.

Checked: Z.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 35 and 36

PROJECT: **SUMMERSIDE WEST PHASE 1**

LOCATION: **City of Ottawa**

File Ref: 12-609 | Date: August, 2015 | Sheet No. 1 of 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 Nominal (mm)	DIA Actual (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)
rue Astervale Street																											
Contribution From croissant Sweetfern Crescent, Pipe 5A - 6A						0.78	78.3										0.78	0.78									
	6A	13A	0.20	5	13.5	0.98	91.8	4.00	1.49								0.20	0.98	0.274	1.76	69.0	200	200	0.40	20.74	0.08	0.66
Contribution From rue Broadleaf Street, Pipe 12A - 13A						0.33	27.0										0.33	1.31									
	13A	15A	0.31	13	35.1	1.62	153.9	4.00	2.49								0.31	1.62	0.454	2.94	64.0	200	200	0.40	20.74	0.14	0.66
To promenade Sweetvalley Drive , Pipe 15A - 17A						1.62	153.9																				
rue Maroma Street																											
	16A	17A	0.21	12	32.4	0.21	32.4	4.00	0.53								0.21	0.21	0.059	0.59	51.0	200	200	0.65	26.44	0.02	0.84
To promenade Sweetvalley Drive , Pipe 17A - 18A						0.21	32.4																				
rue Broadleaf Street																											
	12A	14A	0.12	3	8.1	0.12	8.1	4.00	0.13								0.12	0.12	0.034	0.16	11.0	200	200	1.00	32.80	0.00	1.04
	14A	18A	0.32	13	35.1	0.44	43.2	4.00	0.70								0.32	0.44	0.123	0.82	55.5	200	200	1.00	32.80	0.03	1.04
To promenade Sweetvalley Drive , Pipe 18A - 19A						0.44	43.2																				
	12A	13A	0.33	10	27.0	0.33	27.0	4.00	0.44								0.33	0.33	0.092	0.53	62.5	200	200	1.60	41.49	0.01	1.32
To rue Astervale Street, Pipe 13A - 15A						0.33	27.0																				
promenade Sweetvalley Drive																											
	20A	21A	0.40	8	27.2	0.40	27.2	4.00	0.44								0.40	0.40	0.112	0.55	36.0	200	200	0.65	26.44	0.02	0.84
	21A	22A	0.44	9	30.6	0.84	57.8	4.00	0.94								0.44	0.84	0.235	1.18	53.0	200	200	0.40	20.74	0.06	0.66
	22A	23A	0.62	16	54.4	1.46	112.2	4.00	1.82								0.62	1.46	0.409	2.23	85.5	200	200	0.60	25.41	0.09	0.81
To BLOCK 168 (Servicing & Walkway BLOCK) , Pipe 23A - 53A						1.46	112.2																				
Contribution From South Area						15.57	1108.0										15.57	15.57									
	110A	11A	0.06	0	0.0	15.63	1108.0	3.77	16.92								0.06	15.63	4.376	21.30	33.5	375	375	0.30	96.03	0.22	0.87
Contribution From rue Mandalay Street, Pipe 10A - 11A						1.61	165.2										1.61	17.24									
	11A	150A	0.03	0	0.0	17.27	1273.2	3.73	19.24								0.03	17.27	4.836	24.08	21.0	375	375	0.30	96.03	0.25	0.87
Contribution from BLOCK 163 (PARK)																				5.00	Block 163 (Park) Splash Pad 5.0 L/s Flow Allowance						
San Control MH 1A		150A												1.19	1.19	0.19	1.19	1.19	0.333	5.52	11.0	200	200	1.00	32.80	0.17	1.04
	150A	15A	0.08	0	0.0	17.35	1273.2	3.73	19.24						1.19	0.19	0.08	18.54	5.191	29.62	49.5	375	375	0.30	96.03	0.31	0.87
Contribution From rue Astervale Street, Pipe 13A - 15A						1.62	153.9										1.62	20.16									
	15A	17A	0.09	1	3.4	19.06	1430.5	3.69	21.38						1.19	0.19	0.09	20.25	5.670	32.24	45.0	375	375	0.30	96.03	0.34	0.87
Contribution From rue Maroma Street, Pipe 16A - 17A						0.21	32.4										0.21	20.46									
	17A	18A	0.19	5	17.0	19.46	1479.9	3.68	22.06						1.19	0.19	0.19	20.65	5.782	33.03	45.0	375	375	0.30	96.03	0.34	0.87

DESIGN PARAMETERS

Average Daily Flow =	350 l/p/day	Industrial Peak Factor =	as per MOE Graph
Commercial/Institution Flow =	50000 L/ha/da	Extraneous Flow =	0.280 L/s/ha
Industrial Flow =	35000 L/ha/da	Minimum Velocity =	0.60 m/s
Max Res. Peak Factor =	4.00	Manning's n =	0.013
Commercial/Institution/Park Peak Factor =	1.50	Townhouse coeff=	2.7
Park Average Flow =	9300 L/ha/da	Single house coeff=	3.4

Designed: K.M.

Checked: Z.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 35 and 36

PROJECT: **SUMMERSIDE WEST PHASE 1**

LOCATION: **City of Ottawa**

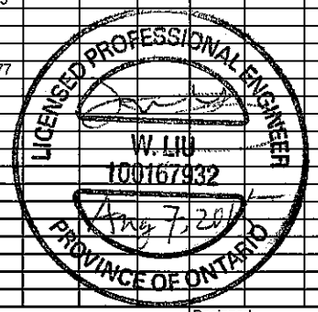
File Ref: 12-609 | Date: August, 2015 | Sheet No. 2 of 3

LICENSED PROFESSIONAL ENGINEER
W. LIU
100167932
PROVINCE OF ONTARIO

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 Nominal (mm)	DIA Actual (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)
Contribution From rue Broadleaf Street, Pipe 14A - 18A						0.44	43.2										0.44	21.09									
	18A	19A	0.33	6	20.4	20.23	1543.5	3.67	22.95						1.19	0.19	0.33	21.42	5.998	34.14	61.5	375	375	0.30	96.03	0.36	0.87
	19A	23A	0.11	1	3.4	20.34	1546.9	3.67	23.00						1.19	0.19	0.11	21.53	6.028	34.22	11.0	375	375	0.30	96.03	0.36	0.87
To BLOCK 168 (Servicing & Walkway BLOCK) , Pipe 23A - 53A						20.34	1546.9								1.19												
BLOCK 168 (Servicing & Walkway BLOCK)																											
Contribution From promenade Sweetvalley Drive, Pipe 22A - 23A						1.46	112.2										1.46	1.46									
Contribution From promenade Sweetvalley Drive, Pipe 19A - 23A						20.34	1546.9								1.19	0.19	21.53	22.99									
	23A	53A	0.04	0	0.0	21.84	1659.1	3.65	24.53						1.19	0.19	0.04	23.03	6.448	36.17	42.0	375	375	0.30	96.03	0.38	0.87
To ROAD ALLOWANCE (TRUNK), Pipe 53A - 54A						21.84	1659.1								1.19												
TRUNK																											
Contribution From FUTURE RESIDENTIAL AREA						9.70	679.0										9.70	9.70									
						10.55	950.0										10.55	20.25									
	Plug	46A	0.00	0	0.0	20.25	1629.0	3.65	24.09								0.00	20.25	5.670	29.76	13.0	300	300	0.20	43.25	0.69	0.61
	46A	47A	0.22	0	0.0	20.47	1629.0	3.65	24.09								0.22	20.47	5.732	29.82	102.0	300	300	0.20	43.25	0.69	0.61
	47A	48A	0.19	0	0.0	20.66	1629.0	3.65	24.09								0.19	20.66	5.785	29.88	93.5	300	300	0.20	43.25	0.69	0.61
	48A	49A	0.15	0	0.0	20.81	1629.0	3.65	24.09								0.15	20.81	5.827	29.92	78.0	300	300	0.20	43.25	0.69	0.61
	49A	50A	0.24	0	0.0	21.05	1629.0	3.65	24.09								0.24	21.05	5.894	29.98	120.0	300	300	0.20	43.25	0.69	0.61
	50A	51A	0.20	0	0.0	21.25	1629.0	3.65	24.09								0.20	21.25	5.950	30.04	98.5	300	300	0.20	43.25	0.69	0.61
	51A	510A	0.02	0	0.0	21.27	1629.0	2.00	13.20								0.02	21.27	5.956	19.16	13.0	300	300	0.20	43.25	0.44	0.61
	510A	52A	0.20	0	0.0	21.47	1629.0	3.65	24.09								0.20	21.47	6.012	30.10	101.0	300	300	0.20	43.246	0.70	0.61
Contribution From BLOCK 166 (Servicing & Walkway), Pipe 33A - 52A						3.60	265.2										3.60	25.07									
	52A	53A	0.22	0	0.0	25.29	1894.2	3.60	27.62								0.22	25.29	7.081	34.70	110.0	375	375	0.20	78.410	0.44	0.71
Contribution From BLOCK 168 (Servicing & Walkway), Pipe 23A - 53A						21.84	1659.1								1.19		23.03	48.32									
	53A	54A	0.21	0	0.0	47.34	3553.3	3.38	48.65						1.19	0.19	0.21	48.53	13.588	67.43	105.5	450	450	0.20	127.503	0.53	0.80
	54A	55A	0.18	0	0.0	47.52	3553.3	3.38	48.65						1.19	0.19	0.18	48.71	13.639	67.48	101.0	450	450	0.20	127.503	0.53	0.80
Contribution From Existing Alavon South						98.22	6997.0										98.22	146.93									
Contribution From AREA 10 (TENTH LINE)						117.93	10240.0										117.93	264.86									
Contribution From URBAN EXPANSION AREA						26.60	1785.0										26.60	291.46									
	55A	Ex. 10128	0.00	0	0.0	290.27	22575.3	2.60	237.77						1.19	0.19	0.00	291.46	81.609	324.57	19.0	675	675	0.50	594.386	0.55	1.66
To PUMPING STATION, Pipe Ex. 10128 - Pumping Station						290.27	22575.3								1.19												



DESIGN PARAMETERS

Average Daily Flow =	350	l/p/day	Industrial Peak Factor = as per MOE Graph		
Commercial/Institution Flow =	50000	L/ha/da	Extraneous Flow =	0.280	L/s/ha
Industrial Flow =	35000	L/ha/da	Minimum Velocity =	0.60	m/s
Max Res. Peak Factor =	4.00		Manning's n =	0.013	
Commercial/institution/Park Peak Factor =	1.50		Townhouse coeff=	2.7	
Park Average Flow =	9300	L/ha/da	Single house coeff=	3.4	

Designed: K.M.

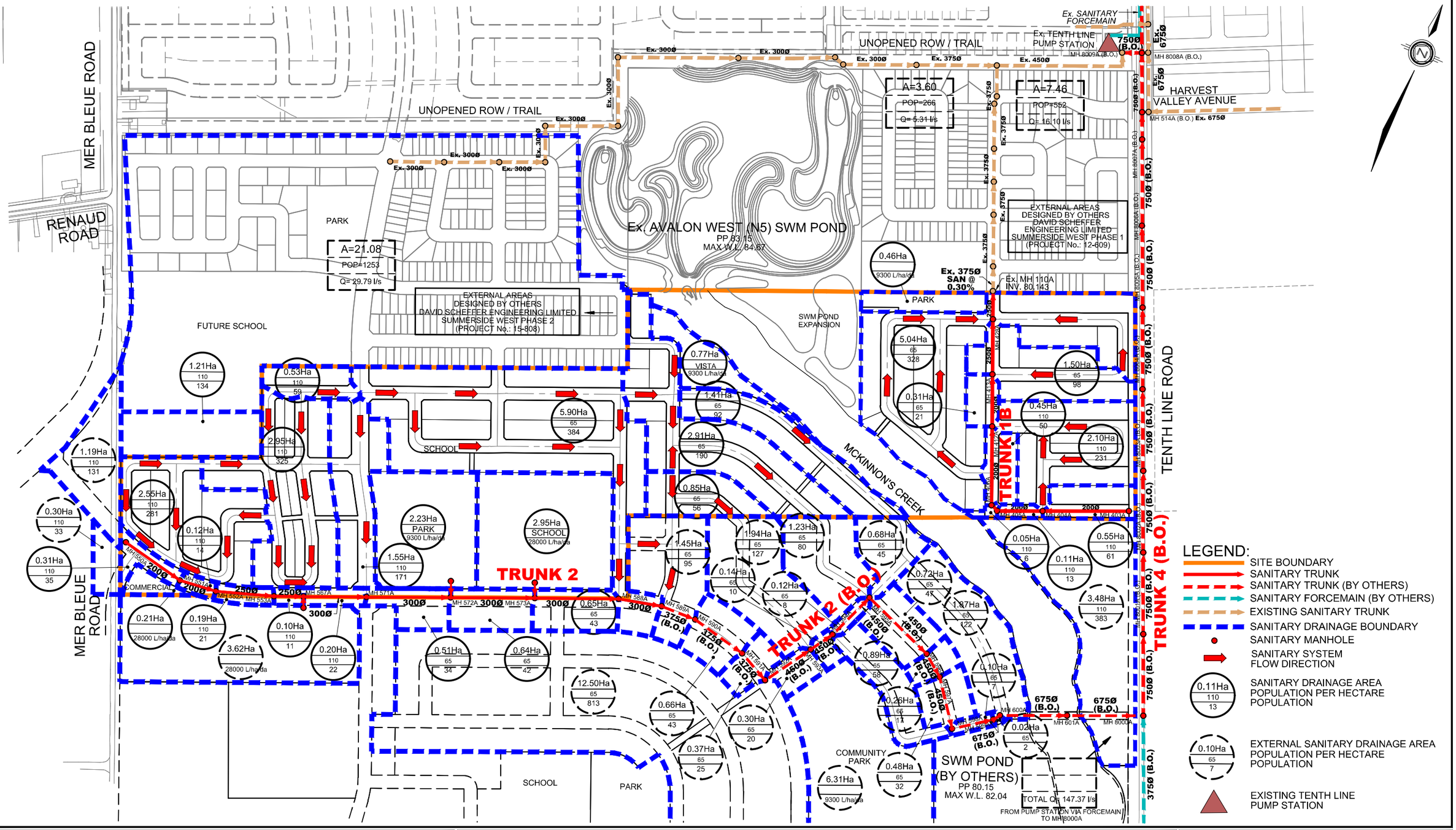
Checked: Z.L.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 35 and 36

PROJECT: **SUMMERSIDE WEST PHASE 1**

LOCATION: **City of Ottawa**

File Ref: 12-609 | Date: August, 2015 | Sheet No. 3 of 3



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SUMMERSIDE WEST PHASES 4, 5 & 6
CONCEPTUAL SANITARY SERVICING
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:5000
DATE:	MAY 2018
FIGURE:	4

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)	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)
TRUNK 2																											
				0.30	33	0.30	33			0.21	0.21						0.51	0.51									
				0.31	35	0.61	68				0.21						0.31	0.82									
		550A	551A	1.19	131	1.80	199	3.52	2.27		0.21					0.10	1.19	2.01	0.66	3.03	90.0	200	0.35	19.40	0.16	0.62	0.45
		551A	552A	0.12	14	1.92	213	3.51	2.42		0.21					0.10	0.12	2.13	0.70	3.23	51.5	200	0.35	19.40	0.17	0.62	0.46
				0.19	21	2.11	234				0.21						0.19	2.32									
				1.21	134	3.32	368				0.21						1.21	3.53									
		552A	553A	2.55	281	5.87	649	3.33	7.01		0.21					0.10	2.55	6.08	2.01	9.11	79.5	250	0.25	29.73	0.31	0.61	0.53
		553A	567A	0.10	11	5.97	660	3.33	7.12		0.21					0.10	0.10	6.18	2.04	9.26	40.5	250	0.25	29.73	0.31	0.61	0.53
				0.20	22	6.17	682			3.62	3.83						3.82	10.00									
		567A	571A	2.95	325	9.12	1007	3.24	10.57		3.83					1.86	2.95	12.95	4.27	16.70	86.0	300	0.20	43.25	0.39	0.61	0.57
				0.51	34	9.63	1041				3.83						0.51	13.46									
		571A	572A	1.55	171	11.18	1212	3.20	12.55		3.83					1.86	1.55	15.01	4.95	19.37	115.0	300	0.20	43.25	0.45	0.61	0.59
		572A	573A	0.64	42	11.82	1254	3.19	12.95		3.83			2.23	2.23	2.22	2.87	17.88	5.90	21.08	115.0	300	0.20	43.25	0.49	0.61	0.61
		573A	588A	0.65	43	12.47	1297	3.18	13.36		3.83	2.95	2.95		2.23	3.66	3.60	21.48	7.09	24.11	115.0	300	0.20	43.25	0.56	0.61	0.63
TRUNK 2 (BY OTHERS)				0.53	59	13.00	1356				3.83		2.95		2.23		0.53	22.01									
		588A	589A	5.90	384	18.90	1740	3.11	17.51		3.83		2.95		2.23	3.66	5.90	27.91	9.21	30.38	59.5	300	0.20	43.25	0.70	0.61	0.66
		589A	590A	1.45	95	20.35	1835	3.09	18.39		3.83		2.95		2.23	3.66	1.45	29.36	9.69	31.73	49.5	375	0.15	67.91	0.47	0.61	0.60
		590A (B.O.)	591A (B.O.)	0.66	43	21.01	1878	3.09	18.78		3.83		2.95		2.23	3.66	0.66	30.02	9.91	32.34	79.0	375	0.15	67.91	0.48	0.61	0.61
		591A (B.O.)	592A (B.O.)	0.37	25	21.38	1903	3.08	19.01		3.83		2.95		2.23	3.66	0.37	30.39	10.03	32.69	48.0	375	0.15	67.91	0.48	0.61	0.61
				0.30	20	21.68	1923				3.83		2.95	6.31	8.54		6.61	37.00									
		592A (B.O.)	593A (B.O.)	12.50	813	34.18	2736	2.98	26.43		3.83		2.95		8.54	4.67	12.50	49.50	16.34	47.44	75.0	450	0.12	98.76	0.48	0.62	0.61
				0.14	10	34.32	2746				3.83		2.95		8.54		0.14	49.64									
				0.85	56	35.17	2802				3.83		2.95		8.54		0.85	50.49									
		593A (B.O.)	594A (B.O.)	1.94	127	37.11	2929	2.96	28.11		3.83		2.95		8.54	4.67	1.94	52.43	17.30	50.08	36.5	450	0.12	98.76	0.51	0.62	0.62
		594A	595A	0.12	8	37.23	2937	2.96	28.18		3.83		2.95		8.54	4.67	0.12	52.55	17.34	50.19	71.0	450	0.12	98.76	0.51	0.62	0.62
				0.68	45	37.91	2982				3.83		2.95	0.77	9.31		1.45	54.00									
				0.72	47	38.63	3029				3.83		2.95		9.31		0.72	54.72									
				1.23	80	39.86	3109				3.83		2.95		9.31		1.23	55.95									
				1.41	92	41.27	3201				3.83		2.95		9.31		1.41	57.36									
		595A (B.O.)	596A (B.O.)	2.91	190	44.18	3391	2.92	32.06		3.83		2.95		9.31	4.80	2.91	60.27	19.89	56.75	109.5	450	0.12	98.76	0.57	0.62	0.64
		596A (B.O.)	597A (B.O.)	0.26	17	44.44	3408	2.92	32.20		3.83		2.95		9.31	4.80	0.26	60.53	19.97	56.98	36.0	450	0.12	98.76	0.58	0.62	0.64
		597A (B.O.)	598A (B.O.)	0.48	32	44.92	3440	2.91	32.47		3.83		2.95		9.31	4.80	0.48	61.01	20.13	57.41	72.5	450	0.12	98.76	0.58	0.62	0.64
				0.10	7	45.02	3447				3.83		2.95		9.31		0.10	61.11									
		598A (B.O.)	599A (B.O.)	0.89	58	45.91	3505	2.91	33.02		3.83		2.95		9.31	4.80	0.89	62.00	20.46	58.28	58.0	675	0.10	265.82	0.22	0.74	0.59
		599A (B.O.)	600A (B.O.)	0.02	2	45.93	3507	2.91	33.04		3.83		2.95		9.31	4.80	0.02	62.02	20.47	58.31	10.5	675	0.10	265.82	0.22	0.74	0.59
		600A (B.O.)	601A (B.O.)	1.87	122	47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	1.87	63.89	21.08	59.95	91.5	675	0.10	265.82	0.23	0.74	0.60
		601A (B.O.)	8000A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	59.95	93.0	675	0.10	265.82	0.23	0.74	0.60
TRUNK 4 (BY OTHERS)																											
Contribution from Pump Station (via Forcemain)																		Fixed Flow =		147.37							
		8000A (B.O.)	8001A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8001A (B.O.)	8002A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8002A (B.O.)	8003A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8003A (B.O.)	8004A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8004A (B.O.)	8005A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8005A (B.O.)	8006A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	111.50	750	0.10	352.05	0.59	0.80	0.83
		8006A (B.O.)	8007A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	117.98	750	0.10	352.05	0.59	0.80	0.83
		8007A (B.O.)	514A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	370.07	750	0.10	352.05	0.59	0.80	0.83
		514A (B.O.)	8008A (B.O.)			47.80	3629	2.90	34.07		3.83		2.95		9.31	4.80	0.00	63.89	21.08	207.32	81.06	750	0.10	352.05	0.59	0.80	0.83
						47.80	3629											63.89		207.32							
TRUNK 1B																											
				0.55	61	0.55	61										0.55	0.55									
		403A	404A	3.48	383	4.03	444	3.40	4.89								3.48	4.03	1.33	6.22	118.0	200	0.34	19.12	0.33	0.61	0.54
		404A	405A	0.11	13	4.14	457	3.40	5.03								0.11	4.14	1.37	6.39	62.0	200	0.34	19.12	0.33	0.61	0.55
		405A	406A	0.05	6	4.19	463	3.39	5.09								0.05	4.19	1.38	6.47	11.0	200	0.34	19.12	0.34	0.61	0.55
		406A	412A	0.45	50	4.64	513	3.37	5.61								0.45	4.64	1.53	7.14	108.0	200	0.34	19.12	0.37	0.61	0.56
				2.10	231	6.74	744										2.10	6.74									
		412A	413A	0.31	21	7.05	765	3.30	8.18								0.31	7.05	2.33	10.50	71.0	200	0.34	19.12	0.55	0.61	0.62
		413A	428A	1.50	98	8.55	863	3.27	9.15								1.50	8.55	2.82	11.97	76.0	250	0.25	29.73	0.40	0.61	0.57
		428A	*Ex. 110A*	5.04	328	13.59	1191	3.20	12.35					0.46	0.46	0.07	5.50	14.05	4.64	17.06	38.5	250	0.25	29.73	0.57	0.61	0.63
		Ex. 110A	*Ex. 11A*	0.06		13.65	1191	3.20	12.35						0.46	0.07	0.06	14.11	4.66	17.08	*33.5*	*375*	*0.30*	96.03	0.18	0.87	0.66
						13.65	1191											14.11		17.08							

DESIGN PARAMETERS

Park Flow =	9300	L/ha/day	Industrial Peak Factor = as per MOE Graph			
Average Daily Flow =	280	L/p/day	Extraneous Flow =	0.330	L/s/ha	
Comm/Inst Flow =	28000	L/ha/day	Minimum Velocity =	0.600	m/s	
Industrial Flow =	35000	L/ha/day	Manning's n =	(Conc) 0.013	(Pvc)	0.013
Max Res. Peak Factor =	4.00		Townhouse coeff=	110 PPHa		
Commercial/Inst./Park Peak Factor =	1.50		Single house coeff=	65 PPHa		

Designed: P.P

Checked: C.M.K.

Dwg. Reference: Sanitary Servicing Plan, Figure No. 4

PROJECT: **Summerside West Phases 4, 5 & 6**

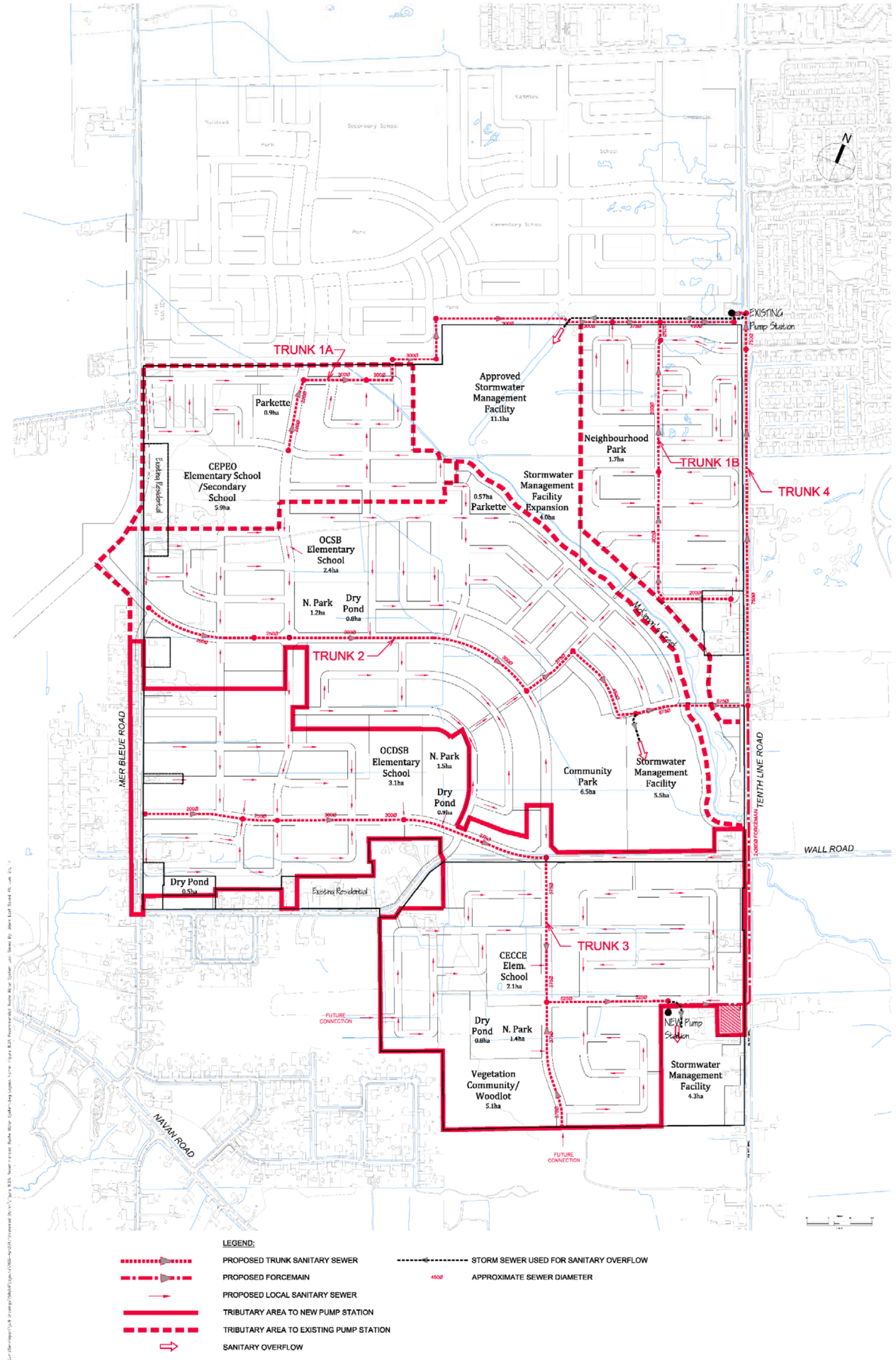
LOCATION: **City of Ottawa**

File Ref: 15-766

Date: May 2018

Sheet No. 1 of 1

766_San2.xlsx



Sheet No.
FIGURE 8.2A
JUNE 2017

Drawing Title
RECOMMENDED WASTE WATER SYSTEM FOR UPDATED DEMONSTRATION PLAN

Project Title
MER BLEUE
MASTER SERVICING STUDY

IBI

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
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ibigroup.com

SANITARY SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
Northern Outlet - Bisson North-West, and lands North-East of McKinnon's Creek - To Existing Pump Station																													
	1002A	MH1002A	MH1003A	0.39				27.0	27.0	4.00	0.44		0.00		0.00		0.00	0.00	0.39	0.39	0.11	0.00	0.55	27.59	72.47	200	0.65	0.851	27.04	98.02%
	1003A	MH1003A	MH1004A	0.29				24.3	51.3	4.00	0.83		0.00		0.00		0.00	0.00	0.29	0.68	0.19	0.00	1.02	20.24	56.87	200	0.35	0.624	19.22	94.95%
	1004A	MH1004A	MH1005A	0.10				5.4	56.7	4.00	0.92		0.00		0.00		0.00	0.00	0.10	0.78	0.22	0.00	1.14	20.24	10.98	200	0.35	0.624	19.11	94.38%
	1005A	MH1005A	MH1050A	0.23				27.0	83.7	4.00	1.36		0.00		0.00		0.00	0.00	0.23	1.01	0.28	0.00	1.64	20.24	41.48	200	0.35	0.624	18.60	91.90%
	1205A	MH1205A	MH1206A	0.55				48.6	48.6	4.00	0.79		0.00		0.00		0.00	0.00	0.55	0.55	0.15	0.00	0.94	27.59	74.65	200	0.65	0.851	26.64	96.59%
	1206A	MH1206A	MH1006A	0.14				8.1	56.7	4.00	0.92		0.00		0.00		0.00	0.00	0.14	0.69	0.19	0.00	1.11	20.24	10.04	200	0.35	0.624	19.13	94.51%
	1006A	MH1006A	MH1050A	0.24				18.9	75.6	4.00	1.23		0.00		0.00		0.00	0.00	0.24	0.93	0.26	0.00	1.49	20.24	60.93	200	0.35	0.624	18.76	92.66%
	1050A	MH1050A	MH1202A	0.19				21.6	180.9	4.00	2.93		0.00		0.00		0.00	0.00	0.19	2.13	0.60	0.00	3.53	20.24	67.60	200	0.35	0.624	16.72	82.57%
	1001A	MH1001A	MH1000A	0.37				35.1	35.1	4.00	0.57		0.00		0.00		0.00	0.00	0.37	0.37	0.10	0.00	0.67	27.59	95.08	200	0.65	0.851	26.91	97.56%
	1000A	MH1000A	MH1200A	0.07				2.7	37.8	4.00	0.61		0.00		0.00		0.00	0.00	0.07	0.44	0.12	0.00	0.74	20.24	8.89	200	0.35	0.624	19.51	96.37%
	1200A	MH1200A	MH1201A	0.18				16.2	54.0	4.00	0.88		0.00		0.00		0.00	0.00	0.18	0.62	0.17	0.00	1.05	20.24	44.00	200	0.35	0.624	19.19	94.82%
	1030A	MH1030A	MH1201A	0.46				70.2	70.2	4.00	1.14		0.00		0.00		0.00	0.00	0.46	0.46	0.13	0.00	1.27	27.59	101.95	200	0.65	0.851	26.32	95.41%
	1201A	MH1201A	MH1201B	0.17				13.5	137.7	4.00	2.23		0.00		0.00		0.00	0.00	0.17	1.25	0.35	0.00	2.58	20.24	45.00	200	0.35	0.624	17.66	87.25%
	1040A	MH1040A	MH1201B	0.46				70.2	70.2	4.00	1.14		0.00		0.00		0.00	0.00	0.46	0.46	0.13	0.00	1.27	27.59	101.94	200	0.65	0.851	26.32	95.41%
	1201B	MH1201B	MH1202A	0.20				18.9	226.8	4.00	3.68		0.00		0.00		0.00	0.00	0.20	1.91	0.53	0.00	4.21	20.24	45.00	200	0.35	0.624	16.03	79.20%
	1202A	MH1202A	MH1203A	0.78				78.3	486.0	3.98	7.84		0.00		0.00		0.00	0.00	0.78	4.82	1.35	0.00	9.19	20.24	119.64	200	0.35	0.624	11.06	54.62%
	1203A	MH1203A	MH1070A	0.62				56.7	542.7	3.96	8.70		0.00		0.00		0.00	0.00	0.62	5.44	1.52	0.00	10.22	20.24	95.78	200	0.35	0.624	10.02	49.52%
	1101A	MH1101A	MH1060A	0.29				20.4	20.4	4.00	0.33		0.00		0.00		0.00	0.00	0.29	0.29	0.08	0.00	0.41	36.69	42.63	200	1.15	1.131	36.28	98.88%
SCHOOL	1100A	MH1100A	MH1060A					0.0	0.0	4.00	0.00	5.24	5.24		0.00		0.00	4.55	5.24	5.24	1.47	0.00	6.02	24.19	19.50	200	0.50	0.746	18.18	75.14%
	1060A	MH1060A	MH1020A	0.64				27.2	47.6	4.00	0.77		5.24		0.00		0.00	4.55	0.64	6.17	1.73	0.00	7.05	20.24	120.00	200	0.35	0.624	13.20	65.19%
PARK	1207A	MH1207A	MH1020A	0.86				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.86	0.86	0.24	0.00	0.24	34.22	13.88	200	1.00	1.055	33.98	99.30%
	1020A	MH1020A	MH1070A	0.12				3.4	51.0	4.00	0.83		5.24		0.00		0.00	4.55	0.12	7.15	2.00	0.00	7.38	20.24	44.87	200	0.35	0.624	12.87	63.56%
	1070A	MH1070A	MH1080A	0.46				34.0	627.7	3.92	9.97		5.24		0.00		0.00	4.55	0.46	13.05	3.65	0.00	18.17	45.12	73.81	300	0.20	0.618	26.94	59.72%
	1800A	MH1800A	MH1081A	0.19				6.8	6.8	4.00	0.11		0.00		0.00		0.00	0.00	0.19	0.19	0.05	0.00	0.16	27.59	11.60	200	0.65	0.851	27.42	99.41%
	1801A	MH1801A	MH1080A	0.40				23.8	30.6	4.00	0.50		0.00		0.00		0.00	0.00	0.40	0.59	0.17	0.00	0.66	20.24	92.15	200	0.35	0.624	19.58	96.73%
	1080A	MH1080A	MH1090A	0.50				44.2	702.5	3.89	11.08		5.24		0.00		0.00	4.55	0.50	14.14	3.96	0.00	19.59	45.12	75.20	300	0.20	0.618	25.53	56.58%
	1930A	MH1930A	MH1090A	0.49				30.6	30.6	4.00	0.50		0.00		0.00		0.00	0.00	0.49	0.49	0.14	0.00	0.63	27.59	100.61	200	0.65	0.851	26.95	97.71%
	1090A	MH1090A	MH1091A	0.26				17.0	750.1	3.88	11.78		5.24		0.00		0.00	4.55	0.26	14.89	4.17	0.00	20.50	45.12	62.83	300	0.20	0.618	24.62	54.56%
	1900A	MH1900A	MH1901A	0.94				61.2	61.2	4.00	0.99		0.00		0.00		0.00	0.00	0.94	0.94	0.26	0.00	1.25	27.59	90.84	200	0.65	0.851	26.33	95.45%
	1901A	MH1901A	MH1910A	0.57				47.6	108.8	4.00	1.76		0.00		0.00		0.00	0.00	0.57	1.51	0.42	0.00	2.19	20.24	81.75	200	0.35	0.624	18.06	89.20%
	1903A	MH1903A	MH1904A	0.40				30.6	30.6	4.00	0.50		0.00		0.00		0.00	0.00	0.40	0.40	0.11	0.00	0.61	27.59	55.56	200	0.65	0.851	26.98	97.80%
	1904A	MH1904A	MH1910A	0.80				64.6	95.2	4.00	1.54		0.00		0.00		0.00	0.00	0.80	1.20	0.34	0.00	1.88	20.24	115.79	200	0.35	0.624	18.36	90.72%
	1910A	MH19010A	MH1920A	0.11				0.0	204.0	4.00	3.31		0.00		0.00		0.00	0.00	0.11	2.82	0.79	0.00	4.10	20.24	72.00	200	0.35	0.624	16.15	79.77%
	1101B	MH1101A	MH1102A	0.38				34.0	34.0	4.00	0.55		0.00		0.00		0.00	0.00	0.38	0.38	0.11	0.00	0.66	28.63	57.79	200	0.70	0.883	27.97	97.70%
	1102A	MH1102A	MH1920A	0.53				47.6	81.6	4.00	1.32		0.00		0.00		0.00	0.00	0.53	0.91	0.25	0.00	1.58	28.63	80.89	200	0.70	0.883	27.05	94.49%
	1923A/1903B	MH1903A	MH1924A	0.27				20.4	20.4	4.00	0.33		0.00		0.00		0.00	0.00	0.27	0.27	0.08	0.00	0.41	27.59	64.27	200	0.65	0.851	27.18	98.53%
	1924A	MH1924A	MH1925A	0.02				0.0	20.4	4.00	0.33		0.00		0.00		0.00	0.00	0.02	0.29	0.08	0.00	0.41	20.24	10.96	200	0.35	0.624	19.83	97.97%
	1925A	MH1925A	MH1926A	0.50				34.0	54.4	4.00	0.88		0.00		0.00		0.00	0.00	0.50	0.79	0.22	0.00	1.10	20.24	91.37	200	0.35	0.624	19.14	94.55%
	1926A	MH1926A	MH1920A	0.47				40.8	95.2	4.00	1.54		0.00		0.00		0.00	0.00	0.47	1.26	0.35	0.00	1.90	20.24	71.89	200	0.35	0.624	18.35	90.64%
	1920A	MH1920A	MH1930A	0.11				0.0	380.8	4.00	6.17		0.00		0.00		0.00	0.00	0.11	5.10	1.43	0.00	7.60	20.24	72.00	200	0.35	0.624	12.64	62.46%
	1800B	MH1800A	MH1930A	0.55				44.2	44.2	4.00	0.72		0.00		0.00		0.00	0.00	0.55	0.55	0.15	0.00	0.87	43.95	82.09	200	1.65	1.355	43.08	98.02%
	1930B	MH1930A	MH1932A	0.25				17.0	442.0	4.00	7.16		0.00		0.00		0.00	0.00	0.25	5.90	1.65	0.00	8.81	20.24	64.59	200	0.35	0.624	11.43	56.46%
	1932A	MH1932A	MH1940A	0.16				6.8	448.8	4.00	7.27		0.00		0.00		0.00	0.00	0.16	6.06	1.70	0.00	8.97	20.24	11.54	200	0.35	0.624	11.28	55.71%
	1940A	MH1940A	MH1941A	0.66				47.6	496.4	3.98	7.99		0.00		0.00		0.00	0.00	0.66	6.72	1.88	0.00	9.88	20.24	85.55	200	0.35	0.624	10.37	51.21%
	1941A	MH1941A	MH1091A	0.18				6.8	503.2	3.97	8.10		0.00		0.00		0.00	0.00	0.18	6.90	1.93	0.00	10.03	20.24	11.70	200	0.35	0.624	10.21	50.45%

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LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
	1091A	MH1091A	MH7000A	0.04				0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.04	21.83	6.11	0.00	29.62	45.12	49.41	300	0.20	0.618	15.49	34.34%
		MH7000A	MH7001A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.83	6.11	0.00	29.62	45.12	99.51	300	0.20	0.618	15.49	34.34%
		MH7001A	MH7002A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	36.37	93.75	300	0.13	0.498	6.75	18.56%
		MH7002A	MH7003A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	45.12	120.00	300	0.20	0.618	15.49	34.34%
		MH7003A	MH7004A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	45.12	120.00	300	0.20	0.618	15.49	34.34%
		MH7004A	MH7005A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	59.68	56.58	300	0.35	0.818	30.06	50.37%
		MH7005A	MH7006A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	42.80	14.74	300	0.18	0.587	13.18	30.79%
		MH7006A	MH7007A					0.0	1253.3	3.73	18.96		5.24		0.00		0.00	4.55	0.00	21.8	6.11	0.00	29.62	45.12	99.79	300	0.20	0.618	15.49	34.34%
	3026A	MH3026A	MH3027A		0.67			43.6	43.6	4.00	0.71		0.00		0.00		0.00	0.00	0.67	0.7	0.19	0.00	0.89	20.24	119.73	200	0.35	0.624	19.35	95.59%
		MH3027A	MH3023A					0.0	43.6	4.00	0.71		0.00		0.00		0.00	0.00	0.00	0.7	0.19	0.00	0.89	20.24	13.12	200	0.35	0.624	19.35	95.59%
	3023A	MH3023A	MH3024A		1.08			70.2	113.8	4.00	1.84		0.00		0.00		0.00	0.00	1.08	1.8	0.49	0.00	2.33	20.24	71.39	200	0.35	0.624	17.91	88.47%
		MH3024A	MH3025A					0.0	113.8	4.00	1.84		0.00		0.00		0.00	0.00	0.00	1.8	0.49	0.00	2.33	20.24	71.97	200	0.35	0.624	17.91	88.47%
		MH3025A	MH3324A					0.0	113.8	4.00	1.84		0.00		0.00		0.00	0.00	0.00	1.8	0.49	0.00	2.33	20.24	12.85	200	0.35	0.624	17.91	88.47%
		MH3324A	MH3325A					0.0	113.8	4.00	1.84		0.00		0.00		0.00	0.00	0.00	1.8	0.49	0.00	2.33	20.24	28.75	200	0.35	0.624	17.91	88.47%
	3320A	MH3320A	MH3322A		1.03			67.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	1.03	1.0	0.29	0.00	1.37	20.24	113.47	200	0.35	0.624	18.87	93.22%
		MH3322A	MH3323A					0.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	0.00	1.0	0.29	0.00	1.37	20.24	12.88	200	0.35	0.624	18.87	93.22%
		MH3323A	MH3325A					0.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	0.00	1.0	0.29	0.00	1.37	20.24	25.74	200	0.35	0.624	18.87	93.22%
	3325A	MH3325A	MH7007A		0.73			47.5	228.2	4.00	3.70		0.00		0.00		0.00	0.00	0.73	3.5	0.98	0.00	4.68	20.24	42.56	200	0.35	0.624	15.56	76.88%
		MH7007A	MH7008A					0.0	1481.5	3.68	22.11		5.24		0.00		0.00	4.55	0.00	25.3	7.10	0.00	33.75	81.80	110.11	375	0.20	0.717	48.05	58.74%
	2000A	MH2000A	MH2001A				2.41	204.9	204.9	4.00	3.32		0.00		0.00		0.00	0.00	2.41	2.4	0.67	0.00	3.99	20.24	29.67	200	0.35	0.624	16.25	80.27%
	2001A	MH2001A	MH2002A		0.87			56.6	261.4	4.00	4.24		0.00		0.00		0.00	0.00	0.87	3.3	0.92	0.00	5.15	20.24	73.57	200	0.35	0.624	15.09	74.54%
		MH2002A	MH2003A					0.0	261.4	4.00	4.24		0.00		0.00		0.00	0.00	0.00	3.3	0.92	0.00	5.15	20.24	81.60	200	0.35	0.624	15.09	74.54%
		MH2003A	MH2004A					0.0	261.4	4.00	4.24		0.00		0.00		0.00	0.00	0.00	3.3	0.92	0.00	5.15	20.24	20.25	200	0.35	0.624	15.09	74.54%
		MH2004A	MH2010A					0.0	261.4	4.00	4.24		0.00		0.00		0.00	0.00	0.00	3.3	0.92	0.00	5.15	20.24	58.54	200	0.35	0.624	15.09	74.54%
	2100A	MH2100A	MH2101A		1.34			87.1	87.1	4.00	1.41		0.00		0.00		0.00	0.00	1.34	1.3	0.38	0.00	1.79	20.24	56.95	200	0.35	0.624	18.46	91.17%
		MH2101A	MH2102A					0.0	87.1	4.00	1.41		0.00		0.00		0.00	0.00	0.00	1.3	0.38	0.00	1.79	20.24	8.41	200	0.35	0.624	18.46	91.17%
		MH2102A	MH2103A					0.0	87.1	4.00	1.41		0.00		0.00		0.00	0.00	0.00	1.3	0.38	0.00	1.79	20.24	120.00	200	0.35	0.624	18.46	91.17%
		MH2103A	MH2010A					0.0	87.1	4.00	1.41		0.00		0.00		0.00	0.00	0.00	1.3	0.38	0.00	1.79	20.24	53.73	200	0.35	0.624	18.46	91.17%
	2111A	MH2111A	MH2112A		0.47			30.6	30.6	4.00	0.50		0.00		0.00		0.00	0.00	0.47	0.5	0.13	0.00	0.63	20.24	15.34	200	0.35	0.624	19.62	96.90%
		MH2112A	MH2010A					0.0	30.6	4.00	0.50		0.00		0.00		0.00	0.00	0.00	0.5	0.13	0.00	0.63	20.24	29.01	200	0.35	0.624	19.62	96.90%
	2010A	MH2010A	MH2020A		0.12			7.8	386.9	4.00	6.27		0.00		0.00		0.00	0.00	0.12	5.2	1.46	0.00	7.73	20.24	72.03	200	0.35	0.624	12.52	61.83%
	2200A	MH2200A	MH2201A		1.39			90.4	90.4	4.00	1.46		0.00		0.00		0.00	0.00	1.39	1.4	0.39	0.00	1.85	20.24	84.16	200	0.35	0.624	18.39	90.85%
		MH2201A	MH2020A					0.0	90.4	4.00	1.46		0.00		0.00		0.00	0.00	0.00	1.4	0.39	0.00	1.85	20.24	100.01	200	0.35	0.624	18.39	90.85%
	2211A	MH2211A	MH2212A		1.14			74.1	74.1	4.00	1.20		0.00		0.00		0.00	0.00	1.14	1.1	0.32	0.00	1.52	20.24	16.38	200	0.35	0.624	18.72	92.49%
		MH2212A	MH2020A					0.0	74.1	4.00	1.20		0.00		0.00		0.00	0.00	0.00	1.1	0.32	0.00	1.52	20.24	106.82	200	0.35	0.624	18.72	92.49%
	2020A	MH2020A	MH2030A		0.12			7.8	559.1	3.95	8.94		0.00		0.00		0.00	0.00	0.12	7.9	2.20	0.00	11.14	20.24	74.99	200	0.35	0.624	9.10	44.95%
	2300A	MH2300A	MH2301A		1.21			78.7	78.7	4.00	1.27		0.00		0.00		0.00	0.00	1.21	1.2	0.34	0.00	1.61	20.24	84.80	200	0.35	0.624	18.63	92.03%
		MH2301A	MH2030A					0.0	78.7	4.00	1.27		0.00		0.00		0.00	0.00	0.00	1.2	0.34	0.00	1.61	20.24	85.21	200	0.35	0.624	18.63	92.03%
	2502A	MH2502A	MH2501A		1.04			67.6	67.6	4.00	1.10		0.00		0.00		0.00	0.00	1.04	1.0	0.29	0.00	1.39	20.24	66.06	200	0.35	0.624	18.86	93.15%
		MH2501A	MH2030A					0.0	67.6	4.00	1.10		0.00		0.00		0.00	0.00	0.00	1.0	0.29	0.00	1.39	20.24	69.39	200	0.35	0.624	18.86	93.15%
	2030A	MH2030A	MH2040A		0.11			7.2	712.5	3.89	11.23		0.00		0.00		0.00	0.00	0.11	10.2	2.86	0.00	14.09	20.24	72.02	200	0.35	0.624	6.15	30.40%
	2400A	MH2400A	MH2401A		1.62			105.3	105.3	4.00	1.71		0.00		0.00		0.00	0.00	1.62	1.6	0.45	0.00	2.16	20.24	60.15	200	0.35	0.624	18.08	89.33%
		MH2401A	MH2402A					0.0	105.3	4.00	1.71		0.00		0.00		0.00	0.00	0.00	1.6	0.45	0.00	2.16	20.24	8.40	200	0.35	0.624	18.08	89.33%
		MH2402A	MH2403A					0.0	105.3	4.00	1.71		0.00		0.00		0.00	0.00	0.00	1.6	0.45	0.00	2.16	20.24	89.66	200	0.35	0.624	18.08	89.33%
		MH2403A	MH2040A					0.0	105.3	4.00	1.71		0.00		0.00		0.00	0.00	0.00	1.6	0.45	0.00	2.16	20.24	80.03	200	0.35	0.624	18.08	89.33%
	2503A	MH2503A	MH2504A		1.01			65.7	65.7	4.00	1.06		0.00		0.00		0.00	0.00	1.01	1.0	0.28	0.00	1.35	20.24	56.43	200	0.35	0.624	18.90	93.35%
		MH2504A	MH2042A					0.0	65.7	4.00	1.06		0.00		0.00		0.00	0.00	0.00	1.0	0.28	0.00	1.35	20.24	9.22	200	0.35	0.624	18.90	93.35%
		MH2042A	MH2041A					0.0	65.7	4.00	1.06		0.00		0.00		0.00	0.00	0.00	1.0	0.28	0.00	1.35	20.24	68.83	200	0.35	0.624	18.90	93.35%
		MH2041A	MH2040A					0.0	65.7	4.00	1.06		0.00		0.00		0.00	0.00	0.00	1.0	0.28	0.00	1.35	20.24	68.79	200	0.35	0.624	18.90	93.35%
	2040A	MH2040A	MH3100A		0.12			7.8	891.3	3.83	13.83		0.00		0.00		0.00	0.00	0.12	13.0	3.63	0.00	17.47	31.02	38.69	250	0.25	0.612	13.55	43.70%
		MH3100A	MH3010A					0.0	891.3	3.83	13.83		0.00		0.00		0.00	0.00	0.00	13.0	3.63	0.00	17.47	31.02	33.71	250	0.25	0.612	13.55	43.70%

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Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW	MED	HIGH	IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL			IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)		L/s	(%)
					65	110	85					IND	CUM	IND	CUM	IND	CUM													
	3004A	MH3004A	MH3000A			0.39		42.9	42.9	4.00	0.70		0.00		0.00		0.00	0.00	0.39	0.4	0.11	0.00	0.80	20.24	86.37	200	0.35	0.624	19.44	96.03%
		MH3000A	MH3001A					0.0	42.9	4.00	0.70		0.00		0.00		0.00	0.00	0.00	0.4	0.11	0.00	0.80	20.24	11.07	200	0.35	0.624	19.44	96.03%
		MH3001A	MH3002A					0.0	42.9	4.00	0.70		0.00		0.00		0.00	0.00	0.00	0.4	0.11	0.00	0.80	20.24	36.40	200	0.35	0.624	19.44	96.03%
	3210B	MH3210A	MH3002A			0.33		36.3	36.3	4.00	0.59		0.00		0.00		0.00	0.00	0.33	0.3	0.09	0.00	0.68	20.24	70.50	200	0.35	0.624	19.56	96.64%
	3002A	MH3002A	MH3003A		0.62			40.3	119.5	4.00	1.94		0.00		0.00		0.00	0.00	0.62	1.3	0.38	0.00	2.31	20.24	67.53	200	0.35	0.624	17.93	88.58%
		MH3003A	MH3010A					0.0	119.5	4.00	1.94		0.00		0.00		0.00	0.00	0.00	1.3	0.38	0.00	2.31	20.24	66.37	200	0.35	0.624	17.93	88.58%
	3010A	MH3010A	MH3011A		0.11			7.2	1017.9	3.80	15.65		0.00		0.00		0.00	0.00	0.11	14.4	4.04	0.00	19.69	31.02	20.97	250	0.25	0.612	11.33	36.54%
PARK	3101A	MH3101A	MH3011A	1.66				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	1.66	1.7	0.46	0.00	0.46	20.24	11.00	200	0.35	0.624	19.78	97.70%
		MH3011A	MH3020A					0.0	1017.9	3.80	15.65		0.00		0.00		0.00	0.00	0.00	16.1	4.50	0.00	20.15	31.02	49.53	250	0.25	0.612	10.87	35.04%
	3004B	MH3004A	MH3201A			0.79		86.9	86.9	4.00	1.41		0.00		0.00		0.00	0.00	0.79	0.8	0.22	0.00	1.63	20.24	38.08	200	0.35	0.624	18.61	91.95%
		MH3201A	MH3202A					0.0	86.9	4.00	1.41		0.00		0.00		0.00	0.00	0.00	0.8	0.22	0.00	1.63	20.24	10.91	200	0.35	0.624	18.61	91.95%
		MH3202A	MH3203A					0.0	86.9	4.00	1.41		0.00		0.00		0.00	0.00	0.00	0.8	0.22	0.00	1.63	20.24	28.73	200	0.35	0.624	18.61	91.95%
		MH3203A	MH3204A					0.0	86.9	4.00	1.41		0.00		0.00		0.00	0.00	0.00	0.8	0.22	0.00	1.63	20.24	11.04	200	0.35	0.624	18.61	91.95%
		MH3204A	MH3210A					0.0	86.9	4.00	1.41		0.00		0.00		0.00	0.00	0.00	0.8	0.22	0.00	1.63	20.24	61.76	200	0.35	0.624	18.61	91.95%
	3210A	MH3210A	MH3220A			0.20		22.0	108.9	4.00	1.76		0.00		0.00		0.00	0.00	0.20	1.0	0.28	0.00	2.04	20.24	69.00	200	0.35	0.624	18.20	89.91%
	3221A	MH3221A	MH3220A			0.41		45.1	45.1	4.00	0.73		0.00		0.00		0.00	0.00	0.41	0.4	0.11	0.00	0.85	20.24	82.28	200	0.35	0.624	19.40	95.82%
	3220A	MH3220A	MH3020A			0.31		34.1	188.1	4.00	3.05		0.00		0.00		0.00	0.00	0.31	1.7	0.48	0.00	3.53	20.24	64.23	200	0.35	0.624	16.72	82.58%
	3020A	MH3020A	MH3022A		0.17			11.1	1217.1	3.74	18.46		0.00		0.00		0.00	0.00	0.17	18.0	5.03	0.00	23.48	31.02	45.00	250	0.25	0.612	7.54	24.29%
	3021A	MH3021A	MH3022A			0.21		23.1	23.1	4.00	0.37		0.00		0.00		0.00	0.00	0.21	0.2	0.06	0.00	0.43	20.24	50.78	200	0.35	0.624	19.81	97.86%
	3022A	MH3022A	MH3313A		0.19			12.4	1252.5	3.73	18.95		0.00		0.00		0.00	0.00	0.19	18.4	5.14	0.00	24.09	31.02	45.00	250	0.25	0.612	6.93	22.34%
	3221B	MH3221A	MH3314A			0.35		38.5	38.5	4.00	0.62		0.00		0.00		0.00	0.00	0.35	0.4	0.10	0.00	0.72	20.24	10.93	200	0.35	0.624	19.52	96.43%
		MH3314A	MH3313A					0.0	38.5	4.00	0.62		0.00		0.00		0.00	0.00	0.00	0.4	0.10	0.00	0.72	20.24	55.68	200	0.35	0.624	19.52	96.43%
	3313A	MH3313A	MH3315A		0.26			16.9	1307.9	3.72	19.72		0.00		0.00		0.00	0.00	0.26	19.0	5.31	0.00	25.03	31.02	61.31	250	0.25	0.612	5.99	19.31%
		MH3315A	MH3303A					0.0	1307.9	3.72	19.72		0.00		0.00		0.00	0.00	0.00	19.0	5.31	0.00	25.03	31.02	11.50	250	0.25	0.612	5.99	19.31%
	3300A	MH3300A	MH3301A		1.67			108.6	108.6	4.00	1.76		0.00		0.00		0.00	0.00	1.67	1.7	0.47	0.00	2.23	27.59	34.76	200	0.65	0.851	25.36	91.93%
		MH3301A	MH3302A					0.0	108.6	4.00	1.76		0.00		0.00		0.00	0.00		1.7	0.47	0.00	2.23	21.64	53.37	200	0.40	0.667	19.41	89.71%
		MH3302A	MH3303A					0.0	108.6	4.00	1.76		0.00		0.00		0.00	0.00	0.00	1.7	0.47	0.00	2.23	26.50	85.36	200	0.60	0.817	24.28	91.60%
		MH3303A	MH7008A					0.0	1416.5	3.70	21.22		0.00		0.00		0.00	0.00	0.00	20.6	5.78	0.00	26.99	100.18	42.38	375	0.30	0.879	73.19	73.05%
		MH7008A	MH7009A					0.0	2897.9	3.46	40.56		5.24		0.00		0.00	4.55	0.00	46.0	12.87	0.00	57.98	133.02	105.62	450	0.20	0.810	75.03	56.41%
		MH7009A	MH7010A					0.0	2897.9	3.46	40.56		5.24		0.00		0.00	4.55	0.00	46.0	12.87	0.00	57.98	133.02	65.50	450	0.20	0.810	75.03	56.41%
		MH7010A	MH8009A					0.0	2897.9	3.46	40.56		5.24		0.00		0.00	4.55	0.00	46.0	12.87	0.00	57.98	133.02	18.21	450	0.20	0.810	75.03	56.41%
				18.25	17.09	2.99	2.41	1644.6	FALSE			5.24	TRUE	0.00	TRUE	0.00	TRUE		45.98	TRUE										
								40.7											45.98	TRUE										

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SANITARY SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
Central Outlet - Lands Immediately South-West of McKinnon's Creek (Gravity to Tenth Line)																													
	4000A/B/C	MH4000A	MH4001A	0.40		2.57		282.7	282.7	4.00	4.58		0.00		0.00		0.00	0.00	2.97	2.97	0.83	0.00	5.41	20.24	34.46	200	0.35	0.624	14.83	73.26%
		MH4001A	MH4002A					0.0	282.7	4.00	4.58		0.00		0.00		0.00	0.00	0.00	2.97	0.83	0.00	5.41	20.24	44.39	200	0.35	0.624	14.83	73.26%
		MH4002A	MH4010A					0.0	282.7	4.00	4.58		0.00		0.00		0.00	0.00	0.00	2.97	0.83	0.00	5.41	20.24	45.99	200	0.35	0.624	14.83	73.26%
	4010A	MH4010A	MH4011A	0.52				0.0	282.7	4.00	4.58		0.00		0.00		0.00	0.00	0.52	3.49	0.98	0.00	5.56	20.24	42.82	200	0.35	0.624	14.68	72.54%
		MH4011A	MH4012A					0.0	282.7	4.00	4.58		0.00		0.00		0.00	0.00	0.00	3.49	0.98	0.00	5.56	20.24	93.46	200	0.35	0.624	14.68	72.54%
	4107A	MH4107A	MH4101A			1.61		177.1	177.1	4.00	2.87		0.00		0.00		0.00	0.00	1.61	1.61	0.45	0.00	3.32	20.24	82.00	200	0.35	0.624	16.92	83.60%
		MH4101A	MH4102A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	43.88	200	0.35	0.624	16.92	83.60%
		MH4102A	MH4103A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	47.64	200	0.35	0.624	16.92	83.60%
		MH4103A	MH4104A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	53.38	200	0.35	0.624	16.92	83.60%
		MH4104A	MH4105A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	33.45	200	0.35	0.624	16.92	83.60%
		MH4105A	MH4106A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	45.81	200	0.35	0.624	16.92	83.60%
		MH4106A	MH4122A					0.0	177.1	4.00	2.87		0.00		0.00		0.00	0.00	0.00	1.61	0.45	0.00	3.32	20.24	92.95	200	0.35	0.624	16.92	83.60%
	4110A	MH4110A	MH4111A			0.94		103.4	103.4	4.00	1.68		0.00		0.00		0.00	0.00	0.94	0.94	0.26	0.00	1.94	20.24	79.93	200	0.35	0.624	18.30	90.42%
		MH4111A	MH4112A					0.0	103.4	4.00	1.68		0.00		0.00		0.00	0.00	0.00	0.94	0.26	0.00	1.94	20.24	5.53	200	0.35	0.624	18.30	90.42%
		MH4112A	MH4113A					0.0	103.4	4.00	1.68		0.00		0.00		0.00	0.00	0.00	0.94	0.26	0.00	1.94	20.24	37.11	200	0.35	0.624	18.30	90.42%
		MH4113A	MH4121A					0.0	103.4	4.00	1.68		0.00		0.00		0.00	0.00	0.00	0.94	0.26	0.00	1.94	20.24	42.35	200	0.35	0.624	18.30	90.42%
	4120A	MH4120A	MH4121A			1.15		126.5	126.5	4.00	2.05		0.00		0.00		0.00	0.00	1.15	1.15	0.32	0.00	2.37	20.24	106.98	200	0.35	0.624	17.87	88.28%
		MH4121A	MH4131A					0.0	229.9	4.00	3.73		0.00		0.00		0.00	0.00	0.00	2.09	0.59	0.00	4.31	20.24	78.00	200	0.35	0.624	15.93	78.71%
		MH4132A	MH4131A					0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.24	67.17	200	0.35	0.624	20.24	100.00%
	4130A	MH4130A	MH4131A			1.28		140.8	140.8	4.00	2.28		0.00		0.00		0.00	0.00	1.28	1.28	0.36	0.00	2.64	20.24	107.13	200	0.35	0.624	17.60	86.96%
		MH4131A	MH4122A					0.0	370.7	4.00	6.01		0.00		0.00		0.00	0.00	0.00	3.37	0.94	0.00	6.95	20.24	72.00	200	0.35	0.624	13.29	65.67%
		MH4122A	MH4012A					0.0	547.8	3.95	8.77		0.00		0.00		0.00	0.00	0.00	4.98	1.39	0.00	10.17	20.24	17.08	200	0.35	0.624	10.08	49.77%
COMMERCIAL	4013A	MH4013A	MH4012A					0.0	0.0	4.00	0.00		0.00	3.83	3.83		0.00	3.32	3.83	3.83	1.07	2.00	6.40	31.02	15.00	250	0.25	0.612	24.62	79.38%
		MH4012A	MH4020A					0.0	830.5	3.85	12.95		0.0		3.8		0.0	3.32	0.00	12.30	3.44	0.00	19.72	31.02	80.97	250	0.25	0.612	11.30	36.42%
	4200A	MH4200A	MH4201A			1.20		132.0	132.0	4.00	2.14		0.00		0.00		0.00	0.00	1.20	1.20	0.34	0.00	2.47	20.24	105.31	200	0.35	0.624	17.77	87.77%
		MH4201A	MH4202A					0.0	132.0	4.00	2.14		0.00		0.00		0.00	0.00	0.00	1.20	0.34	0.00	2.47	20.24	104.56	200	0.35	0.624	17.77	87.77%
	4202A	MH4202A	MH4204A			0.68		74.8	206.8	4.00	3.35		0.00		0.00		0.00	0.00	0.68	1.88	0.53	0.00	3.88	20.24	82.35	200	0.35	0.624	16.37	80.85%
		MH4204A	MH4220A					0.0	206.8	4.00	3.35		0.00		0.00		0.00	0.00	0.00	1.88	0.53	0.00	3.88	20.24	19.14	200	0.35	0.624	16.37	80.85%
SCHOOL	4221A	MH4221A	MH4220A					0.0	0.0	4.00	0.00	2.54	2.54		0.00		0.00	2.20	2.54	2.54	0.71	0.00	2.92	31.02	18.00	250	0.25	0.612	28.10	90.60%
	4220A	MH4220A	MH4222A			1.02		112.2	319.0	4.00	5.17		2.54		0.00		0.00	2.20	1.02	5.44	1.52	0.00	8.90	31.02	30.28	250	0.25	0.612	22.12	71.32%
		MH4222A	MH4223A					0.0	319.0	4.00	5.17		2.54		0.00		0.00	2.20	0.00	5.44	1.52	0.00	8.90	31.02	8.09	250	0.25	0.612	22.12	71.32%
		MH4223A	MH4224A					0.0	319.0	4.00	5.17		2.54		0.00		0.00	2.20	0.00	5.44	1.52	0.00	8.90	31.02	80.83	250	0.25	0.612	22.12	71.32%
		MH4224A	MH4020A					0.0	319.0	4.00	5.17		2.54		0.00		0.00	2.20	0.00	5.44	1.52	0.00	8.90	31.02	89.00	250	0.25	0.612	22.12	71.32%
	4020A	MH4020A	MH4021A		0.92			59.8	1209.3	3.75	18.35		2.54		3.83		0.0	5.53	0.92	18.66	5.22	0.00	29.10	45.12	91.23	300	0.20	0.618	16.01	35.50%
		MH4021A	MH4022A					0.0	1209.3	3.75	18.35		2.54		3.83		0.00	5.53	0.00	18.66	5.22	0.00	29.10	45.12	95.08	300	0.20	0.618	16.01	35.50%
PARK	4023A	MH4023A	MH4022A	2.04				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	2.04	2.04	0.57	0.00	0.57	20.24	25.00	200	0.35	0.624	19.67	97.18%
	4022A	MH4022A	MH4024A		0.89			57.9	1267.2	3.73	19.15		2.54		3.83		0.00	5.53	0.89	21.59	6.05	0.00	30.73	45.12	71.34	300	0.20	0.618	14.39	31.89%
		MH4024A	MH4025A					0.0	1267.2	3.73	19.15		2.54		3.83		0.00	5.53	0.00	21.59	6.05	0.00	30.73	45.12	74.44	300	0.20	0.618	14.39	31.89%
	4025A	MH4025A	MH4026A		1.07			69.6	1336.7	3.72	20.12		2.54		3.83		0.00	5.53	1.07	22.66	6.34	0.00	31.99	45.12	43.97	300	0.20	0.618	13.12	29.09%
		MH4026A	MH4030A					0.0	1336.7	3.72	20.12		2.54		3.83		0.00	5.53	0.00	22.66	6.34	0.00	31.99	45.12	58.67	300	0.20	0.618	13.12	29.09%
	4600A	MH4600A	MH4601A		1.40			91.0	91.0	4.00	1.47		0.00		0.00		0.00	0.00	1.40	1.40	0.39	0.00	1.87	20.24	115.00	200	0.35	0.624	18.38	90.78%
		MH4601A	MH4602A					0.0	91.0	4.00	1.47		0.00		0.00		0.00	0.00	0.00	1.40	0.39	0.00	1.87	20.24	115.00	200	0.35	0.624	18.38	90.78%
	4602A	MH4602A	MH4603A		1.33			86.5	177.5	4.00	2.88		0.00		0.00		0.00	0.00	1.33	2.73	0.76	0.00	3.64	20.24	107.53	200	0.35	0.624	16.60	82.02%
		MH4603A	MH4604A					0.0	177.5	4.00	2.88		0.00		0.00		0.00	0.00	0.00	2.73	0.76	0.00	3.64	20.24	108.47	200	0.35	0.624	16.60	82.02%
	4605A	MH4605A	MH4606A		0.62			40.3	40.3	4.00	0.65		0.00		0.00		0.00	0.00	0.62	0.62	0.17	2.00	2.83	20.24	85.60	200	0.35	0.624	17.42	86.04%
		MH4606A	MH4607A					0.0	40.3	4.00	0.65		0.00		0.00		0.00	0.00	0.00	0.62	0.17	3.00	3.83	20.24	11.40	200	0.35	0.624	16.42	81.10%
		MH4607A	MH4604A					0.0	40.3	4.00	0.65		0.00		0.00		0.00	0.00	0.00	0.62	0.17	4.00	4.83	20.24	63.11	200	0.35	0.624	15.42	76.16%
	4604A	MH4604A	MH4610A		0.26			16.9	234.7	4.00	3.80		0.00		0.00		0.00	0.00	0.26	3.61	1.01	0.00	4.81	20.24	64.53	200	0.35	0.624	15.43	76.22%
	4611A	MH4611A	MH4612A		0.93			60.5	60.5	4.00	0.98		0.00		0.00		0.00	0.00	0.93	0.93	0.26	0.00	1.24	20.24	68.77	200	0.35	0.624	19.00	93.87%
		MH4612A	MH4610A					0.0	60.5	4.00	0.98		0.00		0.00		0.00	0.00	0.00	0.93	0.26	0.00	1.24	20.24	70.00	200	0.35	0.624	19.00	93.87%

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SANITARY SEWER DESIGN SHEET

MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW			CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
												INSTITUTIONAL		COMMERCIAL		INDUSTRIAL													
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			IND	CUM	IND	CUM	IND	CUM		IND	CUM	(L/s)	(L/s)	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
	4610A	MH4610A	MH4620A		0.32			20.8	315.9	4.00	5.12		0.00		0.00		0.00	0.00	0.32	4.86	1.36	0.00	6.48	20.24	72.00	200	0.35	0.624	13.76	67.99%
	4620A	MH4620A	MH4660A		0.42			27.3	343.2	4.00	5.56		0.00		0.00		0.00	0.00	0.42	5.28	1.48	0.00	7.04	20.24	66.50	200	0.35	0.624	13.20	65.22%
	4630A	MH4630A	MH4631A		1.82			118.3	118.3	4.00	1.92		0.00		0.00		0.00	0.00	1.82	1.82	0.51	0.00	2.43	20.24	94.12	200	0.35	0.624	17.82	88.01%
		MH4631A	MH4632A					0.0	118.3	4.00	1.92		0.00		0.00		0.00	0.00	0.00	1.82	0.51	0.00	2.43	20.24	90.57	200	0.35	0.624	17.82	88.01%
		MH4632A	MH4633A					0.0	118.3	4.00	1.92		0.00		0.00		0.00	0.00	0.00	1.82	0.51	0.00	2.43	20.24	11.60	200	0.35	0.624	17.82	88.01%
		MH4633A	MH4640A					0.0	118.3	4.00	1.92		0.00		0.00		0.00	0.00	0.00	1.82	0.51	0.00	2.43	20.24	63.80	200	0.35	0.624	17.82	88.01%
	4343A	MH4343A	MH4341A		0.93			60.5	60.5	4.00	0.98		0.00		0.00		0.00	0.00	0.93	0.93	0.26	0.00	1.24	20.24	61.38	200	0.35	0.624	19.00	93.87%
		MH4341A	MH4640A					0.0	60.5	4.00	0.98		0.00		0.00		0.00	0.00	0.00	0.93	0.26	0.00	1.24	20.24	58.82	200	0.35	0.624	19.00	93.87%
	4640A	MH4640A	MH4650A		0.32			20.8	199.6	4.00	3.23		0.00		0.00		0.00	0.00	0.32	3.07	0.86	0.00	4.09	20.24	72.00	200	0.35	0.624	16.15	79.78%
	4651A	MH4651A	MH4652A		1.37			89.1	89.1	4.00	1.44		0.00		0.00		0.00	0.00	1.37	1.37	0.38	0.00	1.83	20.24	55.86	200	0.35	0.624	18.42	90.98%
		MH4652A	MH4653A					0.0	89.1	4.00	1.44		0.00		0.00		0.00	0.00	0.00	1.37	0.38	0.00	1.83	20.24	7.10	200	0.35	0.624	18.42	90.98%
		MH4653A	MH4654A					0.0	89.1	4.00	1.44		0.00		0.00		0.00	0.00	0.00	1.37	0.38	0.00	1.83	20.24	63.45	200	0.35	0.624	18.42	90.98%
		MH4654A	MH4650A					0.0	89.1	4.00	1.44		0.00		0.00		0.00	0.00	0.00	1.37	0.38	0.00	1.83	20.24	62.73	200	0.35	0.624	18.42	90.98%
	4650A	MH4650A	MH4660A		0.33			21.5	310.1	4.00	5.02		0.00		0.00		0.00	0.00	0.33	4.77	1.34	0.00	6.36	20.24	71.98	200	0.35	0.624	13.88	68.58%
		MH4660A	MH4663A					0.0	653.3	3.91	10.35		0.00		0.00		0.00	0.00	0.00	10.05	2.81	0.00	13.17	20.24	39.65	200	0.35	0.624	7.08	34.96%
		MH4663A	MH4662A					0.0	653.3	3.91	10.35		0.00		0.00		0.00	0.00	0.00	10.05	2.81	0.00	13.17	20.24	18.36	200	0.35	0.624	7.08	34.96%
	4662A	MH4662A	MH4030A		0.36			23.4	676.7	3.90	10.70		0.00		0.00		0.00	0.00	0.36	10.41	2.91	0.00	13.61	20.24	39.58	200	0.35	0.624	6.63	32.75%
	4030A	MH4030A	MH4031A		1.13			73.5	2086.8	3.57	30.19		2.54		3.83		0.00	5.53	1.13	34.20	9.58	0.00	45.30	45.12	40.86	300	0.20	0.618	-0.18	-0.40%
		MH4031A	MH4032A					0.0	2086.8	3.57	30.19		2.54		3.83		0.00	5.53	0.00	34.20	9.58	0.00	45.30	45.12	48.57	300	0.20	0.618	-0.18	-0.40%
		MH4032A	MH4040A					0.0	2086.8	3.57	30.19		2.54		3.83		0.00	5.53	0.00	34.20	9.58	0.00	45.30	45.12	56.87	300	0.20	0.618	-0.18	-0.40%
	4400A	MH4400A	MH4401A		1.93			125.5	125.5	4.00	2.03		0.00		0.00		0.00	0.00	1.93	1.93	0.54	0.00	2.57	20.24	64.93	200	0.35	0.624	17.67	87.29%
		MH4401A	MH4402A					0.0	125.5	4.00	2.03		0.00		0.00		0.00	0.00	0.00	1.93	0.54	0.00	2.57	20.24	10.75	200	0.35	0.624	17.67	87.29%
		MH4402A	MH4403A					0.0	125.5	4.00	2.03		0.00		0.00		0.00	0.00	0.00	1.93	0.54	0.00	2.57	20.24	85.88	200	0.35	0.624	17.67	87.29%
		MH4403A	MH4404A					0.0	125.5	4.00	2.03		0.00		0.00		0.00	0.00	0.00	1.93	0.54	0.00	2.57	20.24	85.84	200	0.35	0.624	17.67	87.29%
	4404A	MH4404A	MH4405A		2.20			143.0	268.5	4.00	4.35		0.00		0.00		0.00	0.00	2.20	4.13	1.16	0.00	5.51	20.24	90.60	200	0.35	0.624	14.74	72.80%
		MH4405A	MH4406A					0.0	268.5	4.00	4.35		0.00		0.00		0.00	0.00	0.00	4.13	1.16	0.00	5.51	20.24	41.28	200	0.35	0.624	14.74	72.80%
		MH4406A	MH4407A					0.0	268.5	4.00	4.35		0.00		0.00		0.00	0.00	0.00	4.13	1.16	0.00	5.51	20.24	29.48	200	0.35	0.624	14.74	72.80%
		MH4407A	MH4408A					0.0	268.5	4.00	4.35		0.00		0.00		0.00	0.00	0.00	4.13	1.16	0.00	5.51	20.24	43.01	200	0.35	0.624	14.74	72.80%
		MH4408A	MH4440A					0.0	268.5	4.00	4.35		0.00		0.00		0.00	0.00	0.00	4.13	1.16	0.00	5.51	20.24	34.11	200	0.35	0.624	14.74	72.80%
	4410A	MH4410A	MH4411A		1.79			116.4	116.4	4.00	1.89		0.00		0.00		0.00	0.00	1.79	1.79	0.50	0.00	2.39	20.24	100.87	200	0.35	0.624	17.86	88.21%
		MH4411A	MH4412A					0.0	116.4	4.00	1.89		0.00		0.00		0.00	0.00	0.00	1.79	0.50	0.00	2.39	20.24	98.47	200	0.35	0.624	17.86	88.21%
	4412A	MH4412A	MH4413A		1.28			83.2	199.6	4.00	3.23		0.00		0.00		0.00	0.00	1.28	3.07	0.86	0.00	4.09	20.24	100.13	200	0.35	0.624	16.15	79.78%
		MH4413A	MH4414A					0.0	199.6	4.00	3.23		0.00		0.00		0.00	0.00	0.00	3.07	0.86	0.00	4.09	20.24	36.11	200	0.35	0.624	16.15	79.78%
		MH4414A	MH4415A					0.0	199.6	4.00	3.23		0.00		0.00		0.00	0.00	0.00	3.07	0.86	0.00	4.09	20.24	24.79	200	0.35	0.624	16.15	79.78%
		MH4415A	MH4425A					0.0	199.6	4.00	3.23		0.00		0.00		0.00	0.00	0.00	3.07	0.86	0.00	4.09	20.24	22.00	200	0.35	0.624	16.15	79.78%
	4420A	MH4420A	MH4421A		1.03			67.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	1.03	1.03	0.29	0.00	1.37	20.24	42.02	200	0.35	0.624	18.87	93.22%
		MH4421A	MH4422A					0.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	0.00	1.03	0.29	0.00	1.37	20.24	75.67	200	0.35	0.624	18.87	93.22%
		MH4422A	MH4423A					0.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	0.00	1.03	0.29	0.00	1.37	20.24	12.07	200	0.35	0.624	18.87	93.22%
		MH4423A	MH4425A					0.0	67.0	4.00	1.08		0.00		0.00		0.00	0.00	0.00	1.03	0.29	0.00	1.37	20.24	35.65	200	0.35	0.624	18.87	93.22%
		MH4425A	MH4440A					0.0	266.5	4.00	4.32		0.00		0.00		0.00	0.00	0.00	4.10	1.15	0.00	5.47	20.24	82.28	200	0.35	0.624	14.78	73.00%
	4430A	MH4430A	MH4431A		1.28			83.2	83.2	4.00	1.35		0.00		0.00		0.00	0.00	1.28	1.28	0.36	0.00	1.71	20.24	70.51	200	0.35	0.624	18.54	91.57%
		MH4431A	MH4432A					0.0	83.2	4.00	1.35		0.00		0.00		0.00	0.00	0.00	1.28	0.36	0.00	1.71	20.24	10.59	200	0.35	0.624	18.54	91.57%
		MH4432A	MH4433A					0.0	83.2	4.00	1.35		0.00		0.00		0.00	0.00	0.00	1.28	0.36	0.00	1.71	20.24	73.98	200	0.35	0.624	18.54	91.57%
	4433A	MH4433A	MH4434A		1.38			89.7	172.9	4.00	2.80		0.00		0.00		0.00	0.00	1.38	2.66	0.74	0.00	3.55	20.24	80.18	200	0.35	0.624	16.70	82.48%
		MH4434A	MH4435A					0.0	172.9	4.00	2.80		0.00		0.00		0.00	0.00	0.00	2.66	0.74	0.00	3.55	20.24	54.23	200	0.35	0.624	16.70	82.48%
		MH4435A	MH4440A					0.0	172.9	4.00	2.80		0.00		0.00		0.00	0.00	0.00	2.66	0.74	0.00	3.55	20.24	34.77	200	0.35	0.624	16.70	82.48%
		MH4440A	MH4040A					0.0	707.9	3.89	11.16		0.00		0.00		0.00	0.00	0.00	10.89	3.05	0.00	14.21	20.24	85.99	200	0.35	0.624	6.03	29.81%

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LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
	4450A	MH4450A	MH4451A		1.52			98.8	98.8	4.00	1.60		0.00		0.00		0.00	0.00	1.52	1.52	0.43	0.00	2.03	20.24	87.00	200	0.35	0.624	18.22	89.99%
		MH4451A	MH4452A					0.0	98.8	4.00	1.60		0.00		0.00		0.00	0.00	0.00	1.52	0.43	0.00	2.03	20.24	78.30	200	0.35	0.624	18.22	89.99%
		MH4452A	MH4453A					0.0	98.8	4.00	1.60		0.00		0.00		0.00	0.00	0.00	1.52	0.43	0.00	2.03	20.24	64.29	200	0.35	0.624	18.22	89.99%
		MH4453A	MH4040A					0.0	98.8	4.00	1.60		0.00		0.00		0.00	0.00	0.00	1.52	0.43	0.00	2.03	20.24	52.25	200	0.35	0.624	18.22	89.99%
	4040A	MH4040A	MH4050A		0.29			18.9	2912.3	3.45	40.74		2.54		3.83		0.00	5.53	0.29	46.90	13.13	0.00	59.40	68.44	75.01	375	0.14	0.600	9.04	13.20%
	4500A	MH4500A	MH4501A		1.68			109.2	109.2	4.00	1.77		0.00		0.00		0.00	0.00	1.68	1.68	0.47	0.00	2.24	20.24	104.50	200	0.35	0.624	18.00	88.94%
		MH4501A	MH4502A					0.0	109.2	4.00	1.77		0.00		0.00		0.00	0.00	0.00	1.68	0.47	0.00	2.24	20.24	41.24	200	0.35	0.624	18.00	88.94%
		MH4502A	MH4503A					0.0	109.2	4.00	1.77		0.00		0.00		0.00	0.00	0.00	1.68	0.47	0.00	2.24	20.24	41.82	200	0.35	0.624	18.00	88.94%
		MH4503A	MH4050A					0.0	109.2	4.00	1.77		0.00		0.00		0.00	0.00	0.00	1.68	0.47	0.00	2.24	20.24	38.81	200	0.35	0.624	18.00	88.94%
	4050A	MH4050A	MH4051A		0.41			26.7	3048.2	3.44	42.43		2.540		3.830		0.000	5.53	0.41	48.99	13.72	0.00	61.68	68.44	36.42	375	0.14	0.600	6.76	9.88%
		MH4070B	MH4724A					0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.24	57.50	200	0.35	0.624	20.24	100.00%
PARK	4725A	MH4725A	MH4724A	6.31				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	6.31	6.31	1.77	0.00	1.77	20.24	18.47	200	0.35	0.624	18.48	91.27%
	4724A	MH4724A	MH4723A		0.82			53.3	53.3	4.00	0.86		0.00		0.00		0.00	0.00	0.82	7.13	2.00	0.00	2.86	20.24	11.59	200	0.35	0.624	17.38	85.87%
		MH4723A	MH4722A					0.0	53.3	4.00	0.86		0.00		0.00		0.00	0.00	0.00	7.13	2.00	0.00	2.86	20.24	48.05	200	0.35	0.624	17.38	85.87%
		MH4722A	MH4721A					0.0	53.3	4.00	0.86		0.00		0.00		0.00	0.00	0.00	7.13	2.00	0.00	2.86	20.24	21.91	200	0.35	0.624	17.38	85.87%
		MH4721A	MH4051A					0.0	53.3	4.00	0.86		0.00		0.00		0.00	0.00	0.00	7.13	2.00	0.00	2.86	20.24	102.20	200	0.35	0.624	17.38	85.87%
		MH4051A	MH4060A					0.0	3101.5	3.43	43.09		2.54		3.830		0.000	5.53	0.00	56.12	15.71	0.00	64.34	68.44	72.00	375	0.14	0.600	4.10	5.99%
	4620B	MH4620B	MH4621A		0.29			18.9	18.9	4.00	0.31		0.00		0.00		0.00	0.00	0.29	0.29	0.08	0.00	0.39	20.24	64.31	200	0.35	0.624	19.86	98.09%
	4621A	MH4621A	MH4622A		0.51			33.2	52.0	4.00	0.84		0.00		0.00		0.00	0.00	0.51	0.80	0.22	0.00	1.07	20.24	65.69	200	0.35	0.624	19.18	94.73%
	4624A	MH4624A	MH4622A		0.25			16.3	16.3	4.00	0.26		0.00		0.00		0.00	0.00	0.25	0.25	0.07	0.00	0.33	20.24	64.78	200	0.35	0.624	19.91	98.35%
		MH4710A	MH4622A					0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.66	41.58	200	0.33	0.606	19.66	100.00%
	4622A	MH4622A	MH4625A		0.18			11.7	80.0	4.00	1.30		0.00		0.00		0.00	0.00	0.18	1.23	0.34	0.00	1.64	19.66	81.19	200	0.33	0.606	18.02	91.66%
	4625A	MH4625A	MH4624A		1.22			79.3	159.3	4.00	2.58		0.000		0.000		0.000	0.00	1.22	2.45	0.69	0.00	3.27	20.24	31.91	200	0.35	0.624	16.98	83.86%
		MH4626A	MH4060A					0.0	159.3	4.00	2.58		0.000		0.000		0.000	0.00	0.00	2.45	0.69	0.00	3.27	20.24	81.69	200	0.35	0.624	16.98	83.86%
	4060A	MH4060A	MH4061A		1.49			96.9	3357.6	3.40	46.25		2.54		3.83		0.00	5.53	1.49	60.06	16.82	0.00	68.60	103.03	91.37	450	0.12	0.628	34.44	33.42%
		MH4061A	MH4062A					0.0	3357.6	3.40	46.25		2.54		3.83		0.00	5.53	0.00	60.06	16.82	0.00	68.60	103.03	35.73	450	0.12	0.628	34.44	33.42%
		MH4062A	MH4063A					0.0	3357.6	3.40	46.25		2.54		3.83		0.00	5.53	0.00	60.06	16.82	0.00	68.60	103.03	35.73	450	0.12	0.628	34.44	33.42%
		MH4063A	MH4070A					0.0	3357.6	3.40	46.25		2.54		3.83		0.00	5.53	0.00	60.06	16.82	0.00	68.60	103.03	54.62	450	0.12	0.628	34.44	33.42%
OVERFLOW		MH4070A						0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	392.18	21.82	675	0.20	1.062	392.18	100.00%
	4070A	MH4070A	MH4716A					0.0	3357.6	3.40	46.25		2.54		3.83		0.00	5.53	0.00	60.06	16.82	0.00	68.60	277.31	72.00	675	0.10	0.751	208.71	75.26%
	4711A	MH4711A	MH4712A		1.01			65.7	65.7	4.00	1.06		0.00		0.00		0.00	0.00	1.01	1.01	0.28	0.00	1.35	19.66	110.54	200	0.33	0.606	18.31	93.15%
	4712A	MH4712A	MH4713A		1.13			73.5	139.1	4.00	2.25		0.00		0.00		0.00	0.00	1.13	2.14	0.60	0.00	2.85	19.66	114.75	200	0.33	0.606	16.80	85.48%
		MH4713A	MH4714A					0.0	139.1	4.00	2.25		0.00		0.00		0.00	0.00	0.00	2.14	0.60	0.00	2.85	19.66	47.60	200	0.33	0.606	16.80	85.48%
	4714A	MH4714A	MH4715A		0.95			61.8	200.9	4.00	3.25		0.00		0.00		0.00	0.00	0.95	3.09	0.87	0.00	4.12	19.66	43.38	200	0.33	0.606	15.54	79.04%
		MH4715A	MH4716A					0.0	200.9	4.00	3.25		0.00		0.00		0.00	0.00	0.00	3.09	0.87	0.00	4.12	19.66	66.78	200	0.33	0.606	15.54	79.04%
								0.0																						
		MH4716A	MH15001A					0.0	3558.4	3.38	48.70		2.54		3.83		0.00	5.53	0.00	63.15	17.68	0.00	71.91	277.31	25.87	675	0.10	0.751	205.40	74.07%
		MH15001A	MH15002A					0.0	3558.4	3.38	48.70		2.54		3.83		0.00	5.53	0.00	63.15	17.68	0.00	71.91	277.31	88.19	675	0.10	0.751	205.40	74.07%
		MH15002A	MH8000A					0.0	3558.4	3.38	48.70		2.54		3.83		0.00	5.53	0.00	63.15	17.68	0.00	71.91	277.31	75.00	675	0.10	0.751	205.40	74.07%
				9.27	37.06	10.45	0.00	3558.4	TRUE			2.54	TRUE	3.83	TRUE	0.00	TRUE		63.15	TRUE										
								56.8											63.15	TRUE										

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LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
Southern Outlet - Lands on and South of Wall Road (Gravity to Pump Station)																													
	5000A/B	MH5000A	MH5001A		1.99	0.89		227.3	227.3	4.00	3.68		0.00		0.00		0.00	0.00	2.88	2.88	0.81	0.00	4.49	20.24	76.00	200	0.35	0.624	15.75	77.83%
		MH5001A	MH5002A					0.0	227.3	4.00	3.68		0.00		0.00		0.00	0.00	0.00	2.88	0.81	0.00	4.49	20.24	75.89	200	0.35	0.624	15.75	77.83%
		MH5002A	MH5010A					0.0	227.3	4.00	3.68		0.00		0.00		0.00	0.00	0.00	2.88	0.81	0.00	4.49	20.24	74.86	200	0.35	0.624	15.75	77.83%
	5110A	MH5110A	MH5111A		1.36			88.4	88.4	4.00	1.43		0.00		0.00		0.00	0.00	1.36	1.36	0.38	0.00	1.81	20.24	70.85	200	0.35	0.624	18.43	91.04%
		MH5111A	MH5112A					0.0	88.4	4.00	1.43		0.00		0.00		0.00	0.00	0.00	1.36	0.38	0.00	1.81	20.24	70.85	200	0.35	0.624	18.43	91.04%
		MH5112A	MH5121A					0.0	88.4	4.00	1.43		0.00		0.00		0.00	0.00	0.00	1.36	0.38	0.00	1.81	20.24	60.05	200	0.35	0.624	18.43	91.04%
	5120A	MH5120A	MH5121A		0.32			20.8	20.8	4.00	0.34		0.00		0.00		0.00	0.00	0.32	0.32	0.09	0.00	0.43	20.24	57.51	200	0.35	0.624	19.82	97.89%
	5121A	MH5121A	MH5122A		0.21			13.7	122.9	4.00	1.99		0.00		0.00		0.00	0.00	0.21	1.89	0.53	0.00	2.52	20.24	8.39	200	0.35	0.624	17.72	87.55%
		MH5122A	MH5010A					0.0	122.9	4.00	1.99		0.00		0.00		0.00	0.00	0.00	1.89	0.53	0.00	2.52	20.24	44.71	200	0.35	0.624	17.72	87.55%
MED RES	5012A	MH5012A	MH5010A			6.20		682.0	682.0	3.90	10.78		0.00		0.00		0.00	0.00	6.20	6.20	1.74	0.00	12.51	31.02	17.00	250	0.25	0.612	18.51	59.66%
	5010A	MH5010A	MH5020A		0.18			11.7	1043.8	3.79	16.02		0.00		0.00		0.00	0.00	0.18	11.15	3.12	0.00	19.14	31.02	80.09	250	0.25	0.612	11.88	38.30%
	5210A	MH5210A	MH5211A		0.84			54.6	54.6	4.00	0.88		0.00		0.00		0.00	0.00	0.84	0.84	0.24	0.00	1.12	20.24	62.75	200	0.35	0.624	19.12	94.47%
		MH5211A	MH5212A					0.0	54.6	4.00	0.88		0.00		0.00		0.00	0.00	0.00	0.84	0.24	0.00	1.12	20.24	8.29	200	0.35	0.624	19.12	94.47%
		MH5212A	MH5220A					0.0	54.6	4.00	0.88		0.00		0.00		0.00	0.00	0.00	0.84	0.24	0.00	1.12	20.24	105.26	200	0.35	0.624	19.12	94.47%
	5220A	MH5220A	MH5221A	0.53	1.64			106.6	161.2	4.00	2.61		0.00		0.00		0.00	0.00	2.17	3.01	0.84	0.00	3.45	20.24	103.43	200	0.35	0.624	16.79	82.93%
		MH5221A	MH5222A					0.0	161.2	4.00	2.61		0.00		0.00		0.00	0.00	0.00	3.01	0.84	0.00	3.45	20.24	82.49	200	0.35	0.624	16.79	82.93%
		MH5222A	MH5223A					0.0	161.2	4.00	2.61		0.00		0.00		0.00	0.00	0.00	3.01	0.84	0.00	3.45	20.24	9.25	200	0.35	0.624	16.79	82.93%
		MH5223A	MH5230A					0.0	161.2	4.00	2.61		0.00		0.00		0.00	0.00	0.00	3.01	0.84	0.00	3.45	20.24	25.96	200	0.35	0.624	16.79	82.93%
	5231A	MH5231A	MH5230A		0.74			48.1	48.1	4.00	0.78		0.00		0.00		0.00	0.00	0.74	0.74	0.21	0.00	0.99	20.24	106.08	200	0.35	0.624	19.26	95.13%
	5230A	MH5230A	MH5020A		0.40			26.0	235.3	4.00	3.81		0.0		0.0		0.0	0.00	0.40	4.2	1.16	0.00	4.97	20.24	87.16	200	0.35	0.624	15.27	75.42%
	5261A	MH5261A	MH5263A			0.85		93.5	93.5	4.00	1.52		0.00		0.00		0.00	0.00	0.85	0.85	0.24	0.00	1.75	20.24	74.22	200	0.35	0.624	18.49	91.34%
		MH5263A	MH5200A					0.0	93.5	4.00	1.52		0.00		0.00		0.00	0.00	0.00	0.85	0.24	0.00	1.75	20.24	102.94	200	0.35	0.624	18.49	91.34%
HIGH RES	5260A	MH5260A	MH5200A				2.79	237.2	237.2	4.00	3.84		0.00		0.00		0.00	0.00	2.79	2.79	0.78	0.00	4.62	31.02	15.00	250	0.25	0.612	26.40	85.09%
	5200A	MH5200A	MH5201A		0.58			37.7	368.4	4.00	5.97		0.00		0.00		0.00	0.00	0.58	4.2	1.18	0.00	7.15	31.02	43.71	250	0.25	0.612	23.87	76.95%
		MH5201A	MH5202A					0.0	368.4	4.00	5.97		0.00		0.00		0.00	0.00	0.00	4.22	1.18	0.00	7.15	31.02	95.34	250	0.25	0.612	23.87	76.95%
		MH5202A	MH5020A					0.0	368.4	4.00	5.97		0.00		0.00		0.00	0.00	0.00	4.22	1.18	0.00	7.15	31.02	67.87	250	0.25	0.612	23.87	76.95%
	5020A	MH5020A	MH5021A		1.40			91.0	1738.5	3.63	25.58		0.00		0.00		0.00	0.00	1.40	20.92	5.86	0.00	31.44	45.12	86.19	300	0.20	0.618	13.68	30.32%
		MH5021A	MH5030A					0.0	1738.5	3.63	25.58		0.00		0.00		0.00	0.00	0.00	20.92	5.86	0.00	31.44	45.12	86.19	300	0.20	0.618	13.68	30.32%
	5310A	MH5310A	MH5311A		1.35			87.8	87.8	4.00	1.42		0.00		0.00		0.00	0.00	1.35	1.35	0.38	0.00	1.80	20.24	67.06	200	0.35	0.624	18.44	91.11%
		MH5311A	MH5312A					0.0	87.8	4.00	1.42		0.00		0.00		0.00	0.00	0.00	1.35	0.38	0.00	1.80	20.24	54.91	200	0.35	0.624	18.44	91.11%
		MH5312A	MH5313A					0.0	87.8	4.00	1.42		0.00		0.00		0.00	0.00	0.00	1.35	0.38	0.00	1.80	20.24	11.10	200	0.35	0.624	18.44	91.11%
		MH5313A	MH5314A					0.0	87.8	4.00	1.42		0.00		0.00		0.00	0.00	0.00	1.35	0.38	0.00	1.80	20.24	75.73	200	0.35	0.624	18.44	91.11%
	5315A	MH5315A	MH5316A		1.13			73.5	73.5	4.00	1.19		0.00		0.00		0.00	0.00	1.13	1.13	0.32	0.00	1.51	20.24	13.67	200	0.35	0.624	18.74	92.56%
		MH5316A	MH5317A					0.0	73.5	4.00	1.19		0.00		0.00		0.00	0.00	0.00	1.13	0.32	0.00	1.51	20.24	72.66	200	0.35	0.624	18.74	92.56%
		MH5317A	MH5314A					0.0	73.5	4.00	1.19		0.00		0.00		0.00	0.00	0.00	1.13	0.32	0.00	1.51	20.24	69.08	200	0.35	0.624	18.74	92.56%
	5314A	MH5314A	MH5030A		0.14			9.1	170.3	4.00	2.76		0.00		0.00		0.00	0.00	0.14	2.62	0.73	0.00	3.49	20.24	86.38	200	0.35	0.624	16.75	82.74%
	5300A	MH5300A	MH5301A		0.98			63.7	63.7	4.00	1.03		0.00		0.00		0.00	0.00	0.98	0.98	0.27	0.00	1.31	20.24	53.88	200	0.35	0.624	18.94	93.55%
		MH5301A	MH5302A					0.0	63.7	4.00	1.03		0.00		0.00		0.00	0.00	0.00	0.98	0.27	0.00	1.31	20.24	9.26	200	0.35	0.624	18.94	93.55%
		MH5302A	MH5030A					0.0	63.7	4.00	1.03		0.00		0.00		0.00	0.00	0.00	0.98	0.27	0.00	1.31	20.24	81.73	200	0.35	0.624	18.94	93.55%
	5030A	MH5030A	MH5031A		1.26			81.9	2054.4	3.58	29.77		0.00		0.00		0.00	0.00	1.26	25.78	7.22	0.00	36.98	45.12	120.00	300	0.20	0.618	8.13	18.02%
SCHOOL	5034A	MH5034A	MH5031A					0.0	0.0	4.00	0.00	2.92	2.92		0.00		0.00	2.53	2.92	2.92	0.82	0.00	3.35	31.02	15.00	250	0.25	0.612	27.67	89.19%
		MH5031A	MH5032A					0.0	2054.4	3.58	29.77		2.92		0.00		0.00	2.53	0.00	28.70	8.04	0.00	40.34	70.84	45.59	375	0.15	0.621	30.51	43.06%
		MH5032A	MH5033A					0.0	2054.4	3.58	29.77		2.92		0.00		0.00	2.53	0.00	28.70	8.04	0.00	40.34	70.84	44.24	375	0.15	0.621	30.51	43.06%
PARK	5035A	MH5035A	MH5033A	2.18				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	2.18	2.18	0.61	0.00	0.61	20.24	20.00	200	0.35	0.624	19.63	96.98%
		MH5033A	MH5040A					0.0	2054.4	3.58	29.77		2.92		0.00		0.00	2.53	0.00	30.88	8.65	0.00	40.95	70.84	43.69	375	0.15	0.621	29.89	42.20%
	5040A	MH5040A	MH5041A		2.23			145.0	2199.3	3.55	31.66		2.92		0.00		0.00	2.53	2.23	33.11	9.27	0.00	43.46	70.84	60.00	375	0.15	0.621	27.38	38.65%
		MH5041A	MH5042A					0.0	2199.3	3.55	31.66		2.92		0.00		0.00	2.53	0.00	33.11	9.27	0.00	43.46	70.84	60.00	375	0.15	0.621	27.38	38.65%
		MH5042A	MH5043A					0.0	2199.3	3.55	31.66		2.92		0.00		0.00	2.53	0.00	33.11	9.27	0.00	43.46	70.84	36.32	375	0.15	0.621	27.38	38.65%
		MH5043A	MH5050A					0.0	2199.3	3.55	31.66		2.92		0.00		0.00	2.53	0.00	33.11	9.27	0.00	43.46	70.84	53.99	375	0.15	0.621	27.38	38.65%
	5500A	MH5500A	MH5050A		0.59			38.4	38.4	4.00	0.62		0.00		0.00		0.00	0.00	0.59	0.59	0.17	0.00	0.79	20.24	120.00	200	0.35	0.624	19.46	96.11%

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LOCATION				RESIDENTIAL							ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
	5600A	MH5600A	MH5601A		1.64			106.6	106.6	4.00	1.73		0.00		0.00		0.00	0.00	1.64	1.64	0.46	0.00	2.19	20.24	120.00	200	0.35	0.624	18.06	89.20%
		MH5601A	MH5052A					0.0	106.6	4.00	1.73		0.00		0.00		0.00	0.00	0.00	1.64	0.46	0.00	2.19	20.24	104.00	200	0.35	0.624	18.06	89.20%
	5052A	MH5052A	MH5051A		1.22			79.3	185.9	4.00	3.01		0.00		0.00		0.00	0.00	1.22	2.86	0.80	0.00	3.81	20.24	115.00	200	0.35	0.624	16.43	81.16%
		MH5051A	MH5050A					0.0	185.9	4.00	3.01		0.00		0.00		0.00	0.00	0.00	2.86	0.80	0.00	3.81	20.24	110.22	200	0.35	0.624	16.43	81.16%
	5050A	MH5050A	MH6010A		0.30			19.5	2443.1	3.52	34.80		2.92		0.00		0.00	2.53	0.30	36.86	10.32	0.00	47.66	70.84	84.63	375	0.15	0.621	23.18	32.73%
	6100A	MH6100A	MH6101A		1.66			107.9	107.9	4.00	1.75		0.00		0.00		0.00	0.00	1.66	1.66	0.46	0.00	2.21	20.24	75.42	200	0.35	0.624	18.03	89.07%
		MH6101A	MH6010A					0.0	107.9	4.00	1.75		0.00		0.00		0.00	0.00	0.00	1.66	0.46	0.00	2.21	20.24	94.08	200	0.35	0.624	18.03	89.07%
	6010A	MH6010A	MH6020A		0.41			26.7	2577.6	3.50	36.52		2.92		0.00		0.00	2.53	0.41	38.93	10.90	0.00	49.96	70.84	82.00	375	0.15	0.621	20.89	29.48%
EXTERNAL	6200A	MH6200A	MH6201A		24.74			510.0	510.0	3.97	8.20		0.00		0.00		0.00	0.00	24.74	24.74	6.93	0.00	15.13	20.24	40.96	200	0.35	0.624	5.11	25.26%
Approximate unit count of 150x3.4=510pp																														
		MH6202A	MH6201A					0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.24	31.64	200	0.35	0.624	20.24	100.00%
	6201A	MH6201A	MH6203A		2.44			158.6	668.6	3.91	10.58		0.00		0.00		0.00	0.00	2.44	27.18	7.61	0.00	18.19	20.24	94.07	200	0.35	0.624	2.05	10.14%
		MH6203A	MH6204A					0.0	668.6	3.91	10.58		0.00		0.00		0.00	0.00	0.00	27.18	7.61	0.00	18.19	20.24	98.76	200	0.35	0.624	2.05	10.14%
		MH6204A	MH6205A					0.0	668.6	3.91	10.58		0.00		0.00		0.00	0.00	0.00	27.18	7.61	0.00	18.19	20.24	9.97	200	0.35	0.624	2.05	10.14%
		MH6205A	MH6210A					0.0	668.6	3.91	10.58		0.00		0.00		0.00	0.00	0.00	27.18	7.61	0.00	18.19	20.24	74.95	200	0.35	0.624	2.05	10.14%
	6211A	MH6211A	MH6212A		1.90			123.5	123.5	4.00	2.00		0.00		0.00		0.00	0.00	1.90	1.90	0.53	0.00	2.53	20.24	64.38	200	0.35	0.624	17.71	87.49%
		MH6212A	MH6213A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	1.90	0.53	0.00	2.53	20.24	11.49	200	0.35	0.624	17.71	87.49%
		MH6213A	MH6214A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	1.90	0.53	0.00	2.53	20.24	73.20	200	0.35	0.624	17.71	87.49%
Woodlot (infil only)	6214A	MH6214A	MH6215A	1.20				0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	1.20	3.10	0.87	0.00	2.87	20.24	78.55	200	0.35	0.624	17.37	85.83%
		MH6215A	MH6210A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	3.10	0.87	0.00	2.87	20.24	78.21	200	0.35	0.624	17.37	85.83%
	6210A	MH6210A	MH6220A		0.19			12.4	804.5	3.86	12.58		0.00		0.00		0.00	0.00	0.19	30.47	8.53	0.00	21.11	31.02	82.00	250	0.25	0.612	9.91	31.96%
	6222A	MH6222A	MH6220A		0.53			34.5	34.5	4.00	0.56		0.00		0.00		0.00	0.00	0.53	0.53	0.15	0.00	0.71	20.24	75.45	200	0.35	0.624	19.54	96.51%
	6223A	MH6223A	MH6224A		1.24			80.6	80.6	4.00	1.31		0.00		0.00		0.00	0.00	1.24	1.24	0.35	0.00	1.65	20.24	61.03	200	0.35	0.624	18.59	91.83%
		MH6224A	MH6225A					0.0	80.6	4.00	1.31		0.00		0.00		0.00	0.00	0.00	1.24	0.35	0.00	1.65	20.24	13.90	200	0.35	0.624	18.59	91.83%
		MH6225A	MH6220A					0.0	80.6	4.00	1.31		0.00		0.00		0.00	0.00	0.00	1.24	0.35	0.00	1.65	20.24	89.28	200	0.35	0.624	18.59	91.83%
	6220A	MH6220A	MH6221A		0.81			52.7	972.2	3.81	15.00		0.00		0.00		0.00	0.00	0.81	33.05	9.25	0.00	24.25	31.02	81.86	250	0.25	0.612	6.77	21.82%
		MH6221A	MH6020A					0.0	972.2	3.81	15.00		0.00		0.00		0.00	0.00	0.00	33.05	9.25	0.00	24.25	31.02	98.37	250	0.25	0.612	6.77	21.82%
	6020A	MH6020A	MH6030A		0.85			55.3	3605.0	3.37	49.26		2.92		0.00		0.00	2.53	0.85	72.83	20.39	0.00	72.19	107.24	82.00	450	0.13	0.653	35.05	32.68%
	6300A	MH6300A	MH6030A					0.0	0.0	4.00	0.00	2.22	2.22		0.00		0.00	1.93	2.22	2.22	0.62	0.00	2.55	20.24	15.00	200	0.35	0.624	17.69	87.41%
	6030A	MH6030A	MH6040A					0.0	3605.0	3.37	49.26		5.14		0.00		0.00	4.46	0.00	75.05	21.01	0.00	74.74	107.24	85.37	450	0.13	0.653	32.50	30.31%
EXT TO SOUTH	6400A	MH6400A	MH6401A		50.53			3284.5	3284.5	3.41	45.35		0.00		0.00		0.00	0.00	50.53	50.53	14.15	0.00	59.50	70.84	27.46	375	0.15	0.621	11.34	16.01%
Woodlot (infil only)	6401A	MH6401A	MH6402A	3.98				0.0	3284.5	3.41	45.35		0.00		0.00		0.00	0.00	3.98	54.51	15.26	0.00	60.62	70.84	13.59	375	0.15	0.621	10.23	14.43%
	6400B	MH6402A	MH6403A		1.43			93.0	3377.4	3.40	46.49		0.00		0.00		0.00	0.00	1.43	55.94	15.66	0.00	62.16	70.84	23.25	375	0.15	0.621	8.69	12.26%
		MH6403A	MH6404A					0.0	3377.4	3.40	46.49		0.00		0.00		0.00	0.00	0.00	55.94	15.66	0.00	62.16	70.84	59.64	375	0.15	0.621	8.69	12.26%
		MH6404A	MH6405A					0.0	3377.4	3.40	46.49		0.00		0.00		0.00	0.00	0.00	55.94	15.66	0.00	62.16	70.84	27.32	375	0.15	0.621	8.69	12.26%
		MH6405A	MH6406A					0.0	3377.4	3.40	46.49		0.00		0.00		0.00	0.00	0.00	55.94	15.66	0.00	62.16	70.84	29.25	375	0.15	0.621	8.69	12.26%
PARK	6407A	MH6407A	MH6406A	2.03				0.0	0.0	4.00	0.00		0.00		0.00		0.00	0.00	2.03	2.03	0.57	0.00	0.57	20.24	16.29	200	0.35	0.624	19.67	97.19%
		MH6406A	MH6040A					0.0	3377.4	3.40	46.49		0.00		0.00		0.00	0.00	0.00	57.97	16.23	0.00	62.72	70.84	114.04	375	0.15	0.621	8.12	11.46%
	6040A	MH6040A	MH6050A		0.18			11.7	6994.1	3.11	88.03		5.14		0.00		0.00	4.46	0.18	133.20	37.30	0.00	129.79	148.80	85.00	525	0.11	0.666	19.02	12.78%
	6500A	MH6500A	MH6501A		1.92			124.8	124.8	4.00	2.02		0.00		0.00		0.00	0.00	1.92	1.92	0.54	0.00	2.56	20.24	92.49	200	0.35	0.624	17.68	87.35%
		MH6501A	MH6502A					0.0	124.8	4.00	2.02		0.00		0.00		0.00	0.00	0.00	1.92	0.54	0.00	2.56	20.24	72.40	200	0.35	0.624	17.68	87.35%
		MH6502A	MH6503A					0.0	124.8	4.00	2.02		0.00		0.00		0.00	0.00	0.00	1.92	0.54	0.00	2.56	20.24	9.76	200	0.35	0.624	17.68	87.35%
		MH6503A	MH6504A					0.0	124.8	4.00	2.02		0.00		0.00		0.00	0.00	0.00	1.92	0.54	0.00	2.56	20.24	67.50	200	0.35	0.624	17.68	87.35%
		MH6504A	MH6505A					0.0	124.8	4.00	2.02		0.00		0.00		0.00	0.00	0.00	1.92	0.54	0.00	2.56	20.24	10.79	200	0.35	0.624	17.68	87.35%
	6505A	MH6505A	MH6506A		1.52			98.8	223.6	4.00	3.62		0.00		0.00		0.00	0.00	1.52	3.44	0.96	0.00	4.59	20.24	53.66	200	0.35	0.624	15.66	77.34%
		MH6506A	MH6507A					0.0	223.6	4.00	3.62		0.00		0.00		0.00	0.00	0.00	3.44	0.96	0.00	4.59	20.24	61.34	200	0.35	0.624	15.66	77.34%
		MH6507A	MH6508A					0.0	223.6	4.00	3.62		0.00		0.00		0.00	0.00	0.00	3.44	0.96	0.00	4.59	20.24	8.00	200	0.35	0.624	15.66	77.34%
		MH6508A	MH6509A					0.0	223.6	4.00	3.62		0.00		0.00		0.00	0.00	0.00	3.44	0.96	0.00	4.59	20.24	29.46	200	0.35	0.624	15.66	77.34%
		MH6509A	MH6510A					0.0	223.6	4.00	3.62		0.00		0.00		0.00	0.00	0.00	3.44	0.96	0.00	4.59	20.24	48.43	200	0.35	0.624	15.66	77.34%
	6511A	MH6511A	MH6512A		1.60			104.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	1.60	1.60	0.45	0.00	2.13	20.24	64.85	200	0.35	0.624	18.11	89.46%
		MH6512A	MH6513A					0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.00	1.60	0.45	0.00	2.13	20.24	9.89	200	0.35	0.624	18.11	89.46%
		MH6513A	MH6514A					0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.00	1.60	0.45	0.00	2.13	20.24	63.44	200	0.35	0.624	18.11	89.46%
		MH6514A	MH6510A					0.0	104.0	4.00	1.69		0.00		0.00		0.00	0.00	0.00	1.60	0.45	0.00	2.13	20.24	67.62	200	0.35	0.624	18.11	89.46%
	6510A	MH6510A	MH6050A		0.37			24.1	351.7	4.00	5.70		0.00		0.00		0.00	0.00	0.37	5.41	1.51	0.00	7.21	20.24	85.00	200	0.35	0.624	13.03	64.37%

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SANITARY SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)	(L/s)	(L/s)	CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
	6520A	MH6520A	MH6521A		1.62			105.3	105.3	4.00	1.71		0.00		0.00		0.00	0.00	1.62	1.62	0.45	0.00	2.16	20.24	117.52	200	0.35	0.624	18.08	89.33%
		MH6521A	MH6522A					0.0	105.3	4.00	1.71		0.00		0.00		0.00	0.00	0.00	1.62	0.45	0.00	2.16	20.24	11.41	200	0.35	0.624	18.08	89.33%
		MH6522A	MH6523A					0.0	105.3	4.00	1.71		0.00		0.00		0.00	0.00	0.00	1.62	0.45	0.00	2.16	20.24	73.71	200	0.35	0.624	18.08	89.33%
	6524A	MH6524A	MH6523A		0.13			8.5	8.5	4.00	0.14		0.00		0.00		0.00	0.00	0.13	0.13	0.04	0.00	0.17	20.24	70.20	200	0.35	0.624	20.07	99.14%
	6525A	MH6525A	MH6523A		0.95			61.8	61.8	4.00	1.00		0.00		0.00		0.00	0.00	0.95	0.95	0.27	0.00	1.27	20.24	117.33	200	0.35	0.624	18.98	93.74%
	6523A	MH6523A	MH6526A		0.37			24.1	199.6	4.00	3.23		0.00		0.00		0.00	0.00	0.37	3.07	0.86	0.00	4.09	20.24	82.28	200	0.35	0.624	16.15	79.78%
	6527A	MH6527A	MH6526A		0.95			61.8	61.8	4.00	1.00		0.00		0.00		0.00	0.00	0.95	0.95	0.27	0.00	1.27	20.24	117.29	200	0.35	0.624	18.98	93.74%
	6526A	MH6526A	MH6050A		0.37			24.1	285.4	4.00	4.62		0.00		0.00		0.00	0.00	0.37	4.39	1.23	0.00	5.85	20.24	84.97	200	0.35	0.624	14.39	71.09%
	6050A	MH6050A	MH6051A		1.03			67.0	7698.1	3.07	95.63		5.14		0.00		0.00	4.46	1.03	144.03	40.33	0.00	140.42	148.80	117.54	525	0.11	0.666	8.38	5.63%
	6051A	MH6051A	MH6053A		0.84			54.6	7752.7	3.06	96.21		5.14		0.00		0.00	4.46	0.84	144.87	40.56	0.00	141.24	148.80	78.08	525	0.11	0.666	7.56	5.08%
	6600A	MH6600A	MH6601A		1.90			123.5	123.5	4.00	2.00		0.00		0.00		0.00	0.00	1.90	1.90	0.53	0.00	2.53	20.24	78.62	200	0.35	0.624	17.71	87.49%
		MH6601A	MH6602A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	1.90	0.53	0.00	2.53	20.24	75.79	200	0.35	0.624	17.71	87.49%
		MH6602A	MH6603A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	1.90	0.53	0.00	2.53	20.24	11.56	200	0.35	0.624	17.71	87.49%
		MH6603A	MH6604A					0.0	123.5	4.00	2.00		0.00		0.00		0.00	0.00	0.00	1.90	0.53	0.00	2.53	20.24	73.95	200	0.35	0.624	17.71	87.49%
	6607A	MH6607A	MH6606A		1.38			89.7	89.7	4.00	1.45		0.00		0.00		0.00	0.00	1.38	1.38	0.39	0.00	1.84	20.24	86.81	200	0.35	0.624	18.40	90.91%
		MH6606A	MH6604A					0.0	89.7	4.00	1.45		0.00		0.00		0.00	0.00	0.00	1.38	0.39	0.00	1.84	20.24	83.70	200	0.35	0.624	18.40	90.91%
	6604A	MH6604A	MH6605A		0.39			25.4	238.6	4.00	3.87		0.00		0.00		0.00	0.00	0.39	3.67	1.03	0.00	4.89	20.24	81.84	200	0.35	0.624	15.35	75.83%
	6608A	MH6608A	MH6609A		1.38			89.7	89.7	4.00	1.45		0.00		0.00		0.00	0.00	1.38	1.38	0.39	0.00	1.84	20.24	86.33	200	0.35	0.624	18.40	90.91%
		MH6609A	MH6605A					0.0	89.7	4.00	1.45		0.00		0.00		0.00	0.00	0.00	1.38	0.39	0.00	1.84	20.24	83.70	200	0.35	0.624	18.40	90.91%
	6605A	MH6605A	MH6621A		0.36			23.4	351.7	4.00	5.70		0.00		0.00		0.00	0.00	0.36	5.41	1.51	0.00	7.21	20.24	85.00	200	0.35	0.624	13.03	64.37%
	6620A	MH6620A	MH6621A		0.62			40.3	40.3	4.00	0.65		0.00		0.00		0.00	0.00	0.62	0.62	0.17	0.00	0.83	20.24	71.07	200	0.35	0.624	19.42	95.92%
	6621A	MH6621A	MH6053A		0.28			18.2	410.2	4.00	6.65		0.00		0.00		0.00	0.00	0.28	6.31	1.77	0.00	8.41	148.80	104.05	525	0.11	0.666	140.39	94.35%
		MH6053A	P.S.					0.0	8162.8	3.04	100.58		5.14		0.00		0.00	4.46	0.00	151.18	42.33	0.00	147.37	212.45	27.40	600	0.11	0.728	65.08	30.63%
				9.92	125.39	7.94	2.79	8162.8	TRUE			5.14	TRUE	0.00	TRUE	0.00	TRUE		151.18	TRUE										
								146.0											151.18	TRUE										

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SANITARY SEWER DESIGN SHEET

MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				RESIDENTIAL								ICI AREAS							INFILTRATION ALLOWANCE			FIXED FLOW	TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA (Ha)	AREA w/o units (pp/Ha)			POPULATION		PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						PEAK FLOW (L/s)	AREA (Ha)		FLOW (L/s)			CAPACITY (L/s)	LENGTH (m)	DIA (mm)	SLOPE (%)	VELOCITY (full) (m/s)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		LOW 65	MED 110	HIGH 85	IND	CUM			INSTITUTIONAL IND	INSTITUTIONAL CUM	COMMERCIAL IND	COMMERCIAL CUM	INDUSTRIAL IND	INDUSTRIAL CUM		IND	CUM								L/s	(%)
Tenth Line Road Forcemain																													
Tenth Line Rd		P.S.	BEND																			147.37	147.37		8.68	200	0.01		
Tenth Line Rd		BEND	BEND																			147.37	147.37		5.23	200	0.01		
Tenth Line Rd		BEND	BEND																			147.37	147.37		176.48	200	0.01		
Tenth Line Rd		BEND	MH8000A																			147.37	147.37		685.42	200	0.01		
Tenth Line Road Gravity Trunk Sewer																													
Tenth Line Rd		MH8000A	MH8001A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.0	5.53	0.00	63.2	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8001A	MH8002A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8002A	MH8003A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8003A	MH8004A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8004A	MH8005A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8005A	MH8006A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	111.50	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8006A	MH8007A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	117.98	750	0.10	0.805	147.99	40.29%
Tenth Line Rd		MH8007A	MH514A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	37.07	750	0.10	0.805	147.99	40.29%
		Mh514A	MH8008A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	367.27	81.06	750	0.10	0.805	147.99	40.29%
		EX MH	MH8008A					0.0	0.0	4.00	0.00		0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	277.31	5.00	675	0.10	0.751	277.31	100.00%
		MH80008A	MH8009A					0.0	3558.4	3.38	48.70		2.54	0.00	3.83		0.00	5.53	0.00	63.15	17.68	147.37	219.28	277.31	26.45	675	0.10	0.751	58.03	20.93%

Design Parameters:

Residential

LOW	65	p/p/ha
MED	110	p/p/ha
HIGH	85	p/p/ha

ICI Areas

			Peak Factor
INST	50,000	L/Ha/day	1.5
COM	50,000	L/Ha/day	1.5
IND	35,000	L/Ha/day	MOE Chart
	17000	L/Ha/day	

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 350 L/day
3. Infiltration allowance: 0.28 L/s/Ha
4. Residential Peaking Factor:

Harmon Formula = 1+(14/(4+P^0.5))
where P = population in thousands

Designed: RM

Checked: DY

Dwg. Reference: 34739-8.2.1

No.	Revision	Date
1.	MSS - 3rd Submission	2017-04

File Reference:	Date:	Sheet No:
34739.5.7.1	3/2/2017	1 of 1

APPENDIX F

EXCERPT FROM THE MER BLEUE MSS, TABLE 7.6 PRE-DEVELOPMENT PEAK FLOW RATES (IBI GROUP, DECEMBER 2017)

FIGURE 5.3 PRE-DEVELOPMENT DRAINAGE AREA PLAN FROM THE MER BLEUE CDP (IBI GROUP, DECEMBER 2017)

FIGURE 8.3.10.1 POTENTIAL DEVELOPMENT DRAINAGE AREA PLAN FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

- *Avalon West (Neighbourhood 5) Stormwater Management Facility Design* (IBI Group, October 2013); and

The following is the CDP-related supporting documentation:

- The Mer Bleue Expansion Area was evaluated in the *Mer Bleue Expansion Area, Community Design Plan, Master Servicing Study, Existing Conditions Report, Municipal Infrastructure* (IBI Group, May 2015); and,
- *Mer Bleue Expansion Study Area Environmental Management Plan DRAFT* (Morrison Hershfield, April 2017); henceforth referred to as the EMP.

7.2.3.3 Regulatory Requirements

Water Quantity Control

As noted above, McKinnons Creek is the recipient of surface runoff from the subject site. McKinnons Creek also accommodates flows from existing external stormwater management systems within the Avalon South (Neighbourhood 4) and Avalon West (Neighbourhood 5) developments.

It is recommended that the proposed SWM system for the Mer Bleue Expansion Study Area control peak flows in McKinnons Creek to pre-development levels at Point E (upstream of Navan Road), as presented in the EMP and summarized in the below **Table 7.6**. To be consistent with previously approved studies in the McKinnons Creek watershed, the 24 hour, SCS type II design storm has been used to evaluate peak flows. The pre-development drainage area plan and SWMHYMO Schematic are provided within **Figure 5. 3** and **Figure 5.3. 1**, respectively, within **Appendix B**.

Table 7.6 Pre-Development Peak Flow Rates

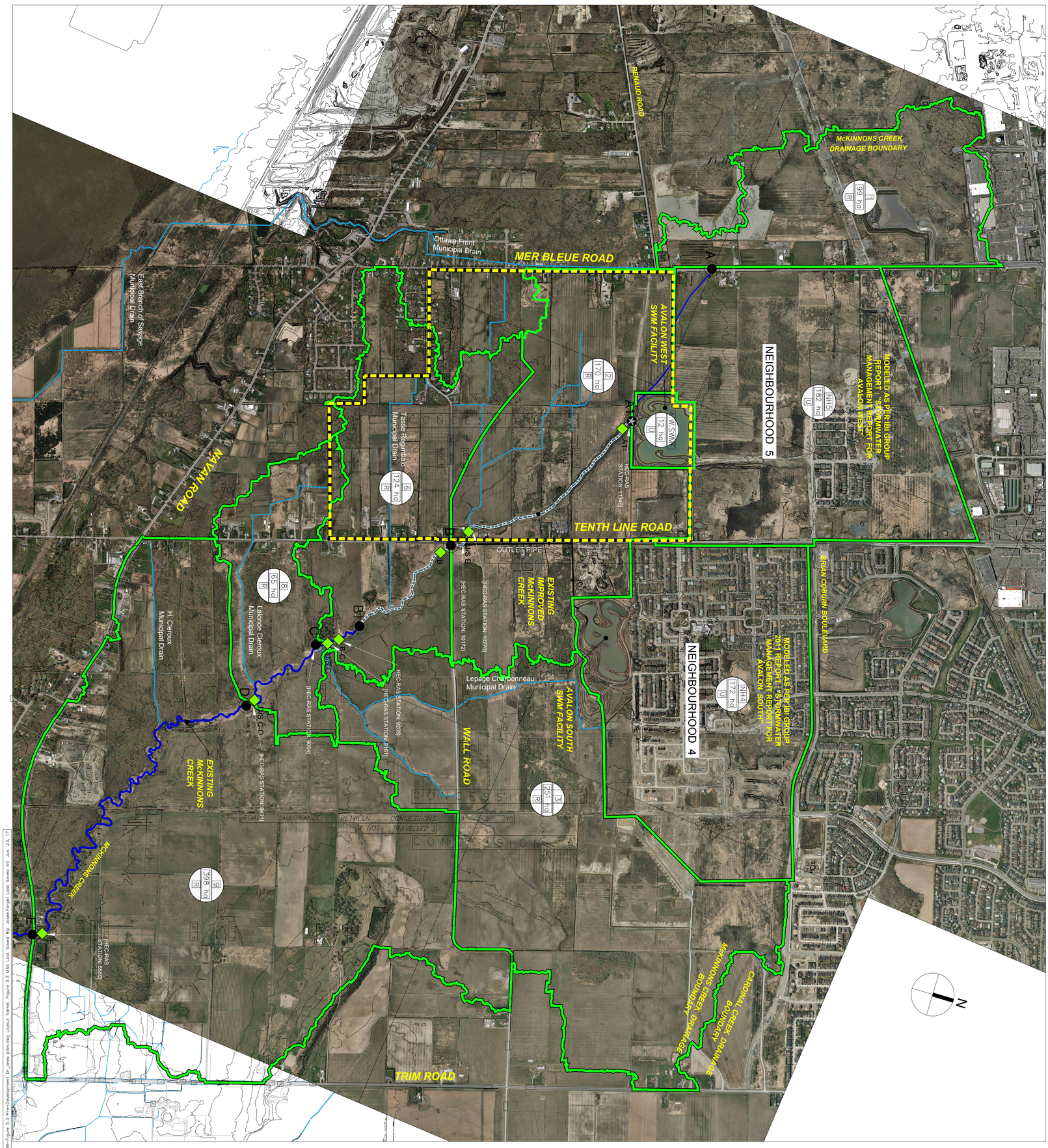
STORM EVENT	PRE-DEVELOPMENT PEAK FLOW RATES (CMS)				
	POINT A1	POINT B	POINT C	POINT D	POINT E
2 year 24 hour SCS Type II	1.74	2.33	3.62	3.48	4.02
5 year 24 hour SCS Type II	1.77	3.06	5.91	5.80	6.63
100 year 24 hour SCS Type II	2.66	6.45	12.82	13.53	16.31

Water Quality Control

It is recommended that SWM facilities tributary to McKinnons Creek be designed to provide an Enhanced Level of Protection, or 80% removal of Total Suspended Solids (TSS) in accordance with the MOE Stormwater Management Planning and Design Manual (March, 2003).

Erosion Potential

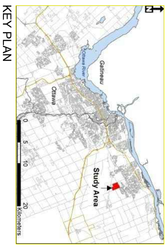
The findings of the geomorphic assessment completed by Parish Geomorphic Ltd. indicate that the lowest critical discharge for the upper reaches of McKinnons Creek (Point A1 to downstream of Point B) are 0.40 cms, while the critical discharge is 1.43 cms for the lower reaches of McKinnons Creek (downstream of Point B to Point E Navan Road). Based on the low critical discharge for the upper reach of McKinnons Creek, it is recommended that the outlet of the proposed MBUEA SWM infrastructure be located downstream of Wall Road (Point B) to minimize the erosion potential of the upper reaches of the creek.



LEGEND:

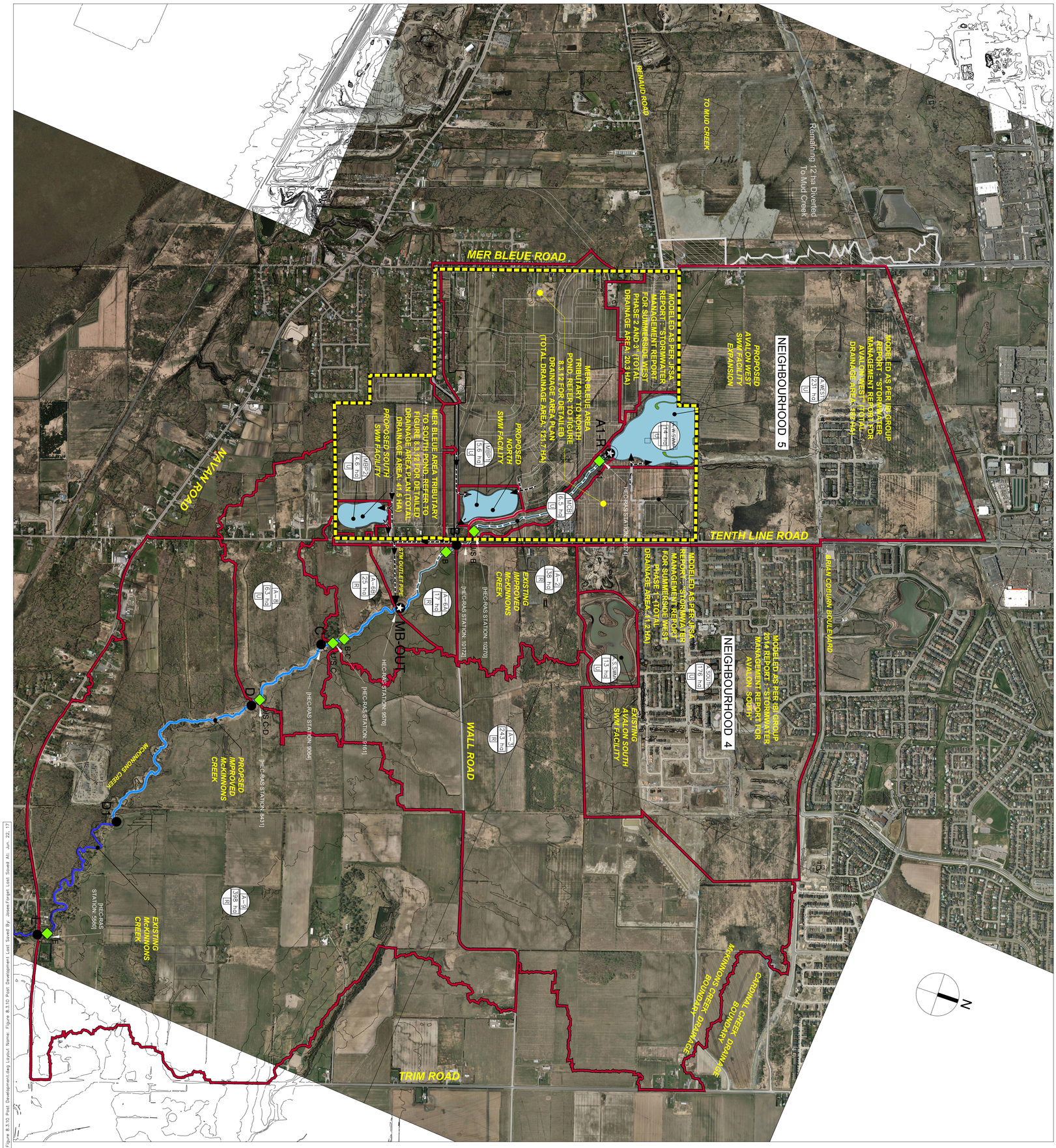
- A1 INTERFACE POINT FOR HYDROLOGIC / HYDRAULIC MODEL
- B PEAK FLOW POINT (SWMHYMO)
- U/S C EROSION ANALYSIS REFERENCE POINT
- EXISTING IMPROVED McKINNONS CREEK
- EXISTING McKINNONS CREEK
- STUDY AREA
- PRE-DEVELOPMENT DRAINAGE BOUNDARY
- [HECRAS STATION: 5580] PEAK FLOW LOCATION (HEC RAS)

KEY PLAN



Sheet No.	Drawing Title	Project Title
FIGURE 5.3 JUNE 2017	PRE-DEVELOPMENT DRAINAGE AREA PLAN	MER BLEUE MASTER SERVICING STUDY

IBI



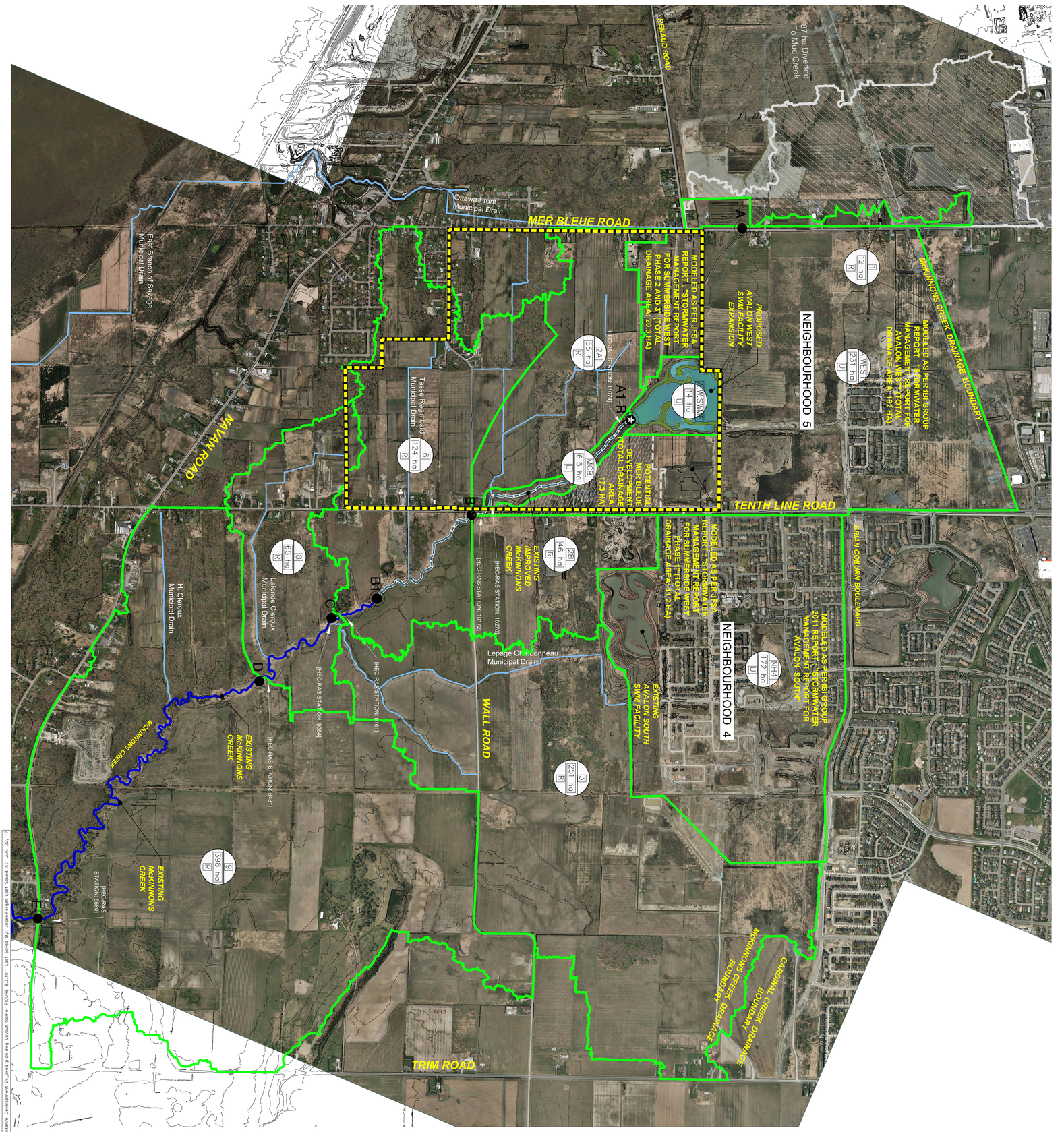
LEGEND:

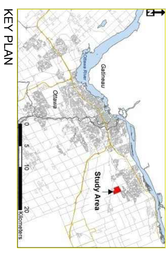
- A1 — INTERFACE POINT FOR HYDROLOGIC / HYDRAULIC MODEL
- B — PEAK FLOW POINT (SWMHYMO)
- D-D1 — EROSION ANALYSIS REFERENCE POINT
- EXISTING IMPROVED McKINNONS CREEK
- PROPOSED IMPROVED McKINNONS CREEK
- EXISTING McKINNONS CREEK
- STUDY AREA
- POST-DEVELOPMENT DRAINAGE BOUNDARY
- STM SEWER PIPE
- AREA DIVERTED TO MUD CREEK WATERSHED
- [HECRAS STATION: 5580] PEAK FLOW LOCATION (HEC RAS)

KEY PLAN

Sheet No.	Drawing Title	Project Title
FIGURE 8.3.10 JUNE 2017	POST-DEVELOPMENT DRAINAGE AREA PLAN	MER BLEUE MASTER SERVICING STUDY

IBI





LEGEND:

- A1 — INTERFACE POINT FOR HYDROLOGIC / HYDRAULOGIC MODEL
- B — PEAK FLOW POINT (SWMHYMO)
- EXISTING IMPROVED McKINNONS CREEK
- EXISTING McKINNONS CREEK
- STUDY AREA
- PRE-DEVELOPMENT DRAINAGE BOUNDARY
- AREA DIVERTED TO MUD CREEK WATERSHED
- POTENTIAL DEVELOPMENT IN ADVANCE OF MCKINNONS CREEK ENHANCEMENT
- [HECRAS STATION: 5580] PEAK FLOW LOCATION (HEC RAS)

Sheet No.	Drawing Title	Project Title
FIGURE 8.3.10.1 JUNE 2017	POTENTIAL DEVELOPMENT IN ADVANCE OF MCKINNONS CREEK ENHANCEMENT	MER BLEUE MASTER SERVICING STUDY

IBI

APPENDIX G

FIGURE 8.3A RECOMMENDED STORM TRUNK SERVICING FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

SSW PHASE 4, 5 AND 6 STORM DESIGN SHEET (DSEL, MAY 2018)

Multiples
Secondary School
Park
Multiples
Commercial
School
Park
Elementary School
Park
FIRE STATION
Park
EXISTING Pump Station
TRUNK 1A
TRUNK 1B
TRUNK 1C
TRUNK 2
TRUNK 3
TRUNK 4
TRUNK 5
TRUNK 6
OUTLET 1
OUTLET 1-2
Parkette 0.9ha
Approved Stormwater Management Facility 11.1ha
Neighbourhood Park 1.7ha
CEPEO Elementary School /Secondary School 5.9ha
Existing Residential
0.57ha Parkette
Stormwater Management Facility Expansion 4.0ha
OCSB Elementary School 2.4ha
N. Park 1.2ha
Dry Pond 0.8ha
McKinnon's Creek
OCDSB Elementary School 3.1ha
N. Park 1.5ha
Dry Pond 0.9ha
Community Park 6.5ha
Stormwater Management Facility 5.5ha
Dry Pond 0.5ha
Existing Residential
CECCE Elem. School 2.1ha
Dry Pond 0.8ha
N. Park 1.4ha
NEW Pump Station
Stormwater Management Facility 4.3ha
Vegetation Community/ Woodlot 5.1ha
MER BLEUE ROAD
TENTH LINE ROAD
WALL ROAD
NAVAN ROAD
Regional Road 174
N
Meters
50 0 50 100
1:4000

LEGEND:

- PROPOSED TRUNK STORM SEWER
- PROPOSED LOCAL STORM SEWER
- PROPOSED STORM OUTLET
- DRAINAGE SPLIT
- MH4000 — MANHOLE NODE
- MH3220 (12) — MANHOLE NODE (DSL MH ID)
- 450Ø — APPROXIMATE SEWER DIAMETER

J:\34739-CumbServReport\5.9 Drawings\59civil\layouts\MSS-Apr2017\Preferred Option\Figure 8.3A Recommended Storm Trunk Servicing.dwg Layout Name: Figure 8-3A STM Trunk Servicing Last Saved By: ddore Last Saved At: Jun. 27, 17

Sheet No.

FIGURE 8.3A
JUNE 2017

Drawing Title

RECOMMENDED STORM TRUNK SERVICING FOR UPDATED DEMONSTRATION PLAN

Project Title

MER BLEUE
MASTER SERVICING STUDY

IBI

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #1: AVALON POND 5 (West)																																				
	1002AB	1002	1003								0.28	0.10				0.77	0.77	10.00	1.28	11.28	76.81	104.19	178.56	59.44				59.44	148.72	69.52	450			0.25	0.906	89.27	60.03%
	1003ABC	1003	1004					0.16			0.24	0.13				1.01	1.78	11.28	1.01	12.29	72.22	97.89	167.65	128.69				128.69	286.47	59.51	600			0.20	0.982	157.77	55.08%
		1004	1005													0.00	1.78	12.29	0.20	12.49	69.01	93.48	160.03	122.97				122.97	286.47	11.69	600			0.20	0.982	163.50	57.07%
	1005AB	1005	1006								0.12	0.16				0.57	2.35	12.49	0.76	13.25	68.41	92.66	158.62	161.08				161.08	286.47	44.98	600			0.20	0.982	125.38	43.77%
	1007AB	1007	1008									0.42				0.86	0.86	10.00	1.40	11.40	76.81	104.19	178.56	66.36				66.36	148.72	75.90	450			0.25	0.906	82.36	55.38%
	1008	1008	1009					0.15								0.24	1.10	11.40	0.20	11.60	71.83	97.35	166.73	79.14				79.14	148.72	11.07	450			0.25	0.906	69.58	46.79%
	1009AB	1009	1006					0.27				0.15				0.74	1.84	11.60	0.84	12.44	71.16	96.44	165.14	130.81				130.81	265.43	60.18	525			0.35	1.188	134.62	50.72%
	1006A-C	1006	1202					0.22			0.15	0.06				0.78	4.97	13.25	1.08	14.33	66.23	89.67	153.44	329.10				329.10	579.98	68.00	825			0.15	1.051	250.88	43.26%
	1200A-F	1200	1201					0.20			0.57	0.06				1.60	1.60	10.00	0.95	10.95	76.81	104.19	178.56	122.67				122.67	224.33	56.94	525			0.25	1.004	101.66	45.32%
	1201A-C	1201	1202								0.32	0.18				1.02	2.62	10.95	1.55	12.49	73.36	99.45	170.36	191.96				191.96	339.63	85.26	675			0.15	0.919	147.67	43.48%
	1202A-H	1202	1203					0.23				0.64				1.68	9.27	14.33	1.26	15.59	63.39	85.79	146.74	587.49				587.49	4,154.07	120.00	1800			0.12	1.581	3566.58	85.86%
	1203	1203	1070									0.24				0.49	9.76	15.59	0.95	16.55	60.40	81.68	139.66	589.54				589.54	4,154.07	90.56	1800			0.12	1.581	3564.53	85.81%
	1207A-C	1207	1070				0.15	0.09		0.11						0.58	0.58	10.00	0.32	10.32	76.81	104.19	178.56	44.92				44.92	112.79	29.61	300			1.25	1.546	67.87	60.17%
	1100AB	1100	1101				0.15			0.08						0.38	0.38	10.00	0.31	10.31	76.81	104.19	178.56	29.42				29.42	131.53	33.61	300			1.70	1.803	102.11	77.63%
	1901A	1901	1101							0.50						0.99	0.99	10.00	1.93	11.93	76.81	104.19	178.56	75.80				75.80	148.72	105.07	450			0.25	0.906	72.92	49.03%
	1101AB	1101	1060				0.19			0.19						0.66	2.03	11.93	1.32	13.25	70.10	94.98	162.63	142.32				142.32	245.74	87.14	525			0.30	1.100	103.42	42.08%
	1921A	1921	1060							0.14						0.28	0.28	10.00	0.72	10.72	76.81	104.19	178.56	21.22				21.22	320.28	47.25	600			0.25	1.097	299.06	93.37%
Future School	1060A	1208	1060						5.24							10.20	10.20	10.00	0.21	10.21	76.81	104.19	178.56	783.18				783.18	1,575.26	16.60	1200			0.15	1.349	792.08	50.28%
	1060AB	1060	1020							0.42						0.83	13.33	13.25	1.54	14.79	66.22	89.66	153.43	882.91				882.91	1,928.87	120.61	1350			0.12	1.305	1045.97	54.23%
Park	1020A		1020			0.86										0.96	0.96	10.00	0.16	10.16	76.81	104.19	178.56	73.45				73.45	129.34	11.00	375			0.50	1.134	55.89	43.21%
	1020BC	1020	1070					0.07		0.24						0.58	14.87	14.79	0.50	15.29	62.26	84.23	144.06	926.01				926.01	2,156.55	43.75	1350			0.15	1.460	1230.54	57.06%
	1070	1070	1080							0.25						0.49	25.71	16.55	0.79	17.34	58.34	78.86	134.80	1,500.02				1,500.02	4,154.07	74.58	1800			0.12	1.581	2654.05	63.89%
		1800	1801													0.00	0.00	10.00	0.26	10.26	76.81	104.19	178.56	0.00				0.00	63.80	13.65	300			0.40	0.874	63.80	100.00%
	1801AB	1801	1080				0.45			0.43						1.52	1.52	10.26	1.76	12.02	75.82	102.84	176.21	115.57				115.57	200.65	94.93	525			0.20	0.898	85.07	42.40%
	1080	1080	1090							0.25						0.49	27.73	17.34	0.79	18.12	56.75	76.70	131.07	1,573.82				1,573.82	4,154.07	74.81	1800			0.12	1.581	2580.25	62.11%
	1901B	1901	1910							0.22						0.43	0.43	10.00	1.54	11.54	76.81	104.19	178.56	33.35				33.35	100.18	81.06	375			0.30	0.879	66.83	66.71%
	1911A-C	1911	1910				0.18			0.07						0.41	0.41	10.00	0.56	10.56	76.81	104.19	178.56	31.37				31.37	71.33	33.00	300			0.50	0.978	39.97	56.03%
	1903AB	1903	1904				0.15			0.19						0.60	0.60	10.00	1.04	11.04	76.81	104.19	178.56	46.10				46.10	148.72	56.43	450			0.25	0.906	102.62	69.00%
	1904	1904	1910							0.50						0.99	1.59	11.04	2.21	13.25	73.04	99.01	169.59	115.92				115.92	200.65	119.13	525			0.20	0.898	84.73	42.23%
	1910A-C	1910	1920				0.69			0.13						1.29	3.72	13.25	1.27	14.52	66.23	89.68	153.46	246.53				246.53	654.22	76.00	900			0.12	0.996	407.69	62.32%
	1921B	1921	1922							0.35						0.69	0.69	10.00	1.09	11.09	76.81	104.19	178.56	53.06				53.06	100.18	57.56	375			0.30	0.879	47.13	47.04%
	1922	1922	1920							0.22						0.43	1.13	11.09	1.43	12.52	72.85	98.76	169.16	81.96				81.96	148.72	77.78	450			0.25	0.906	66.75	44.89%
	1903B-D	1930	1924				0.04			0.11						0.28	0.28	10.00	1.38	11.38	76.81	104.19	178.56	21.29				21.29	59.68	67.81	300			0.35	0.818	38.39	64.33%
	1924AB	1924	1925							0.21						0.41	0.69	11.38	0.22	11.60	71.88	97.42	166.84	49.72				49.72	100.18	11.61	375			0.30	0.879	50.47	50.38%
	1925	1925	1926							0.27						0.53	1.22	11.60	1.68	13.28	71.16	96.43	165.13	87.14				87.14	148.72	91.40	450			0.25	0.906	61.58	41.41%
	1926	1926	1920							0.23						0.45	1.68	13.28	1.48	14.77	66.14	89.55	153.24	111.02				111.02	248.09	75.59	600			0.15	0.850	137.07	55.25%
	1920A-C	1920	1930				0.59			0.13						1.14	7.67	14.77	1.02	15.79	62.33	84.32	144.21	477.92				477.92	986.85	67.75	1050			0.12	1.104	508.93	51.57%
	1800	1800	1930							0.28						0.55	0.55	10.00	1.49	11.49	76.81	104.19	178.56	42.45				42.45	148.72	81.19	450			0.25	0.906	106.27	71.46%
																	4.11	=50% of flow to MH1090/DSELMH36 and MH1932/DSELMH31																		
	1930AB	1930	1090				0.21			0.36						1.03	5.14	15.79	1.46	17.24	59.97	81.09	138.64	308.00				308.00	1,408.95	105.44	1200			0.12	1.207	1100.95	78.14%
	1090AB	1090	1092				0.24			0.18						0.72	33.58	18.12	0.57	18.70	55.26	74.66	127.54	1,855.73				1,855.73	4,154.07	54.28	1800			0.12	1.581	2298.34	55.33%
		1092	1091													0.00	33.58	18.70	0.12	18.82	54.23	73.25	125.12	1,821.12				1,821.12	4,154.07	11.66	1800			0.12	1.581	2332.95	56.16%
	1930C	1930	1932							0.27						0.53	4.64	14.77	0.95	15.71	62.33	84.32	144.21	289.40				289.40	1,408.95	68.46	1200			0.12	1.207	1119.56	79.46%
		1932	1940													0.00	4.64	15.71	0.17	15.88	60.14	81.33	139.05	279.24				279.24	1,408.95	12.39	1200			0.12	1.207	1129.71	80.18%
	1940	1940	1941							0.45						0.89	5.53	15.88	1.23	17.11	59.76	80.81	138.16	330.57				330.57	1,408.95	88.88	1200			0.12	1.207	1078.39	76.54%
		1941	1091													0.00	5.53	17.11	0.31	17.42	57.20	77.31	132.11	316.39				316.39	1,408.95	22.56	1200			0.12	1.207	1092.56	77.54%

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LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	1091AB	1091	RAD				0.16									0.24	39.35	18.82	0.10	18.92	54.01	72.96	124.61	2,125.61				2,125.61	5,142.48	10.31	1950			0.12	1.668	3016.87	58.67%
		RAD	RAD													0.00	39.35	18.92	0.20	19.13	53.83	72.71	124.19	2,118.55				2,118.55	5,142.48	20.39	1950			0.12	1.668	3023.93	58.80%
		RAD	10001													0.00	39.35	19.13	0.06	19.19	53.48	72.23	123.36	2,104.74				2,104.74	5,142.48	6.17	1950			0.12	1.668	3037.75	59.07%
		EXT	MH10001													0.00	0.00	25.00	0.13	25.13	45.17	60.90	103.85	0.00				0.00	10,068.39	15.00	2550			0.11	1.910	10068.39	100.00%
		MH10001	MH10008													0.00	39.35	25.13	0.25	25.38	45.01	60.69	103.49	1,771.48				1,771.48	15,688.99	28.57		3000	2700	0.10	1.937	13917.51	88.71%
		MH10008	MH10002													0.00	39.35	25.38	0.39	25.77	44.73	60.30	102.82	1,760.30				1,760.30	15,688.99	45.79		3000	2700	0.10	1.937	13928.69	88.78%
		EXT	MH10004													0.00	0.00	25.00	0.17	25.17	45.17	60.90	103.85	0.00				0.00	3,792.13	15.00	1800			0.10	1.444	3792.13	100.00%
		MH10002	MH10003													0.00	39.35	25.38	0.24	25.62	44.73	60.30	102.82	1,760.30				1,760.30	6,745.44	22.78		2400	1800	0.10	1.561	4985.13	73.90%
				0.00	0.00	0.86	3.20	1.39	5.24	6.78	1.68	2.14	0.00	0.00	0.00	39.35	TRUE																			
															21.29																					

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LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #2: AVALON POND 5 (South-East)																																				
	2000	MH2000	MH2001												2.41	5.36	5.36	10.00	0.49	10.49	76.81	104.19	178.56	411.66				411.66	775.41	29.82	975			0.11	1.006	363.75	46.91%
	2001	MH2001	MH2002										0.87			1.69	7.05	10.49	1.25	11.74	74.96	101.65	174.17	528.67				528.67	944.84	79.07	1050			0.11	1.057	416.17	44.05%
		MH2002	MH2003													0.00	7.05	11.74	1.25	12.99	70.71	95.82	164.07	498.71				498.71	944.84	79.07	1050			0.11	1.057	446.13	47.22%
		MH2003	MH2004													0.00	7.05	12.99	0.35	13.33	66.97	90.68	155.19	472.30				472.30	944.84	21.98	1050			0.11	1.057	472.54	50.01%
		MH2004	MH2010													0.00	7.05	13.33	0.97	14.30			152.91	0.00				0.00	944.84	61.35	1050			0.11	1.057	944.84	100.00%
	2111	MH2111	MH2112										0.47			0.91	0.91	10.00	0.32	10.32	76.81	104.19	178.56	70.25				70.25	136.30	15.97	450			0.21	0.830	66.05	48.46%
		MH2112	MH2010													0.00	0.91	10.32	0.56	10.88	75.60	102.53	175.68	69.14				69.14	136.30	27.65	450			0.21	0.830	67.16	49.27%
	2100	MH2100	MH2101										1.34			2.61	2.61	10.00	1.13	11.13	76.81	104.19	178.56	200.28				200.28	303.78	55.64	675			0.12	0.822	103.50	34.07%
		MH2101	MH2102													0.00	2.61	11.13	0.20	11.33	72.73	98.59	168.87	189.65				189.65	303.78	10.05	675			0.12	0.822	114.12	37.57%
		MH2102	MH2103													0.00	2.61	11.33	2.43	13.76	72.05	97.65	167.24	187.87				187.87	303.78	120.00	675			0.12	0.822	115.91	38.16%
		MH2103	MH2010													0.00	2.61	13.76	1.15	14.91	64.85	87.78	150.18	169.10				169.10	303.78	56.57	675			0.12	0.822	134.68	44.33%
	2010	MH2010	MH2020										0.12			0.23	10.81	14.30	1.04	15.34	63.47	85.89	146.91	686.00				686.00	1,348.97	71.80	1200			0.11	1.155	662.97	49.15%
	2211	MH2211	MH2212										1.14			2.22	2.22	10.00	0.34	10.34	76.81	104.19	178.56	170.39				170.39	303.78	16.97	675			0.12	0.822	133.39	43.91%
		MH2212	MH2020													0.00	2.22	10.34	2.14	12.48	75.51	102.41	175.48	167.51				167.51	303.78	105.41	675			0.12	0.822	136.27	44.86%
	2200	MH2200	MH2201										1.39			2.70	2.70	10.00	1.72	11.72	76.81	104.19	178.56	207.75				207.75	385.20	87.03	750			0.11	0.845	177.44	46.07%
		MH2201	MH2020													0.00	2.70	11.72	1.99	13.70	70.79	95.92	164.25	191.47				191.47	385.20	100.71	750			0.11	0.845	193.73	50.29%
	2020	MH2020	MH2030										0.12			0.23	15.97	13.70	0.95	14.65	65.00	87.99	150.55	1,037.83				1,037.83	1,846.76	70.98	1350			0.11	1.250	808.92	43.80%
	2300	MH2300	MH2301										1.21			2.35	2.35	10.00	1.70	11.70	76.81	104.19	178.56	180.85				180.85	303.78	83.91	675			0.12	0.822	122.93	40.47%
		MH2301	MH2030													0.00	2.35	11.70	1.80	13.50	70.84	95.99	164.38	166.80				166.80	303.78	88.90	675			0.12	0.822	136.98	45.09%
	2030	MH2030	MH2040										0.11			0.21	18.53	14.65	1.01	15.66	62.60	84.70	144.87	1,160.32				1,160.32	1,846.76	76.03	1350			0.11	1.250	686.44	37.17%
																					167.22	230.48														
	2400	MH2400	MH2401										1.62			3.15	3.15	10.00	1.22	11.22	76.81	104.19	178.56	242.13				242.13	385.20	61.83	750			0.11	0.845	143.07	37.14%
		MH2401	MH2402													0.00	3.15	11.22	0.20	11.42	72.42	98.16	168.13	228.30				228.30	385.20	10.04	750			0.11	0.845	156.90	40.73%
TENTH LINE ROAD		MH2402	MH2403											4.50		9.51	12.66	11.42	1.18	12.60	71.76	97.25	166.56	908.45				908.45	1,846.76	88.84	1350			0.11	1.250	938.30	50.81%
		MH2403	MH2040													0.00	12.66	12.60	1.12	13.72	68.07	92.20	157.81	861.81				861.81	1,846.76	83.68	1350			0.11	1.250	984.95	53.33%
	2040	MH2040	MH2041										0.71			1.38	32.58	15.66	0.75	16.42	60.24	81.47	139.29	1,962.44				1,962.44	3,977.22	68.16	1800			0.11	1.514	2014.78	50.66%
		MH2041	MH2042													0.00	32.58	16.42	0.76	17.17	58.62	79.25	135.46	1,909.53				1,909.53	3,977.22	68.79	1800			0.11	1.514	2067.69	51.99%
		MH2042	MH2050													0.00	32.58	17.17	0.11	17.28	57.07	77.14	131.82	1,859.26				1,859.26	3,977.22	10.07	1800			0.11	1.514	2117.96	53.25%
	2500	MH2500	MH2501										1.45			2.82	2.82	10.00	1.18	11.18	76.81	104.19	178.56	216.72				216.72	303.78	58.26	675			0.12	0.822	87.06	28.66%
		MH2501	MH2502													0.00	2.82	11.18	1.39	12.57	72.55	98.34	168.44	204.72				204.72	303.78	68.41	675			0.12	0.822	99.06	32.61%
		MH2502	MH2503													0.00	2.82	12.57	0.21	12.77	68.18	92.34	158.06	192.38				192.38	303.78	10.19	675			0.12	0.822	111.40	36.67%
		MH2503	MH2504													0.00	2.82	12.77	1.26	14.03	67.58	91.52	156.64	190.68				190.68	303.78	62.02	675			0.12	0.822	113.10	37.23%
		MH2504	MH2050													0.00	2.82	14.03	0.24	14.27	64.15	86.83	148.54	181.03				181.03	303.78	11.61	675			0.12	0.822	122.75	40.41%
		MH2050	MH2051													0.00	35.40	17.28	0.45	17.74	56.86	76.84	131.31	2,012.58				2,012.58	3,977.22	41.23	1800			0.11	1.514	1964.64	49.40%
		MH2051	HW2													0.00	35.40	17.74	1.06	18.79	55.98	75.64	129.24	1,981.62				1,981.62	3,977.22	95.90	1800			0.11	1.514	1995.60	50.18%
				0.00	0.00	0.00	0.00	0.00	0.00	0.00			10.55	4.50	2.41	35.40	TRUE																			
															17.46																					

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LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #3: AVALON POND 5 (North)																																				
MANDALEY	3001	MH3001	MH3002										0.32			0.62	0.62	10.00	0.22	10.22	76.81	104.19	178.56	47.83				47.83	100.18	11.73	375			0.30	0.879	52.36	52.26%
MANDALEY		MH3002	MH3003													0.00	0.62	10.22	0.73	10.96	75.96	103.03	176.55	47.30				47.30	148.72	39.93	450			0.25	0.906	101.41	68.19%
SWEETFERN	3210B	MH3210	MH3003										0.32			0.62	0.62	0.00	1.34	1.34	167.22	230.48	398.62	104.13				104.13	100.18	70.50	375			0.30	0.879	-3.95	-3.94%
MANDALEY	3003	MH3003	MH3004										0.62			1.21	2.45	10.96	1.21	12.17	73.32	99.39	170.26	179.77				179.77	339.63	66.87	675			0.15	0.919	159.87	47.07%
MANDALEY		MH3004	MH3010													0.00	2.45	10.96	1.14	12.09	73.32	99.39	170.26	179.77				179.77	449.81	67.25	750			0.15	0.986	270.05	60.04%
SWEETVALLEY	3010	MH3010	MH3011										0.11			0.21	2.67	12.09	0.41	12.51	69.60	94.30	161.45	185.57				185.57	579.98	25.97	825			0.15	1.051	394.41	68.00%
PARK	3101	MH3101	MH3011		1.66											1.38	1.38	13.00	0.18	13.18	66.93	90.63	155.11	92.66				92.66	184.99	8.80	525			0.17	0.828	92.33	49.91%
SWEETVALLEY		MH3011	MH3020													0.00	4.05	12.51	0.70	13.20	68.36	92.59	158.50	276.89				276.89	579.98	44.03	825			0.15	1.051	303.09	52.26%
SWEETFERN	3202	MH3202	MH3203										0.86			1.67	1.67	10.00	0.57	10.57	76.81	104.19	178.56	128.54				128.54	162.91	34.18	450			0.30	0.992	34.37	21.10%
SWEETFERN		MH3203	MH3204													0.00	1.67	10.57	0.21	10.78	74.67	101.26	173.48	124.96				124.96	200.65	11.30	525			0.20	0.898	75.68	37.72%
SWEETFERN		MH3204	MH3210													0.00	1.67	10.78	0.99	11.78	73.92	100.23	171.70	123.71				123.71	320.28	65.29	600			0.25	1.097	196.57	61.37%
ASTERVALE	3210B	MH3210	MH3220										0.20			0.39	2.06	11.78	1.03	12.81	70.60	95.67	163.81	145.63				145.63	579.98	65.00	825			0.15	1.051	434.35	74.89%
BROADLEAF	3221B	MH3221	MH3220										0.51			0.99	0.99	10.00	1.73	11.73	76.81	104.19	178.56	76.23				76.23	184.99	85.82	525			0.17	0.828	108.76	58.79%
ASTERVALE	3220A	MH3220	MH3020										0.31			0.60	3.66	12.81	0.89	13.69	67.48	91.39	156.42	246.88				246.88	844.60	68.46	900			0.20	1.286	597.72	70.77%
CASA GRANDE	3020	MH3020	MH3021										0.67			1.30	9.01	12.51	0.83	13.34	68.36	92.59	158.50	616.11				616.11	1,575.26	67.59	1200			0.15	1.349	959.15	60.89%
CASA GRANDE		MH3021	MH3022													0.00	9.01	13.34	0.71	14.05	65.98	89.33	152.87	594.70				594.70	2,856.14	67.01	1500			0.15	1.566	2261.44	79.18%
CASA GRANDE	3022	MH3022	MH3023										1.08			2.10	11.11	14.05	0.14	14.20	64.10	86.74	148.40	712.38				712.38	2,856.14	13.50	1500			0.15	1.566	2143.75	75.06%
CASA GRANDE		MH3023	MH3024													0.00	11.11	14.20	0.75	14.95	63.73	86.24	147.53	708.32				708.32	3,682.64	75.25	1650			0.15	1.668	2974.32	80.77%
CASA GRANDE		MH3024	MH3025													0.00	11.11	14.95	0.53	15.48	61.89	83.72	143.18	687.85				687.85	3,682.64	52.93	1650			0.15	1.668	2994.79	81.32%
CASA GRANDE		MH3025	MH3030													0.00	11.11	15.48	0.12	15.60	60.66	82.04	140.28	674.23				674.23	3,682.64	12.32	1650			0.15	1.668	3008.41	81.69%
SWEETVALLEY	3300	MH3300	MH3301										1.67			3.25	3.25	10.00	0.68	10.68	76.81	104.19	178.56	249.60				249.60	100.18	35.91	375			0.30	0.879	-149.42	-149.14%
SWEETVALLEY		MH3301	MH3302													0.00	3.25	10.68	0.98	11.66	74.29	100.73	172.56	241.41				241.41	148.72	53.06	450			0.25	0.906	-92.70	-62.33%
SWEETVALLEY		MH3302	MH3303													0.00	3.25	11.66	0.93	12.59	70.98	96.18	164.71	230.67				230.67	317.25	79.51	525			0.50	1.420	86.58	27.29%
SWEETVALLEY		MH3303	MH3310													0.00	3.25	12.59	0.31	12.90	68.11	92.25	157.90	221.34				221.34	317.25	26.70	525			0.50	1.420	95.91	30.23%
SWEETVALLEY	3312	MH3312	MH3313										0.47			0.91	0.91	10.00	1.00	11.00	76.81	104.19	178.56	70.25				70.25	63.80	52.58	300			0.40	0.874	-6.44	-10.10%
BROADLEAF		MH3221	MH3314													0.00	0.91	10.00	0.23	10.23	76.81	104.19	178.56	70.25				70.25	136.30	11.58	450			0.21	0.830	66.05	48.46%
BROADLEAF	3314	MH3314	MH3313										0.35			0.68	0.68	10.23	1.19	11.42	75.92	102.98	176.46	51.71				51.71	136.30	59.20	450			0.21	0.830	84.59	62.06%
SWEETVALLEY	3313	MH3313	MH3315										0.26			0.51	2.10	11.00	0.77	11.77	73.16	99.18	169.89	153.76				153.76	224.33	46.42	525			0.25	1.004	70.57	31.46%
SWEETVALLEY		MH3315	MH3310													0.00	2.10	11.77	0.20	11.98	70.61	95.68	163.83	148.39				148.39	224.33	12.24	525			0.25	1.004	75.93	33.85%
PATHWAY		MH3310	MH3311													0.00	5.35	12.90	0.51	13.42	67.20	91.00	155.75	359.63				359.63	734.54	49.70	750			0.40	1.611	374.91	51.04%
PATHWAY		MH3311	MH3322													0.00	5.35	13.42	0.10	13.52	65.77	89.04	152.36	351.97				351.97	899.63	12.16	750			0.60	1.973	547.65	60.88%
CASA GRANDE	3320	MH3320	MH3322										1.03			2.00	2.00	10.00	1.93	11.93	76.81	104.19	178.56	153.95				153.95	224.33	116.20	525			0.25	1.004	70.38	31.37%
CASA GRANDE		MH3322	MH3323										0.73			1.42	8.78	13.52	0.16	13.69	65.49	88.66	151.71	574.80				574.80	1,045.56	13.43	975			0.20	1.357	470.76	45.02%
CASA GRANDE	3323	MH3323	MH3324													0.00	8.78	13.69	0.55	14.24	65.05	88.06	150.66	570.94				570.94	2,033.65	57.95	1200			0.25	1.742	1462.71	71.93%
CASA GRANDE		MH3324	MH3030													0.00	8.78	14.24	0.23	14.48	63.62	86.09	147.27	558.36				558.36	2,227.75	26.86	1200			0.30	1.908	1669.40	74.94%
		MH3030	MH3031													0.00	19.89	15.60	0.18	15.78	60.39	81.67	139.63	1,201.11				1,201.11	6,638.91	23.44	1950			0.20	2.154	5437.80	81.91%
		MH3031	MH3032													0.00	19.89	15.78	0.05	15.83	59.98	81.11	138.68	1,193.08				1,193.08	6,638.91	6.57	1950			0.20	2.154	5445.84	82.03%
		MH3032	MH3033													0.00	19.89	15.83	0.43	16.27	59.87	80.96	138.41	1,190.85				1,190.85	5,749.47	48.48	1950			0.15	1.865	4558.62	79.29%
		MH3033	EXMH1													0.00	19.89	16.27	0.14	16.41	58.93	79.68	136.20	1,172.21				1,172.21	5,749.47	15.70	1950			0.15	1.865	4577.26	79.61%
		EXMH1	EXMH2													0.00	19.89	16.41	0.25	16.65	58.64	79.27	135.50	1,166.31				1,166.31	8,261.44	28.32		2400	1800	0.15	1.912	7095.13	85.88%
		EXMH2	HW3													0.00	19.89	16.41	0.34	16.75	58.64	79.27	135.50	1,166.31				1,166.31	6,745.44	31.94		2400	1800	0.10	1.561	5579.12	82.71%
				0.00	1.66	0.00	0.00	0.00	0.00	0.00			9.51	0.00	0.00	19.89	TRUE																			
															11.17																					

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STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #4: New Central SWM Pond (North)																																				
MER BLEUE ROAD	4000A/B	MH4000	MH4001										0.40	1.46		3.86	3.86	13.67	0.78	14.45	65.10	88.12	150.76	251.47				251.47	626.37	44.75	900			0.11	0.954	374.90	59.85%
		MH4001	MH4002													0.00	3.86	14.45	0.77	15.22	63.09	85.37	146.02	243.73				243.73	626.37	43.86	900			0.11	0.954	382.64	61.09%
		MH4002	MH4010													0.00	3.86	15.22	0.79	16.01	61.26	82.86	141.69	236.64				236.64	626.37	45.49	900			0.11	0.954	389.73	62.22%
	4010	MH4010	MH4011										0.52			1.01	4.88	16.01	0.70	16.71	59.47	80.42	137.48	289.94				289.94	775.41	42.33	975			0.11	1.006	485.47	62.61%
		MH4011	MH4012													0.00	4.88	16.71	1.51	18.22	58.00	78.40	133.99	282.73				282.73	775.41	91.15	975			0.11	1.006	492.68	63.54%
	4110	MH4110	MH4111										0.92			1.79	1.79	10.00	1.79	11.79	76.81	104.19	178.56	137.51				137.51	239.68	88.06	600			0.14	0.821	102.17	42.63%
		MH4111	MH4112													0.00	1.79	11.79	0.14	11.93	70.56	95.61	163.72	126.33				126.33	239.68	6.82	600			0.14	0.821	113.35	47.29%
		MH4112	MH4113													0.00	1.79	11.93	0.77	12.69	70.13	95.01	162.68	125.55				125.55	239.68	37.74	600			0.14	0.821	114.13	47.62%
		MH4113	MH4121													0.00	1.79	12.69	0.84	13.53	67.81	91.84	157.20	121.41				121.41	239.68	41.15	600			0.14	0.821	118.27	49.34%
	4120	MH4120	MH4121										0.79			1.54	1.54	10.00	2.39	12.39	76.81	104.19	178.56	118.08				118.08	93.27	117.46	375			0.26	0.818	-24.81	-26.60%
	4121	MH4121	MH4131										0.31			0.60	3.93	13.53	1.44	14.97	65.48	88.64	151.67	257.39				257.39	496.66	77.96	825			0.11	0.900	239.27	48.18%
	4130	MH4130	MH4131										0.78			1.52	1.52	10.00	2.40	12.40	76.81	104.19	178.56	116.58				116.58	93.27	117.68	375			0.26	0.818	-23.31	-25.00%
	4132	MH4132	MH4131										0.12			0.23	0.23	10.00	1.45	11.45	76.81	104.19	178.56	17.94				17.94	93.27	71.02	375			0.26	0.818	75.33	80.77%
	4131	MH4131	MH4140										0.33			0.64	6.32	14.97	1.19	16.16	61.84	83.65	143.06	391.09				391.09	775.41	72.00	975			0.11	1.006	384.32	49.56%
	4100	MH4100	MH4101										0.10			0.19	0.19	10.00	1.19	11.19	76.81	104.19	178.56	14.95				14.95	496.66	64.10	825			0.11	0.900	481.72	96.99%
	4107	MH4107	MH4101										0.40			0.78	0.78	10.00	1.67	11.67	76.81	104.19	178.56	59.79				59.79	93.27	82.00	375			0.26	0.818	33.48	35.90%
	4101	MH4101	MH4102										1.16			2.26	3.23	11.67	0.80	12.47	70.94	96.13	164.61	229.15				229.15	496.66	43.26	825			0.11	0.900	267.52	53.86%
		MH4102	MH4103													0.00	3.23	12.47	0.90	13.37	68.46	92.73	158.73	221.15				221.15	496.66	48.72	825			0.11	0.900	275.51	55.47%
		MH4103	MH4104													0.00	3.23	13.37	0.99	14.37	65.89	89.21	152.65	212.86				212.86	496.66	53.73	825			0.11	0.900	283.81	57.14%
		MH4104	MH4105													0.00	3.23	14.37	0.63	15.00	63.30	85.65	146.51	204.48				204.48	496.66	33.89	825			0.11	0.900	292.19	58.83%
		MH4105	MH4106													0.00	3.23	15.00	0.86	15.85	61.78	83.57	142.91	199.56				199.56	496.66	46.18	825			0.11	0.900	297.11	59.82%
		MH4106	MH4140													0.00	3.23	15.85	1.69	17.54	59.83	80.90	138.32	193.27				193.27	496.66	91.06	825			0.11	0.900	303.40	61.09%
		MH4140	MH4012													0.00	9.55	17.54	0.19	17.73	56.36	76.16	130.14	538.53				538.53	944.84	12.08	1050			0.11	1.057	406.31	43.00%
		MH4012	MH4020													0.00	14.43	17.73	1.08	18.81	56.00	75.67	129.28	808.05				808.05	1,846.76	80.96	1350			0.11	1.250	1038.71	56.24%
	4200	MH4200	MH4201										0.80			1.56	1.56	10.00	2.08	12.08	76.81	104.19	178.56	119.57				119.57	385.20	105.31	750			0.11	0.845	265.63	68.96%
	4201	MH4201	MH4202										1.06			2.06	3.62	12.08	2.13	14.21	69.65	94.36	161.56	252.11				252.11	385.20	107.95	750			0.11	0.845	133.09	34.55%
		MH4202	MH4204													0.00	3.62	14.21	1.44	15.64	63.70	86.21	147.47	230.57				230.57	496.66	77.56	825			0.11	0.900	266.09	53.58%
		MH4204	MH4220													0.00	3.62	15.64	0.38	16.02	60.29	81.53	139.40	218.21				218.21	496.66	20.27	825			0.11	0.900	278.45	56.06%
	4212	MH4212	MH4213										0.99			1.93	1.93	10.00	0.73	10.73	76.81	104.19	178.56	147.97				147.97	303.78	35.90	675			0.12	0.822	155.81	51.29%
		MH4213	MH4220													0.00	1.93	10.73	0.53	11.26	74.12	100.50	172.17	142.79				142.79	303.78	26.26	675			0.12	0.822	160.98	52.99%
SCHOOL	4221	MH4221	MH4220												2.54	5.65	5.65	13.00	0.35	13.35	66.93	90.63	155.11	378.08				378.08	626.37	20.00	900			0.11	0.954	248.29	39.64%
	4220	MH4220	MH4222										1.01			1.97	13.16	16.02	0.83	16.85	59.46	80.40	137.45	782.54				782.54	1,348.97	57.40	1200			0.11	1.155	566.43	41.99%
		MH4222	MH4223													0.00	13.16	16.85	0.48	17.32	57.73	78.03	133.35	759.69				759.69	1,348.97	32.99	1200			0.11	1.155	589.28	43.68%
		MH4223	MH4224													0.00	13.16	17.32	0.54	17.87	56.78	76.73	131.12	747.22				747.22	1,348.97	37.75	1200			0.11	1.155	601.75	44.61%
		MH4224	MH4020													0.00	13.16	17.87	1.22	19.09	55.73	75.31	128.66	733.50				733.50	1,348.97	84.51	1200			0.11	1.155	615.48	45.63%
	4020	MH4020	MH4021										0.92			1.79	29.38	19.09	1.11	20.20	53.55	72.32	123.52	1,573.28				1,573.28	3,153.62	95.11	1650			0.11	1.429	1580.34	50.11%
		MH4021	MH4022													0.00	29.38	20.20	1.11	21.31	51.72	69.82	119.21	1,519.50				1,519.50	3,153.62	95.12	1650			0.11	1.429	1634.12	51.82%
PARK	4332	MH4023	MH4022		2.04											1.70	1.70	13.33	0.38	13.71	66.01	89.37	152.93	112.31				112.31	184.99	19.00	525			0.17	0.828	72.68	39.29%
	4022	MH4022	MH4024										0.89			1.73	32.81	21.31	0.83	22.14	50.02	67.51	115.23	1,641.40				1,641.40	3,153.62	71.11	1650			0.11	1.429	1512.23	47.95%
		MH4024	MH4025													0.00	32.81	22.14	0.85	22.99	48.83	65.89	112.44	1,602.37				1,602.37	3,153.62	72.87	1650			0.11	1.429	1551.26	49.19%
	4025	MH4025	MH4026										1.07			2.08	34.90	22.99	0.52	23.50	47.68	64.31	109.73	1,663.73				1,663.73	3,153.62	44.40	1650			0.11	1.429	1489.89	47.24%
		MH4026	MH4030													0.00	34.90	23.50	0.66	24.16	47.00	63.39	108.15	1,640.19				1,640.19	3,153.62	56.54	1650			0.11	1.429	1513.43	47.99%
	4030	MH4030	MH4031										1.13			2.20	37.10	24.16	0.51	24.68	46.17	62.27	106.20	1,712.81				1,712.81	3,153.62	44.06	1650			0.11	1.429	1440.82	45.69%
		MH4031	MH4032													0.00	37.10	24.68	0.57	25.25	45.55	61.42	104.74	1,689.67				1,689.67	3,153.62	49.23	1650			0.11	1.429	1463.95	46.42%
		MH4032	MH4040													0.00	37.10	25.25	0.67	25.92	44.87	60.50	103.16	1,664.64				1,664.64	3,977.22	60.53	1800			0.11	1.514	2312.58	58.15%
	4400	MH4400	MH4401										1.93			3.76	3.76	10.00	1.24	11.24	76.81	104.19	178.56	288.46				288.46	496.66	67.15	825			0.11	0.900	208.20	41.92%
		MH4401	MH4402													0.00	3.76	11.24	0.23	11.47	72.34	98.05	167.94	271.69				271.69	496.66	12.40	825			0.11	0.900	224.98	45.30%
		MH4402	MH4403													0.00	3.76	11.47	1.58	13.05	71.58	97.01	166.13	268.83				268.83	496.66	85.28	825			0.11	0.900	227.84	45.87%
		MH4403	MH4404													0.00	3.76	13.05	1.58	14.63	66.78	90.43	154.76	250.82				250.82	496.66	85.28	825			0.11	0.900	245.84	49.50%
	4404	MH4404	MH4405										2.20			4.28	8.04	14.63	1.54	16.17	62.65	84.77	144.98	503.53				503.53	775.41	92.82	975			0.11	1.006	271.88	35.06%
		MH4405	MH4406													0.00	8.04	16.17	0.69	16.86	59.14	79.96	136.69	475.30				475.30	775.41	41.72	975			0.11	1.006	300.11	38.70%
		MH4406	MH4407													0.00	8.04	16.86	0.50	17.36	57.70	77.99	133.29	463.73				463.73	775.41	29.92	975			0.11	1.006	311.68	40.20%
		MH4407	MH4408													0.00	8.04	17.36	0.72	18.08	56.71	76.65	130.97	455.81				455.81	775.41	43.43	975			0.11	1.006	319.60	41.22%
		MH4408	MH4440													0.00	8.04	18.08	0.60	18.68	55.35	74.78	127.76	444.84				444.84	775.41	36.52	975			0.11	1.006	330.57	42.63%

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STORM SEWER DESIGN SHEET
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MSS Preferred Concept
CITY OF OTTAWA
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LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	4410	MH4410	MH4411										2.15			4.18	4.18	10.00	1.82	11.82	76.81	104.19	178.56	321.34				321.34	496.66	98.27	825			0.11	0.900	175.32	35.30%
		MH4411	MH4412													0.00	4.18	11.82	1.82	13.64	70.46	95.47	163.48	294.79				294.79	496.66	98.27	825			0.11	0.900	201.87	40.65%
	4412	MH4412	MH4413										1.28			2.49	6.67	13.64	1.42	15.06	65.18	88.23	150.96	435.04				435.04	1,348.97	98.27	1200			0.11	1.155	913.93	67.75%
		MH4413	MH4414													0.00	6.67	15.06	0.51	15.57	61.63	83.37	142.58	411.39				411.39	1,348.97	35.55	1200			0.11	1.155	937.58	69.50%
		MH4414	MH4415													0.00	6.67	15.57	0.35	15.92	60.45	81.76	139.79	403.52				403.52	1,348.97	24.20	1200			0.11	1.155	945.45	70.09%
		MH4415	MH4424													0.00	6.67	15.92	0.34	16.26	59.68	80.70	137.97	398.36				398.36	1,348.97	23.36	1200			0.11	1.155	950.61	70.47%
	4420	MH4420	MH4421										0.91			1.77	1.77	10.00	0.84	10.84	76.81	104.19	178.56	136.01				136.01	239.68	41.35	600			0.14	0.821	103.66	43.25%
		MH4421	MH4422													0.00	1.77	10.84	1.54	12.38	73.73	99.96	171.23	130.56				130.56	239.68	76.12	600			0.14	0.821	109.12	45.53%
		MH4422	MH4423													0.00	1.77	12.38	0.24	12.62	68.72	93.09	159.35	121.69				121.69	239.68	11.68	600			0.14	0.821	117.98	49.23%
		MH4423	MH4424													0.00	1.77	12.62	0.67	13.29	68.02	92.12	157.69	120.45				120.45	239.68	32.89	600			0.14	0.821	119.22	49.74%
		MH4424	MH4440													0.00	8.45	16.26	1.25	17.50	58.95	79.71	136.25	497.91				497.91	1,348.97	86.61	1200			0.11	1.155	851.06	63.09%
	4430	MH4430	MH4431										0.83			1.62	1.62	10.00	1.51	11.51	76.81	104.19	178.56	124.05				124.05	239.68	74.43	600			0.14	0.821	115.62	48.24%
		MH4431	MH4432													0.00	1.62	11.51	0.23	11.74	71.45	96.84	165.84	115.41				115.41	239.68	11.53	600			0.14	0.821	124.26	51.85%
		MH4432	MH4433													0.00	1.62	11.74	1.57	13.31	70.70	95.80	164.04	114.19				114.19	239.68	77.32	600			0.14	0.821	125.49	52.36%
	4433	MH4433	MH4434										1.38			2.69	4.30	13.31	1.47	14.78	66.06	89.43	153.04	284.09				284.09	496.66	79.15	825			0.11	0.900	212.58	42.80%
		MH4434	MH4435													0.00	4.30	14.78	1.01	15.79	62.29	84.28	144.14	267.90				267.90	496.66	54.79	825			0.11	0.900	228.76	46.06%
		MH4435	MH4440													0.00	4.30	15.79	0.61	16.41	59.95	81.08	138.61	257.85				257.85	496.66	33.15	825			0.11	0.900	238.82	48.08%
		MH4440	MH4040													0.00	20.78	17.50	1.16	18.66	56.43	76.25	130.29	1,172.70				1,172.70	1,846.76	86.70	1350			0.11	1.250	674.06	36.50%
																					167.22	230.48															
	4450	MH4450	MH4451										1.50			2.92	2.92	10.00	1.66	11.66	76.81	104.19	178.56	224.19				224.19	385.20	84.22	750			0.11	0.845	161.00	41.80%
		MH4451	MH4452													0.00	2.92	11.66	1.55	13.21	70.96	96.16	164.67	207.14				207.14	385.20	78.50	750			0.11	0.845	178.05	46.22%
		MH4452	MH4453													0.00	2.92	13.21	1.28	14.49	66.34	89.82	153.71	193.65				193.65	385.20	64.76	750			0.11	0.845	191.55	49.73%
		MH4453	MH4040													0.00	2.92	14.49	0.98	15.47	63.00	85.25	145.81	183.90				183.90	385.20	49.59	750			0.11	0.845	201.30	52.26%
	4040	MH4040	MH4050										0.29			0.56	61.36	25.92	0.70	26.62	44.12	59.47	101.39	2,707.24				2,707.24	5,999.35	70.78	2100			0.11	1.678	3292.11	54.87%
	4500	MH4500	MH4501										1.68			3.27	3.27	10.00	2.12	12.12	76.81	104.19	178.56	251.10				251.10	385.20	107.48	750			0.11	0.845	134.10	34.81%
		MH4501	MH4502													0.00	3.27	12.12	0.82	12.94	69.52	94.18	161.25	227.28				227.28	385.20	41.59	750			0.11	0.845	157.92	41.00%
		MH4502	MH4503													0.00	3.27	12.94	0.82	13.76	67.10	90.86	155.50	219.35				219.35	385.20	41.59	750			0.11	0.845	165.84	43.05%
		MH4503	MH4050													0.00	3.27	13.76	0.82	14.58	64.85	87.78	150.19	212.02				212.02	385.20	41.59	750			0.11	0.845	173.18	44.96%
	4050	MH4050	MH4051										0.41			0.80	65.43	26.62	0.35	26.97	43.35	58.43	99.60	2,836.48				2,836.48	5,999.35	35.44	2100			0.11	1.678	3162.87	52.72%
		MH4051	MH4060													0.00	65.43	26.97	0.73	27.70	42.98	57.92	98.73	2,812.08				2,812.08	5,999.35	73.50	2100			0.11	1.678	3187.27	53.13%
	4600	MH4600	MH4601										1.29			2.51	2.51	10.00	2.34	12.34	76.81	104.19	178.56	192.81				192.81	303.78	115.57	675			0.12	0.822	110.97	36.53%
		MH4601	MH4602													0.00	2.51	12.34	2.34	14.68	68.85	93.26	159.65	172.83				172.83	303.78	115.57	675			0.12	0.822	130.95	43.11%
	4602	MH4602	MH4603										1.45			2.82	5.33	14.68	1.88	16.57	62.52	84.59	144.68	333.37				333.37	626.37	107.75	900			0.11	0.954	293.00	46.78%
		MH4603	MH4604													0.00	5.33	16.57	1.88	18.45	58.30	78.81	134.71	310.86				310.86	626.37	107.75	900			0.11	0.954	315.51	50.37%
	4605	MH4605	MH4606										0.46			0.90	0.90	10.00	1.69	11.69	76.81	104.19	178.56	68.75				68.75	91.46	81.57	375			0.25	0.802	22.70	24.82%
		MH4606	MH4607													0.00	0.90	11.69	0.24	11.94	70.86	96.02	164.42	63.43				63.43	91.46	11.63	375			0.25	0.802	28.03	30.65%
	4607	MH4607	MH4604	0.60												0.50	1.40	11.94	1.28	13.22	70.09	94.97	162.60	97.82				97.82	184.99	63.78	525			0.17	0.828	87.17	47.12%
	4604	MH4604	MH4610										0.26			0.51	7.23	18.45	1.07	19.52	54.67	73.85	126.15	395.43				395.43	626.37	61.03	900			0.11	0.954	230.94	36.87%
	4611	MH4611	MH4612										0.93			1.81	1.81	10.00	1.50	11.50	76.81	104.19	178.56	139.00				139.00	290.85	71.05	675			0.11	0.787	151.85	52.21%
		MH4612	MH4610													0.00	1.81	11.50	1.40	12.91	71.48	96.87	165.89	129.35				129.35	385.20	71.05	750			0.11	0.845	255.84	66.42%
	4610	MH4610	MH4620										0.32			0.62	9.67	19.52	1.14	20.65	52.82	71.33	121.81	510.59				510.59	944.84	72.00	1050			0.11	1.057	434.25	45.96%
	4630	MH4630	MH4631										1.82			3.54	3.54	10.00	1.85	11.85	76.81	104.19	178.56	272.02				272.02	385.20	93.78	750			0.11	0.845	113.18	29.38%
		MH4631	MH4632													0.00	3.54	11.85	1.85	13.70	70.36	95.34	163.25	249.20				249.20	385.20	93.78	750			0.11	0.845	135.99	35.31%
		MH4632	MH4633													0.00	3.54	13.70	0.23	13.93	65.01	88.00	150.57	230.26				230.26	385.20	11.83	750			0.11	0.845	154.94	40.22%
		MH4633	MH4640													0.00	3.54	13.93	1.26	15.19	64.40	87.17	149.12	228.10				228.10	385.20	63.65	750			0.11	0.845	157.10	40.78%
	4641	MH4641	MH4642										0.93			1.81	1.81	10.00	1.42	11.42	76.81	104.19	178.56	139.00				139.00	212.45	61.91	600			0.11	0.728	73.45	34.57%
		MH4642	MH4640													0.00	1.81	11.42	1.42	12.84	71.76	97.26	166.56	129.87				129.87	212.45	61.91	600			0.11	0.728	82.58	38.87%
	4640	MH4640	MH4650										0.32			0.62	5.97	15.19	1.31	16.50	61.32	82.95	141.84	366.35				366.35	626.37	74.98	900			0.11	0.954	260.02	41.51%
	4651A	MH4651	MH4652										1.37			2.67	2.67	10.00	1.20	11.20	76.81	104.19	178.56	204.76				204.76	303.78	59.31	675			0.12	0.822	99.01	32.59%
		MH4652	MH4653													0.00	2.67	11.20	0.15	11.35	72.48	98.25	168.27	193.23				193.23	303.78	7.34	675			0.12	0.822	110.55	36.39%
		MH4653	MH4654													0.00	2.67	11.35	1.31	12.66	71.98	97.56	167.09	191.90				191.90	303.78	64.51	675			0.12	0.822	111.88	36.83%
		MH4654	MH4650													0.00	2.67	12.66	1.31	13.97	67.91	91.98	157.43	181.05				181.05	303.78	64.51	675			0.12	0.822	122.73	40.40%
	4651B	MH4650	MH4660										0.33			0.64	9.28	16.50	1.08	17.58	58.44	79.00	135.04	542.45				542.45	944.84	68.50	1050			0.11	1.057	402.38	42.59%
																					167.22	230.48															
	4661	MH4661	MH4662										0.36			0.70	0.70	0.00	0.55	0.55	167.22	230.48	398.62	117.15				117.15	184.99	27.35	525			0.17	0.828	67.84	36.67%
		MH4662	MH4663													0.00	0.70	0.55	0.36	0.91	156.09	214.71	370.99	109.35				109.35	184.99	17.64	525			0.17	0.828	75.64	40.89%
		MH4663	MH4660													0.00	0.70	0.91	0.77	1.67	149.73	205.75	355.30	104.90				104.90	184.99	38.15	525			0.17	0.828	80.09	43.29%
	4660	MH4660	MH4620										0.42			0.82	10.80	17.58	1.10	18.68	56.28	76.05	129.95	607.83				607.83	944.84	69.50	1050			0.11	1.057	337.00	35.67%

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STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
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LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW											SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	4622	MH4620	MH4621										0.29			0.56	21.03	20.65	1.22	21.87	51.01	68.85	117.54	1,072.69				1,072.69	1,846.76	91.45	1350			0.11	1.250	774.06	41.91%
	4621	MH4621	MH4622										0.51			0.99	22.02	21.87	0.77	22.65	49.20	66.39	113.31	1,083.62				1,083.62	1,846.76	58.10	1350			0.11	1.250	763.13	41.32%
	4624	MH4624	MH4622										0.25			0.49	0.49	0.00	1.32	1.32	167.22	230.48	398.62	81.35				81.35	93.27	64.60	375			0.26	0.818	11.91	12.77%
	4623	MH4623	MH4622										0.18			0.35	0.35	0.00	0.59	0.59	167.22	230.48	398.62	58.57				58.57	136.30	29.35	450			0.21	0.830	77.73	57.03%
		MH4622	MH4625													0.00	22.86	22.65	0.95	23.60	48.13	64.93	110.79	1,100.26				1,100.26	1,846.76	71.19	1350			0.11	1.250	746.50	40.42%
	4625	MH4625	MH4626										1.22			2.37	25.23	23.60	0.44	24.04	46.88	63.23	107.87	1,183.08				1,183.08	1,846.76	33.18	1350			0.11	1.250	663.67	35.94%
		MH4626	MH4060													0.00	25.23	24.04	1.10	25.14	46.33	62.48	106.57	1,169.04				1,169.04	1,846.76	82.57	1350			0.11	1.250	677.72	36.70%
	4060	MH4060	MH4061										1.49			2.90	93.56	27.70	0.82	28.52	42.23	56.90	96.97	3,950.94				3,950.94	8,565.43	89.77	2400			0.11	1.834	4614.49	53.87%
		MH4061	MH4062													0.00	93.56	28.52	0.32	28.84	41.42	55.80	95.09	3,875.58				3,875.58	8,565.43	35.42	2400			0.11	1.834	4689.85	54.75%
		MH4062	MH4063													0.00	93.56	28.84	0.32	29.16	41.11	55.38	94.37	3,846.72				3,846.72	8,565.43	35.42	2400			0.11	1.834	4718.72	55.09%
		MH4063	MH4070													0.00	93.56	29.16	0.52	29.68	40.81	54.97	93.66	3,818.33				3,818.33	8,565.43	57.52	2400			0.11	1.834	4747.10	55.42%
	4720	MH4720	MH4721										0.82			1.60	1.60	10.00	1.75	11.75	76.81	104.19	178.56	122.56				122.56	184.99	87.00	525			0.17	0.828	62.43	33.75%
		MH4721	MH4722													0.00	1.60	11.75	0.42	12.17	70.68	95.77	163.99	112.78				112.78	184.99	20.83	525			0.17	0.828	72.21	39.03%
		MH4722	MH4723													0.00	1.60	12.17	0.96	13.13	69.37	93.97	160.88	110.69				110.69	184.99	47.67	525			0.17	0.828	74.30	40.16%
		MH4723	MH4724													0.00	1.60	13.13	0.28	13.41	66.56	90.13	154.24	106.22				106.22	184.99	13.70	525			0.17	0.828	78.77	42.58%
PARK	4725	MH4725	MH4724		6.31											5.26	5.26	15.00	0.28	15.28	61.77	83.56	142.89	325.05				325.05	496.66	15.00	825			0.11	0.900	171.61	34.55%
		MH4724	MH4070													0.00	6.86	13.41	1.06	14.46	65.80	89.09	152.44	451.30				451.30	775.41	63.81	975			0.11	1.006	324.11	41.80%
	4710	MH4710	MH4711										1.01			1.97	1.97	10.00	0.20	10.20	76.81	104.19	178.56	150.96				150.96	239.68	9.81	600			0.14	0.821	88.72	37.02%
		MH4711	MH4712													0.00	1.97	10.20	2.25	12.44	76.05	103.15	176.76	149.47				149.47	239.68	110.65	600			0.14	0.821	90.20	37.64%
	4712	MH4712	MH4713										1.13			2.20	4.16	12.44	2.13	14.58	68.54	92.84	158.92	285.43				285.43	496.66	115.08	825			0.11	0.900	211.24	42.53%
		MH4713	MH4714													0.00	4.16	14.58	0.89	15.47	62.79	84.95	145.30	261.47				261.47	496.66	48.16	825			0.11	0.900	235.19	47.35%
	4714	MH4714	MH4715										0.95			1.85	6.01	15.47	0.77	16.24	60.69	82.08	140.34	364.91				364.91	626.37	43.97	900			0.11	0.954	261.46	41.74%
		MH4715	MH4716													0.00	6.01	16.24	1.05	17.29	59.00	79.77	136.35	354.76				354.76	626.37	60.36	900			0.11	0.954	271.62	43.36%
		MH4716	MH4717													0.00	6.01	17.29	0.24	17.53	56.84	76.82	131.27	341.80				341.80	626.37	13.70	900			0.11	0.954	284.58	45.43%
		MH4717	MH4070													0.00	6.01	17.53	1.17	18.70	56.38	76.18	130.18	339.00				339.00	626.37	66.81	900			0.11	0.954	287.37	45.88%
		MH4070	HW4													0.00	106.43	29.68	0.43	30.12	40.33	54.31	92.53	4,292.31				4,292.31	8,565.43	47.51	2400			0.11	1.834	4273.13	49.89%
				0.00	8.95	0.00	0.00	0.00	0.00	0.00			46.37	1.46	2.54	106.43	TRUE																			
															59.32																					

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STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #5: New Central SWM Pond (South)																																				
MER BLEUE ROAD	5000A/B	MH5000	MH5001										0.89	1.99		5.94	5.94	16.67	1.36	18.03	58.09	78.52	134.21	344.83				344.83	626.37	77.55	900			0.11	0.954	281.54	44.95%
		MH5001	MH5002													0.00	5.94	18.03	1.36	19.38	55.44	74.91	127.97	329.12				329.12	626.37	77.55	900			0.11	0.954	297.25	47.46%
		MH5002	MH5010													0.00	5.94	19.38	1.28	20.66	53.05	71.64	122.35	314.93				314.93	626.37	73.01	900			0.11	0.954	311.44	49.72%
	5110	MH5110	MH5111										1.36			2.65	2.65	10.00	1.43	11.43	76.81	104.19	178.56	203.27				203.27	303.78	70.81	675			0.12	0.822	100.51	33.09%
		MH5111	MH5112													0.00	2.65	11.43	1.43	12.87	71.70	97.18	166.43	189.76				189.76	303.78	70.81	675			0.12	0.822	114.01	37.53%
		MH5112	MH5121													0.00	2.65	12.87	1.18	14.05	67.30	91.14	155.98	178.11				178.11	303.78	58.19	675			0.12	0.822	125.67	41.37%
	5120	MH5120	MH5121										0.32			0.62	0.62	10.00	1.14	11.14	76.81	104.19	178.56	47.83				47.83	93.27	55.81	375			0.26	0.818	45.44	48.72%
	S5122	MH5121	MH5122										0.21			0.41	3.68	14.05	0.20	14.25	64.11	86.76	148.42	235.78				235.78	385.20	10.26	750			0.11	0.845	149.42	38.79%
		MH5122	MH5010													0.00	3.68	14.25	0.92	15.18	63.59	86.06	147.21	233.89				233.89	385.20	46.87	750			0.11	0.845	151.31	39.28%
HIGH RES	5012	MH5012	MH5010												6.20	13.79	13.79	15.83	0.22	16.05	59.88	80.97	138.43	825.61				825.61	1,348.97	15.00	1200			0.11	1.155	523.36	38.80%
	5010	MH5010	MH5020										0.18			0.35	23.75	16.05	0.99	17.04	59.40	80.32	137.31	1,411.03				1,411.03	2,445.85	79.77	1500			0.11	1.341	1034.81	42.31%
COMMERCIAL	5262	MH5262	MH5263												3.83	8.52	8.52	14.50	0.24	14.74	62.97	85.21	145.74	536.40				536.40	809.89	15.00	975			0.12	1.051	273.49	33.77%
	5261	MH5261	MH5263										0.85			1.65	1.65	10.00	1.51	11.51	76.81	104.19	178.56	127.04				127.04	239.68	74.23	600			0.14	0.821	112.63	46.99%
																					167.22	230.48														
		MH5263	MH5200													0.00	10.17	14.74	1.48	16.22	62.39	84.41	144.37	634.66				634.66	1,348.97	102.73	1200			0.11	1.155	714.31	52.95%
HIGH RES	5260	MH5260	MH5200												2.79	6.20	6.20	13.00	0.25	13.25	66.93	90.63	155.11	415.30				415.30	775.41	15.00	975			0.11	1.006	360.11	46.44%
	5200	MH5200	MH5201										0.58			1.13	17.51	16.22	0.62	16.83	59.03	79.81	136.43	1,033.38				1,033.38	1,846.76	46.14	1350			0.11	1.250	813.38	44.04%
		MH5201	MH5202													0.00	17.51	16.83	1.25	18.09	57.75	78.06	133.41	1,010.96				1,010.96	1,846.76	94.11	1350			0.11	1.250	835.79	45.26%
		MH5202	MH5020													0.00	17.51	18.09	0.88	18.97	55.32	74.74	127.69	968.44				968.44	1,846.76	66.17	1350			0.11	1.250	878.31	47.56%
	5210	MH5210	MH5211										0.84			1.63	1.63	10.00	1.19	11.19	76.81	104.19	178.56	125.55				125.55	239.68	58.40	600			0.14	0.821	114.13	47.62%
		MH5211	MH5212													0.00	1.63	11.19	0.24	11.42	72.54	98.32	168.40	118.57				118.57	239.68	11.62	600			0.14	0.821	121.11	50.53%
		MH5212	MH5220													0.00	1.63	11.42	2.01	13.43	71.75	97.24	166.53	117.28				117.28	239.68	98.89	600			0.14	0.821	122.39	51.07%
PARK	5220A/B	MH5220	MH5221		0.53								1.24			2.86	4.49	13.43	1.71	15.14	65.74	89.01	152.30	295.17				295.17	775.41	103.16	975			0.11	1.006	480.24	61.93%
		MH5221	MH5222													0.00	4.49	15.14	1.34	16.48	61.45	83.12	142.13	275.87				275.87	775.41	81.04	975			0.11	1.006	499.54	64.42%
		MH5222	MH5223													0.00	4.49	16.48	0.19	16.67	58.48	79.06	135.14	262.57				262.57	775.41	11.66	975			0.11	1.006	512.84	66.14%
		MH5223	MH5230													0.00	4.49	16.67	0.34	17.01	58.08	78.52	134.20	260.77				260.77	775.41	20.26	975			0.11	1.006	514.64	66.37%
	5231	MH5231	MH5230										1.16			2.26	2.26	10.00	2.19	12.19	76.81	104.19	178.56	173.38				173.38	239.68	108.08	600			0.14	0.821	66.30	27.66%
	S5230	MH5230	MH5020										0.40			0.78	7.53	17.01	1.44	18.45	57.40	77.58	132.59	431.97				431.97	944.84	91.14	1050			0.11	1.057	512.87	54.28%
	5020	MH5020	MH5021										1.40			2.72	51.51	18.45	0.86	19.30	54.67	73.86	126.17	2,816.22				2,816.22	5,999.35	86.18	2100			0.11	1.678	3183.13	53.06%
		MH5021	MH5030													0.00	51.51	19.30	0.90	20.20	53.18	71.82	122.66	2,739.40				2,739.40	5,999.35	90.18	2100			0.11	1.678	3259.95	54.34%
	5300	MH5300	MH5301										1.61			3.13	3.13	10.00	1.11	11.11	76.81	104.19	178.56	240.63				240.63	303.78	54.71	675			0.12	0.822	63.14	20.79%
		MH5301	MH5302													0.00	3.13	11.11	0.22	11.33	72.79	98.68	169.02	228.07				228.07	303.78	10.92	675			0.12	0.822	75.71	24.92%
		MH5302	MH5030													0.00	3.13	11.33	1.71	13.04	72.05	97.66	167.25	225.74				225.74	303.78	84.57	675			0.12	0.822	78.04	25.69%
	5310	MH5310	MH5311										0.99			1.93	1.93	10.00	1.27	11.27	76.81	104.19	178.56	147.97				147.97	239.68	62.41	600			0.14	0.821	91.71	38.26%
		MH5311	MH5312													0.00	1.93	11.27	1.27	12.53	72.26	97.95	167.75	139.21				139.21	239.68	62.41	600			0.14	0.821	100.46	41.92%
		MH5312	MH5313													0.00	1.93	12.53	0.24	12.78	68.28	92.48	158.30	131.54				131.54	239.68	12.02	600			0.14	0.821	108.14	45.12%
		MH5313	MH5314													0.00	1.93	12.78	1.58	14.36	67.57	91.50	156.61	130.17				130.17	239.68	78.09	600			0.14	0.821	109.51	45.69%
	5315	MH5315	MH5316										1.13			2.20	2.20	10.00	0.28	10.28	76.81	104.19	178.56	168.89				168.89	303.78	13.90	675			0.12	0.822	134.89	44.40%
		MH5316	MH5317													0.00	2.20	10.28	1.47	11.75	75.74	102.73	176.02	166.55				166.55	303.78	72.38	675			0.12	0.822	137.23	45.17%
		MH5317	MH5314													0.00	2.20	11.75	1.48	13.23	70.69	95.78	164.01	155.44				155.44	303.78	72.88	675			0.12	0.822	148.34	48.83%
	5314	MH5314	MH5030										0.14			0.27	4.40	14.36	1.53	15.90	63.31	85.68	146.55	278.46				278.46	496.66	82.88	825			0.11	0.900	218.21	43.93%
	5030	MH5030	MH5031										2.20			4.28	63.32	20.20	1.15	21.35	51.72	69.82	119.21	3,274.74				3,274.74	5,999.35	116.00	2100			0.11	1.678	2724.61	45.42%
SCHOOL	5034	MH5034	MH5031												2.92	6.49	6.49	13.33	0.25	13.58	66.01	89.37	152.93	428.69				428.69	775.41	15.00	975			0.11	1.006	346.72	44.71%
		MH5031	MH5032													0.00	69.82	21.35	0.48	21.83	49.96	67.42	115.08	3,487.78				3,487.78	5,999.35	47.96	2100			0.11	1.678	2511.57	41.86%
		MH5032	MH5033													0.00	69.82	21.83	0.43	22.25	49.27	66.48	113.46	3,439.68				3,439.68	5,999.35	43.21	2100			0.11	1.678	2559.67	42.67%
PARK	5035	MH5035	MH5033		2.18											1.82	1.82	13.50	0.36	13.86	65.55	88.74	151.84	119.18				119.18	239.68	17.81	600			0.14	0.821	120.50	50.28%
		MH5033	MH5040													0.00	71.63	22.25	0.43	22.68	48.67	65.66	112.05	3,486.07				3,486.07	5,999.35	43.11	2100			0.11	1.678	2513.28	41.89%
		MH5440	MH5441													0.00	0.00	10.00	0.38	10.38	76.81	104.19	178.56	0.00				0.00	93.27	18.69	375			0.26	0.818	93.27	100.00%
		MH5441	MH5040													0.00	0.00	10.38	0.40	10.78	75.37	102.22	175.15	0.00				0.00	93.27	19.82	375			0.26	0.818	93.27	100.00%
	5040	MH5040	MH5041										3.26			6.34	77.98	22.68	0.61	23.30	48.08	64.86	110.67	3,749.17				3,749.17	5,999.35	61.73	2100			0.11	1.678	2250.18	37.51%
		MH5041	MH5042													0.00	77.98	23.30	0.61	23.91	47.27	63.76	108.77	3,685.91				3,685.91	5,999.35	61.73	2100			0.11	1.678	2313.44	38.56%
		MH5042	MH5043													0.00	77.98	23.91	0.34	24.25	46.49	62.69	106.94	3,624.99				3,624.99	5,999.35	34.46	2100			0.11	1.678	2374.36	39.58%
		MH5043	MH5050													0.00	77.98	24.25	0.55	24.80	46.06	62.12	105.95	3,591.96				3,591.96	5,999.35	55.60	2100			0.11	1.678	2407.39	40.13%

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STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW												SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	5500	MH5500	MH5050										0.75			1.46	1.46	10.00	2.40	12.40	76.81	104.19	178.56	112.10				112.10	184.99	119.28	525			0.17	0.828	72.89	39.40%
	5050	MH5050	MH5051										1.65			3.21	82.65	24.80	1.00	25.80	45.40	61.21	104.39	3,752.07				3,752.07	7,211.18	104.95	2250			0.11	1.757	3459.11	47.97%
		MH5051	MH5052													0.00	82.65	25.80	1.04	26.84	44.25	59.65	101.70	3,657.24				3,657.24	7,211.18	109.95	2250			0.11	1.757	3553.94	49.28%
		MH5052	MH5060													0.00	82.65	26.84	0.16	27.00	43.12	58.11	99.05	3,563.44				3,563.44	7,211.18	16.98	2250			0.11	1.757	3647.73	50.58%
	5600	MH5600	MH5601										2.10			4.09	4.09	10.00	2.14	12.14	76.81	104.19	178.56	313.87				313.87	496.66	115.31	825			0.11	0.900	182.79	36.80%
		MH5601	MH5602													0.00	4.09	12.14	1.76	13.89	69.48	94.12	161.14	283.92				283.92	496.66	94.83	825			0.11	0.900	212.75	42.83%
		MH5602	MH5060													0.00	4.09	13.89	0.31	14.21	64.51	87.32	149.39	263.64				263.64	496.66	16.95	825			0.11	0.900	233.02	46.92%
		MH5060	HW5													0.00	86.73	27.00	0.48	27.48	42.95	57.87	98.65	3,724.94				3,724.94	7,211.18	50.69	2250			0.11	1.757	3486.24	48.34%
				0.00	2.71	0.00	0.00	0.00	0.00	0.00			23.26	1.99	15.74	86.73	TRUE																		
															43.70																				

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STORM SEWER DESIGN SHEET
MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)												RATIONAL DESIGN FLOW												SEWER DATA									
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
OUTLET #6: New Southern SWM Pond																																				
	6000	MH6000	MH6010										0.26			0.51	0.51	10.00	1.17	11.17	76.81	104.19	178.56	38.86				38.86	93.27	57.40	375			0.26	0.818	54.41	58.33%
	6100	MH6100	MH6101										1.05			2.04	2.04	10.00	1.73	11.73	76.81	104.19	178.56	156.94				156.94	303.78	85.16	675			0.12	0.822	146.84	48.34%
		MH6101	MH6010													0.00	2.04	11.73	1.73	13.45	70.76	95.88	164.18	144.58				144.58	303.78	85.16	675			0.12	0.822	159.20	52.41%
	6010	MH6010	MH6020										0.41			0.80	3.35	13.45	1.63	15.08	65.68	88.92	152.15	219.84				219.84	385.20	82.51	750			0.11	0.845	165.36	42.93%
		MH6200	MH6201													0.00	0.00	10.00	0.80	10.80	76.81	104.19	178.56	0.00				0.00	93.27	39.46	375			0.26	0.818	93.27	100.00%
		MH6202	MH6201													0.00	0.00	10.00	0.62	10.62	76.81	104.19	178.56	0.00				0.00	93.27	30.47	375			0.26	0.818	93.27	100.00%
	6201	MH6201	MH6203										2.62			5.10	5.10	10.80	1.71	12.52	73.85	100.13	171.53	376.53				376.53	626.37	98.09	900			0.11	0.954	249.85	39.89%
		MH6203	MH6204													0.00	5.10	12.52	1.71	14.23	68.32	92.54	158.41	348.35				348.35	626.37	98.07	900			0.11	0.954	278.03	44.39%
		MH6204	MH6205													0.00	5.10	14.23	0.18	14.41	63.64	86.13	147.33	324.48				324.48	626.37	10.22	900			0.11	0.954	301.89	48.20%
		MH6205	MH6210													0.00	5.10	14.41	1.36	15.77	63.20	85.51	146.27	322.21				322.21	626.37	77.78	900			0.11	0.954	304.17	48.56%
	6211	MH6211	MH6212										1.90			3.70	3.70	10.00	1.23	11.23	76.81	104.19	178.56	283.98				283.98	496.66	66.55	825			0.11	0.900	212.69	42.82%
		MH6212	MH6213													0.00	3.70	11.23	0.22	11.45	72.38	98.10	168.03	267.60				267.60	496.66	11.70	825			0.11	0.900	229.06	46.12%
		MH6213	MH6214													0.00	3.70	11.45	1.43	12.88	71.66	97.11	166.32	264.94				264.94	496.66	77.05	825			0.11	0.900	231.73	46.66%
WOODLOT	6219	MH6219	MH6214	1.20												0.67	0.67	12.50	0.31	12.81	68.38	92.61	158.53	45.62				45.62	93.27	15.00	375			0.26	0.818	47.65	51.09%
		MH6214	MH6215													0.00	4.36	12.88	1.06	13.93	67.28	91.11	155.94	293.66				293.66	496.66	57.01	825			0.11	0.900	203.00	40.87%
		MH6215	MH6210													0.00	4.36	13.93	1.83	15.76	64.41	87.18	149.14	281.12				281.12	496.66	98.72	825			0.11	0.900	215.54	43.40%
	6210	MH6210	MH6220										0.29			0.56	10.03	15.77	1.24	17.01	60.01	81.15	138.74	601.75				601.75	944.84	78.96	1050			0.11	1.057	343.09	36.31%
	6222	MH6222	MH6220										0.59			1.15	1.15	10.00	1.51	11.51	76.81	104.19	178.56	88.18				88.18	184.99	74.78	525			0.17	0.828	96.80	52.33%
	6223	MH6223	MH6224										1.24			2.41	2.41	10.00	1.25	11.25	76.81	104.19	178.56	185.33				185.33	303.78	61.78	675			0.12	0.822	118.45	38.99%
		MH6224	MH6225													0.00	2.41	11.25	0.28	11.53	72.31	98.01	167.87	174.49				174.49	303.78	13.65	675			0.12	0.822	129.29	42.56%
		MH6225	MH6220													0.00	2.41	11.53	1.81	13.34	71.40	96.76	165.70	172.28				172.28	303.78	89.45	675			0.12	0.822	131.50	43.29%
	6620	MH6220	MH6221										0.81			1.58	15.16	17.01	1.09	18.10	57.39	77.57	132.56	870.31				870.31	1,846.76	81.41	1350			0.11	1.250	976.45	52.87%
		MH6221	MH6020													0.00	15.16	18.10	1.30	19.40	55.30	74.72	127.65	838.68				838.68	1,846.76	97.38	1350			0.11	1.250	1008.08	54.59%
	S6020	MH6020	MH6030										0.85			1.65	20.17	19.40	1.09	20.48	53.02	71.60	122.28	1,069.21				1,069.21	1,846.76	81.50	1350			0.11	1.250	777.54	42.10%
SCHOOL	6300	MH6300	MH6030												2.22	4.94	4.94	13.00	0.26	13.26	66.93	90.63	155.11	330.45				330.45	626.37	15.00	900			0.11	0.954	295.92	47.24%
		MH6030	MH6040													0.00	25.10	20.48	1.12	21.61	51.26	69.20	118.15	1,286.91				1,286.91	2,445.85	90.38	1500			0.11	1.341	1158.94	47.38%
	6400	MH6400	MH6401										1.43			2.78	2.78	10.00	0.54	10.54	76.81	104.19	178.56	213.73				213.73	385.20	27.40	750			0.11	0.845	171.47	44.51%
WOODLOT	6408	MH6408	MH6401	3.98												2.21	2.21	14.67	0.30	14.97	62.56	84.64	144.76	138.43				138.43	239.68	15.00	600			0.14	0.821	101.24	42.24%
		MH6401	MH6402													0.00	5.00	14.97	0.25	15.22	61.83	83.64	143.04	308.87				308.87	496.66	13.37	825			0.11	0.900	187.79	37.81%
		MH6402	MH6403													0.00	5.00	15.22	0.43	15.65	61.25	82.85	141.67	305.98				305.98	496.66	22.99	825			0.11	0.900	190.69	38.39%
		MH6403	MH6404													0.00	5.00	15.65	1.10	16.75	60.28	81.52	139.38	301.14				301.14	496.66	59.66	825			0.11	0.900	195.53	39.37%
		MH6404	MH6405													0.00	5.00	16.75	0.51	17.26	57.92	78.29	133.81	289.34				289.34	496.66	27.58	825			0.11	0.900	207.32	41.74%
		MH6405	MH6406													0.00	5.00	17.26	0.51	17.77	56.90	76.89	131.40	284.23				284.23	496.66	27.53	825			0.11	0.900	212.43	42.77%
PARK	6407	MH6407	MH6406		2.03											1.69	1.69	13.00	0.30	13.30	66.93	90.63	155.11	113.31				113.31	184.99	15.00	525			0.17	0.828	71.67	38.74%
		MH6406	MH6040													0.00	6.69	17.77	1.98	19.75	55.91	75.55	129.08	373.99				373.99	626.37	113.03	900			0.11	0.954	252.38	40.29%
	6040	MH6040	MH6050										0.18			0.35	32.14	21.61	1.01	22.62	49.58	66.91	114.19	1,593.62				1,593.62	3,153.62	86.50	1650			0.11	1.429	1560.00	49.47%
	6500	MH6500	MH6501										1.92			3.74	3.74	10.00	1.55	11.55	76.81	104.19	178.56	286.97				286.97	496.66	83.83	825			0.11	0.900	209.70	42.22%
		MH6501	MH6502													0.00	3.74	11.55	1.55	13.10	71.32	96.65	165.51	266.47				266.47	496.66	83.83	825			0.11	0.900	230.20	46.35%
		MH6502	MH6503													0.00	3.74	13.10	0.18	13.29	66.64	90.23	154.41	248.97				248.97	496.66	9.98	825			0.11	0.900	247.69	49.87%
		MH6503	MH6504													0.00	3.74	13.29	1.19	14.48	66.12	89.52	153.20	247.06				247.06	496.66	64.53	825			0.11	0.900	249.60	50.26%
		MH6504	MH6505													0.00	3.74	14.48	0.27	14.76	63.01	85.26	145.84	235.43				235.43	496.66	14.76	825			0.11	0.900	261.23	52.60%
	6505	MH6505	MH6506										1.52			2.96	6.69	14.76	0.87	15.62	62.35	84.35	144.26	417.36				417.36	775.41	52.33	975			0.11	1.006	358.05	46.18%
		MH6506	MH6507													0.00	6.69	15.62	1.04	16.66	60.33	81.59	139.50	403.88				403.88	775.41	62.68	975			0.11	1.006	371.53	47.91%
		MH6507	MH6508													0.00	6.69	16.66	0.12	16.79	58.10	78.54	134.24	388.95				388.95	775.41	7.44	975			0.11	1.006	386.46	49.84%
		MH6508	MH6509													0.00	6.69	16.79	0.52	17.30	57.85	78.20	133.65	387.26				387.26	775.41	31.21	975			0.11	1.006	388.15	50.06%
		MH6509	MH6510													0.00	6.69	17.30	0.83	18.14	56.82	76.79	131.21	380.35				380.35	775.41	50.27	975			0.11	1.006	395.06	50.95%

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STORM SEWER DESIGN SHEET

MER BLEUE Urban Expansion Area
MSS Preferred Concept
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)											RATIONAL DESIGN FLOW											SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.30	C= 0.40	C= 0.54	C= 0.57	C= 0.70	C= 0.71	C= 0.73	C= 0.74	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (2) (mm/hr)	i (5) (mm/hr)	i (100) (mm/hr)	2yr PEAK FLOW (L/s)	5yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (2yr) (L/s)	(%)
	S6431	MH6511	MH6512										1.60			3.11	3.11	10.00	1.33	11.33	76.81	104.19	178.56	239.14				239.14	385.20	67.37	750			0.11	0.845	146.06	37.92%
		MH6512	MH6513													0.00	3.11	11.33	0.20	11.53	72.05	97.66	167.26	224.34				224.34	385.20	10.15	750			0.11	0.845	160.86	41.76%
		MH6513	MH6514													0.00	3.11	11.53	1.32	12.85	71.39	96.75	165.69	222.29				222.29	385.20	66.94	750			0.11	0.845	162.91	42.29%
		MH6514	MH6510													0.00	3.11	12.85	1.32	14.17	67.36	91.21	156.11	209.72				209.72	385.20	66.94	750			0.11	0.845	175.48	45.56%
	6510	MH6510	MH6050										0.37			0.72	10.53	18.14	1.27	19.40	55.24	74.63	127.49	581.53				581.53	944.84	80.41	1050			0.11	1.057	363.31	38.45%
	6520	MH6520	MH6521										1.24			2.41	2.41	10.00	2.43	12.43	76.81	104.19	178.56	185.33				185.33	303.78	120.00	675			0.12	0.822	118.45	38.99%
		MH6521	MH6522													0.00	2.41	12.43	0.24	12.67	68.58	92.89	159.01	165.48				165.48	303.78	11.64	675			0.12	0.822	138.30	45.53%
		MH6522	MH6523													0.00	2.41	12.67	1.49	14.16	67.88	91.94	157.37	163.80				163.80	303.78	73.55	675			0.12	0.822	139.97	46.08%
	6524	MH6524	MH6523										0.13			0.25	0.25	10.00	1.46	11.46	76.81	104.19	178.56	19.43				19.43	93.27	71.44	375			0.26	0.818	73.84	79.17%
	6525	MH6525	MH6523										0.95			1.85	1.85	10.00	2.44	12.44	76.81	104.19	178.56	141.99				141.99	239.68	120.00	600			0.14	0.821	97.69	40.76%
	6523	MH6523	MH6526										0.37			0.72	5.23	14.16	1.44	15.60	63.83	86.38	147.76	334.12				334.12	626.37	82.25	900			0.11	0.954	292.25	46.66%
	6527	MH6527	MH6526										0.95			1.85	1.85	10.00	2.44	12.44	76.81	104.19	178.56	141.99				141.99	239.68	120.00	600			0.14	0.821	97.69	40.76%
	6526	MH6526	MH6050										0.37			0.72	7.80	15.60	1.41	17.01	60.40	81.68	139.66	471.30				471.30	944.84	89.50	1050			0.11	1.057	473.54	50.12%
	6050	MH6050	MH6051										1.03			2.00	52.48	19.40	1.23	20.63	53.01	71.59	122.25	2,781.90				2,781.90	4,923.55	117.54	1950			0.11	1.597	2141.65	43.50%
		MH6051	MH6052													0.00	52.48	20.63	0.92	21.55	51.04	68.90	117.62	2,678.43				2,678.43	4,923.55	88.31	1950			0.11	1.597	2245.12	45.60%
	6052	MH6052	MH6060										0.84			1.63	54.11	21.55	0.15	21.70	49.66	67.02	114.38	2,687.33				2,687.33	4,923.55	13.92	1950			0.11	1.597	2236.22	45.42%
	6600	MH6600	MH6601										1.48			2.88	2.88	10.00	1.59	11.59	76.81	104.19	178.56	221.20				221.20	303.78	78.58	675			0.12	0.822	82.57	27.18%
		MH6601	MH6602													0.00	2.88	11.59	1.59	13.18	71.19	96.47	165.20	205.03				205.03	303.78	78.58	675			0.12	0.822	98.75	32.51%
		MH6602	MH6603													0.00	2.88	13.18	0.24	13.42	66.41	89.92	153.88	191.27				191.27	303.78	11.71	675			0.12	0.822	112.51	37.04%
		MH6603	MH6604													0.00	2.88	13.42	1.50	14.92	65.76	89.03	152.34	189.40				189.40	303.78	73.85	675			0.12	0.822	114.38	37.65%
	6605	MH6605	MH6606										1.38			2.69	2.69	10.00	1.74	11.74	76.81	104.19	178.56	206.26				206.26	303.78	85.86	675			0.12	0.822	97.52	32.10%
		MH6606	MH6604													0.00	2.69	11.74	1.77	13.51	70.71	95.82	164.08	189.90				189.90	303.78	87.57	675			0.12	0.822	113.88	37.49%
	6604	MH6604	MH6607										0.39			0.76	6.32	14.92	1.43	16.35	61.96	83.82	143.35	391.86				391.86	626.37	81.85	900			0.11	0.954	234.51	37.44%
	6608	MH6608	MH6609										1.38			2.69	2.69	10.00	1.75	11.75	76.81	104.19	178.56	206.26				206.26	303.78	86.17	675			0.12	0.822	97.52	32.10%
		MH6609	MH6607													0.00	2.69	11.75	1.76	13.51	70.69	95.79	164.03	189.84				189.84	303.78	86.98	675			0.12	0.822	113.93	37.51%
	6607	MH6607	MH6621										0.36			0.70	9.71	16.35	1.41	17.76	58.76	79.44	135.79	570.56				570.56	944.84	89.49	1050			0.11	1.057	374.28	39.61%
TENTH LINE ROAD	6620A/B	MH6620	MH6621										0.62	3.22		8.01	8.01	15.67	1.11	16.78	60.23	81.45	139.26	482.43				482.43	944.84	70.59	1050			0.11	1.057	462.41	48.94%
	6621	MH6621	MH6622										0.28			0.54	18.27	17.76	1.04	18.80	55.94	75.58	129.14	1,021.71				1,021.71	1,846.76	77.62	1350			0.11	1.250	825.04	44.68%
		MH6622	MH6060													0.00	18.27	18.80	0.19	18.98	54.05	73.01	124.71	987.30				987.30	1,846.76	13.91	1350			0.11	1.250	859.45	46.54%
		MH6060	HW6													0.00	72.38	21.70	0.53	22.22	49.45	66.73	113.89	3,579.24				3,579.24	5,999.35	52.97	2100			0.11	1.678	2420.11	40.34%
				5.18	2.03	0.00	0.00	0.00	0.00	0.00			28.81	3.22	2.22	72.38	TRUE																		
															41.46																				

OVERALL SITE AREA

	A
Outlet #1 : EX Pond North - West	21.29
Outlet #2: EX Pond South - East	17.46
Outlet #3: EX Pond North - East	11.17
Outlet #4: New Central Pond North	59.32
Outlet #5: New Central Pond South	43.70
Outlet #6: New South Pond	41.46
	194.40
Measured Area (excl Ponds and McKinnon's Creek)	XXX

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
[i = 1174.184 / (TC+6.014)^0.816] 10 YEAR
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: RM
Checked: DY
Dwg. Reference: 34739-8.3.1

No.	Revision	Date
1.	MSS - 1st Submission	2016-03
2.	MSS - 3rd Submission	2017-03

File Reference: 34739-5.7.1
Date: 3/15/2016
Sheet No: 1 of 1

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STORM SEWER DESIGN SHEET

MER BLEUE Urban Expansion Area
MSS Preferred Outlet
CITY OF OTTAWA
Owners Group

LOCATION				AREA (Ha)										RATIONAL DESIGN FLOW											SEWER DATA								
STREET	AREA ID	FROM	TO	C= 0.20	C= 0.25	C= 0.40	C= 0.50	C= 0.57	C= 0.65	C= 0.69	C= 0.70	C= 0.76	C= 0.80	IND 2.78AC	CUM 2.78AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
Wall Road		MH7000	MH7001																						2,400.00	2,400.00	3,006.86	56.37	1650			0.10	1.362	606.86	20.18%
Wall Road		MH7001	MH7002																						2,400.00	2,400.00	3,006.86	76.46	1650			0.10	1.362	606.86	20.18%
Tenth Line Road		MH7002	MH7003																						2,400.00	2,400.00	3,006.86	105.55	1650			0.10	1.362	606.86	20.18%
Tenth Line Road		MH7003	MH7004																						2,400.00	2,400.00	3,006.86	101.00	1650			0.10	1.362	606.86	20.18%
Tenth Line Road		MH7004	MH7005																						2,400.00	2,400.00	3,006.86	100.01	1650			0.10	1.362	606.86	20.18%
Tenth Line Road		MH7100	MH7101																						780.00	780.00	900.87	39.71	1050			0.10	1.008	120.87	13.42%
Tenth Line Road		MH7101	MH7102																						780.00	780.00	900.87	63.03	1050			0.10	1.008	120.87	13.42%
Tenth Line Road		MH7102	MH7005																						780.00	780.00	900.87	40.06	1050			0.10	1.008	120.87	13.42%
		MH7005	MH7006																						3,180.00	3,180.00	3,682.64	12.60	1650			0.15	1.668	502.64	13.65%
		MH7006	MH7007																						3,180.00	3,180.00	3,682.64	114.00	1650			0.15	1.668	502.64	13.65%
		MH7007	MH7008																						3,180.00	3,180.00	3,682.64	110.00	1650			0.15	1.668	502.64	13.65%
		MH7008																							3,180.00	3,180.00	3,682.64	107.85	1650			0.15	1.668	502.64	13.65%

Definitions:
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Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (Ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 998.071 / (TC+6.053)^0.814] 5 YEAR
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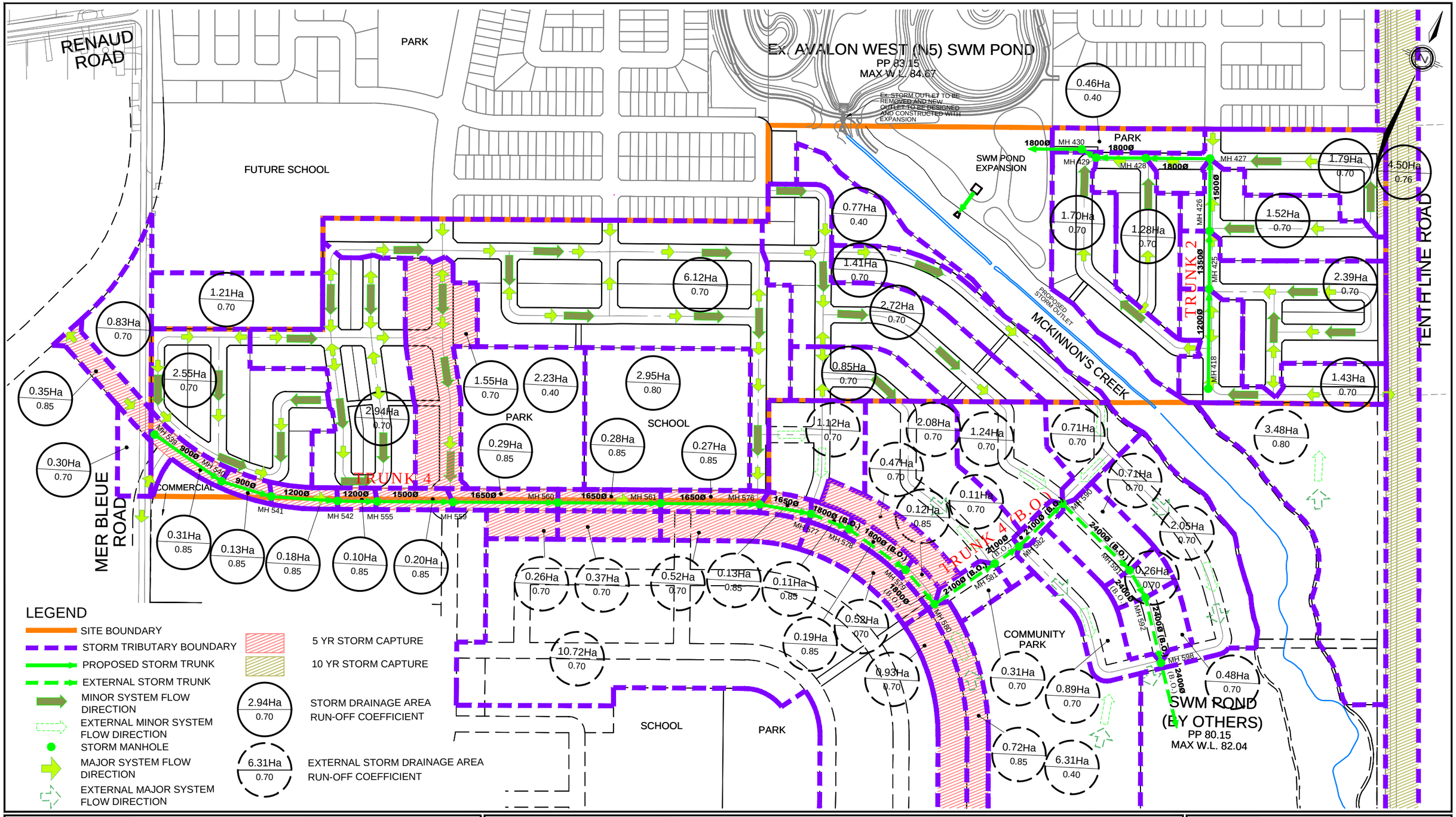
[i = 1735.688 / (TC+6.014)^0.820] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: RM
Checked: DY
Dwg. Reference: 34739-8.3.1

No.	Revision	Date
1.	MSS - 1st Submission	2016-03
2.	MSS - 3rd Submission	2017-04

File Reference: 34739.5.7.1
Date: 3/15/2016
Sheet No: 1 of 1



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SUMMERSIDE WEST PHASES 4, 5 & 6
STORM SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	15-766
SCALE:	1:4000
DATE:	MAY 2018
FIGURE:	5

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) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 10 YEAR				FLOW					SEWER DATA								
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
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	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	LOW (min	Q/Q full
TRUNK 4																												
			0.30	0.70	0.58	0.58				0.00				0.00														
						0.58	0.31	0.85	0.73	0.73				0.00														
						0.58	0.35	0.85	0.83	1.56				0.00														
	539	540	0.83	0.70	1.62	2.20				1.56				0.00	10.00	76.81	104.19	122.14	331	900	900	CONC	0.10	91.5	572	0.90	1.69	0.58
	540	541				2.20	0.13	0.85	0.31	1.87				0.00	11.69	70.86	96.02	112.52	335	900	900	CONC	0.10	58.5	572	0.90	1.08	0.59
						2.20	0.18	0.85	0.43	2.29				0.00														
			1.21	0.70	2.35	4.55				2.29				0.00														
	541	542	2.55	0.70	4.96	9.52				2.29				0.00	15.13	61.46	83.14	97.36	775	1200	1200	CONC	0.10	74.5	1233	1.09	1.14	0.63
	542	555				9.52	0.10	0.85	0.24	2.53				0.00	16.27	58.93	79.67	93.28	762	1200	1200	CONC	0.10	44.5	1233	1.09	0.68	0.62
						9.52	0.20	0.85	0.47	3.00				0.00														
	555	559	2.94	0.70	5.72	15.24				3.00				0.00	16.95	57.52	77.75	91.02	1110	1500	1500	CONC	0.10	85.0	2235	1.26	1.12	0.50
						15.24	0.26	0.70	0.51	3.51				0.00														
						15.24	0.29	0.85	0.69	4.19				0.00														
	559	560				15.24	1.55	0.70	3.02	7.21				0.00	18.07	55.36	74.79	87.55	1383	1650	1650	CONC	0.10	117.5	2882	1.35	1.45	0.48
						15.24	0.28	0.85	0.66	7.87				0.00														
						15.24	0.37	0.70	0.72	8.59				0.00														
	560	561	2.23	0.40	2.48	17.72				8.59				0.00	19.52	52.81	71.32	83.46	1548	1650	1650	CONC	0.10	115.5	2882	1.35	1.43	0.54
						17.72	0.27	0.85	0.64	9.23				0.00														
						17.72	0.52	0.70	1.01	10.24				0.00														
	561	576	2.95	0.80	6.56	24.28				10.24				0.00	20.95	50.55	68.23	79.84	1926	1650	1650	CONC	0.10	111.5	2882	1.35	1.38	0.67
						24.28	0.13	0.85	0.31	10.55				0.00														
	576	577	6.12	0.70	11.91	36.19				10.55				0.00	25.60	44.48	59.95	70.12	2242	1650	1650	CONC	0.10	58.5	2882	1.35	0.72	0.78
						36.19	0.11	0.85	0.26	10.81				0.00														
						36.19	0.47	0.70	0.91	11.72				0.00														
TRUNK 4 (BY OTHERS)						36.19	0.52	0.70	1.01	12.73				0.00														
	577	578 (B.O.)	1.12	0.70	2.18	38.37				12.73				0.00	26.32	43.67	58.86	68.84	2425	1800	1800	CONC	0.10	46.0	3635	1.43	0.54	0.67
	578 (B.O.)	579 (B.O.)				38.37	0.19	0.85	0.45	13.18				0.00	26.86	43.10	58.08	67.92	2419	1800	1800	CONC	0.10	78.0	3635	1.43	0.91	0.67
	579 (B.O.)	580 (B.O.)				38.37	0.12	0.85	0.28	13.47				0.00	27.77	42.16	56.80	66.42	2382	1800	1800	CONC	0.10	50.5	3635	1.43	0.59	0.66
			0.31	0.70	0.60	38.97				13.47				0.00														
						38.97	0.72	0.85	1.70	15.17				0.00														
						38.97	0.93	0.70	1.81	16.98				0.00														
	580 (B.O.)	581 (B.O.)	10.72	0.70	20.86	59.83				16.98				0.00	28.36	41.58	56.01	65.49	3438	2100	2100	CONC	0.10	81.0	5483	1.58	0.85	0.63
			0.85	0.70	1.65	61.49				16.98				0.00														
	581 (B.O.)	582 (B.O.)	2.08	0.70	4.05	65.53				16.98				0.00	29.21	40.76	54.91	64.19	3604	2100	2100	CONC	0.10	33.5	5483	1.58	0.35	0.66
	582 (B.O.)	590 (B.O.)	0.11	0.70	0.21	65.75				16.98				0.00	29.56	40.44	54.46	63.67	3583	2100	2100	CONC	0.10	68.5	5483	1.58	0.72	0.65
			0.71	0.70	1.38	67.13				16.98				0.00														
			0.71	0.70	1.38	68.51				16.98				0.00														
			0.77	0.40	0.86	69.37				16.98				0.00														
			1.24	0.70	2.41	71.78				16.98				0.00														
			1.41	0.70	2.74	74.52				16.98				0.00														
	590 (B.O.)	591 (B.O.)	2.72	0.70	5.29	79.82				16.98				0.00	30.29	39.79	53.58	62.64	4086	2400	2400	CONC	0.10	106.0	7828	1.73	1.02	0.52
	591 (B.O.)	592 (B.O.)	0.26	0.70	0.51	80.32				16.98				0.00	31.31	38.91	52.39	61.24	4015	2400	2400	CONC	0.10	35.5	7828	1.73	0.34	0.51
	592 (B.O.)	598 (B.O.)	0.48	0.70	0.93	81.26				16.98				0.00	31.65	38.62	52.00	60.78	4021	2400	2400	CONC	0.10	75.0	7828	1.73	0.72	0.51
			0.89	0.70	1.73	82.99				16.98				0.00														
			6.31	0.40	7.02	90.01				16.98				0.00														
	598 (B.O.)	HW (B.O.)	2.05	0.70	3.99	93.99				16.98				0.00	32.37	38.04	51.20	59.85	4445	2400	2400	CONC	0.10	67.0	7828	1.73	0.65	0.57
TRUNK 2																												
			1.43	0.70	2.78	2.78				0.00				0.00														
	418	425	3.48	0.80	7.74	10.52				0.00				0.00	12.83	67.41	91.29	106.95	709	1200	1200	CONC	0.10	112.0	1233	1.09	1.71	0.58
	425	426	2.39	0.70	4.65	15.17				0.00				0.00	14.79	62.27	84.24	98.66	945	1350	1350	CONC	0.10	65.0	1688	1.18	0.92	0.56
	426	427	1.52	0.70	2.96	18.13				0.00				0.00	15.71	60.14	81.33	95.23	1090	1500	1500	CONC	0.10	81.0	2235	1.26	1.07	0.49
			1.79	0.70	3.48	21.61				0.00				0.00														
	427	428	0.46	0.40	0.51	22.13				0.00	4.50	0.76	9.51	9.51	16.78	57.86	78.22	91.57	2151	1800	1800	CONC	0.10	72.0	3635	1.43	0.84	0.59
	428	429	1.28	0.70	2.49	24.62				0.00			0.00	9.51	17.62	56.20	75.95	88.91	2229	1800	1800	CONC	0.10	55.5	3635	1.43	0.65	0.61
	429	430				24.62				0.00			0.00	9.51	18.27	54.99	74.29	86.96	2180	1800	1800	CONC	0.10	18.5	3635	1.43	0.22	0.60
	430	HW	1.70	0.70	3.31	27.93				0.00			0.00	9.51	18.48	54.61	73.77	86.35	2346	1800	1800	CONC	0.10	60.0	3635	1.43	0.70	0.65

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: P.P.	PROJECT: **Summerside West Phases 4, 5 & 6**		
Checked: C.M.K.	LOCATION: **City of Ottawa**		
Dwg. Reference: Storm Servicing Plan, Figure No. 5	File Ref: 15-766	Date: May, 2018	Sheet No. 1 of 1

APPENDIX H

FIGURE 8.3.12 DRAINAGE AREA PLAN FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

FIGURE 8.3.14 CONCEPTUAL AVALON WEST SWM FACILITY EXPANSION PLAN VIEW FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

FIGURE 8.3.16 CONCEPTUAL NORTHERN SWM FACILITY PLAN VIEW FROM THE MER BLEUE MSS (IBI GROUP, DECEMBER 2017)

KEY PLAN

N

MODELED AS PER JFSA REPORT : "STORMWATER MANAGEMENT REPORT FOR SUMMERSIDE WEST PHASE 2 AND PHASE 3"

AVALON WEST SWM FACILITY EXPANSION

MODELED AS PER JFSA REPORT : "STORMWATER MANAGEMENT REPORT FOR SUMMERSIDE WEST PHASE 1"

CEPEO Secondary School 5.6 ha

Neighbourhood Park 1.7 ha

Existing Residential

OCSB Elem. School 2.5 ha

DRY POND

Parkette 0.6 ha

[HEC RAS STATION : 11074]

OCDSB Elem. School

DRY POND

Community park 6.3 ha

NORTH SWM FACILITY

[HEC RAS STATION : 10270]

[HEC RAS STATION : 10172]

WALL ROAD

MCKINNONS CREEK

[HEC RAS STATION : 9576

TO MCKINNONS CREEK

CECCE Elem. School

DRY POND

SOUTH SWM FACILITY

Vegetation Community / Woodlot

Existing Residential

DRY POND

MER BLEUE ROAD

NAVAN ROAD

TENTH LINE ROAD

Tenth Line Rd

LEGEND:

- STUDY AREA
- DRAINAGE AREA BOUNDARY
- STORM SEWER
- MANHOLE AND ID (MH6219)
- TRIBUTARY AREA ID (6219), AREA (Hectares²), IMPERVIOUSNESS, CN / Tp (hrs)
- MAJOR FLOW (4)
- DRY POND
- AREA TRIBUTARY TO AVALON WEST EXPANSION SWM FACILITY (INTERIM DEVELOPMENT)
- AREA TRIBUTARY TO NORTH SWM FACILITY
- AREA TRIBUTARY TO SOUTH SWM FACILITY
- * INTERFACE POINT FOR HYDROLOGIC / HYDRAULIC MODEL
- [HEC RAS STATION : 5580] PEAK FLOW LOCATION (HEC RAS)

Sheet No.

FIGURE 8.3.12
JUNE 2017

Drawing Title

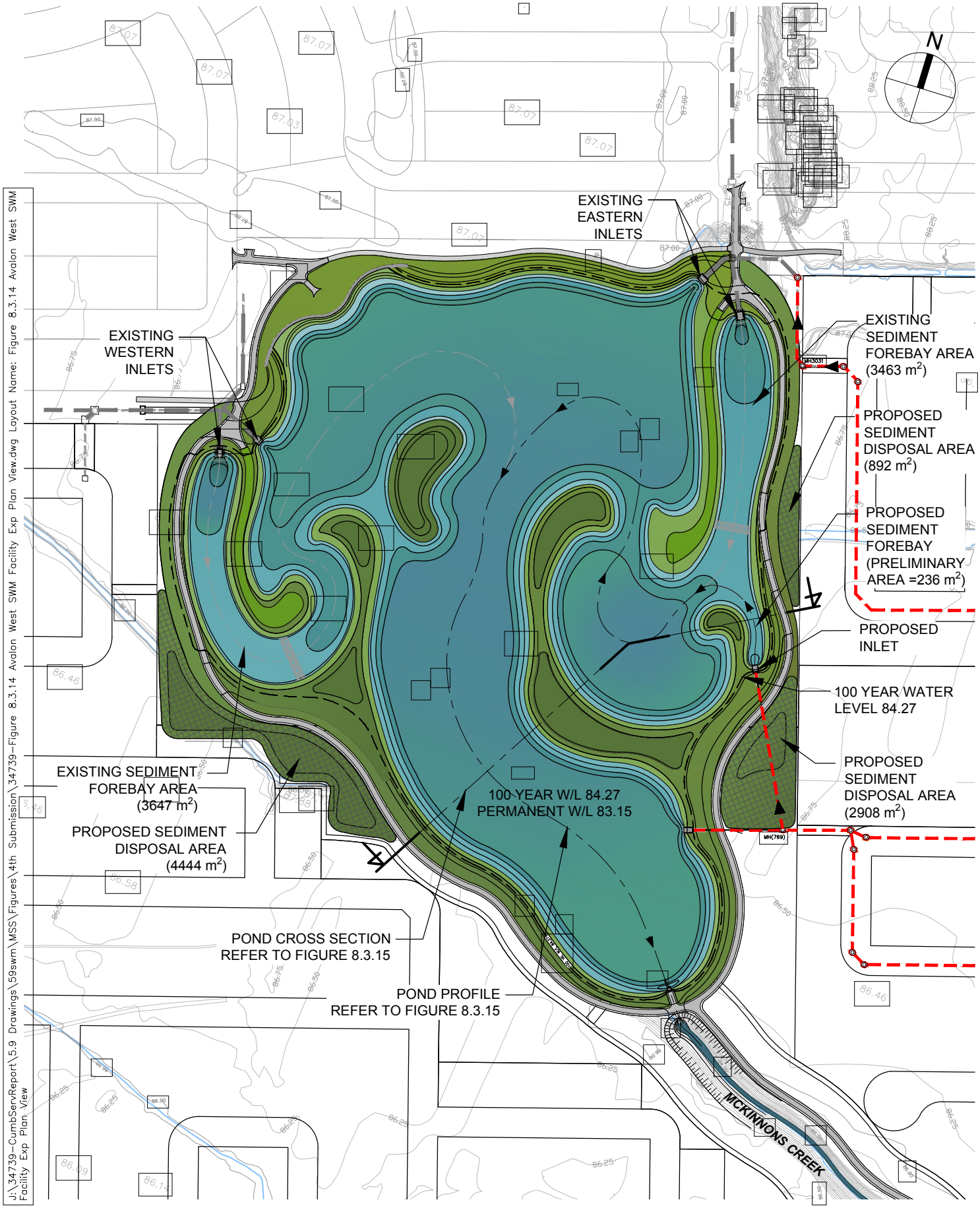
ON - SITE SWMHYMO
DRAINAGE AREA PLAN

Project Title

MER BLEUE
MASTER SERVICING STUDY

IBI

J:\34739-Cumdev\Report\8.0 Drawings\Stawm\MIDS\Figures\4th Submission\34739-Figure 8.3.12 Post Swmymo Drainage area plan.dwg Layout Name: Figure 8.3.12 Post SWMYMO Dr Area Plan Last Saved By: JosseForget Last Saved At: Jun. 22, 17



Project Title	Drawing Title	Sheet No.
MER BLEUE MASTER SERVICING STUDY	CONCEPTUAL AVALON WEST SWM FACILITY EXPANSION PLAN VIEW	FIGURE 8.3.14 JUNE 2017

J:\34739-CumbServReport\5.9 Drawings\59swm\MSS\Figures\4th Submission\34739-FIGURE 8.3.16 North SWMF Facility Plan View.dwg Layout Name: FIGURE 8.3.16 North SWMF Plan View

Project Title	Drawing Title	Sheet No.
MER BLEUE MASTER SERVICING STUDY	CONCEPTUAL NORTH SWM FACILITY PLAN VIEW	FIGURE 8.3.16 JUNE 2017