

**0 INNES ROAD (FORMER BMR LANDS)**

**CONCEPTUAL SITE SERVICING AND  
STORMWATER MANAGEMENT REPORT**



Prepared for:

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October 8, 2019

Novatech File: 118224  
Ref: R-2019-174

October 8, 2019

City of Ottawa  
Planning and Growth Management Department  
Development Review (Urban Services - East) Branch  
Infrastructure Approvals Division  
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**Project Manager**

**Reference:**     **0 Innes Road (Former BMR Lands)**  
                         **Conceptual Site Servicing and Stormwater Management Report**  
                         **Novatech File No.: 118224**

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In support of the Draft Plan of Subdivision application for the above-noted site, you will find enclosed the Conceptual Site Servicing and Stormwater Management Report for the 0 Innes Road (Former BMR Lands) development.

This report addresses the approach to site servicing and stormwater management for the subject site, which been developed based on the requirements of the City of Ottawa and Rideau Valley Conservation Authority.

Should you have any questions, or require additional information, please contact me.

Yours truly,

**NOVATECH**



Bassam Bahiã, M.Eng., P. Eng.  
Project Manager | Land Development

cc:     Eric Lalande, Rideau Valley Conservation Authority  
         Michael Michaud, Glenview Homes (Innes) Ltd.

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## 1.0 INTRODUCTION

### 1.1 Background

This report addresses the approach to site servicing for the 0 Innes Road development (Subject Site), formerly known as BMR Lands, which is being proposed by Glenview Homes (Innes) Ltd. (Developer).

The site is located within the north-west quadrant of the East Urban Community (EUC) Phase 3 Area Community Design Plan. More specifically, the site is south of Innes Road, 240m east of its intersection with Lamarche Avenue, as shown on **Figure 1.1** – Key Plan. The site is bound to the south and east by future development lands owned by Richcraft Homes, to the west by the recently constructed residential subdivision known as Orleans Village by Caivan Communities, and to the north by Innes Road, and remnant mixed use parcels.

Historically, the existing land usage was for a commercial plaza that comprised of the BMR sales center/ warehouse and parking lot along Innes Road as shown on **Figure 1.2** – Existing Conditions Plan. Two parts of the existing parcel have since been severed and will be developed under separate planning applications. The existing buildings within the limits of the Subject Site were demolished in 2017. The north side of the subject side is relatively flat and at grade with Innes Road. The south side is undeveloped and slopes gradually downward to the south property line.

The existing residential subdivisions to the west, Orleans Village is currently serviced with public services (i.e. sanitary and storm sewers, and watermain), and drainage is directed towards EUC Pond 1.

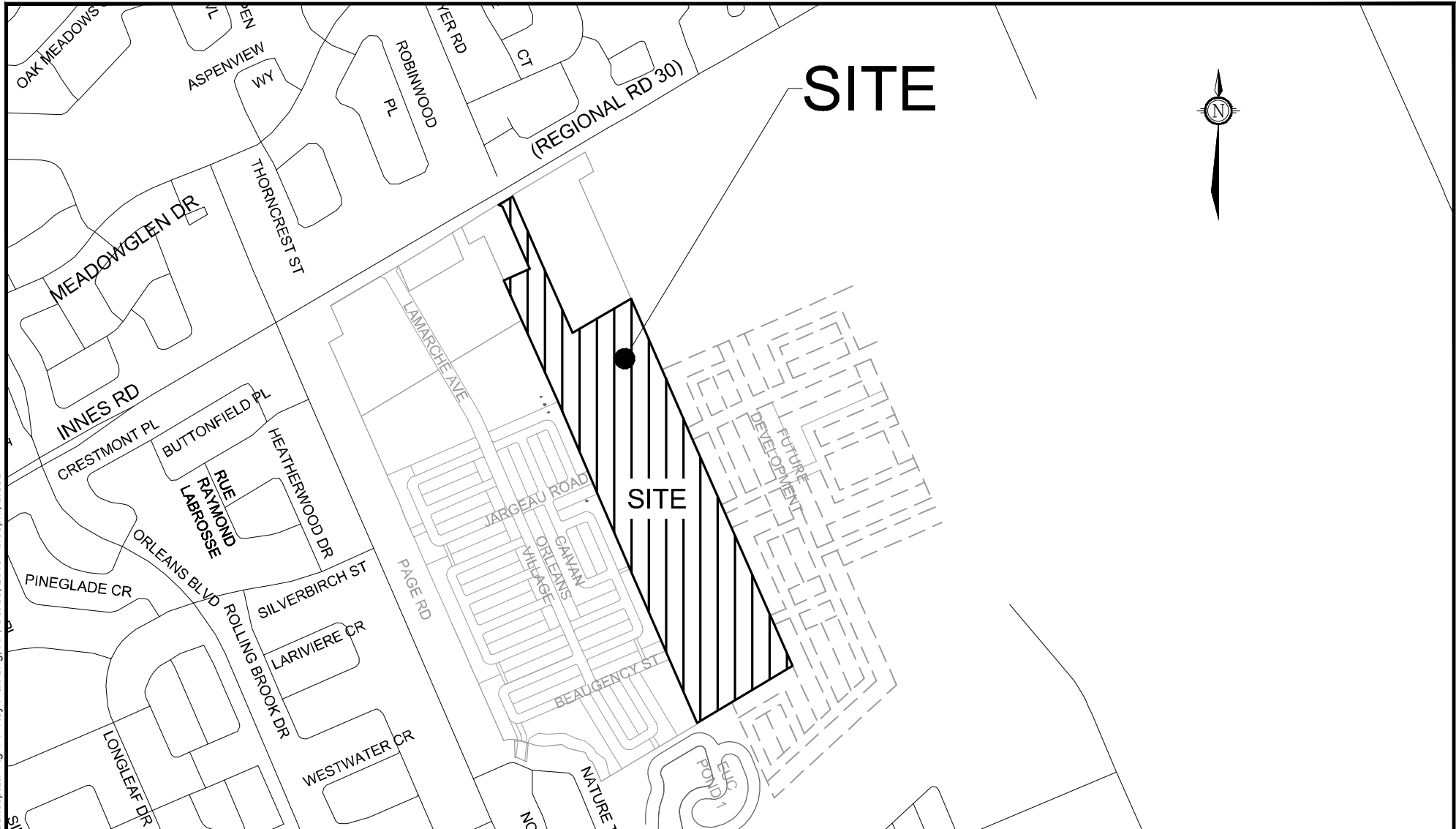
### 1.2 Development Intent

The Subject Site has an area of 15.71 ha, and the proposed subdivision will comprise of residential housing, public right-of-ways and parkland, as shown in **Table 1.1**. The development will contain City of Ottawa municipal road allowances of 16.5, 18.0, and 24.0 metres wide. The proposed site development plan is shown on **Figure 1.3** – Site Plan.

**Table 1.1: Land Use, Development Potential, and Yield**

Unit Type	Number of Units	Area
Singles	180	5.98 ha
Townhouses	109	2.32 ha
Medium Density (2-BR Apartments)	168	2.04 ha
Local Roads / Pathways	-	4.36 ha
Parkland	-	1.01 ha
<b>TOTAL</b>	<b>457</b>	<b>15.71 ha</b>

The Subject Site is located within the serviced area in the City of Ottawa Official Plan and; therefore, the site has been designed with city water and sanitary sewage collection.



**SITE**

**SITE**



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**0 INNES ROAD  
 (FORMER BMR LANDS)**

**KEY PLAN**

SCALE **NOT TO SCALE**

DATE	JOB	FIGURE
OCT 2019	118224	1.1

M:\2018\118224\CAD\Design\Figures\Design Brief\Conceptual\Fig 1.1 - Key Plan.dwg, KP, Oct 03, 2019 - 5:09pm, breed



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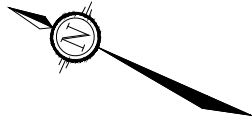
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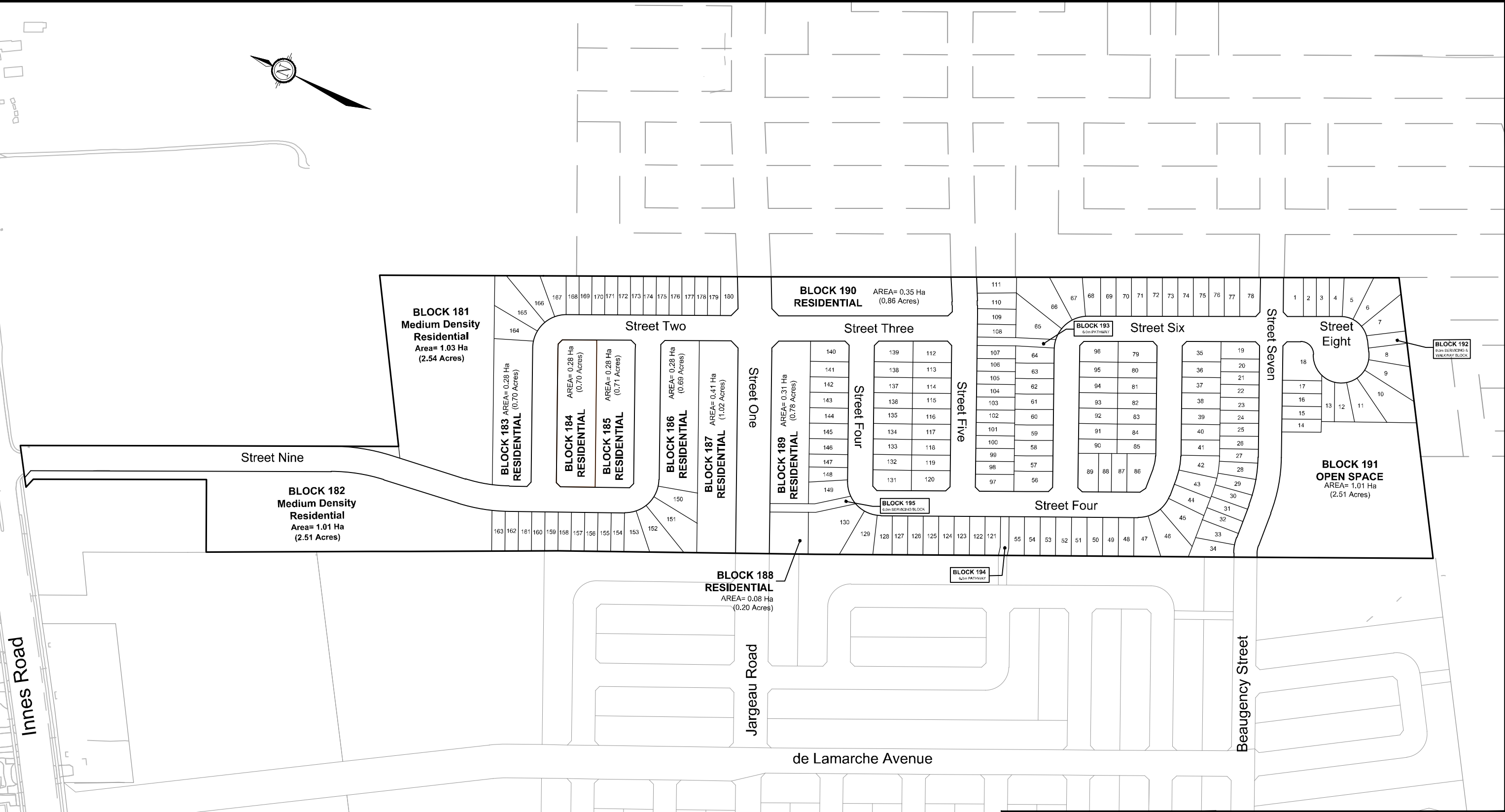
**EXISTING CONDITIONS**

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DATE	OCT 2019	JOB	118224	FIGURE	1.2
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Innes Road

Jargeau Road

Beaugency Street

de Lamarche Avenue

**BLOCK 181**  
Medium Density Residential  
Area= 1.03 Ha  
(2.54 Acres)

**BLOCK 182**  
Medium Density Residential  
Area= 1.01 Ha  
(2.51 Acres)

**BLOCK 183**  
RESIDENTIAL  
AREA= 0.28 Ha  
(0.70 Acres)

**BLOCK 184**  
RESIDENTIAL  
AREA= 0.28 Ha  
(0.70 Acres)

**BLOCK 185**  
RESIDENTIAL  
AREA= 0.28 Ha  
(0.71 Acres)

**BLOCK 186**  
RESIDENTIAL  
AREA= 0.28 Ha  
(0.69 Acres)

**BLOCK 187**  
RESIDENTIAL  
AREA= 0.41 Ha  
(1.02 Acres)

**BLOCK 188**  
RESIDENTIAL  
AREA= 0.08 Ha  
(0.20 Acres)

**BLOCK 190**  
RESIDENTIAL  
AREA= 0.35 Ha  
(0.86 Acres)

**BLOCK 189**  
RESIDENTIAL  
AREA= 0.31 Ha  
(0.78 Acres)

**BLOCK 195**  
6.0m SERVICE BLOCK

**BLOCK 194**  
6.0m PATHWAY

**BLOCK 193**  
6.0m PATHWAY

**BLOCK 192**  
6.0m SERVICE & WALKWAY BLOCK

**BLOCK 191**  
OPEN SPACE  
AREA= 1.01 Ha  
(2.51 Acres)

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**0 INNES ROAD  
(FORMER BMR LANDS)**

**SITE PLAN**

SCALE **NOT TO SCALE**

DATE **OCT 2019** JOB **118224** FIGURE **1.3**

### **1.3 Report Objective**

This report assesses the adequacy of existing and proposed services to support the proposed development. This report will be provided to the various agencies for approval and to obtain any applicable permits.

The City of Ottawa Applicant Study and Plan Identification List along with proof of a pre-consultation meeting is provided in **Appendix A**.

The City of Ottawa Servicing Study Guidelines for Development Applications checklist has been completed and is provided in **Appendix B**.

## 2.0 REFERENCES AND SUPPORTING DOCUMENTS

### 2.1 Guidelines and Supporting Studies

The following guidelines and supporting documents were utilized in the preparation of this report:

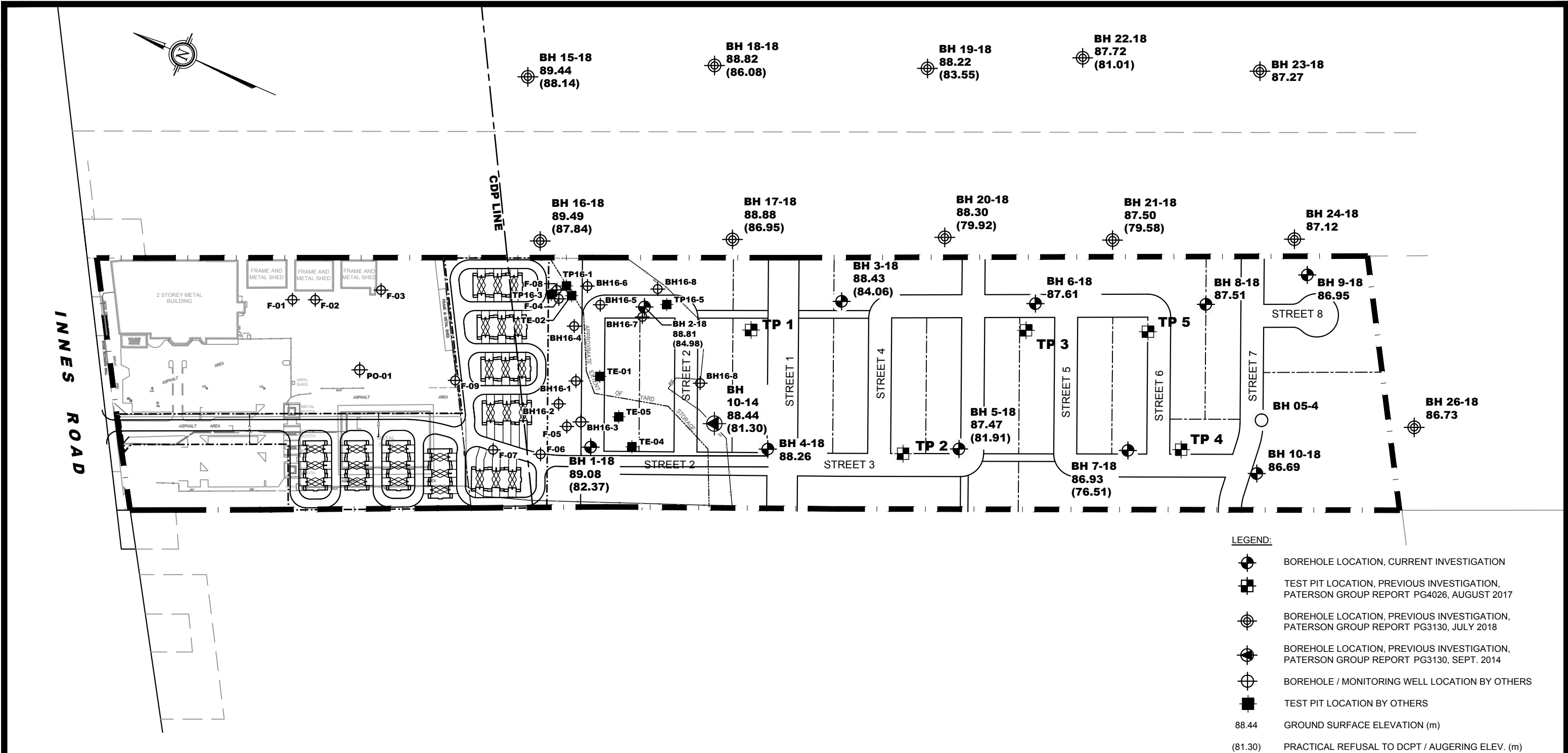
- **City of Ottawa Official Plan (OP)**  
City of Ottawa, adopted by Council 2003.
- **City of Ottawa Infrastructure Master Plan (IMP)**  
City of Ottawa, November 2013.
- **City of Ottawa Water Distribution Guidelines (OWDG)**  
City of Ottawa, October 2012.
- **Revisions to OWDG** (ISTB-2010-01, ISTB-2014-02, ISTB-2018-02, ISTB-2018-04)  
City of Ottawa, December 2010, May 2014, March 2018, and June 2018.
- **City of Ottawa Sewer Design Guidelines (OSDG)**  
City of Ottawa, October 2012.
- **Revisions to OSDG** (ISTB-2016-01, ISTB-2018-01, & ISTB-2018-03)  
City of Ottawa, September 2016 and March 2018.
- **Design Guidelines for Sewage Works and Drinking Water System** (MOE Guidelines)  
Ontario's Ministry of the Environment, 2008.
- **Stormwater Management Planning and Design Manual** (MOE SWM Guidelines)  
Ontario's Ministry of the Environment, 2003.
- **Master Servicing Study for East Urban Community Phase 3** (MSS EUC-Phase 3)  
David Schaeffer Engineering, 2018.

### 2.2 Geotechnical Investigation

Paterson Group Inc. (Paterson) conducted a geotechnical investigation (**Appendix F**) in support of the proposed residential development:

*Geotechnical Investigation – Proposed Residential Development 0 Innes Road, Ottawa, Ontario; Report No. PG4436-2 (revision 1), Paterson Group Inc., August 24, 2019.*

Based on the geotechnical study, it is not anticipated that there will be any significant geotechnical concerns with respect to servicing and developing the site. The borehole locations are provided as **Figure 2.1**. A summary of the geotechnical report findings is provided in **Table 2.1** below.



**FIGURE 2.1- GEOTECHNICAL INVESTIGATION- BOREHOLE LOCATIONS**

**patersongroup**  
 consulting engineers

154 Colonnade Road South  
 Ottawa, Ontario K2E 7J5  
 Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
3	UPDATED CONCEPTUAL PLAN	09/08/2019	RG
2	EXISTING BOREHOLES BY OTHERS ADDED	01/2019	RG
1	NEW BOREHOLES ADDED	11/2018	RG

GLENVIEW HOMES (INNES) LTD.  
 SUPPLEMENTAL GEOTECHNICAL INVESTIGATION  
 3604-3646 INNES ROAD

OTTAWA, ONTARIO

Title: **TEST HOLE LOCATION PLAN**

Scale:	1:3000	Date:	08/2017
Drawn by:	RCG	Report No.:	PG4026-1
Checked by:	NZ	Dwg. No.:	<b>PG4026-1</b>
Approved by:	DJG	Revision No.:	3

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**Table 2.1: Summary of Geotechnical Servicing and Grading Considerations**

<b>Parameter</b>	<b>Summary</b>
Sub-Soil Conditions	Silty Clay / Glacier Till / Bedrock
Grade Raise Restriction	2.5m to 2.0m
OHSA Soil Type	Type 2 and 3
Groundwater Considerations	Low to Moderate groundwater flow
Pipe Bedding / Backfill	Pipe Bedding            150 mm to 300mm Granular A Pipe Cover                300 mm Granular A Backfill                    Native Material
Pavement Structure (Driveways)	50mm Wear Course        (SuperPave 12.5) 150mm Base                (Granular A) 300mm Subbase            (Granular B Type II)
Pavement Structure (Local Roadways)	40mm Wear Course        (SuperPave 12.5) 50mm Binder Course      (SuperPave 19.0) 150mm Base                (Granular A) 400mm Subbase            (Granular B Type II)
Pavement Structure (Collector Roads)	40mm Wear Course        (SuperPave 12.5) 50mm Upper Binder Course (SuperPave 19.0) 50mm Lower Binder Course (SuperPave 19.0) 150mm Base                (Granular A) 550mm Subbase            (Granular B Type II)
Landscape Consideration	Large Trees (Minimum setback of the full mature height of the tree) Small to Medium tree species (7.5 m set back)

### **3.0 SERVICING AND GRADING**

#### **3.1 Contemplated MSS EUC-Phase 3 Servicing Connections**

Sanitary servicing for the proposed site will connect to the existing trunk sanitary sewer located within Beagency Street, west of Street Seven of the Subject Site. Storm servicing for the proposed site will outlet into the EUC Pond 1. Water service for the proposed site will connect to the existing watermains to the west along Street Seven and Street One, and also a connection to the north along Innes Road.

Refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up included in the enclosed drawing set.

#### **3.2 General Servicing**

The Subject Site will be serviced using local storm and sanitary sewers, and watermain. The storm / stormwater management, sanitary and water servicing strategy is discussed in further detail in the following sections.

Refer to **Figure 3.1** – Proposed Servicing Layout Plan and the preliminary General Plan of Services (Drawing 118224-GP) included in the enclosed drawing set.

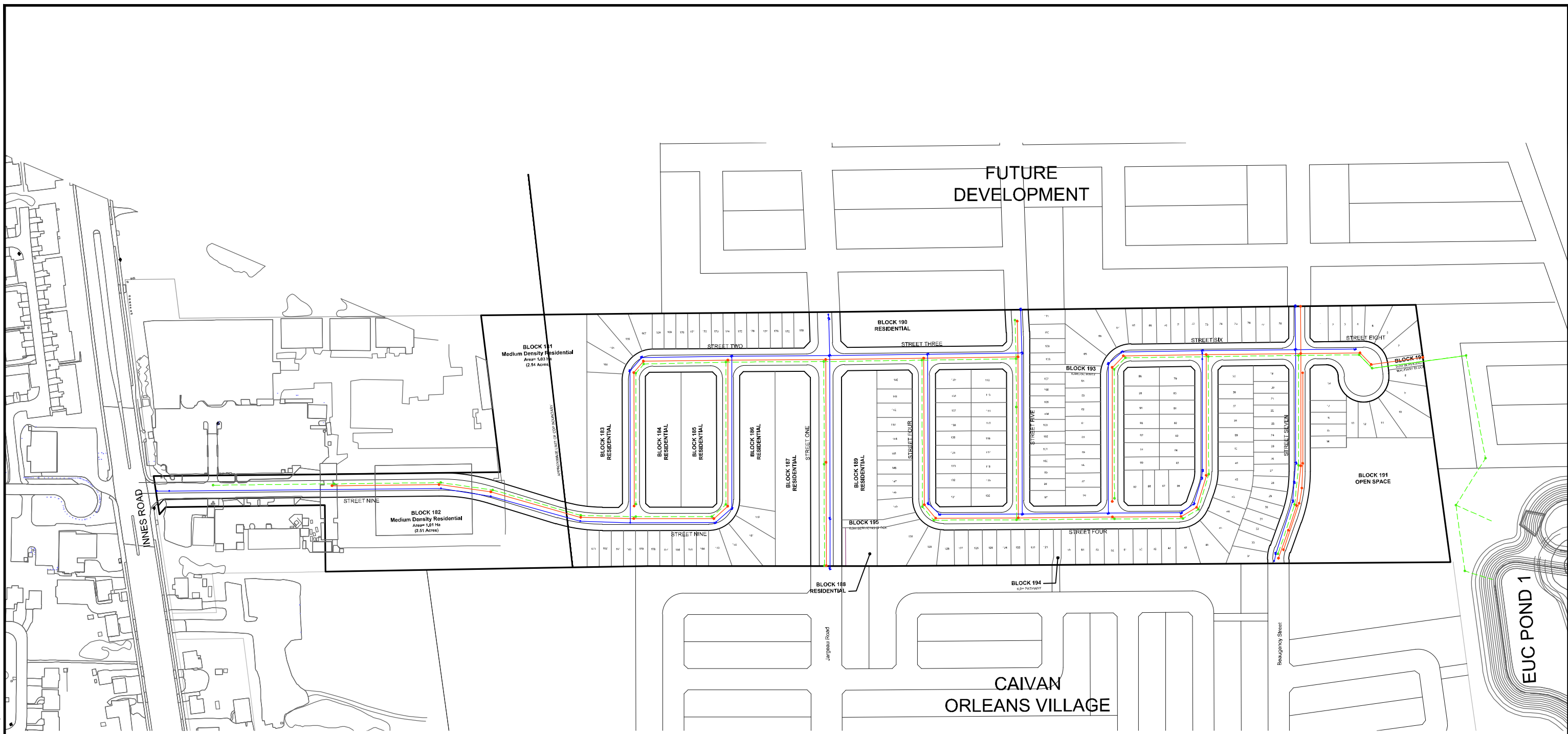
#### **3.3 General Grading**

The local roadway within the Subject Site will be graded in a saw-toothed pattern to promote surface storage of stormwater. The grading will direct emergency overland flows from the local roads to EUC Pond 1.

The lots will be graded from front to back to direct surface drainage to the rearyard areas.

Refer to the preliminary Macro Grading, Erosion and Sediment Control Plan (Drawing 118224-GR) included in the enclosed drawing set.

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### LEGEND

- PROPOSED WATERMAIN AND DIAMETER
- PROPOSED SANITARY MH & SEWER
- - - PROPOSED STORM MH & SEWER
- PROPOSED ROW LIMIT
- PROPOSED EDGE OF PAVEMENT
- PROPERTY BOUNDARY
- BEND
- PROPOSED BEND AND THRUSTBLOCK  
11.25°, 22.5°, 45°, CAP, CROSS or TEE
- PROPOSED BEND AND THRUSTBLOCK  
11.25°, 22.5°, 45°, CAP, CROSS or TEE

<b>NOVATECH</b>		<b>0 INNES ROAD (FORMER BMR LANDS)</b>	
Engineers, Planners & Landscape Architects		<b>PROPOSED SERVICING LAYOUT PLAN</b>	
Suite 200, 240 Michael Cowpland Drive Ottawa, Ontario, Canada K2M 1P6		SCALE: <b>1:3000</b>	
Telephone (613) 254-9643	Facsimile (613) 254-5867	DATE: <b>OCT 2019</b>	JOB: <b>118224</b>
Website: <a href="http://www.novatech-eng.com">www.novatech-eng.com</a>		FIGURE: <b>3.1</b>	

## 4.0 STORM SEWER SYSTEM AND STORMWATER MANAGEMENT

The post-development storm sewer and stormwater management system will adhere to the criteria outlined as a part of the MSS EUC-Phase 3. Storm runoff from the site will outlet to the existing EUC Pond 1 stormwater management facility at the south end of the site. The following sections outline the preliminary stormwater management design and analysis.

### 4.1 Stormwater Management Criteria

The Subject Site is located within the Ottawa River East Subwatershed, and are tributary to the Ottawa River, which falls under the jurisdiction of the Rideau Valley Conservation Authority (RVCA). The following stormwater management criteria have been developed based on the criteria in the MSS EUC-Phase 3, and requirements of the RVCA and the OSDG.

#### Minor System (Storm Sewers)

- Storm sewers are to be designed using the Rational Method as follows:
  - 1:2-year return period for local streets;
  - 1:5-year return period for collector roads;
- Inlet control devices (ICDs) are to be installed in road and rearyard catchbasins to control inflows to the storm sewers;
- Ensure that the 100-year hydraulic grade line in the storm sewer is at least 0.3 m below the underside of footing (USF) elevations for the proposed development.

#### Major System (Overland Flow)

- Overland flows are to be confined within the right-of-ways and/ or defined drainage easements for all storms up to and including the 1:100-year event;
- Storm runoff that exceeds the capacity of the minor system will be stored within road sags;
  - Runoff that exceeds the capacity of the road sags will be conveyed overland along defined major system flow routes towards the proposed major system outlet to the SWM Facility;
- Major system storage in backyards is not to be included/ accounted for in design computations;
- Maximum depth of flow (static + dynamic) on local and collector streets shall not exceed 0.35 m and shall be confined to the road right-of-way, as well as not touch any part of the building envelope and must remain below the lowest building opening during the stress test event;
- The product of the 100-year flow depth (m) on street and flow velocity (m/s) shall not exceed 0.60.

#### Water Quality & Quantity Control

- A *Normal* (70% TSS removal) level of quality control will be provided by the EUC Pond 1 SWM Facility, which outlets to Mud Creek, which ultimately outlets to Green's Creek and then the Ottawa River;
- Implement lot level and conveyance Best Management Practices to promote infiltration and treatment of storm runoff;

- Inflows to the storm sewer are to be controlled by inlet control devices installed in all catchbasins to limit inflows during larger storm events.

## 4.2 Proposed Storm Drainage System

Storm servicing for the Subject Site will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while runoff from larger storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). The EUC Pond 1 SWM facility is the outlet for both the major and minor systems.

Excerpts of the storm sewer design sheets from the MSS EUC-Phase 3, demonstrating that the Subject Site was accounted for in the EUC Pond 1 SWM facility revisions/pond expansion, can be found in **Appendix C**. Refer to the MSS EUC-Phase 3 for additional details on the revisions/pond expansion. Note that additional correspondence between City staff and DSEL, including MSS EUC-Phase 3 City comments and DSEL's proposed alternative storm servicing and pond concepts, can be found in **Appendix A**. The East Urban Community Phase 3 Area Community Design Plan – Conceptual Storm Servicing is included in the enclosed drawing set. For reference to the Subject Site's location, refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up.

### 4.2.1 Storm Sewer Design (Minor System)

The minor system has been conceptually designed using the Rational Method. The conceptual storm sewer design sheets are provided in **Appendix C**. Refer to the Storm Drainage Area Plan (Drawing 118224-STM) for details. The criteria used to size the storm sewers are summarized in **Table 4.1** below.

**Table 4.1: Storm Sewer Design Parameters**

Parameter	Design Criteria
Local Roads	2-year Return Period
Collector Roads	5-year Return Period
Storm Sewer Design	Rational Method/Modeling
IDF Rainfall Data	OSDG
Initial Time of Concentration ( $T_c$ )	10 minutes
Minimum Velocity	0.8 m/s
Maximum Velocity	3.0 m/s
Minimum Diameter	250 mm

Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system during larger storm events. ICDs will be sized during the detailed design stage.

### 4.2.2 Overland Flow Path (Major System)

During the detailed design stage, the site will be graded to provide an engineered overland flow route (major system) for large, infrequent storms or in the event that the storm sewer system becomes obstructed. Flows will be directed to EUC Pond 1. The major system is to be designed to conform to the design standards outlined in Section 5.5 of the OSDG.

### 4.2.3 **Best Management Practices and Low Impact Development**

The proposed development will explore the following stormwater best management practices (BMPs) and low impact development (LID) techniques to mitigate the reduction in groundwater infiltration / recharge resulting from the proposed development:

- Bio-swales, and/ or infiltration trenches in the side-yard areas within the City ROW will be used to promote infiltration;
- Roof leaders should be directed to grassed rear yard areas.

By implementing stormwater management BMPs and LIDs as part of the storm drainage design, the impacts of development on the hydrologic cycle can be reduced. The use and implementation of BMPs and LIDs will be reviewed again during the detailed design process.

#### 4.2.1 **SWM Facility – EUC Pond 1**

Water quantity control and water quality treatment will be provided by an end-of pipe stormwater management pond, 'EUC Pond 1'. EUC Pond 1 was designed and constructed for a total drainage area of approximately 326 ha, providing a *Normal* level of water quality protection (70% long-term removal of TSS). Some modifications to the pond were made to increase the amount of storage provided, and to meet updated City standards. Details are outlined in the MSS EUC-Phase 3.

### 4.3 **Hydrologic & Hydraulic Modeling**

The OSDG requires hydrologic modeling for all dual drainage systems. The performance of the proposed storm drainage system for the Subject Site was evaluated using the PCSWMM hydrologic/hydraulic model.

Since the design is still in the draft plan stage, the major system has not yet been designed. The major system will be analyzed using PCSWMM during the detailed design stage.

#### 4.3.1 **Design Storms**

The hydrologic analysis was completed using the following synthetic design storms and historical storms. The IDF parameters used to generate the design storms were taken from the OSDG.

3 Hour Chicago Storms:

2-year 3hr Chicago storm  
5-year 3hr Chicago storm  
100-year 3hr Chicago storm

12 Hour SCS Type II Storms:

2-year 12hr SCS Type II storm  
5-year 12hr SCS Type II storm  
100-year 12hr SCS Type II storm

The 3-hour Chicago distribution generated the highest peak flows, however the 12-hour SCS storm generated higher HGL elevations. Thus, both storm distributions were used for the design of the storm drainage system.

The 100-year 3-hour Chicago storm was also increased by 20% (intensity + total precipitation) to evaluate the impact of an extreme event/ climate change scenario on the performance of the dual drainage system.

Modeling files are provided on the enclosed CD.

### 4.3.2 Model Development

The PCSWMM model has been developed to account for both minor and major system flows from the development and ensure no adverse impacts on the downstream drainage system.

The results of the analysis were used to:

- Determine the required volume of major system storage;
- Determine the storm sewer hydraulic grade line for the 100-year storm event.

The PCSWMM model schematics and 100-year model output data are provided in **Appendix C**. Digital copies of the modeling files and model output for all storm events are provided on the enclosed CD.

#### Storm Drainage Areas

The site has been divided into large subcatchments based on the proposed land use, storm sewer, and roadway design. The catchment areas used in the development of the Storm Sewer Design Sheet (refer to **Appendix C**) are shown on the Storm Drainage Area Plan (Drawing 118224-STM).

#### Model Parameters

Since the major system has not yet been designed, the drainage areas have been lumped into larger areas based on the land use and road profiles. The storage to be provided by the major system has been represented in the PCSWMM model as storage nodes, and are connected to the storm sewer system via orifices meant to limit flows into the storm sewer system as follows:

- 2-year flows captured on local streets; and
- 5-year flows captured on collector roads.

The hydrologic parameters for each subcatchment were developed based on the Site Plan (**Figure 1.3**) and the Storm Drainage Area Plan (Drawing 118224-STM). An overview of the modeling parameters is provided in **Table 4.2**.

**Table 4.2: Model Parameters**

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	No Depression (%)	Equivalent Width (m)	Average Slope (%)
A01-03	0.70	0.70	71%	50%	346.88	0.2%
A04-08	3.00	0.70	71%	50%	209.96	0.2%
A09-15	3.14	0.70	71%	50%	224.27	0.2%
A16-21	2.85	0.70	71%	50%	203.49	0.2%
A22-25	1.74	0.70	71%	50%	166.09	0.2%
B01	1.01	0.80	86%	50%	189.62	0.2%
B02	1.03	0.80	86%	50%	145.21	0.2%
B03	0.97	0.25	7%	0%	114.46	0.2%
C01-03	1.27	0.70	71%	50%	175.73	0.2%

**TOTAL: 15.71**

### Depression Storage

The default values for depression storage in the City of Ottawa were used for all catchments.

- Depression Storage (pervious areas): 4.67 mm
- Depression Storage (impervious areas): 1.57 mm

Residential rooftops are assumed to provide no depression storage and all rainfall is converted to runoff.

### Equivalent Width

'Equivalent Width' refers to the width of the sub-catchment flow path. This parameter (Table 5.1) is calculated as described in the *Sewer Design Guidelines, October 2012, Section 5.4.5.6*.

### Impervious Values

Impervious (TIMP) values for each subcatchment area were calculated based on the concept plan (**Figure 2**). The impervious values correspond to the Runoff Coefficients used in the Rational Method calculations using the equation:

$$C = 0.90(\%IMP) + 0.20(1-\%IMP)$$

### Boundary Conditions

To determine the effect of the water level in the existing SWM facility would impact the HLG in the proposed storm sewer system, a boundary condition was applied to each of the outlet nodes. Water levels are from Table 23 of the MSS EUC-Phase 3, and are listed as follows:

- 2-year = 81.75 m
- 5-year = 82.15 m
- 100-year = 82.96 m

A note has been included in the PCSWMM model to this effect.

## 4.3.3 **Results of Hydrologic Analysis**

The PCSWMM hydrologic/hydraulic model was used to evaluate the performance of the proposed storm drainage system for the development. Results from the model are outlined in the following sections.

### Hydraulic Grade Line

The results of the analysis were used to determine preliminary hydraulic grade line (HGL) elevations within the proposed storm sewers. As the design is only at the draft plan stage, underside of footing (USF) elevations have not yet been determined. To analyze whether or not the HGL elevations will pose a risk to the proposed dwellings, the HGL elevations reported from the PCSWMM model were compared against the T/G elevation of the manhole. Generally, HGL elevations are at least 3.0m below the T/G, indicating the storm sewer sizing is sufficient, and there are no anticipated issues with the HGL being within the 0.30m freeboard below the USF elevations. Refer to the HGL table included in **Appendix C**. At the detailed design stage, an HGL analysis will be completed using the proposed USF elevations.

Major System Storage

Potential storage within the major system has been modeled using storage nodes and analyzed on a per-hectare basis. Results of the analysis are outlined in **Table 4.3**.

**Table 4.3: Major System Storage Requirements**

Drainage Area ID	Area (ha)	Storage Required (m <sup>3</sup> )	
		Total Volume (m <sup>3</sup> )	Per Hectare Volume (m <sup>3</sup> /ha)
A01-03	0.70	55	79
A04-08	3.00	215	72
A09-15	3.14	212	67
A16-21	2.84	199	70
A22-24	1.74	91	52
B01+B02	2.04	46	23
C01	1.31	16	12

**AVERAGE = 53**

As shown in table, the average requirement for major system storage during the 100-year event is approximately 53 m<sup>3</sup>/h. This is achievable through a saw-toothed road pattern and maximizing the surface storage to the allowable 0.35m depth within the right-of-way. At the detailed design stage, the major system design will be refined and modeled accordingly.

## 5.0 SANITARY SEWER SYSTEM

### 5.1 Existing Sanitary Infrastructure

The sanitary outlet for the site will consist of an existing 525 mm trunk sanitary sewer (gravity) located within Beaugency Street, west of Street Seven of the Subject Site. Refer to the General Plan of Services and the Sanitary Drainage Area Plan (Drawings 118224-GP and 118224-SAN) for an illustration of the proposed sanitary connection and layout details.

Excerpts of the sanitary sewer design sheets from the MSS EUC-Phase 3, demonstrating that the Subject Site was accounted for in the downstream sewers, can be found in **Appendix D**. The East Urban Community Phase 3 Area Community Design Plan – Conceptual Sanitary Servicing is included in the enclosed drawing set. For reference to the Subject Site's location, refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up.

### 5.2 Proposed Sanitary Infrastructure

#### On-site works

The proposed on-site works will require approximately 2,045 m of on-site sanitary sewer (gravity) to collect wastewater flows and to direct flows to the sanitary outlet. The existing trunk sanitary sewer will be extended within Street Seven of the Subject Site to service the future development to the east. The proposed service laterals on Street Seven will connect to a separate collector sanitary sewer running parallel to the trunk sanitary sewer extension and will outlet into the trunk downstream of Street Seven.

### 5.3 Sanitary Demand and Design Parameters

The peak design flow parameters in **Table 5.1** have been used in the sewer capacity analysis. Unit and population densities and all other design parameters are specified in the OSDG.

**Table 5.1: Sanitary Sewer Design Parameters**

Design Component	Design Parameter
Unit Population:	
Single Detached Home	3.4 people/unit
Semis-Detached /Townhomes	2.7 people/unit
2-BR Apartments	2.1 people/unit
Residential Flow Rate, Average Daily	280 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0) Harmon Correction Factor = 0.8
Extraneous Flow Rate	0.33 L/s/ha
Minimum Pipe Size	200mm (Res)
Minimum Velocity <sup>1</sup>	0.6 m/s
Maximum Velocity	3.0 m/s
Minimum Pipe Cover	2.5 m (Unless frost protection provided)

<sup>1</sup>A minimum gradient of 0.65% is required for any initial sewer run with less than 10 residential connections.

The sanitary sewer design sheet, located in **Appendix D**, confirms the combined peaked sanitary flows from the Subject Site to the receiving sanitary trunk sewer will be 17.57 L/s, respectively.

## 6.0 WATER SUPPLY SYSTEM

### 6.1 Existing Water Infrastructure

The watermain connection points for the proposed site are an existing 300 mm watermain within Jargeau Road (Connection 1); an existing 200 mm watermain within Beaugency Street (Connection 2); and an existing 400 mm watermain located at the Innes Road and Street Nine intersection (Connection 3).

As per the MSS EUC-Phase 3, it is proposed that the 300 mm watermain within Jargeau Road be extended to the future development to the east. Excerpts from the MSS EUC-Phase 3 showing the proposed EUC Phase 3 site layout, connection points, and water supply system is included in **Appendix E**. Refer to the East Urban Community Phase 3 Area Community Design Plan – Key Plan Mark-up, included in the enclosed drawing set, for reference to the Subject Site's location.

### 6.2 Proposed Water Infrastructure

The Subject Site will be serviced with approximately 2,155 m of on-site watermain 200 mm in diameter, and 200 m of a watermain trunk 300 mm in diameter within Street One. The location of hydrants will be confirmed during detailed design. Refer to the General Plan of Services (Drawings 118224-GP) for an illustration of the proposed water supply system.

### 6.3 Watermain Design Parameters

Boundary conditions were provided by the City of Ottawa, based on the OWDG water demand criteria for the proposed development comprising of approximately 180 single family dwellings, 109 townhouses and 168 medium density units. The boundary conditions are included in **Appendix E**.

The domestic demand design parameters, fire fighting demand design scenarios and system pressure criteria design parameters are outlined in **Table 6.1** below. The system pressure design criteria used to determine the size of the watermains, required within the Subject Site, and are based on a conservative approach that considers three possible scenarios.

**Table 6.1: Watermain Design Parameters and Criteria**

<b>Domestic Demand Design Parameters</b>	<b>Design Parameters</b>
Unit Population:	
Single Detached Home	3.4 people/unit
Semis-Detached /Townhomes	2.7 people/unit
2-BR Apartments	2.1 people/unit
Basic Day Residential Demand (BSDY)	350 L/c/d
Maximum Day Demand (MXDY)	2.5 x Basic Day
Peak Hour Demand (PKHR)	2.2 x Maximum Day
<b>Fire Demand (FF) Design</b>	<b>Design Flows</b>
Conventional single/town units, unless otherwise noted.	10,000L/min per FUS / OWDG TB-2014
Medium density residential blocks	15,000L/min per FUS
Hydrant spacing and coding	90 to 120m spacing per OWDG
<b>System Pressure Criteria Design Parameters</b>	<b>Criteria</b>
Maximum Pressure (BSDY) Condition	< 80 psi occupied areas < 100 psi unoccupied areas
Minimum Pressure (PKHR) Condition	> 40 psi
Minimum Pressure (MXDY+FF) Condition	> 20 psi

The firefighting water demands for the Subject Site have been estimated per OWDG which refers to the Fire Underwriters Survey (CGI, 1999) document, abbreviated as FUS.

In accordance with the FUS and based on the proposed zoning, there is potential for less than 3m of separation between the single family, semi-detached, and row townhome wood-framed buildings, which would require the fire area in the FUS estimate for multiple buildings to be treated as a contiguous block area. This results in a high fire flow demand which is difficult to attain from the existing system; moreover, it would trigger larger diameter watermain size within the Subject Site, creating system vulnerabilities such as water age issues. As per the ISTB-2014-02, fire flows may be capped at 167 L/s (10,000 L/min) for single family, semi-detached, and row townhome, provided certain site criteria are met. The criteria are:

- For singles: a min separation of 10m between the backs of adjacent units.
- Traditional side-by-side semi-detached or row townhomes:
  - a. firewalls with a min two-hour rating to separate the block into fire areas of no more than the lesser of 7 dwelling units, or 600 m<sup>2</sup> of building area; and
  - b. Min separation of 10 m between the backs of adjacent units.

In general, the proposed layout of the Subject Site in conjunction with the established zoning setbacks ensures that the minimum separation of 10 meters between the backs of adjacent units is achieved.

Areas where the minimum separations are not achieved will require additional analysis. These areas will be highlighted as part of the detailed design process.

Notwithstanding the above, the Subject Site's layout shall meet the foregoing criteria allowing the capped fire flow of 167 L/s to be used for these particular unit types of residential units. Detailed calculations can be found attached in **Appendix E**.

#### 6.4 System Pressure Modeling and Results

System pressures for the Subject Site were estimated using the EPANET engine within PCSWMM.

The PCSWMM model layout is demonstrated in **Figure 6.1** – Proposed Watermain Sizing, Layout and Junction IDs and **Figure 6.2** – Ground Elevations (m).

##### Domestic Demand

The water demand summary for the complete build out of the Subject Site for the basic daily and peak hour demands has been provided in Error! Reference source not found. **6.2** below. For detailed results refer to the tables provided in **Appendix E**. The detailed results are also demonstrated in **Figure 6.3** – Maximum Pressures During BSDY Condition and **Figure 6.4** – Minimum Pressures During PKHR Condition.

**Table 6.2: System Pressure (EPANET)**

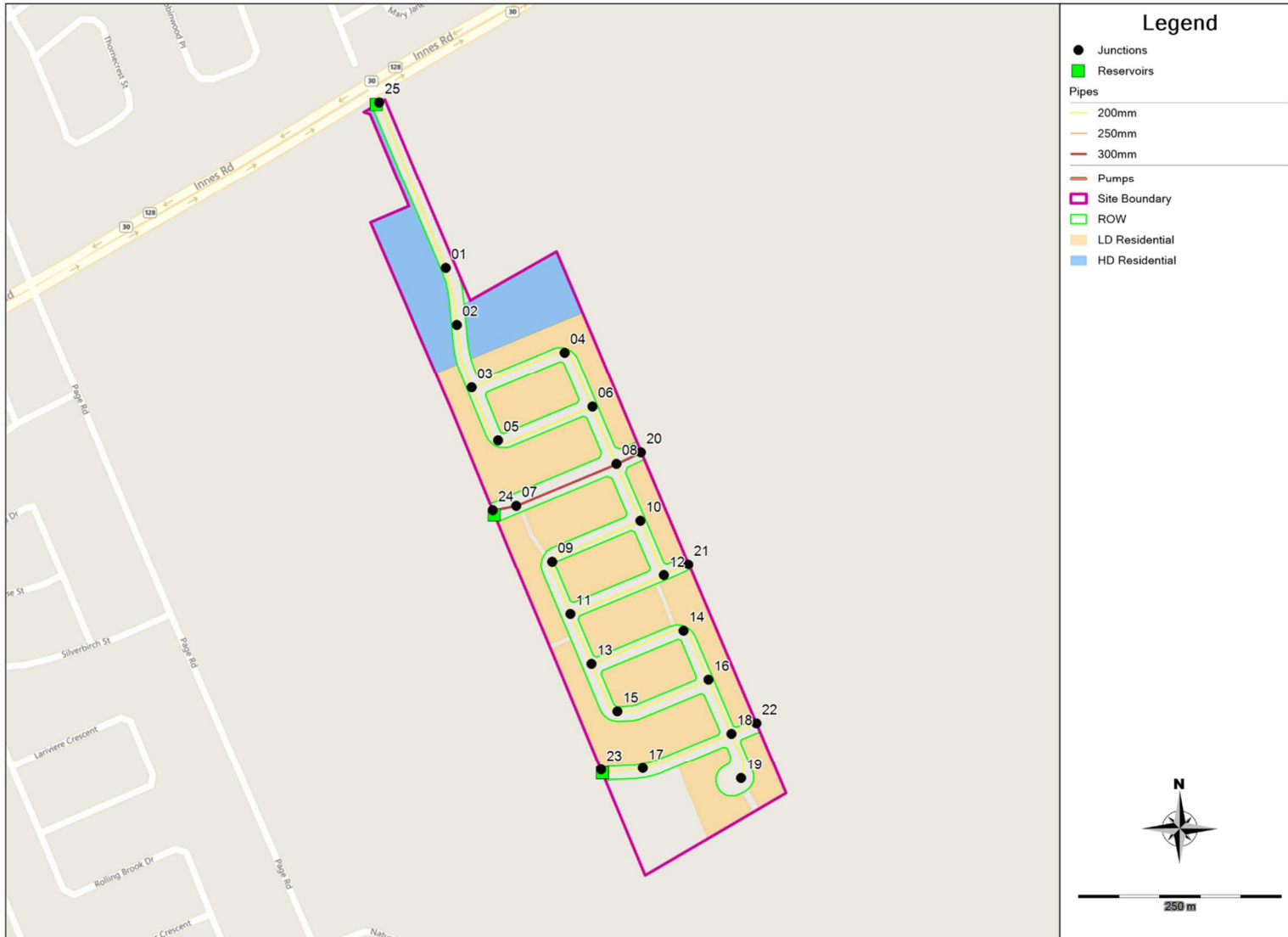
Condition	Demand (L/s)	Allowable Pressure (psi)	Max/Min Pressure (psi)
Basic Daily Demand	5.11	80 (Max)	62
Peak Hour Demand	28.13	40 (Min)	56

##### Fire Demand

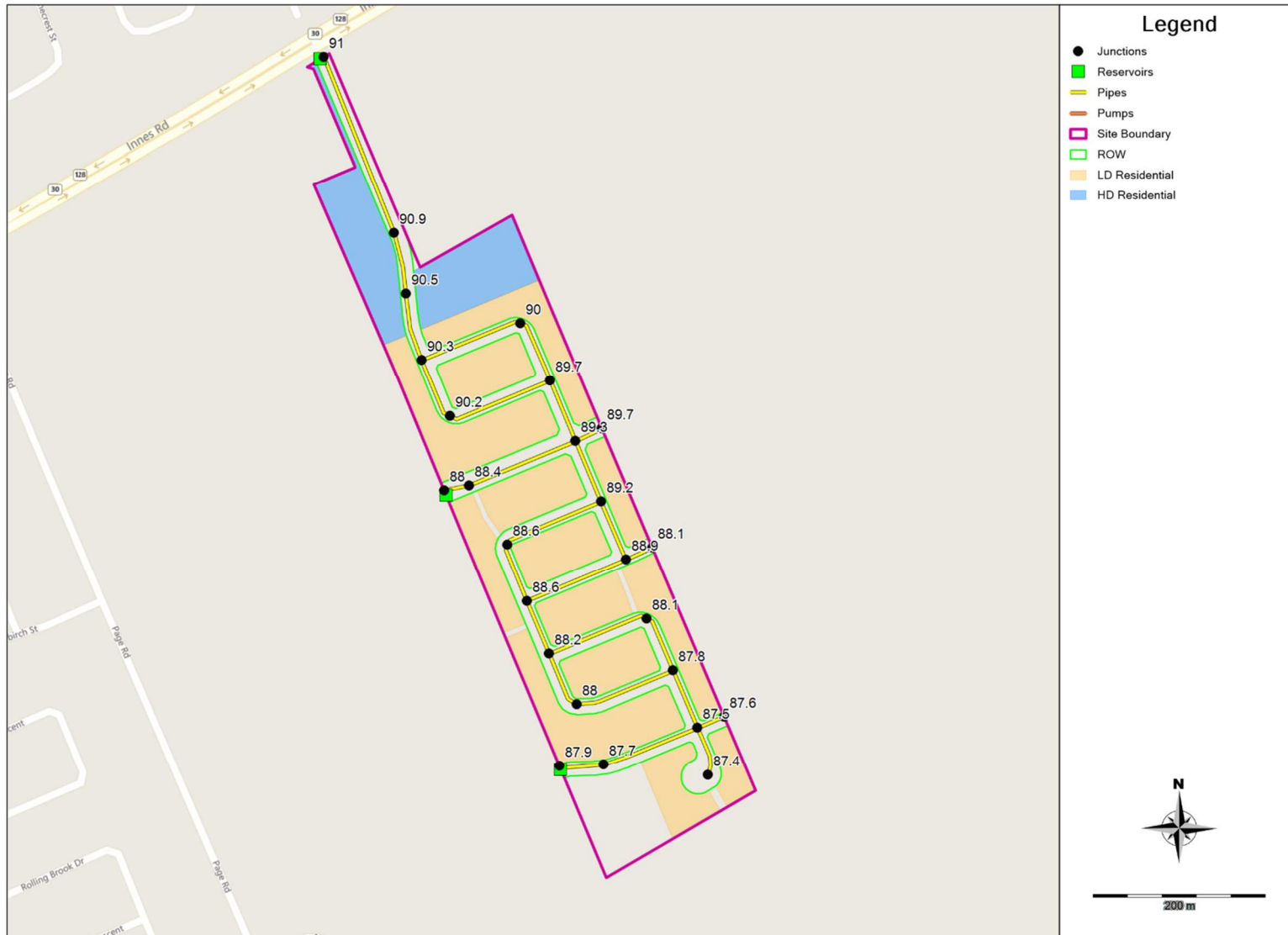
Furthermore, an analysis was carried out to determine the available fire flow under maximum day demand while maintaining a residual pressure of 20psi. This was completed using the EPANET fire flow analysis feature within PCSWMM. For detailed results refer to the tables provided in **Appendix E**. The detailed results are also demonstrated in **Figure 6.5** – Available Flow at 20psi During MXDY+FF Condition.

The hydraulic analysis demonstrates that the proposed watermain sizing meets the design criteria.

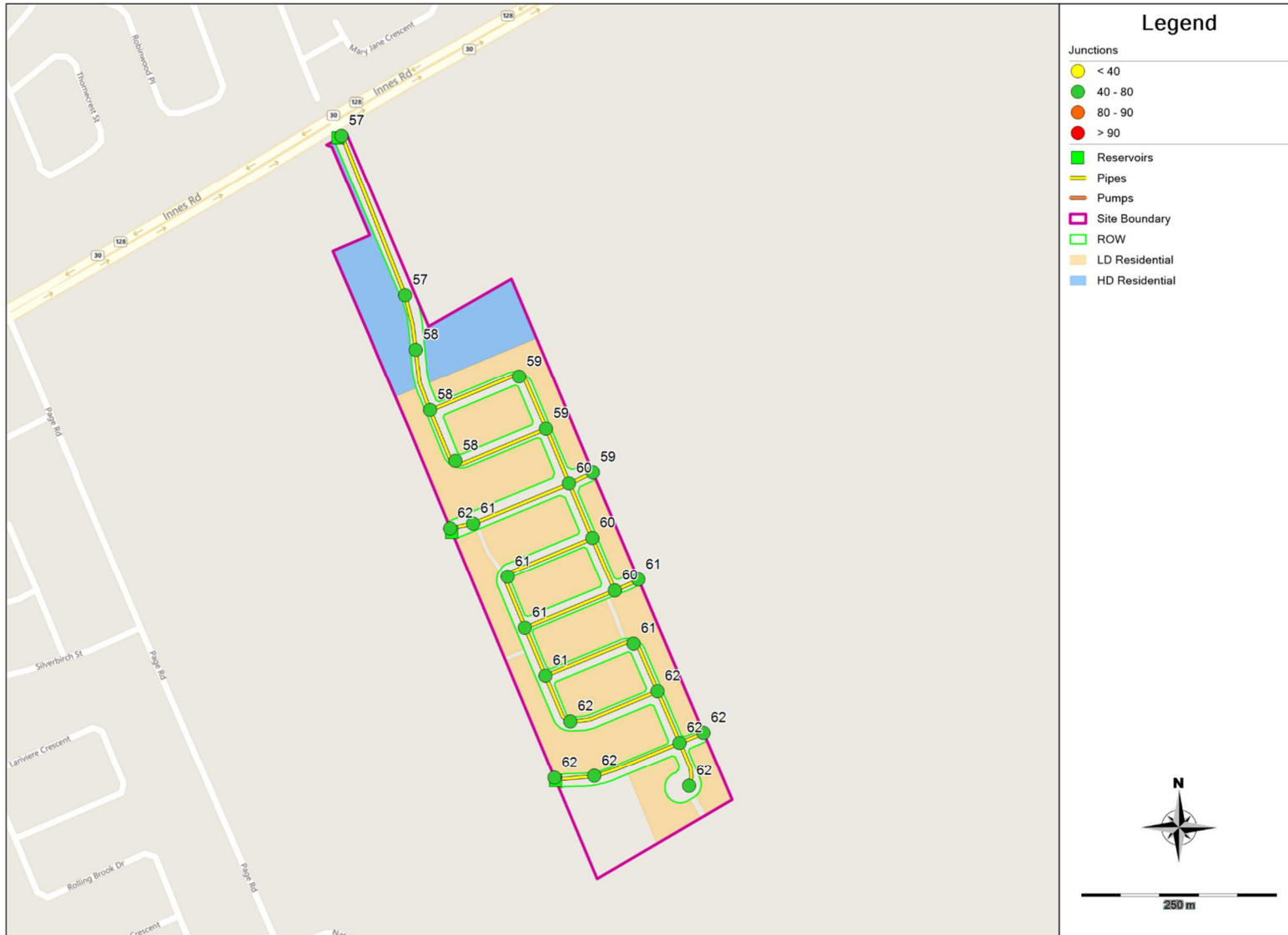
**0 Innes Road (Former BMR Lands)**  
**Job No. 118224**  
**PCSWMM Model Schematic**  
**Figure 6.1 – Proposed Watermain Sizing, Layout and Junction IDs**



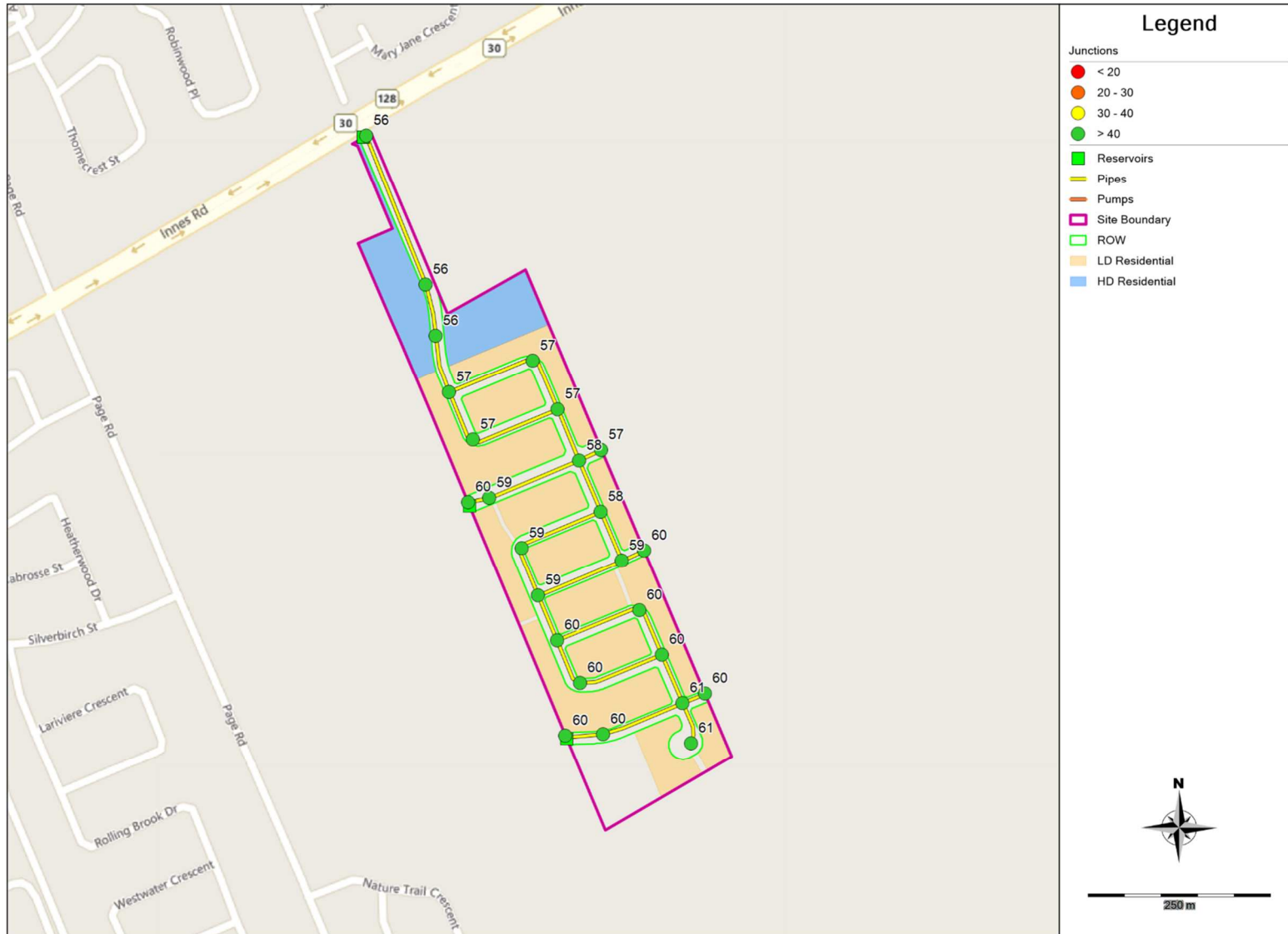
**0 Innes Road (Former BMR Lands)**  
**Job No. 118224**  
**PCSWMM Model Schematic**  
**Figure 6.2 – Ground Elevations (m)**



**0 Innes Road (Former BMR Lands)**  
**Job No. 118224**  
**PCSWMM Model Schematic**  
**Figure 6.3 – Maximum Pressures During BSDY Conditions**



**0 Innes Road (Former BMR Lands)**  
**Job No. 118224**  
**PCSWMM Model Schematic**  
**Figure 6.4 – Minimum Pressures During PKHR Conditions**

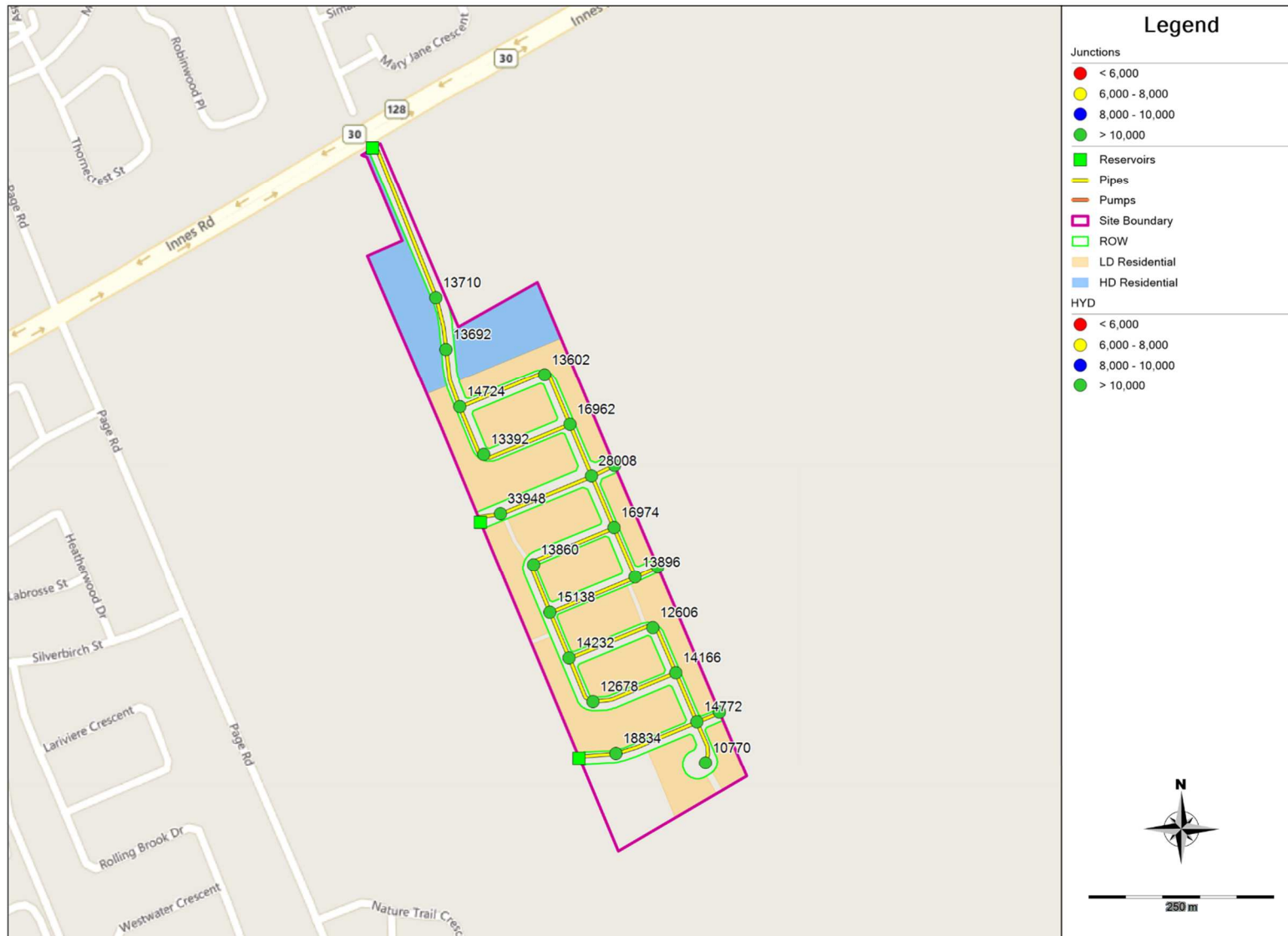


# 0 Innes Road (Former BMR Lands)

Job No. 118224

## PCSWMM Model Schematic

Figure 6.5 – Available Flow at 20psi During MXDY+FF Conditions



Date: 2019/10/04

M:\2018\118224\DATA\Reports\Design Brief\Conceptual\Figures\EPANET Model Schematic.docx

## **7.0 UTILITIES**

The development will be serviced by Hydro Ottawa, Bell Canada, Rogers Communications, and Enbridge Gas Distribution Inc. Furthermore, streetlighting will be provided within the proposed road allowances, and will be designed in accordance with the City's lighting policy (2016). The works will be coordinated with local utility companies during detailed design.

A Composite Utility Plan will be prepared as part of the detailed design process.

The cross section of the utility trench and the connection to the existing services will also be confirmed during the detailed design process. For the preliminary right-of-way cross section refer to the Cross Sections Typical ROW (Drawing 118224-XS), included in the enclosed drawing set.

## **8.0 EROSION AND SEDIMENT CONTROL AND DEWATERING MEASURES**

Temporary erosion and sediment control measures will be implemented during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987). Details will be provided on an Erosion and Sediment Control Plan, prepared as part of detailed design. Erosion and sediment control measures may include:

- Placement of filter fabric under all catch basin and maintenance hatches;
- Tree protection fence around the trees to be maintained
- Silt fence around the area under construction placed as per OPSS 577 / OPSD 219.110
- Light duty straw bale check dam per OPSD 219.180

The erosion and sediment control measures will need to be installed to the satisfaction of the engineer, the City, the Ontario Ministry of Environment, Conservation, and Parks (MECP), and the RVCA, prior to construction and will remain in place during construction until vegetation is established. The erosion and sediment control measure will also be subject to regular inspection to ensure that measures are operational.

Refer to the preliminary Macro Grading, Erosion and Sediment Control Plan (Drawing 118224-GR) included in the enclosed drawing set.

## **9.0 NEXT STEPS, COORDINATION, AND APPROVALS**

The proposed municipal infrastructure may be subject, but not limited to the following approvals:

- MECP PTTW. Submitted to: MECP. Proponent: Glenview Homes (Innes) Ltd.
- MECP Environmental Certificate of Approval (ECA) for the storm / sanitary sewers through the “Transfer of Review” program. Submitted to: City of Ottawa/ MECP and approved by MECP. Proponent: Glenview Homes (Innes) Ltd.
- MECP Pre-authorized watermain alteration and extension program granted as part of City of Ottawa’s Drinking Water Works Permit (F-1 Form). Submitted to: City of Ottawa. Proponent: Glenview Homes (Innes) Ltd.
- Road Cut Permit. Submitted to City of Ottawa. Proponent: Glenview Homes (Innes) Ltd., or its contractor/agent.
- Tree Cutting Permit. Submitted to City of Ottawa. Proponent: Glenview Homes (Innes) Ltd., or its contractor/agent.
- Separate from this report, the Developer may enter into a Cost Sharing Agreement to provide cost sharing principles and recovery mechanisms for development components that benefit external parties.

## 10.0 SUMMARY AND CONCLUSIONS

This report demonstrates that the proposed development can be adequately serviced with storm and sanitary sewers and watermain. The report is summarized below:

### Stormwater Management:

- The Subject Site will be serviced with approximately 2,260 m of on-site storm sewers ranging from 250 mm to 1500 mm in diameter. The on-site storm sewers will outlet to the existing EUC Pond 1 stormwater management facility to the south of the Subject Site.
- Storm servicing for the Subject Site will be provided using a dual drainage system: Runoff from frequent events will be conveyed by storm sewers (minor system), while runoff from larger storm events which exceed the capacity of the minor system will be conveyed overland along defined overland flow routes (major system). The EUC Pond 1 SWM facility is the outlet for both the major and minor systems.
- Inlet control devices (ICDs) are to be installed in all catchbasins to limit inflows to the minor system during larger storm events. ICDs will be sized during the detailed design stage.
- Road Right-of-Ways will be used for surface storage (i.e. road sags – saw-toothed grading).

### Sanitary and Wastewater Collection System:

- The Subject Site will be serviced with approximately 2,045 m of on-site sanitary sewers ranging from 200 mm to 250 mm in diameter, which will direct flows to an existing 525 mm trunk sanitary sewer (gravity) located within Beaugency Street, west of Street Seven of the Subject Site. The existing trunk sanitary sewer will be extended within Street Seven of the Subject Site to service the future development to the east. The proposed service laterals on Street Seven will connect to a separate collector sanitary sewer running parallel to the trunk sanitary sewer extension and will outlet into the trunk downstream of Street Seven.
- The downstream existing sanitary sewer system have been designed for the flows of the Subject Site and have adequate capacity.

### Water Supply System

- The Subject Site will be serviced with approximately 2,155 m of on-site watermain 200 mm in diameter, and 200 m of a watermain trunk 300 mm in diameter within Street One. The watermain connection points for the proposed site are an existing 300 mm watermain within Jargeau Road (Connection 1); an existing 200 mm watermain within Beaugency Street (Connection 2); and the existing 400 mm watermain located at the Innes Road and Street Nine intersection.

### Erosion and Sediment Control

- Temporary erosion and sediment control measures will be implemented both prior to commencement and during construction in accordance with the “Guidelines on Erosion and Sediment Control for Urban Construction Sites” (Government of Ontario, May 1987).

### **Next Steps, Coordination, and Approvals**

- MECP PTTW.
- MECP Environmental Certificate of Approval (ECA) for the storm / sanitary sewers through the “Transfer of Review” program.
- MECP Pre-authorized watermain alteration and extension program granted as part of City of Ottawa’s Drinking Water Works Permit (F-1 Form).
- Road Cut Permit.
- Tree Cutting Permit.
- Separate from this report, the developer may enter into a Cost Sharing Agreement to provide cost sharing principles and recovery mechanisms for development components that provide direct benefits to more than one party.

## 11.0 CLOSURE

This report is respectfully submitted for review and subsequent approval. Please contact the undersigned should you have questions or require additional information.

### NOVATECH

Prepared by:



Ben Sweet, P.Eng.  
Project Coordinator | Land Development



Kallie Auld, M.A.Sc., P.Eng.  
Project Coordinator | Water Resources

Reviewed by:

A handwritten signature in blue ink, appearing to read "Bassam Bahia".

Bassam Bahia, M.Eng., P.Eng.  
Project Manager | Land Development

**Appendix A  
Correspondence**

## MINUTES

### Pre-Consultation Meeting

ADDRESS: 3604-3636 Innes Road

DATE: October 5, 2017

TIME: 3:00pm to 4:00pm

LOCATION: 110 Laurier Ave West, Room 4102E

CONTACT: Michael Boughton

### City of Ottawa Staff Present:

Michael Boughton (Planner), Nick Stow (Environmental Planner), Diane Emmerson (Parks Planner), Isaac Wong (Engineer), Ellen Potts (Student Planner)

### Invitees Present:

Michael Michaud (Glenview Homes)

## 1.0 Introductions

## 2.0 Overview of Proposal

- To develop the rear portion of the site for a residential subdivision consisting of single-detached and townhouse dwellings according to the on-going EUC MUC CDP.

## 3.0 Summary of Preliminary Comments from City Staff Represented Disciplines

- **Michael Boughton and Ellen Potts provided transportation comments (on behalf of Asad Yousfani) and planning comments**
  - A noise study is required and should take into account the area within 100 metres of the right-of-way of arterial and collector roads, both existing and proposed.
  - A transportation study is required.
    - The new TIA guidelines can be accessed at [http://documents.ottawa.ca/sites/documents.ottawa.ca/files/tia\\_guidelines\\_en.pdf](http://documents.ottawa.ca/sites/documents.ottawa.ca/files/tia_guidelines_en.pdf)
    - The study will focus on identifying the road modifications required to safely accommodate the site generated traffic.
- **Isaac Wong provided engineering comments**
  - Please see the attached memo.
- **Nick Stow provided environmental comments**
  - No EIS is required, but a tree conservation report is required.
- **Diane Emmerson provided parks comments**
  - Confirmed that the proposed park is a neighbourhood park
  - Explained the new developer-built park process
    - Reviewed the various amenities needed in this park
    - Developer is to provide a Facility-Fit plan prior to Draft Plan approval
  - Main concerns:
    - Park is lacking street frontage; proposed park is only at 25% street frontage (including Caivan's section), but closer to 50% frontage is preferred.

- Michael Michaud pointed out that Caivan has not provided 50% street frontage for their portion of the park and Richcraft is not supplying any.
- Diane Emmerson suggested that Glenview enter into a cost-sharing agreement with Caivan to compensate the lost profit from the removal of housing units for parkland.
  - It is not common practise in cost sharing agreements to compensate a developer for lost revenue from homes that could have been built. Ellen Potts will look into options for compensation.
  - Suggested that residential lots bordering the park on Street 7 and Street 8 be eliminated, but of particular concern is the little “divot” on Street 7
  - The general location of the park is fine.
  - There may be a potential to shift some of the parkland dedication to the north.
  - The park budget is \$504,865 per hectare.

#### 4.0 Next Steps

- Meet with City staff to have a discussion regarding subdivision layout/design and coordination the CDP.

#### 5.0 List of Required Plans and Studies

##### Engineering

- Site Servicing Plan (3 copies)
- Site Servicing Study (3 copies)
- Stormwater Management Report (3 copies)
- Geotechnical Study (3 copies)
- Noise Study (3 copies)
- Transportation Impact Study (3 copies)

##### Planning / Design / Survey

- Draft Plan of Subdivision (15 copies)
- Land-use table (include on Draft Plan of Subdivision)
- Concept Plan showing proposed street configuration, blocks, lots, and dwelling types (colour coordinated, simple) (3 copies)
- Survey Plan (6 copies)
- Planning Rationale (include explanation of how proposal complies with draft EUC MUC CDP) (3 copies)
- Archaeological Resource Assessment (3 copies)

##### Environmental

- Tree Conservation Report (3 copies)

**\*\*Please submit all plans, studies and reports as separate pdf. files on a USB stick or CD (the Draft Plan of Subdivision should also be submitted as a dwg. file)**

# **ATTACHMENTS**

## MEMO

Date: October 6, 2017

To / Destinataire	Ellen Potts, Student Planner	
From / Expéditeur	Isaac Wong, Project Manager, Infrastructure Approvals	
Subject / Objet	<b>Pre-Application Consultation 3604 Innes Road Ward No. 2</b> <i>Develop the rear vacant portion of the site for a residential subdivision consisting of single-detached and townhouse dwellings.</i>	File No. PC2017-0262

Please note the following information regarding the engineering design submission for the above noted site:

1. The Servicing Study Guidelines for Development Applications are available at the following address: <http://ottawa.ca/en/development-application-review-process-0/servicing-study-guidelines-development-applications>
2. The following Engineering plans and reports are requested for submission:
  - a. Site Servicing Plan
  - b. Site Servicing Study
  - c. Geotechnical Study
  - d. Stormwater Management Report
3. Servicing and site works shall be in accordance with the following documents:
  - ⇒ Ottawa Sewer Design Guidelines (October 2012)
  - ⇒ Ottawa Design Guidelines – Water Distribution (2010)

- ⇒ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - ⇒ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
  - ⇒ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
  - ⇒ City of Ottawa Park and Pathway Development Manual (2012)
  - ⇒ City of Ottawa Accessibility Design Standards (2012)
  - ⇒ Ottawa Standard Tender Documents (latest version)
  - ⇒ Ontario Provincial Standards for Roads & Public Works (2013)
4. Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at [InformationCentre@ottawa.ca](mailto:InformationCentre@ottawa.ca) or by phone at (613) 580-2424 x.44455).
5. The Stormwater Management Criteria, for the subject site, is to be based on the following:
- i. The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
  - ii. For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
  - iii. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
  - iv. A calculated time of concentration (Cannot be less than 10 minutes).
  - v. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
  - vi. For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.

**Note:** There may be area specific SWM Criteria that may apply. Check for any related SWM &/or Sub-watershed studies that may have been completed.

6. Deep Services (Storm, Sanitary & Water Supply)

- i. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*
- ii. *Connections to trunk sewers and easement sewers are typically not permitted.*
- iii. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*
- iv. *Review provision of a high-level sewer.*
- v. *Provide information on the type of connection permitted*

Sewer connections to be made above the springline of the sewermain as per:

- a. *Std Dwg S11.1 for flexible main sewers – connections made using approved tee or wye fittings.*
- b. *Std Dwg S11 (For rigid main sewers) – lateral must be less than 50% the diameter of the sewermain,*
- c. *Std Dwg S11.2 (for rigid main sewers using bell end insert method) – for larger diameter laterals where manufactured inserts are not available; lateral must be less than 50% the diameter of the sewermain,*
- d. *Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.*
- e. *No submerged outlet connections.*

7. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:

- i. Location of service

- ii. Type of development and the amount of fire flow required (as per FUS, 1999).
  - iii. Average daily demand: \_\_\_ l/s.
  - iv. Maximum daily demand: \_\_\_ l/s.
  - v. Maximum hourly daily demand: \_\_\_ l/s.
8. MOECC ECA Requirements – The applicant shall consult with the local office of the MOECC to determine which ECA, if any, are required. **NOTE: Site Plan Approval, or Draft Approval, is required before any Ministry of the Environment and Climate Change application is sent to the MOECC.**

For residential applications: Charlie Primeau

(613) 521-3450, ext. 251

[Charlie.Primeau@ontario.ca](mailto:Charlie.Primeau@ontario.ca)

For I/C/I applications: Emily Diamond

(613) 521-3450, ext. 238

[Emily.Diamond@ontario.ca](mailto:Emily.Diamond@ontario.ca)

9. Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

Should you have any questions or require additional information, please contact me directly at (613) 580-2424, x 24169 or by email at [Isaac.Wong@ottawa.ca](mailto:Isaac.Wong@ottawa.ca).

## **Ben Sweet**

---

**Subject:** RE: Pre-con Follow-up - 3604 Innes Rd, BMR lands

**From:** Belan, Steve <[Steve.Belan@ottawa.ca](mailto:Steve.Belan@ottawa.ca)>  
**Sent:** Tuesday, July 16, 2019 3:34 PM  
**To:** Michael Michaud <[MMichaud@glenview.ca](mailto:MMichaud@glenview.ca)>  
**Subject:** Pre-con Follow-up - 3604 Innes Rd, BMR lands

**In attendance:** Mike Giampa, Robin van de Lande, Sara Mashaie, Mike Thivierge, Sami Rehman, Steve Belan, Michael Michaud, Jake Shabinsky, Jenifer Wong, James Ireland

Hello,

Please refer to the below regarding the Pre-Application Consultation (pre-con) Meeting held on June 28 for the property at 3604 Innes Road for a rezoning and plan of subdivision application in order to allow the development of a plan of subdivision by Glenview Homes. I have also attached the required Plans & Study List for application submission.

### **As Heard**

- Pre-Application Consultation held in 2017, Plan of Subdivision delayed to delays of the CDP
- Brownfield Clean-up in southern portion of site to be completed, 90% complete, RSC awaiting completion
- Early servicing to begin in 2020, home building 2021
- Park concern addressed with Ingrid (see park comments)
- McEwen and U-Haul have purchased lands up on Innes Road, remainder of the lands outside of the CDP to be incorporated into this subdivision
- The City has asked U-Haul and Gib Patterson for an access (private or public) road (or a protected ROW), running parallel to Innes to allow connectivity between lots/developments
- The lands on the edge of the CDP are medium density (62 unit/ha) and will continue that density over the abutting lands to the north
- Adjacent to Significant woodlands, EIS requirements? (see Sami's comments)
- Engineering, MMS is still underway along with the CDP. LIDs in the MSS: the MSS will not have 10mm accommodation cushion. Glenview will be required to implement the use of LIDs either as soft or other, this is all related to Mud Creek flows.

Below are staff's preliminary comments based on the information available since of pre-con meeting:

### **Planning**

- Draft CDP to be posted
- Road pattern looks acceptable
- Planning wants a ROW (public or private running parallel with Innes Road. To be roughly along the rear of the U-haul property. In a pre-consultation, U-haul was considering providing 40 feet at the rear of their property.
- Maybe both Glenview and U-haul could contribute some land for this ROW and provide landscaping to buffer residential uses from the warehouse space
- We have no issue with including lands outside of the CDP to this application
- A Zoning amendment application will need to be submitted to address the permitted uses and accommodate any provision requests.

## **Urban Design**

- This application will not subject to the Urban Design Review Panel
- Mid to higher density development should be orientated (door should face) to the street.
- There should be accommodations made to provide street trees in front of every house and each corner side yards.

## **Engineering**

- Please consult the Pre-con servicing memo Dated October 6, 2017 From Isaac Wong
- Servicing will be in conformity with the MSS
- Storm water quantity and quality will be controlled
- LIDs either as soft or other need to be implemented and the MSS will not have a 10mm accommodation cushion.

Feel free to contact Infrastructure Project Manager, Sara Mashaie, at [sara.mashaie@ottawa.ca](mailto:sara.mashaie@ottawa.ca) or 613.580.2424 ext./poste 27885, for follow-up questions

## **Transportation**

- TIA submission / Road modification agreement requirements

Feel free to contact Transportation Project Manager, Mike Giampa, at [mike.giampa@ottawa.ca](mailto:mike.giampa@ottawa.ca) or 613.580.2424 ext./poste 23657, for follow-up questions

## **Environmental**

- The scoped EIS was reviewed and it was found that it does not sufficiently cover the requirements for an EIS in support of the subdivision. The EIS is required since the site is adjacent to a significant woodlot and Species at Risk have been identified in the vicinity by the CDP study, The EIS should cover potential impacts on these two items and demonstrate how the proposed development will have no negative impacts. Further details of EIS requirements can be found in the OP section 4.7.8 and the EIS guidelines:  
[https://documents.ottawa.ca/sites/default/files/documents/eis\\_guidelines2015\\_en.pdf](https://documents.ottawa.ca/sites/default/files/documents/eis_guidelines2015_en.pdf)
- A RSC will be required for sensitive land uses where Brownfields development occurs.

Feel free to contact Sami Rehman, Environmental Planner, at [Sami.Rehman@ottawa.ca](mailto:Sami.Rehman@ottawa.ca) or 613.580.2424 ext./poste 13364, for follow-up questions.

## **Parkland**

- The park size proposed is 0.96ha. The CDP and Area Parks Plan requires a 1.82ha park block shown as Park 1 in the APP. Caivan has provided 0.654ha of the required 1.82ha. The remaining parkland is to be conveyed by Glenview. Please have Glenview revise Block 186 to reflect the required 1.166ha park block.
- Once a formal application is submitted, Parks and Facility Planning will review and provide draft conditions as required.

Feel free to contact Mary Ellen Wood, Parks Planner, at [MaryEllen.Wood@ottawa.ca](mailto:MaryEllen.Wood@ottawa.ca) or 613.580.2424 ext./poste 16482, for follow-up questions.

## **Conservation Authority**

- Comments related to the Conservation Authority
  - Stormwater runoff quality criteria
  - Area specific stormwater runoff criteria
-

## **Other**

- You are encouraged to contact the Ward Councillor, Councillor Laura Dudas, at [Laura.Dudas@ottawa.ca](mailto:Laura.Dudas@ottawa.ca) about the proposal.

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

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

Please do not hesitate to contact me if you have any questions.

Regards,

Steve Belan, MCIP, RPP

Planner Planning Services, Development Review Services  
Planning, Infrastructure and Economic Development  
City of Ottawa / Ville d'Ottawa  
110 Laurier Avenue West, 4th Floor / 110, avenue Laurier Ouest, 4e étage  
Ottawa, ON K1P 1J1  
Telephone / tél.: 613-580-2424 ext./poste 27591  
E-mail / courriel: [Steve.Belan@ottawa.ca](mailto:Steve.Belan@ottawa.ca)

## APPLICANT'S STUDY AND PLAN IDENTIFICATION LIST

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S/A	Number of copies	ADDITIONAL REQUIREMENTS		S/A	Number of copies
S	1	44. Applicant's Public Consultation Strategy (may be provided as part of the Planning Rationale)	45.	■	

Meeting Date: June 28, 2019

Application Type: *Zoning By-Law Amendment*

File Lead (Assigned Planner): Steve Belan

Infrastructure Approvals Project Manager: Sara Mashaie

Site Address (Municipal Address): 3604 Innes Road

\*Preliminary Assessment: 1  2  3  4  5

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<http://ottawa.ca/fr/hotel-de-ville/urbanisme-et-amenagement/amenagement-dune-propriete/le-processus-dexamen-dune-dema-72>.

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<input type="checkbox"/>	15	48. Plan de modelé et de drainage	49. Étude géotechnique / étude sur la stabilité des pentes	<input type="checkbox"/>	3
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<input type="checkbox"/>	PDF	60. Plan de Modifications aux chaussées	61. Étude relative à la proximité d'un aménagement à la Ligne de la Confédération	<input type="checkbox"/>	3

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<input type="checkbox"/>	15	72. Plan d'aménagement paysager	73. Évaluation archéologique conditions: <b>S</b> (plans d'implantation) <b>A</b> (plans de lotissement, condominium)	<input type="checkbox"/>	3
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Date de réunion :

Type de demande :

Urbaniste responsable du dossier :

Gestionnaire de projet, Approbation des demandes d'infrastructure :

Adresse du site (adresse municipale) :

\*Évaluation préliminaire : 1  2  3  4  5

\*Le chiffre un (1) indique que des révisions importantes sont nécessaires avant qu'une demande d'aménagement puisse être présentée, et le chiffre cinq (5) suppose que la demande semble conforme aux politiques et aux directives d'utilisation du sol de la Ville. Cette évaluation est purement consultative. Elle ne tient pas compte des aspects techniques de la demande et ne garantit d'aucune manière l'approbation d'une demande.

*Il est important de noter que la nécessité de produire d'autres études ou plans peut survenir au cours de l'examen de la demande. Si, après la présentation de votre demande, il s'avère que des documents ne figurant pas dans cette liste de vérification sont requis pour compléter la demande, conformément aux dispositions de la Loi sur l'aménagement du territoire et du Plan officiel, le Direction général de la planification, de l'infrastructure et du développement économique vous informera des documents manquants au cours de la période légale de 30 jours. La consultation obligatoire préalable à la demande ne réduit pas le délai normal de traitement de la demande par la Ville, ni ne garantit qu'une demande sera approuvée. Elle a pour but d'aider à sensibiliser et à informer le requérant au sujet des exigences relatives aux demandes, des procédés, des politiques et des principaux enjeux municipaux, avant qu'il ne présente sa demande officielle. Cette liste est valide une année après la date de la réunion. Si la demande n'est pas présentée pendant cette période, le requérant devra à nouveau procéder à une consultation préalable auprès du Direction général de la planification, de l'infrastructure et du développement économique.*

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Meeting Date: June 28, 2019

Application Type: *Plan of Subdivision*

File Lead (Assigned Planner): Steve Belan

Infrastructure Approvals Project Manager: Sara Mashaie

Site Address (Municipal Address): 3604 Innes Road

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Date de réunion :

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Gestionnaire de projet, Approbation des demandes d'infrastructure :

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\*Évaluation préliminaire : 1  2  3  4  5

\*Le chiffre un (1) indique que des révisions importantes sont nécessaires avant qu'une demande d'aménagement puisse être présentée, et le chiffre cinq (5) suppose que la demande semble conforme aux politiques et aux directives d'utilisation du sol de la Ville. Cette évaluation est purement consultative. Elle ne tient pas compte des aspects techniques de la demande et ne garantit d'aucune manière l'approbation d'une demande.

*Il est important de noter que la nécessité de produire d'autres études ou plans peut survenir au cours de l'examen de la demande. Si, après la présentation de votre demande, il s'avère que des documents ne figurant pas dans cette liste de vérification sont requis pour compléter la demande, conformément aux dispositions de la Loi sur l'aménagement du territoire et du Plan officiel, le Directeur général de la planification, de l'infrastructure et du développement économique vous informera des documents manquants au cours de la période légale de 30 jours. La consultation obligatoire préalable à la demande ne réduit pas le délai normal de traitement de la demande par la Ville, ni ne garantit qu'une demande sera approuvée. Elle a pour but d'aider à sensibiliser et à informer le requérant au sujet des exigences relatives aux demandes, des procédés, des politiques et des principaux enjeux municipaux, avant qu'il ne présente sa demande officielle. Cette liste est valide une année après la date de la réunion. Si la demande n'est pas présentée pendant cette période, le requérant devra à nouveau procéder à une consultation préalable auprès du Directeur général de la planification, de l'infrastructure et du développement économique.*

## City of Ottawa 2017 TIA Guidelines Screening Form

### 1. Description of Proposed Development

Municipal Address	
Description of Location	
Land Use Classification	
Development Size (units)	
Development Size (m <sup>2</sup> )	
Number of Accesses and Locations	
Phase of Development	
Buildout Year	

**If available, please attach a sketch of the development or site plan to this form.**

### 2. Trip Generation Trigger

Considering the Development’s Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m <sup>2</sup>
Industrial	5,000 m <sup>2</sup>
Fast-food restaurant or coffee shop	100 m <sup>2</sup>
Destination retail	1,000 m <sup>2</sup>
Gas station or convenience market	75 m <sup>2</sup>

*\* If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

**If the proposed development size is greater than the sizes identified above, the Trip Generation Trigger is satisfied.**

### 3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the City’s Transit Priority, Rapid Transit or Spine Bicycle Networks?		
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		

\*DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).

**If any of the above questions were answered with ‘Yes,’ the Location Trigger is satisfied.**

### 4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 km/hr or greater?		
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?		
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 m of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?		
Is the proposed driveway within auxiliary lanes of an intersection?		
Does the proposed driveway make use of an existing median break that serves an existing site?		
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?		
Does the development include a drive-thru facility?		

**If any of the above questions were answered with ‘Yes,’ the Safety Trigger is satisfied.**

### 5. Summary

	Yes	No
Does the development satisfy the Trip Generation Trigger?		
Does the development satisfy the Location Trigger?		
Does the development satisfy the Safety Trigger?		

**If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).**

## Ben Sweet

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**Subject:** RE: IPU Review Comments - Oct 2018 EUCMUC MSS

On Jun 20, 2019, at 12:48 PM, Michael Michaud <[MMichaud@glenview.ca](mailto:MMichaud@glenview.ca)> wrote:

Hi Sam. Please see attached from Laura. Maybe the anticipated meeting is not required?

Mike

From: Laura Maxwell <[LMaxwell@dsel.ca](mailto:LMaxwell@dsel.ca)>

Sent: June 20, 2019 12:40 PM

To: van de Lande, Robin <[Robin.vandelande@ottawa.ca](mailto:Robin.vandelande@ottawa.ca)>; [Ted.Cooper@ottawa.ca](mailto:Ted.Cooper@ottawa.ca); Baird, Natasha <[Natasha.Baird@ottawa.ca](mailto:Natasha.Baird@ottawa.ca)>

Cc: 'Fairouz Wahab - Richcraft ([FWahab@richcraft.com](mailto:FWahab@richcraft.com))' <[FWahab@richcraft.com](mailto:FWahab@richcraft.com)>; Steve Pichette <[SPichette@dsel.ca](mailto:SPichette@dsel.ca)>; Matt Wingate <[MWingate@dsel.ca](mailto:MWingate@dsel.ca)>; Michael Michaud <[MMichaud@glenview.ca](mailto:MMichaud@glenview.ca)>

Subject: RE: IPU Review Comments - Oct 2018 EUCMUC MSS

Hi Robin, Ted, Natasha,

Please find attached draft updated storm servicing & pond concepts for the northwest quadrant, for review and discussion.

I've provided preliminary notes below [in red], based on a phone conversation with Ted last month about the City comments we received April 29, 2019 [in black].

Attachments are available for download at this link:

- \* <https://spaces.hightail.com/receive/e0VcWngSbx>
- \* Expires Friday June 28th

Can we please meet to discuss and set out next steps for the MSS?

We would like to suggest Monday, June 24th starting anytime between 11:00am and 12:30pm – are you available?

Thanks,

Laura Maxwell, B.Sc.(Civil Eng), M.Pl.  
Client Project Manager

DSEL  
david schaeffer engineering ltd.

phone: (613) 836-0856 ext. 527  
cell: (613) 293-8750  
email: [lmaxwell@DSEL.ca](mailto:lmaxwell@DSEL.ca)<<mailto:lmaxwell@DSEL.ca>>

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sender by reply email and destroy all copies of the original.

Following are IPU's comments following our review of the subject MSS:

#### General

The MSS has been prepared with the intention of fulfilling documentation requirements of the MEA Class EA process. It is normal practice for the City to require documentation and evaluation of alternatives in the MSS prior to recommending the approval by Council of the preferred water, wastewater and stormwater servicing plans (I have attached excerpts from the Area 10 MSS that provides an example of the typical type of servicing alternatives considered / evaluated in an MSS).

[Noted.]

[The public consultation report (that will be published as a MCEA document alongside the existing conditions report, the MSS, the MTS, and the CDP) will describe the evaluation of alternative development scenarios and associated servicing options. I've re-attached a summary of the evaluation that was presented at TAC #4 (Attachment A) and the associated responses to City comments (Attachment B), for reference.]

[The MSS will be updated to further document the consideration of alternative designs.]

It is acknowledged that previous servicing plans have been approved in recent years in the Southeast and Southwest quadrants that need not be re-opened (unless affected by changes in development / servicing elsewhere in the EUCMUC). However, the Northwest quadrant is largely a greenfield area where servicing alternatives are not constrained. (For the Northeast quadrant, given the passage of time and change in environmental setting, should this area remain part of the EUCMUC study area, existing preferred servicing approaches would need to be re-confirmed or revised as appropriate).

[Noted. While servicing alternatives may not be considered constrained within the quadrants, the MSS builds on the existing trunk infrastructure surrounding each quadrant that has been built with allowances for development of the subject lands.]

We are not requesting an exhaustive development and evaluation of alternatives. We explain what would be helpful in our comments on water, wastewater and stormwater below.

[Noted.]

The SWM approach and hydraulic modelling documentation included in the MSS was reviewed and found to be consistent with the City's master servicing and design guideline requirements.

[Noted.]

#### Water

As per the Area 10 examples, it would be helpful to present alternative watermain networks and a discussion, for example, of how the various alternatives improve looping, simplify phasing/implementation, etc.

[Consideration of alternative designs will be further described in the MSS. See snapshot below for alternative trunk watermain locations that were considered, based on available connection points to the City's existing watermain

network. The network identified in the MSS represents the minimum amount of trunk infrastructure required to meet service pressures and to provide a redundant network. The watermain network in the northeast quadrant will be defined as the internal road network is finalized for each development parcel.]

[\[cid:image001.jpg@01D52766.41F65DB0\]](#)

## Wastewater

Again, as per the Area 10 examples, alternative routing of trunk sewers should be presented. As noted in the EUCMUC MSS Alternatives attachment, there appears to be an opportunity to locate the deeper trunk sanitary sewer (Trunk 1) to the hydro corridor alignment (Trunk 2), which would avoid the need to construct the deeper trunk sewer on a local street within a narrow ROW.

[Consideration of the alternative designs will be further described in the MSS. Given the grade raise restrictions for the soils, the overall grading strategy is to keep the road grades as low as possible in the northwest quadrant. The sanitary sewer elevation drives the grading plan for the northwest quadrant. To keep sanitary sewers as flat as possible, the overall concept is to collect as much flow as possible into a main trunk sewer and have the alignment be as direct as possible to the existing outlet within the Orleans Village development. The sanitary sewer is expected to have a max cover of about 3.75m at the downstream end of the system.]

## Stormwater (Sewers)

The EUC MUC MSS Alternatives attachment presents a storm sewer alternative similar to the alternative wastewater solution referred to above, whereby the deeper trunk storm sewer (Trunk 1) is relocated to the hydro corridor (Trunk 2), which would avoid the need to construct a deep trunk storm sewer on a local street within a narrow ROW. The terminus of the Snow Storage Facility FM could be relocated to outlet to this storm trunk.

[Consideration of the alternative designs will be further described in the MSS. The attached updated servicing design relocates the trunk storm sewer towards the Hydro One corridor as suggested, to minimize the extent of large storm sewers within local roads, which will contribute to ease of maintenance. The updated servicing design restricts capture and requires storage up to the 100-year design event on development blocks other than low density residential areas. Note that there is a proposed 2.7m dia. storm trunk sewer within the local ROWs surrounding the pond. The attached memo from Paterson (Attachment C) confirms that the construction of a storm sewer up to 3m dia. is acceptable in this area, including where the storm trunk sewer runs parallel to the sanitary trunk sewer. Per the City's direction at TAC #5, the snow disposal facility is assumed to remain in place (e.g. no future development) with its forcemain directly connected to EUC Pond 1, like in existing conditions.]

## SWM Pond Expansion

The MSS identified the need to expand the existing EUC Pond 1. The MSS did not present / evaluate alternatives that were considered as to how / where the SWMP was to be expanded. The only approach presented included expansion of the SWMP into the woodlot surrounding the existing pond, part of which is subject to the City's Significant Woodland Guidelines. Application of the Significant Woodland Guidelines must follow the mitigation hierarchy outlined below, which lends itself well to the normal evaluation process requirements of MSSs / Class EAs previously approved by Council. As is outlined in the Guidelines, environmental reports must explicitly address how the mitigation hierarchy has been applied in the proposed development or site alteration.

The mitigation hierarchy is a widely accepted approach in conservation and land use planning for guiding decisions on protection of the natural environment. It categorizes and prioritizes protective measures according to their general type and effectiveness:

Priority 1 - Avoidance: redirection of the proposed action away from the natural feature.

Priority 2 - Minimization: reduction of the magnitude of the proposed action, either in space, time, or both.

Priority 3 - Mitigation: protection of the feature from the proposed action, through measures such as changes in design, physical barriers, and modified operating procedures.

Priority 4 - Compensation: off-setting of the impacts through replacement of the feature and its ecological functions elsewhere, typically at a ratio greater than 1:1 to reflect the greater risks.

The current draft of the MSS has focused entirely on Priority 4 – proposing compensation of only 0.5 ha of tree planting for every 1 ha of loss of woodland around EUC Pond 1. There will be a need to demonstrate why Priorities 1-3 cannot apply if there is a need to expand the SWM Pond into the Significant Woodlands at the perimeter of EUC Pond 1.

[Noted. The attached memo from Kilgour (Attachment D) clarifies the extent of the significant woodland. Based on the new woodland definition and the updated predicted storm inflows (including exclusion of future development of the snow dump), a revised draft pond footprint is proposed for City comment. Please note that overall this pond does not meet the RVCA's request for 80% TSS removal (which is beyond the 70% TSS removal approved for the existing EUC Pond 1), but is expected to achieve around 78% TSS removal for the lands draining to the proposed expanded north forebays.]

Four alternative SWM pond expansion concepts have been presented in the EUCMUC MSS Alternatives attachment. The alternatives present incremental pond expansion approaches:

1) Construct new sediment forebay at east end of existing SWMP, and modify existing outlet structure to more closely discharge pre-development flows so as to minimize peak quantity control storage requirements;

[Per discussions with City staff regarding the Mud Creek CIS study, the project team has previously been directed to keep the existing EUC Pond 1 outflows that were approved under the existing ECA for EUC Pond 1.]

2) If additional quantity control is required beyond Alternative 1, expand existing SWMP into hydro corridor to the south;

[Per the approved EUC Pond 1 design drawings, the Hydro One corridor is the location of the sediment management area for EUC Pond 1.]

3) If additional quantity control is required beyond Alternative 2, expand SWMP to the east of the existing SWMP;

[Noted.]

4) If additional quantity control is required beyond Alternative 3, expand existing SWMP into area south of existing SWMP.

[Noted.]

If there is no means to satisfy quantity and quality control requirements with Alternative 4, then the SWMP could be expanded to the north into the Significant Woodland providing acceptable compensation is agreed to.

[Noted.]

[I've attached an updated slope stability report for the area surrounding the pond (Attachment E), prepared in response

to the geotechnical peer review comments dated April 5, 2019 (Attachment F) and RVCA comments dated February 11, 2019 and March 7, 2019 (Attachment G). The slope stability report shows that the pond slopes could be constructed close to the existing headwater features provided the limit of hazard line is respected, although additional clearance is proposed under the latest pond concept.]

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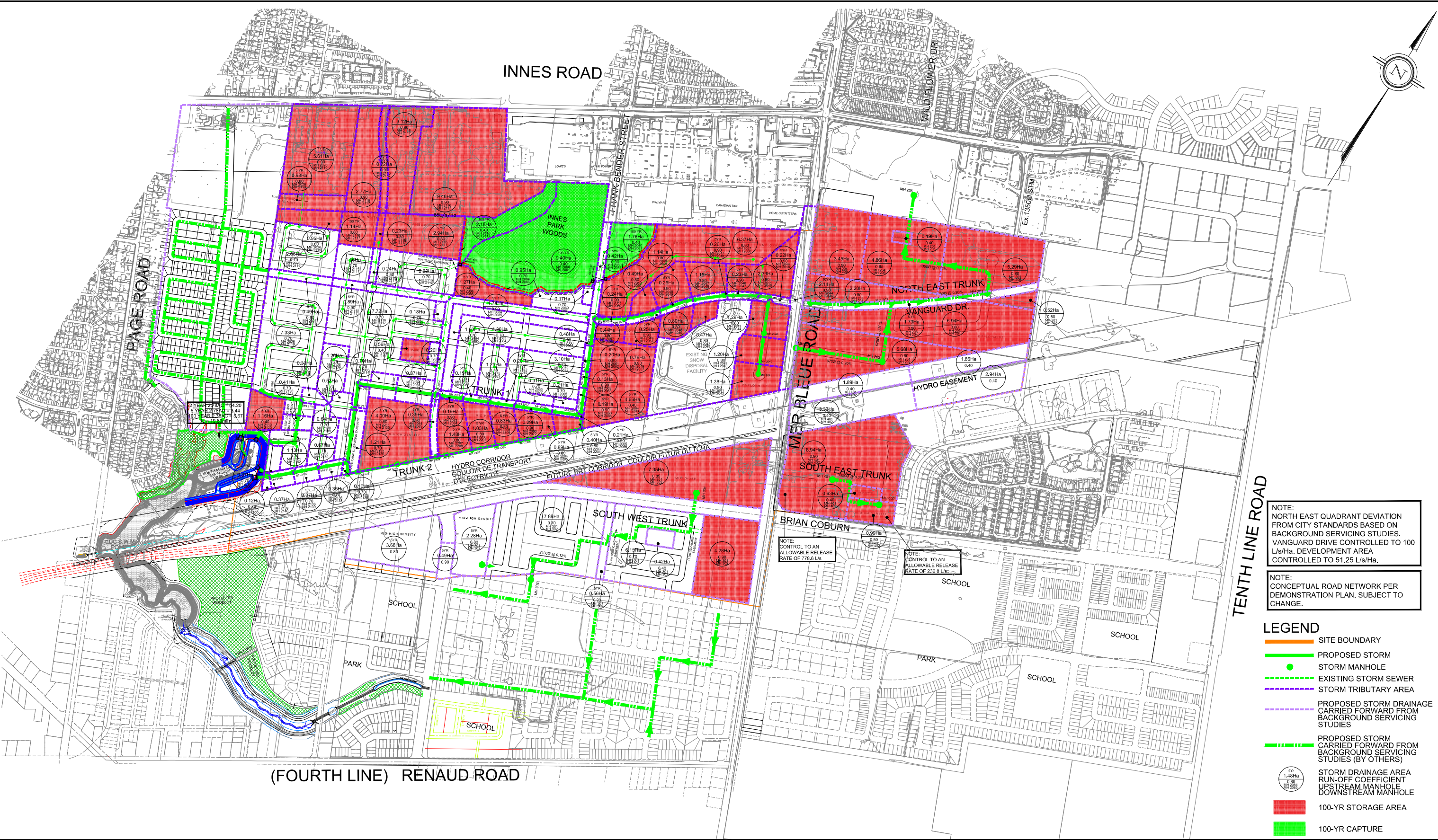
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<03D\_733\_ServicingPlan\_June2019\_DRAFT.pdf>

<03F\_733\_ExistSWMPond\_June2019\_DRAFT.pdf>



NOTE:  
NORTH EAST QUADRANT DEVIATION  
FROM CITY STANDARDS BASED ON  
BACKGROUND SERVICING STUDIES.  
VANGUARD DRIVE CONTROLLED TO 100  
L/s/ha. DEVELOPMENT AREA  
CONTROLLED TO 51.25 L/s/ha.

NOTE:  
CONCEPTUAL ROAD NETWORK PER  
DEMONSTRATION PLAN. SUBJECT TO  
CHANGE.

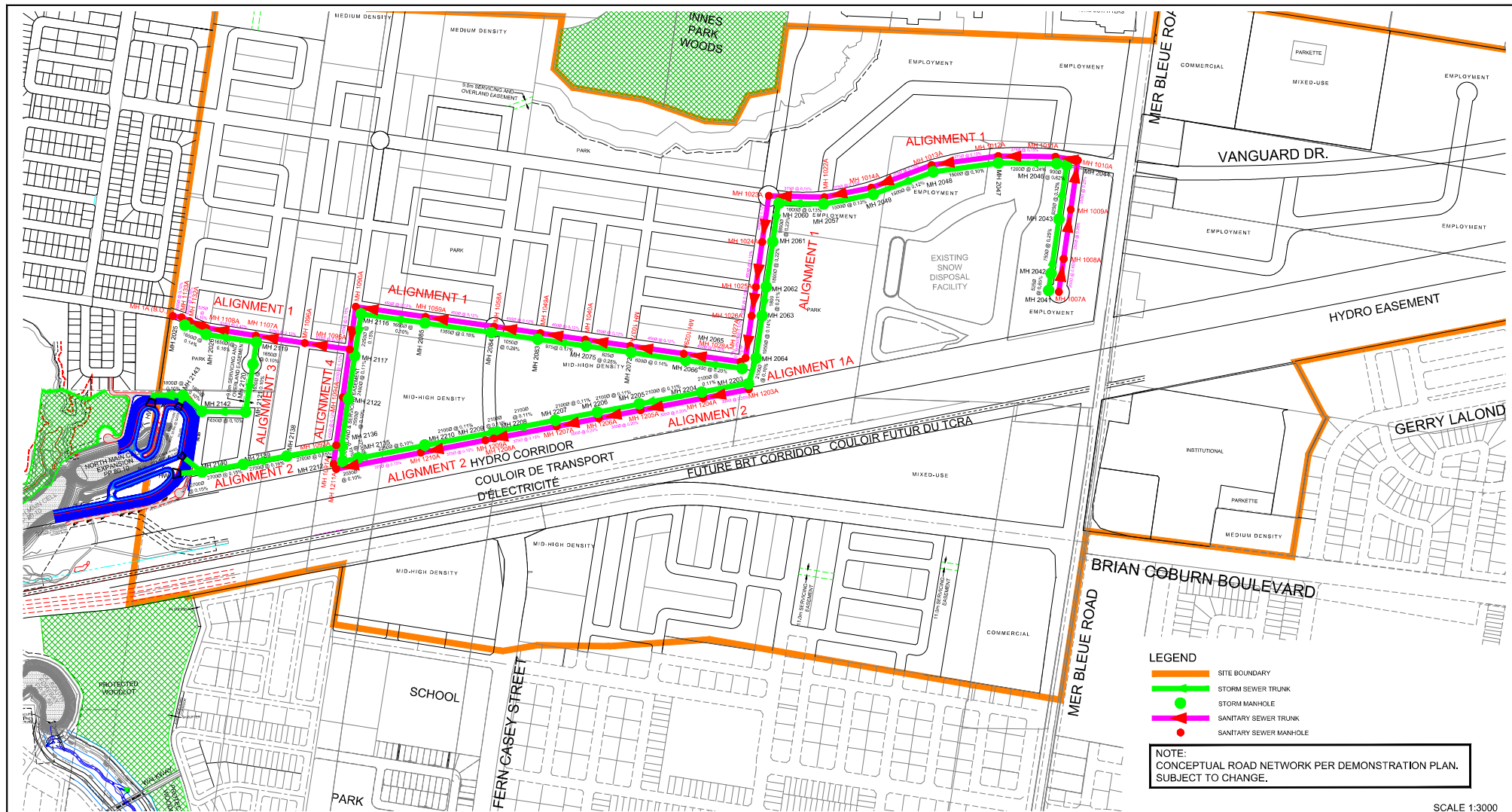
- LEGEND**
- SITE BOUNDARY
  - PROPOSED STORM
  - STORM MANHOLE
  - EXISTING STORM SEWER
  - STORM TRIBUTARY AREA
  - PROPOSED STORM DRAINAGE CARRIED FORWARD FROM BACKGROUND SERVICING STUDIES
  - PROPOSED STORM DRAINAGE CARRIED FORWARD FROM BACKGROUND SERVICING STUDIES (BY OTHERS)
  - 5YR  
1.48Ha  
10YR  
2.15Ha STORM DRAINAGE AREA RUN-OFF COEFFICIENT UPSTREAM MANHOLE DOWNSTREAM MANHOLE
  - 100-YR STORAGE AREA
  - 100-YR CAPTURE



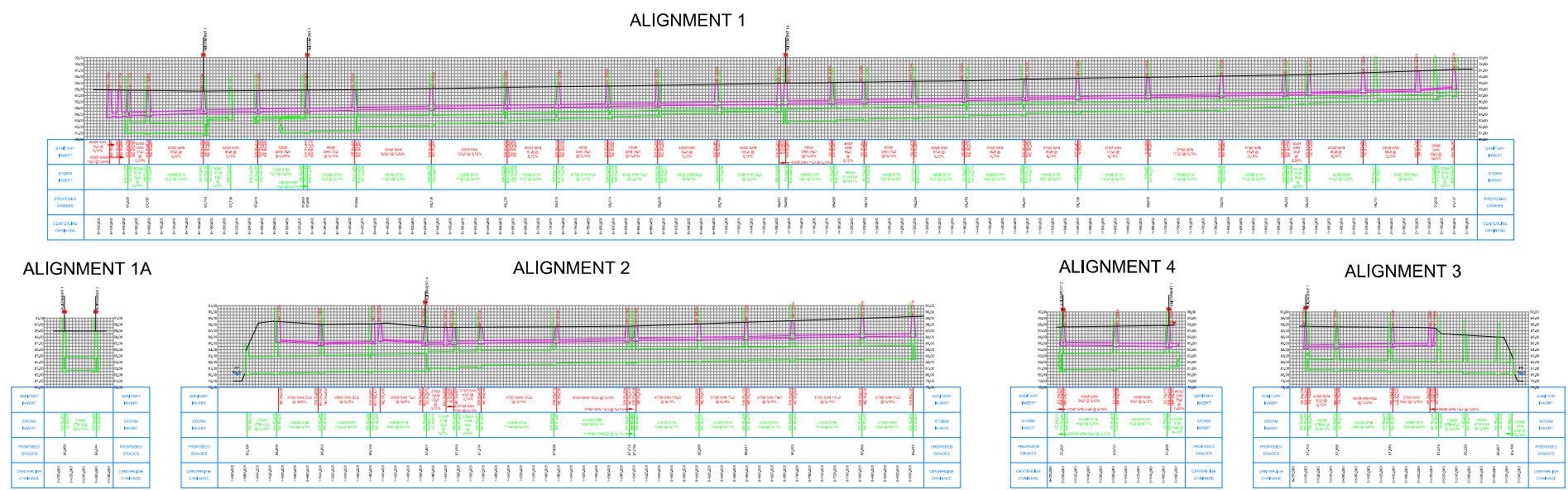
120 Iber Road, Unit 103  
Stittsville, ON K2S 1E9  
Tel. (613) 836-0856  
Fax. (613) 836-7183  
www.DSEL.ca

**EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN  
CONCEPTUAL STORM SERVICING**

PROJECT No. :	14-733
SCALE	1:5000
DATE:	JUNE 2019
DRAWING No.	4



SCALE 1:3000



SCALE HOR. 1:3000  
VER. 1:300

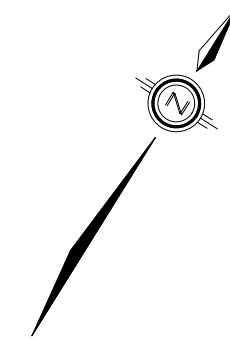
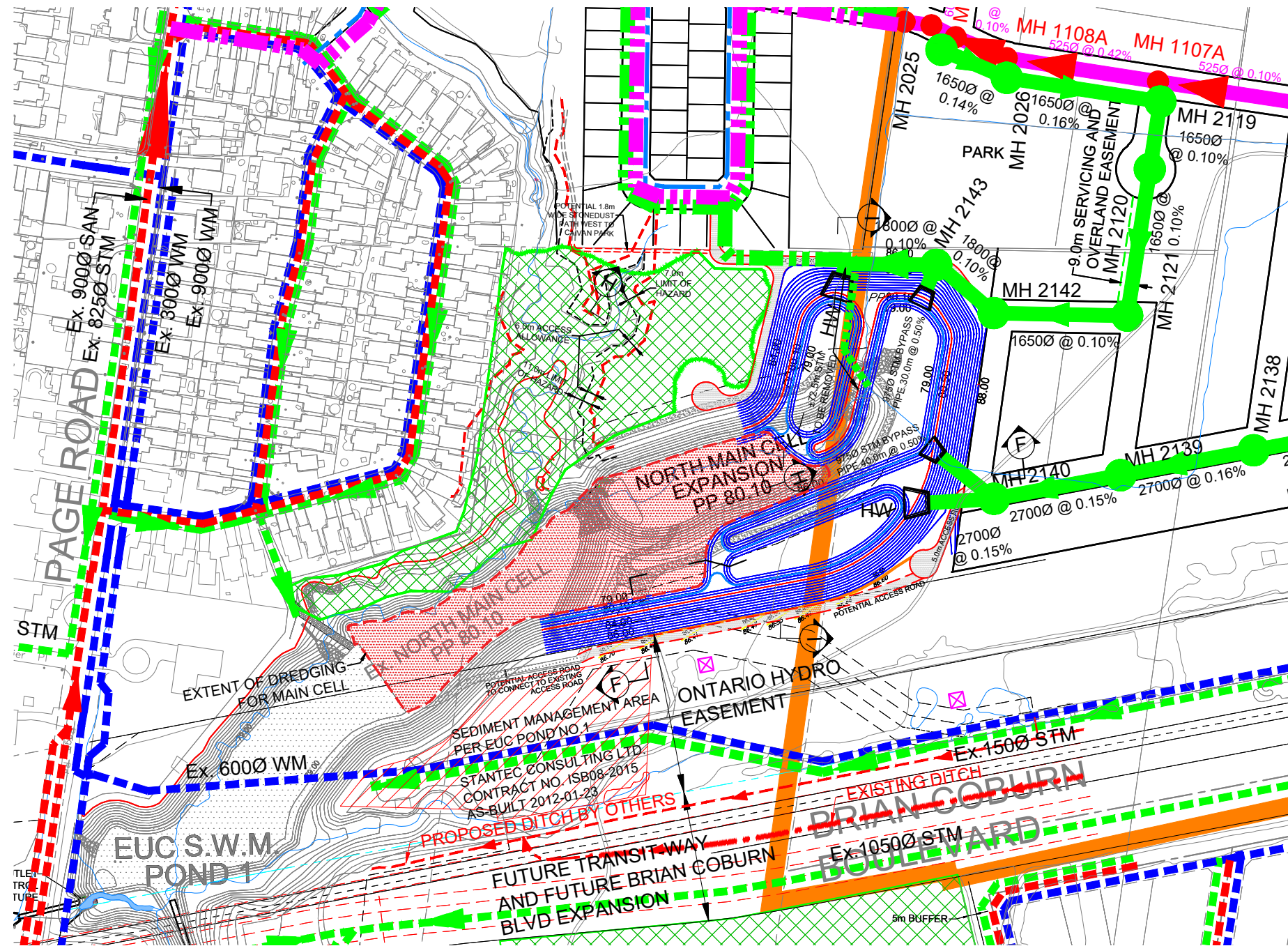


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EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN  
STORM AND SANITARY TRUNK PROFILES  
OPTION 1 - ONE POND

PROJECT No. : 14-733  
SCALE: NOT APPLICABLE  
DATE: JUNE 2019  
DRAWING No. 3

EUC POND No. 1 PAGE ROAD SWM FACILITY  
 REFER TO  
 STANTEC CONSULTING LTD.  
 CONTRACT No. ISB08-2015  
 AS-BUILT 2012-01-23



**LEGEND**

- - - EXISTING STORM SEWER
- PROPOSED STORM TRUNK
- - - PROPOSED STORM SEWER
- - - STORM SEWER BY OTHERS
- - - EXISTING SANITARY SEWER
- PROPOSED SAN SEWER
- - - SAN SEWER BY OTHERS
- - - EXISTING WATERMAIN
- PROPOSED WATERMAIN
- - - WATERMAIN BY OTHERS
- ⊠ EXISTING HYDRO TOWER
- ▨ SEDIMENT MANAGEMENT AREA

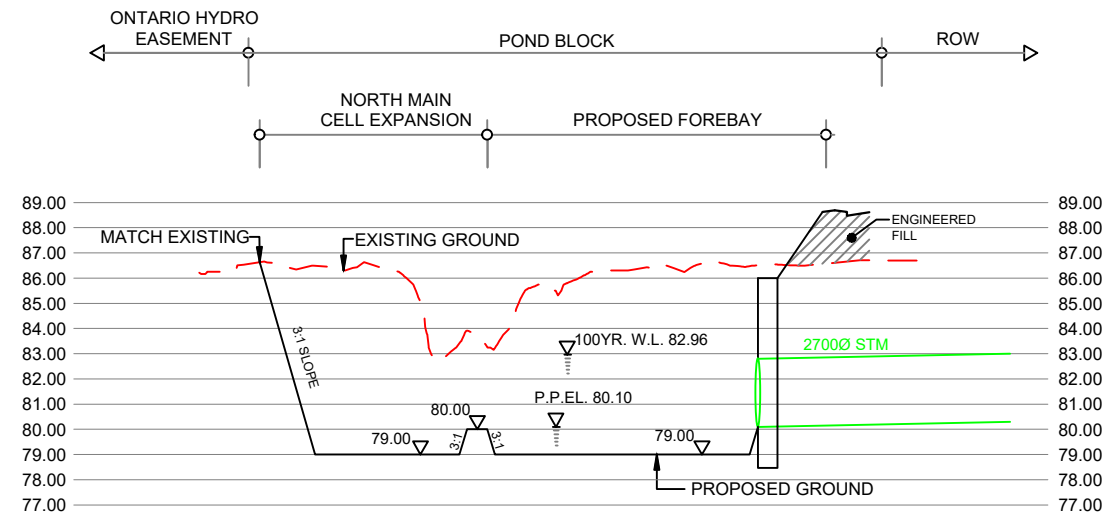
NOTE:  
 FOR CROSS-SECTIONS F, H, AND I,  
 REFER TO FIGURE 3A



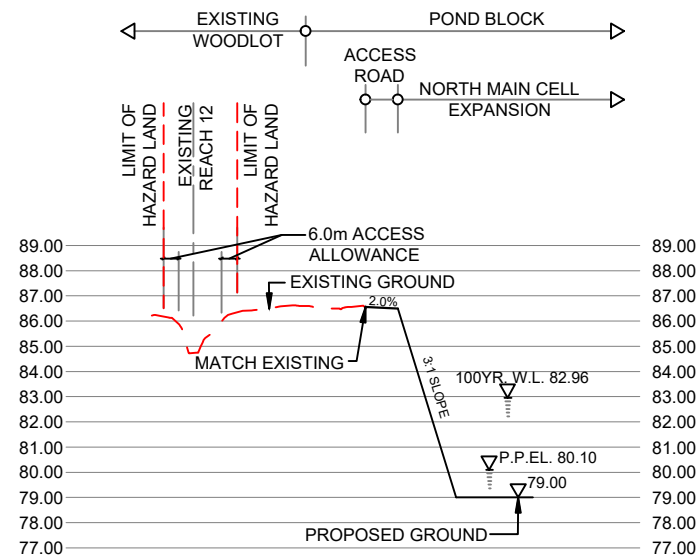
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 Stittsville, ON K2S 1E9  
 TEL: (613) 836-0856  
 FAX: (613) 836-7183  
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**EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN**  
**PROPOSED SWM POND EXPANSION**  
**CITY OF OTTAWA**

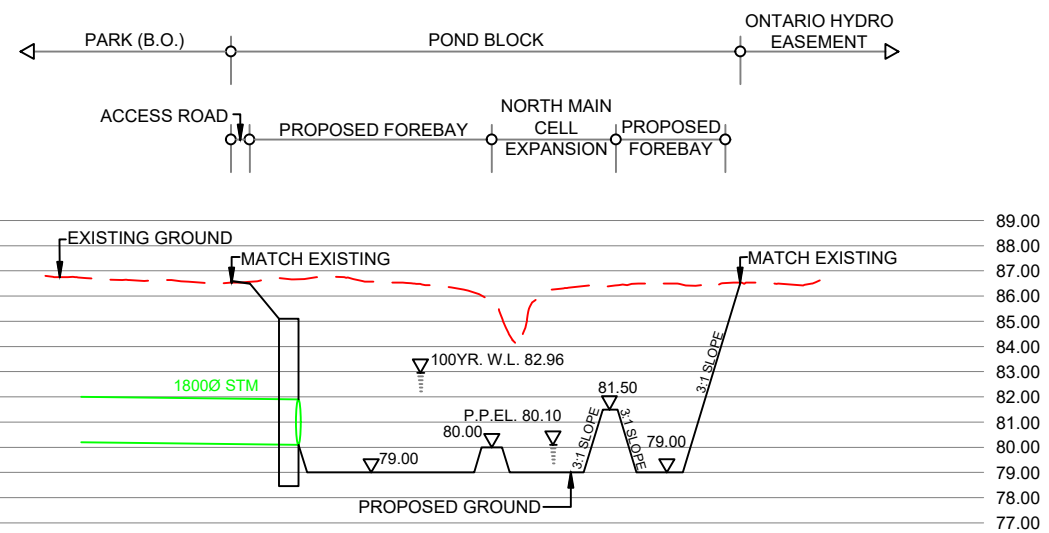
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PROJECT No.:	14-733
FIGURE	3



SECTION F-F  
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VER. 1:300



SECTION H-H  
SCALE HOR. 1:3000  
VER. 1:300



SECTION I-I  
SCALE HOR. 1:3000  
VER. 1:300

**Appendix B**  
**Servicing Report Checklist**

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Executive Summary (for larger reports only).	NA		
Date and revision number of the report.	Y	Cover	
Location map and plan showing municipal address, boundary, and layout of proposed development.	Y	Fig 1.1, 1.2, 1.3	
Plan showing the site and location of all existing services.	Y	Fig 1.2	
Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	NA		
Summary of Pre-consultation Meetings with City and other approval agencies.	Y	1	
Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	Y	2	
Statement of objectives and servicing criteria.	Y	1	
Identification of existing and proposed infrastructure available in the immediate area.	Y	4,5,6	
Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	NA		
Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighboring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Y	GR	

4.1 General Content	Addressed (Y/N/NA)	Section	Comments
Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	NA		
Proposed phasing of the development, if applicable.	NA		
Reference to geotechnical studies and recommendations concerning servicing.	Y	2.2	
All preliminary and formal site plan submissions should have the following information:			
Metric scale	NA		
North arrow (including construction North)	NA		
Key plan	NA		
Name and contact information of applicant and property owner	NA		
Property limits including bearings and dimensions	NA		
Existing and proposed structures and parking areas	NA		
Easements, road widening and rights-of-way	NA		
Adjacent street names	NA		

4.2 Water	Addressed (Y/N/NA)	Section	Comments
Confirm consistency with Master Servicing Study, if available.	Y	6	
Availability of public infrastructure to service proposed development.	Y	6	
Identification of system constraints.	Y	6	
Identify boundary conditions.	Y	6	
Confirmation of adequate domestic supply and pressure.	Y	6	
Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	Y	6	
Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	Y	6	
Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design.	N		TBD as part of detailed design
Address reliability requirements such as appropriate location of shut-off valves.	N		TBD as part of detailed design
Check on the necessity of a pressure zone boundary modification.	NA		
Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	Y	6	
Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants) including special metering provisions.	Y	6, GP	
Description of off-site required feeder mains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	NA		
Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Y	6	
Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Y	Fig 6.1	

4.3 Wastewater	Addressed (Y/N/NA)	Section	Comments
Summary of proposed design criteria (Note: Wet-weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	Y	5	
Confirm consistency with Master Servicing Study and/or justifications for deviations.	Y	5	
Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	NA		
Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Y	5	
Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable)	Y	5	
Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	NA		
Description of proposed sewer network including sewers, pumping stations, and forcemains.	Y	5	
Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	NA		
Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	NA		
Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	NA		
Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	NA		
Special considerations such as contamination, corrosive environment etc.	NA		

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Description of drainage outlets and downstream constraints including legality of outlet (i.e. municipal drain, right-of-way, watercourse, or private property).	Y	4	
Analysis of the available capacity in existing public infrastructure.	NA		
A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns and proposed drainage patterns.	Y	AppC	
Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	Y	4	
Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Y	4	
Description of stormwater management concept with facility locations and descriptions with references and supporting information.	Y	4	
Set-back from private sewage disposal systems.	NA		
Watercourse and hazard lands setbacks.	NA		
Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	NA		
Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Y	4	
Storage requirements (complete with calcs) and conveyance capacity for 5 yr and 100 yr events.	Y	4	
Identification of watercourse within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	Y	4	
Calculate pre and post development peak flow rates including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	Y	4	
Any proposed diversion of drainage catchment areas from one outlet to another.	NA		
Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and SWM facilities.	Y	4	
If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	NA		

4.4 Stormwater	Addressed (Y/N/NA)	Section	Comments
Identification of municipal drains and related approval requirements.	NA		
Description of how the conveyance and storage capacity will be achieved for the development.	Y	4	
100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Y	4	
Inclusion of hydraulic analysis including HGL elevations.	Y	4	
Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Y	8	
Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	Y	4	
Identification of fill constrains related to floodplain and geotechnical investigation.	NA		

4.5 Approval and Permit Requirements	Addressed (Y/N/NA)	Section	Comments
Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams as defined in the Act.	Y	9	
Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	Y	9	
Changes to Municipal Drains.	NA		
Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Y	9	

4.6 Conclusion	Addressed (Y/N/NA)	Section	Comments
Clearly stated conclusions and recommendations.	Y	10	
Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	NA		
All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario.	Y	11	

**Appendix C**  
**Storm Sewer Design Sheets and Stormwater Management Calculations**

**STORM SEWER CALCULATION SHEET (RATIONAL METHOD)**

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

Manning 0.013



LOCATION			AREA (Ha)																FLOW					SEWER DATA													
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO				
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)	(%)	(m)	(l/s)	(m/s)	LOW (min)	Q/Q full					
	2085	2116	0.70	0.70	1.36	68.69			0.00	14.26			0.00	5.35			0.00	12.43	26.63	43.35	58.42	0.00	99.58	5049	3000	3000	CONC	0.10	119.5	14194	2.01	0.99	0.36				
PARK			0.56	0.40	0.62	69.32			0.00	14.26			0.00	5.35			0.00	12.43																			
			1.16	0.70	2.26	71.57			0.00	14.26			0.00	5.35	1.13	0.80	2.51	14.95																			
			2.62	0.70	5.10	76.67			0.00	14.26			0.00	5.35			0.00	14.95																			
FUTURE EXT. COMM.			2.77	0.90	6.93	83.60			0.00	14.26			0.00	5.35			0.00	14.95																			
			0.00	0.00	0.00	83.60			0.00	14.26			0.00	5.35	2.94	0.80	6.54	21.48																			
FUTURE EXT. COMM.			3.12	0.90	7.81	91.41			0.00	14.26			0.00	5.35			0.00	21.48																			
			7.72	0.70	15.02	106.43			0.00	14.26			0.00	5.35			0.00	21.48																			
			0.23	0.80	0.51	106.94			0.00	14.26			0.00	5.35			0.00	21.48																			
			0.72	0.90	1.80	108.75			0.00	14.26			0.00	5.35			0.00	21.48																			
			9.47	0.90	0.00	108.75			0.00	14.26			0.00	5.35	2.18	0.40	2.42	23.91						85L/s/Ha	805												
FUTURE E	2116	2117	0.24	0.80	0.53	109.28	0.89	0.90	2.23	16.49			0.00	5.35			0.00	23.91	27.62	42.31	57.01	0.00	97.17	8692	3000	3000	CONC	0.13	75.0	16183	2.29	0.55	0.54				
	2117	2118	0.53	0.70	1.03	110.31			0.00	16.49			0.00	5.35			0.00	23.91	28.16	41.77	56.27	0.00	95.89	8633	3000	3000	CONC	0.13	85.0	16183	2.29	0.62	0.53				
			0.30	0.70	0.58	110.89			0.00	16.49			0.00	5.35			0.00	23.91																			
			0.64	0.70	1.25	112.14			0.00	16.49			0.00	5.35			0.00	23.91																			
	2118	2119	1.26	0.70	2.45	114.59			0.00	16.49			0.00	5.35			0.00	23.91	28.78	41.17	55.46	0.00	94.49	8696	3000	3000	CONC	0.10	80.5	14194	2.01	0.67	0.61				
FUTURE EXT. COMM.			5.63	0.90	14.09	128.68			0.00	16.49			0.00	5.35			0.00	23.91																			
FUTURE EXT. MED.			0.00	0.00	0.00	128.68			0.00	16.49			0.00	5.35	0.95	0.80	2.11	26.02																			
PARK			1.16	0.40	1.29	129.97			0.00	16.49			0.00	5.35			0.00	26.02																			
			2.86	0.70	5.57	135.53			0.00	16.49			0.00	5.35			0.00	26.02																			
			0.00	0.00	0.00	135.53			0.00	16.49			0.00	5.35	0.95	0.80	2.11	28.13																			
	2119	2120	7.33	0.70	14.26	149.80	0.49	0.90	1.23	17.71			0.00	5.35			0.00	28.13	29.45	40.54	54.60	0.00	93.03	10463	3000	3000	CONC	0.10	47.0	14194	2.01	0.39	0.74				
	2120	2121	0.41	0.70	0.80	150.60			0.00	17.71			0.00	5.35			0.00	28.13	29.84	40.19	54.12	0.00	92.20	10409	3000	3000	CONC	0.10	84.5	14194	2.01	0.70	0.73				
	2121	2142	1.13	0.70	2.20	152.79			0.00	17.71			0.00	5.35			0.00	28.13	29.84	40.19	54.12	0.00	92.20	10498	3000	3000	CONC	0.10	76.0	14194	2.01	0.63	0.74				
To TRUNK 2						152.79				17.71				5.35				28.13	30.54																		
TRUNK 2																																					
	2201	2202	6.77	0.80	15.06	15.06			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	1156	1350	1350	CONC	0.10	110.0	1688	1.18	1.55	0.69				
	2202	2203	0.00	0.00	0.00	15.06			0.00	0.00			0.00	0.00			0.00	0.00	11.55	71.31	96.64	0.00	165.49	1074	1350	1350	CONC	0.10	110.0	1688	1.18	1.55	0.64				
			0.40	0.80	0.89	15.95			0.00	0.00			0.00	0.00			0.00	0.00																			
	2203	2204	4.64	0.40	5.16	21.11			0.00	0.00			0.00	0.00			0.00	0.00	13.11	66.62	90.21	0.00	154.38	1406	1350	1350	CONC	0.10	110.0	1688	1.18	1.55	0.83				
	2204	2205	0.89	0.80	1.98	23.09			0.00	0.00			0.00	0.00			0.00	0.00	14.66	62.57	84.66	0.00	144.79	1444	1350	1350	CONC	0.12	110.0	1849	1.29	1.42	0.78				
	2205	2206	0.83	0.80	1.85	24.93			0.00	0.00			0.00	0.00			0.00	0.00	16.08	59.32	80.21	0.00	137.12	1479	1350	1350	CONC	0.12	110.0	1849	1.29	1.42	0.80				
	2206	2207	1.03	0.80	2.29	27.22			0.00	0.00			0.00	0.00			0.00	0.00	17.50	56.43	76.26	0.00	130.30	1536	1500	1500	CONC	0.10	109.5	2235	1.26	1.44	0.69				
	2207	2208	0.00	0.00	0.00	27.22			0.00	0.00			0.00	0.00			0.00	0.00	18.95	53.79	72.65	0.00	124.09	1464	1500	1500	CONC	0.10	92.0	2235	1.26	1.21	0.66				
	2208	2209	1.48	0.80	3.29	30.51			0.00	0.00			0.00	0.00			0.00	0.00	20.16	51.78	69.91	0.00	119.36	1580	1500	1500	CONC	0.10	91.5	2235	1.26	1.21	0.71				
	2209	2210			0.00	30.51	0.39	0.90	0.98	0.98			0.00	0.00			0.00	0.00	21.36	49.94	67.39	0.00	115.03	1589	1500	1500	CONC	0.10	91.5	2235	1.26	1.21	0.71				
	2210	2211	0.00	0.00	0.00	30.51			0.00	0.98			0.00	0.00			0.00	0.00	22.57	48.23	65.07	0.00	111.04	1535	1500	1500	CONC	0.10	35.0	2235	1.26	0.46	0.69				
	2211	2212	3.97	0.80	8.83	39.34			0.00	0.98			0.00	0.00			0.00	0.00	23.03	47.62	64.23	0.00	109.59	1936	1650	1650	CONC	0.10	35.0	2882	1.35	0.43	0.67				
	2212	2136	0.10	0.70	0.19	39.54			0.00	0.98			0.00	0.00			0.00	0.00	23.46	47.05	63.47	0.00	108.27	1922	1650	1650	CONC	0.10	35.0	2882	1.35	0.43	0.67				
			0.35	0.70	0.68	40.22			0.00	0.98			0.00	0.00			0.00	0.00																			
	2136	2138	1.21	0.70	2.35	42.57			0.00	0.98			0.00	0.00																							

# STORM SEWER DESIGN SHEET



Novatech Project #: 118224  
 Project Name: 0 Innes Road (Former BMR Lands)  
 Date Prepared: 10/4/2019  
 Date Revised:  
 Input By: Ben Sweet  
 Reviewed By: Sam Bahia  
 Drawing Reference: 118224-GP AND 118224-STM

Legend: PROJECT SPECIFIC INFO  
 USER DESIGN INPUT  
 CUMULATIVE CELL  
 CALCULATED DESIGN CELL OUTPUT  
 USER AS-BUILT INPUT

LOCATION			DEMAND											CAPACITY													
STREET	FROM MH	TO MH	AREA					TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	RAIN INTENSITY (mm/hr)			PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (Q <sub>Design</sub> )	TOTAL RESTRICTED PEAK FLOW (Q)	PROPOSED SEWER PIPE SIZING / DESIGN								
			AREA ID	FUTURE	HIGH DENSITY	ROAD 1	REAR YARD 1 (TOWN)						REAR YARD 2 (SINGLE/SEMI)	PARK	2yr				5yr	100yr	LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY
			0.80	0.70	0.50	0.45	0.25	(ha)			(min.)				(L/s)	(L/s)	(m)	(mm / type)	(m)	(%)	(L/s)	(m/s)	(min.)	(%)			
Street 9	149	150	A1		0.32				0.32	0.70	0.62	0.62	10.00	76.81		47.83	47.8		93.9	375 PVC	0.381	0.013	0.32	103.5	0.91	1.72	46.2%
								0.00	0.00	0.00	0.00	0.00	10.00		0.00												
								0.00	0.00	0.00	0.00	0.00	10.00		0.00												
	150	151	A2, B1		0.24				0.24	0.70	0.47	1.09	11.72	70.76		77.11											
					1.01				1.01	0.80	2.25	2.25	11.72		95.89	215.39											
									0.00	0.00	0.00	0.00	11.72		0.00												
									0.00	0.00	0.00	1.09	12.84	67.40	73.45												
									0.00	0.00	0.00	2.25	12.84		205.01												
151	152	-						0.00	0.00	0.00	0.00	12.84	91.27		0.00												
								0.00	0.00	0.00	0.00	12.84		0.00													
152	153	A3, B2		0.14				0.14	0.70	0.27	1.36	13.34	65.99		89.89												
				1.03				1.03	0.80	2.29	4.54	13.34		89.34	405.31												
								0.00	0.00	0.00	0.00	13.34		0.00													
								0.45	0.70	0.88	2.24	14.11	63.95		143.11												
153	99	A4A		0.45				0.00	0.00	0.00	4.54	14.11		86.55	392.65												
								0.00	0.00	0.00	0.00	14.11		0.00													
								0.00	0.00	0.00	2.24	14.57	62.79		140.52												
99	100	-						0.00	0.00	0.00	4.54	14.57		84.96	385.45												
								0.00	0.00	0.00	0.00	14.57		0.00													
								0.23	0.70	0.45	2.69	15.22	61.26		164.52												
100	101	A4B		0.23				0.00	0.00	0.00	4.54	15.22		82.87	375.96												
								0.00	0.00	0.00	0.00	15.22		0.00													
								0.77	0.70	1.50	4.18	15.37	60.90		254.81												
101	75	A7		0.77				0.00	0.00	0.00	4.54	15.37		82.37	373.73												
								0.00	0.00	0.00	0.00	15.37		0.00													
Street 2	72	73	A5		0.89				0.89	0.70	1.73	1.73	10.00	76.81		133.02											
								0.00	0.00	0.00	0.00	10.00		0.00													
								0.00	0.00	0.00	0.00	10.00		0.00													
73	74	-						0.00	0.00	0.00	1.73	11.49	71.53		123.88												
								0.00	0.00	0.00	0.00	11.49		0.00													
								0.00	0.00	0.00	0.00	11.49		0.00													
74	75	A6		0.35				0.35	0.70	0.68	2.41	11.63	71.07		171.51												
								0.00	0.00	0.00	0.00	11.63		0.00													
								0.00	0.00	0.00	0.00	11.63		0.00													
Street 2	75	76	A8		0.31				0.31	0.70	0.60	7.20	16.50	58.44		420.75											
								0.00	0.00	0.00	4.54	16.50		79.00	358.42												
								0.00	0.00	0.00	0.00	16.50		0.00													
Street 1	97	98	C1		0.61				0.00	0.70	1.19	1.19	10.00	104.19		123.68											
								0.00	0.00	0.00	0.00	10.00		0.00													
98	76	C2		0.60				0.00	0.70	1.17	2.35	11.28	97.90		230.52												
								0.00	0.00	0.00	0.00	11.28		0.00													
Street 3	76	77	C3, A9		0.28				0.28	0.70	0.54	7.75	17.24	56.94		441.02											
					0.06			0.06	0.70	0.12	7.01	17.24		76.96	539.34												
								0.00	0.00	0.00	0.00	17.24		0.00													
Street 4	77	95	A12		0.84				0.84	0.70	1.63	9.38	17.94	55.59		521.45											
								0.00	0.00	0.00	7.01	17.94		75.11	526.43												
								0.00	0.00	0.00	0.00	17.94		0.00													
95	96	-						0.00	0.00	0.00	9.38	19.16	53.43		501.16												
								0.00	0.00	0.00	7.01	19.16		72.16	505.73												
								0.00	0.00	0.00	0.00	19.16		0.00													
96	79	A14		0.41				0.41	0.70	0.80	10.18	19.32	53.16		541.03												
								0.00	0.00	0.00	7.01	19.32		71.79	503.14												
								0.00	0.00	0.00	0.00	19.32		0.00													
Street 3	77	78	A10		0.30				0.30	0.70	0.58	0.58	10.00	76.81		44.84											
								0.00	0.00	0.00	0.00	10.00		0.00													
								0.00	0.00	0.00	0.00	10.00		0.00													
Street 5	43	78	A11		0.18				0.18	0.70	0.35	0.35	10.00	76.81		26.90											
								0.00	0.00	0.00	0.00	10.00		0.00													
								0.00	0.00	0.00	0.00	10.00		0.00													
78	45	A13		0.81				0.81	0.70	1.58	2.51	10.51	74.91		188.06												
								0.00	0.00	0.00	0.00	10.51		0.00													
								0.00	0.00	0.00	0.00	10.51		0.00													
45	79	-						0.00	0.00	0.00	2.51	11.01	73.14		183.60												
								0.00	0.00	0.00	0.00	11.01		0.00													
								0.00	0.00	0.00	0.00	11.01		0.00													

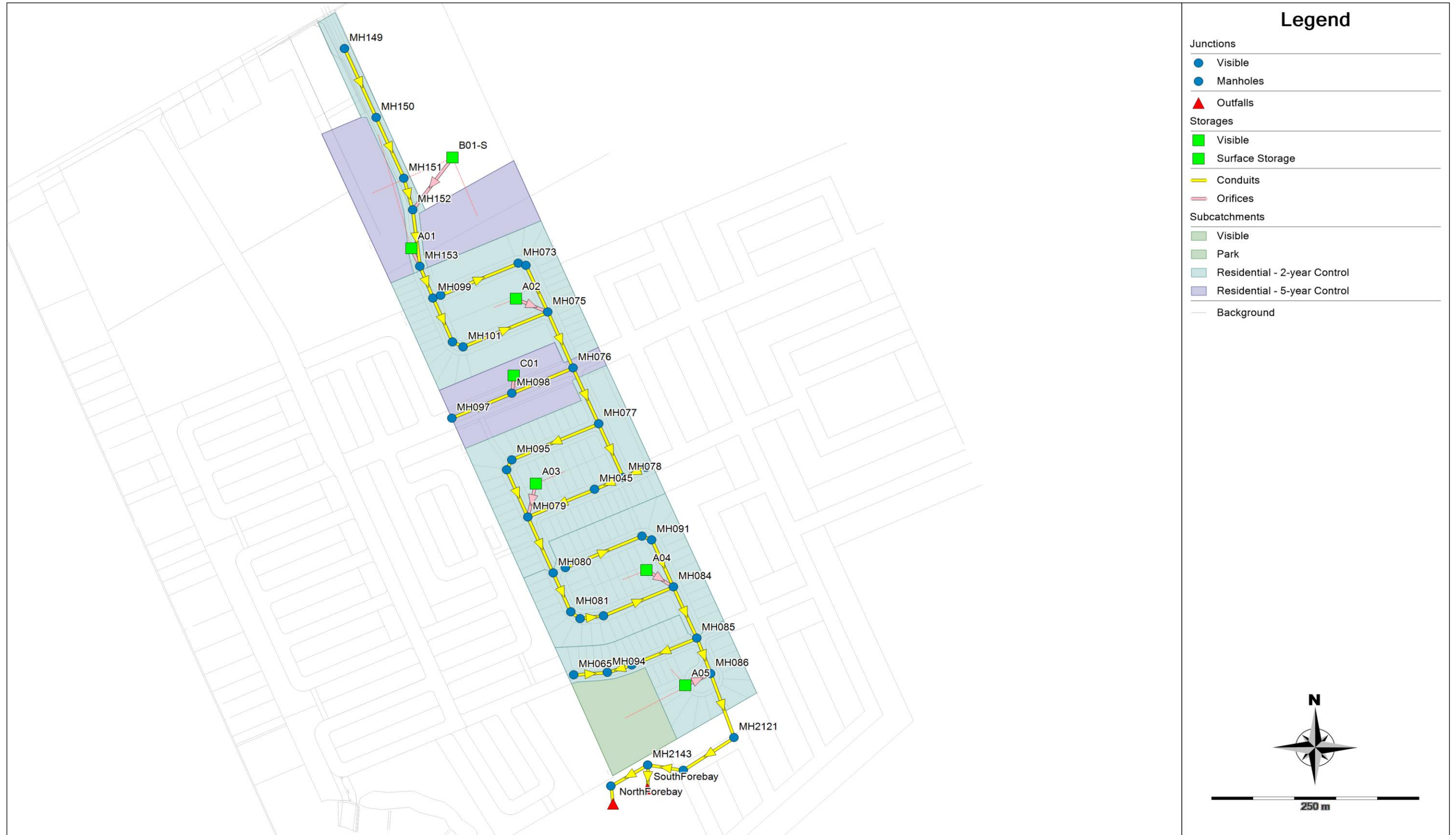
STORM SEWER DESIGN SHEET

LOCATION			DEMAND													CAPACITY													
STREET	FROM MH	TO MH	AREA					TOTAL AREA	WEIGHTED RUNOFF COEFFICIENT	INDIVI 2.78 AR	ACCUM 2.78 AR	TIME OF CONC	RAIN INTENSITY (mm/hr)			PEAK FLOW	TOTAL UNCONTROLLED PEAK FLOW (QDesign)	TOTAL RESTRICTED PEAK FLOW (Q)	PROPOSED SEWER PIPE SIZING / DESIGN										
			AREA ID	FUTURE	HIGH DENSITY	ROAD 1	REAR YARD 1 (TOWN)						REAR YARD 2 (SINGLE/SEMI)	PARK	2yr				5yr	100yr	LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
					0.80	0.70	0.50	0.45	0.25	(ha)									(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)		
Street 4	79	80	A15			0.32				0.32	0.70	0.62	13.31	20.06	51.93			691.18	1182.5		76.0	1200 CONC	1.2192	0.013	0.20	1819.0	1.56	0.81	65.0%
	80	81	A16			0.57				0.57	0.70	1.11	14.42	20.88	50.66			730.52	1209.8		53.2	1200 CONC	1.2192	0.013	0.20	1819.0	1.56	0.57	66.5%
	81	82	-							0.00		0.00	14.42	21.45	49.81			718.31	1189.5		13.9	1200 CONC	1.2192	0.013	0.20	1819.0	1.56	0.15	65.4%
	82	83	A17			0.16				0.16	0.70	0.31	14.73	21.60	49.60			730.64	1199.7		28.4	1200 CONC	1.2192	0.013	0.20	1819.0	1.56	0.30	66.0%
	83	84	A19			0.60				0.60	0.70	1.17	15.90	21.90	49.16			781.64	1246.6		91.1	1200 CONC	1.2192	0.013	0.20	1819.0	1.56	0.97	68.5%
Street 6	89	90	A18			0.79				0.79	0.70	1.54	1.54	10.00	76.81			118.08	118.1		100.0	450 PVC	0.4572	0.013	0.32	168.3	1.02	1.63	70.2%
	90	91	-							0.00		0.00	1.54	11.63	71.08			109.27	109.3		12.6	450 PVC	0.4572	0.013	0.32	168.3	1.02	0.20	64.9%
	91	84	A20			0.41				0.41	0.70	0.80	2.34	11.83	70.43			164.46	164.5		64.2	525 CONC	0.5334	0.013	0.32	253.8	1.14	0.94	64.8%
Street 6	84	85	A21			0.31				0.31	0.70	0.60	18.84	22.87	47.82			900.88	1353.0		70.0	1350 CONC	1.3716	0.013	0.32	3149.8	2.13	0.55	43.0%
Street 7	92	94	A23A			0.21				0.21	0.70	0.41	0.41	10.00	76.81			31.39	31.4		40.4	250 PVC	0.254	0.013	0.65	50.0	0.99	0.68	62.8%
	94	136	A23B, B3			0.11		1.01		1.12	0.29	0.92	1.32	10.68	74.28			98.40	98.4		30.5	450 PVC	0.4572	0.013	0.20	133.0	0.81	0.63	74.0%
	136	85	A22			0.54				0.54	0.70	1.05	2.38	11.31	72.12			171.32	171.3		85.2	525 CONC	0.5334	0.013	0.20	200.6	0.90	1.58	85.4%
Street 8	85	86	A24			0.77				0.77	0.70	1.50	22.71	23.42	47.11			1069.86	1515.2		47.1	1500 CONC	1.524	0.013	0.10	2332.0	1.28	0.61	65.0%
	86	87	-							0.00		0.00	22.71	24.04	46.33			1052.23	1490.1		14.5	1500 CONC	1.524	0.013	0.10	2332.0	1.28	0.19	63.9%
	87	2121	-							0.00		0.00	22.71	24.22	46.10			1046.93	1482.6		73.5	1500 CONC	1.524	0.013	0.10	2332.0	1.28	0.96	63.6%

**TO TRUNK STORM SEWER**

**DEMAND EQUATION**  
 $Q = 2.78 \text{ AIR}$  Where : Q = Peak flow in litres per second (L/s)  
 A = Area in hectares (ha)  
 R = Weighted runoff coefficient (increased by 25% for 100-year)  
 I = Rainfall intensity in millimeters per hour (mm/hr)  
 Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

**CAPACITY EQUATION**  
 $Q_{full} = (1/n) A R^{(2/3)} S_o^{(1/2)}$  Where : Q full = Capacity (L/s)  
 n = Manning coefficient of roughness (0.013)  
 A = Flow area (m<sup>2</sup>)  
 R = Wetter perimeter (m)  
 S<sub>o</sub> = Pipe Slope/gradient



**BMR Lands - Innes**  
**HGL Elevations**

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	HGL Elevation - 100yr4hr (m)	HGL Elevation - 100yr4hr+20% (m)	Min USF (m)	Clearance below T/G (100yr) (m)	Clearance below T/G (100yr+20%) (m)
MH043	85.26	88.41	85.26	85.26	85.56	3.15	3.15
MH045	84.60	88.72	84.97	84.98	85.27	3.75	3.74
MH065	83.77	87.88	83.77	83.77	84.07	4.11	4.11
MH072	86.30	90.08	86.30	86.30	86.60	3.78	3.78
MH073	85.97	90.04	86.13	86.17	86.43	3.91	3.87
MH074	85.93	89.98	86.13	86.17	86.43	3.85	3.81
MH075	84.98	89.76	86.13	86.17	86.43	3.63	3.59
MH076	84.65	89.43	85.88	85.94	86.18	3.55	3.49
MH077	84.22	89.32	85.63	85.68	85.93	3.69	3.64
MH078	84.72	88.99	84.72	84.72	85.02	4.27	4.27
MH079	83.89	88.61	84.96	84.98	85.26	3.65	3.63
MH080	83.37	88.37	84.72	84.74	85.02	3.65	3.63
MH081	83.24	88.09	84.56	84.57	84.86	3.53	3.52
MH082	83.22	88.01	84.51	84.52	84.81	3.50	3.49
MH083	83.13	87.89	84.41	84.42	84.71	3.48	3.47
MH084	82.79	87.85	84.00	84.01	84.30	3.85	3.84
MH085	82.29	87.56	83.38	83.39	83.68	4.18	4.17
MH086	81.79	87.46	83.28	83.29	83.58	4.18	4.17
MH089	84.28	88.21	84.28	84.28	84.58	3.93	3.93
MH090	83.93	88.07	83.93	83.93	84.23	4.14	4.14
MH091	83.81	88.08	83.81	83.81	84.11	4.27	4.27
MH094	83.61	87.78	83.61	83.61	83.91	4.17	4.17
MH095	83.92	88.60	85.24	85.27	85.54	3.36	3.33
MH096	83.87	88.57	85.20	85.22	85.50	3.37	3.35
MH097	85.82	88.49	86.23	86.25	86.53	2.26	2.24
MH098	85.42	89.59	86.23	86.24	86.53	3.36	3.35
MH099	85.78	90.32	86.74	86.75	87.04	3.58	3.57
MH100	85.59	90.13	86.48	86.49	86.78	3.65	3.64
MH101	85.77	90.16	86.41	86.42	86.71	3.75	3.74
MH136	83.48	87.69	83.48	83.48	83.78	4.21	4.21
MH149	87.30	91.00	87.30	87.30	87.60	3.70	3.70

**BMR Lands - Innes**  
**HGL Elevations**

Manhole ID	MH Invert Elevation (m)	T/G Elevation (m)	HGL Elevation - 100yr4hr (m)	HGL Elevation - 100yr4hr+20% (m)	Min USF (m)	Clearance below T/G (100yr) (m)	Clearance below T/G (100yr+20%) (m)
MH150	86.78	90.97	86.84	87.01	87.14	4.13	3.96
MH151	86.44	90.88	87.08	87.09	87.38	3.80	3.79
MH152	86.16	90.61	87.08	87.09	87.38	3.53	3.52
MH153	85.93	90.53	86.90	86.91	87.20	3.63	3.62
MH2121	80.27	87.00	83.14	83.14	83.44	3.86	3.86
MH2142	80.17	86.78	83.06	83.06	83.36	3.72	3.72
MH2143	79.97	86.54	83.02	83.02	83.32	3.52	3.52
MH2144	79.86	86.70	82.98	82.98	83.28	3.72	3.72

**BMR Lands - Innes**  
**Design Storm Time Series Data**  
**3-hour Chicago Design Storms**



C25mm-3.stm		C2-3.stm		C5-3.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0	0:00	0	0:00	0
0:10	2.21	0:10	2.81	0:10	3.68
0:20	2.75	0:20	3.5	0:20	4.58
0:30	3.68	0:30	4.69	0:30	6.15
0:40	5.73	0:40	7.3	0:40	9.61
0:50	14.29	0:50	18.21	0:50	24.17
1:00	60.28	1:00	76.81	1:00	104.19
1:10	18.9	1:10	24.08	1:10	32.04
1:20	9.7	1:20	12.36	1:20	16.34
1:30	6.53	1:30	8.32	1:30	10.96
1:40	4.94	1:40	6.3	1:40	8.29
1:50	3.99	1:50	5.09	1:50	6.69
2:00	3.37	2:00	4.29	2:00	5.63
2:10	2.92	2:10	3.72	2:10	4.87
2:20	2.58	2:20	3.29	2:20	4.3
2:30	2.32	2:30	2.95	2:30	3.86
2:40	2.1	2:40	2.68	2:40	3.51
2:50	1.93	2:50	2.46	2:50	3.22
3:00	1.79	3:00	2.28	3:00	2.98

**BMR Lands - Innes**  
**Design Storm Time Series Data**  
**3-hour Chicago Design Storms**



C100-3.stm		C100-3+20%.stm	
Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr
0:00	0	0:00	0
0:10	6.05	0:10	6.14
0:20	7.54	0:20	9.05
0:30	10.16	0:30	12.19
0:40	15.97	0:40	19.16
0:50	40.65	0:50	48.78
1:00	178.56	1:00	214.27
1:10	54.05	1:10	64.86
1:20	27.32	1:20	32.78
1:30	18.24	1:30	21.89
1:40	13.74	1:40	16.49
1:50	11.06	1:50	13.27
2:00	9.29	2:00	11.15
2:10	8.02	2:10	9.62
2:20	7.08	2:20	8.5
2:30	6.35	2:30	7.62
2:40	5.76	2:40	6.91
2:50	5.28	2:50	6.34
3:00	4.88	3:00	5.86

**BMR Lands - Innes**  
**Design Storm Time Series Data**  
**SCS Design Storms**



S2-12.stm		S5-12.stm		S100-12.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0.00	0:00	0	0:00	0
0:30	1.27	0:30	1.69	0:30	2.82
1:00	0.59	1:00	0.79	1:00	1.31
1:30	1.10	1:30	1.46	1:30	2.44
2:00	1.10	2:00	1.46	2:00	2.44
2:30	1.44	2:30	1.91	2:30	3.19
3:00	1.27	3:00	1.69	3:00	2.82
3:30	1.69	3:30	2.25	3:30	3.76
4:00	1.69	4:00	2.25	4:00	3.76
4:30	2.29	4:30	3.03	4:30	5.07
5:00	2.88	5:00	3.82	5:00	6.39
5:30	4.57	5:30	6.07	5:30	10.14
6:00	36.24	6:00	48.08	6:00	80.38
6:30	9.23	6:30	12.25	6:30	20.47
7:00	4.06	7:00	5.39	7:00	9.01
7:30	2.71	7:30	3.59	7:30	6.01
8:00	2.37	8:00	3.15	8:00	5.26
8:30	1.86	8:30	2.47	8:30	4.13
9:00	1.95	9:00	2.58	9:00	4.32
9:30	1.27	9:30	1.69	9:30	2.82
10:00	1.02	10:00	1.35	10:00	2.25
10:30	1.44	10:30	1.91	10:30	3.19
11:00	0.93	11:00	1.24	11:00	2.07
11:30	0.85	11:30	1.12	11:30	1.88
12:00	0.85	12:00	1.12	12:00	1.88

**BMR Lands - Innes**  
**Design Storm Time Series Data**  
**SCS Design Storms**



S2-24.stm		S5-24.stm		S100-24.stm	
Duration	Intensity	Duration	Intensity	Duration	Intensity
min	mm/hr	min	mm/hr	min	mm/hr
0:00	0.00	0:00	0	0:00	0
1:00	0.72	1:00	0.44	1:00	0.6
2:00	0.34	2:00	0.44	2:00	0.75
3:00	0.63	3:00	0.81	3:00	1.39
4:00	0.63	4:00	0.81	4:00	1.39
5:00	0.81	5:00	1.06	5:00	1.81
6:00	0.72	6:00	0.94	6:00	1.6
7:00	0.96	7:00	1.25	7:00	2.13
8:00	0.96	8:00	1.25	8:00	2.13
9:00	1.30	9:00	1.68	9:00	2.88
10:00	1.63	10:00	2.12	10:00	3.63
11:00	2.59	11:00	3.37	11:00	5.76
12:00	20.55	12:00	26.71	12:00	45.69
13:00	5.23	13:00	6.8	13:00	11.64
14:00	2.30	14:00	2.99	14:00	5.12
15:00	1.54	15:00	2	15:00	3.42
16:00	1.34	16:00	1.75	16:00	2.99
17:00	1.06	17:00	1.37	17:00	2.35
18:00	1.11	18:00	1.44	18:00	2.46
19:00	0.72	19:00	0.94	19:00	1.6
20:00	0.58	20:00	0.75	20:00	1.28
21:00	0.81	21:00	1.06	21:00	1.81
22:00	0.53	22:00	0.68	22:00	1.17
23:00	0.48	23:00	0.63	23:00	1.07
0:00	0.48	0:00	0.63	0:00	1.07

**Appendix D**  
**Sanitary Sewer Design Sheets and Sanitary Calculations**

# 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		PEAK FACT.	PEAK FLOW (l/s)	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.		
					AREA (ha)	POP.																	(FULL) (m/s)	(ACT.) (m/s)	
<b>North West Sanitary Trunk</b>																									
<b>Trunk 1</b>					0.00				2.58	2.58			1.57	2.58	2.58	0.85	2.42	58.00	200.00	0.65	26.44	0.09	0.84	0.52	
		1007A	1008A			0.00																			
		1008A	1009A			0.00	0			2.58			1.57	0.00	2.58	0.85	2.42	86.50	250.00	0.25	29.73	0.08	0.61	0.37	
		1009A	1010A			0.00	0		1.29	3.87			2.35	1.29	3.87	1.28	3.63	86.50	250.00	0.25	29.73	0.12	0.61	0.41	
		1010A	1011A			0.00	0		0.22	4.09			2.49	0.22	4.09	1.35	3.84	39.50	300.00	0.20	43.25	0.09	0.61	0.38	
Commercial						0.00	0		1.63	5.72				1.63	5.72										
		1011A	1012A			0.00	0		0.99	6.71			4.08	0.99	6.71	2.21	6.29	99.50	375.00	0.15	67.91	0.09	0.61	0.38	
		1012A	1013A			0.00	0		1.41	8.12			4.93	1.41	8.12	2.68	7.61	117.00	375.00	0.15	67.91	0.11	0.61	0.40	
		1013A	1014A			0.00	0		1.41	9.53			5.79	1.41	9.53	3.14	8.93	112.00	375.00	0.15	67.91	0.13	0.61	0.41	
		1014A	1022A			0.00	0		1.51	11.04			6.71	1.51	11.04	3.64	10.35	83.50	375.00	0.15	67.91	0.15	0.61	0.44	
		1022A	1023A			0.00	0		7.05	18.09			10.99	7.05	18.09	5.97	16.96	96.50	375.00	0.15	67.91	0.25	0.61	0.51	
		1023A	1024A	0.65	66	0.65	66	3.63	0.78		18.09		10.99	0.65	18.74	6.18	17.95	81.00	450.00	0.12	98.76	0.18	0.62	0.47	
		1024A	1025A	0.20	21	0.85	87	3.61	1.02		18.09		10.99	0.20	18.94	6.25	18.26	79.00	450.00	0.12	98.76	0.18	0.62	0.47	
		1025A	1026A	0.13	14	0.98	101	3.59	1.18		18.09		10.99	0.13	19.07	6.29	18.46	51.00	450.00	0.12	98.76	0.19	0.62	0.48	
		1026A	1027A	0.20	21	1.18	122	3.58	1.42		18.09		10.99	0.20	19.27	6.36	18.77	74.00	450.00	0.12	98.76	0.19	0.62	0.48	
		1027A	1028A			1.18	122	3.58	1.42		18.09		10.99	0.00	19.27	6.36	18.77	11.00	450.00	0.12	98.76	0.19	0.62	0.48	
		1028A	1029A	0.42	43	1.60	165	3.54	1.89		18.09		10.99	0.42	19.69	6.50	19.38	100.00	450.00	0.12	98.76	0.20	0.62	0.48	
		1029A	1037A	0.60	61	2.20	226	3.50	2.56		18.09		10.99	0.60	20.29	6.70	20.25	94.00	450.00	0.12	98.76	0.21	0.62	0.49	
		1037A	1040A	3.30	334	5.50	560	3.36	6.10		18.09		10.99	3.30	23.59	7.78	24.87	79.00	450.00	0.12	98.76	0.25	0.62	0.51	
		1040A	1049A	1.45	147	6.95	707	3.31	7.58		18.09		10.99	1.45	25.04	8.26	26.83	79.00	450.00	0.12	98.76	0.27	0.62	0.52	
		1049A	1058A	4.50	455	11.45	1162	3.21	12.09		18.09		10.99	4.50	29.54	9.75	32.83	81.50	450.00	0.12	98.76	0.33	0.62	0.56	
PARK		1058A	1059A	5.80	586	17.25	1748	3.10	17.56		18.09	1.27	11.20	7.07	36.61	12.08	40.84	120.50	450.00	0.12	98.76	0.41	0.62	0.59	
		1059A	1090A	0.70	71	17.95	1819	3.09	18.22		18.09		11.20	0.70	37.31	12.31	41.73	123.00	450.00	0.12	98.76	0.42	0.62	0.59	
PARK, EXT FUT				4.29	618	22.24	2437			5.42	23.51	0.56	1.83		10.27	47.58									
		1090A	1095A	12.63	1276	34.87	3713	2.89	34.77		23.51		1.83	14.58	12.63	60.21	19.87	69.22	75.00	450.00	0.15	110.42	0.63	0.69	0.73
		1095A	1096A	0.50	51	35.37	3764	2.89	35.25		23.51		1.83	14.58	0.50	60.71	20.03	69.86	79.00	525.00	0.10	136.00	0.51	0.63	0.63
Contribution from Trunk 2, MH 1094A-1095A						10.71	1475			8.04			4.64		23.39										
		1096A	1107A	2.17	220	48.25	5459	2.77	49.00		31.55		6.47	20.22	2.17	86.27	28.47	97.69	86.50	525.00	0.10	136.00	0.72	0.63	0.69
		1107A	1108A	4.26	431	52.51	5890	2.74	52.30		31.55		6.47	20.22	4.26	90.53	29.87	102.39	87.00	525.00	0.10	136.00	0.75	0.63	0.69
PARK		1108A	1132A	0.07	8	52.58	5898	2.74	52.37		31.55	1.16	7.63	20.40	1.23	91.76	30.28	103.05	31.50	525.00	0.10	136.00	0.76	0.63	0.69
Contribution from External					0.96	139	53.54	6037	2.00	39.13	4.28		7.63		5.24	97.00									
					0.95	137	54.49	6174					7.63		0.95	97.95									
		1132A	1133A	9.84	994	64.33	7168	2.68	62.26		35.83		7.63	23.00	9.84	107.79	35.57	120.83	15.50	600.00	0.10	194.17	0.62	0.69	0.72
		1133A	1A (B.O.)			64.33	7168	2.68	62.26		35.83		7.63	23.00	0.00	107.79	35.57	120.83	15.50	600.00	0.10	194.17	0.62	0.69	0.72
<b>To MH 1A By Others</b>					64.33	7168	2.68	62.26		35.83			7.63		107.79		120.83								
<b>Trunk 2</b>																									
Snow removal facility		1201A	1202A			0.00	0			8.04			4.89	8.04	8.04	2.65	7.54	100.00	375.00	0.14	65.60	0.11	0.59	0.38	
Park		1202A	1203A			0.00	0			8.04			4.89	0.00	8.04	2.65	7.54	100.00	375.00	0.14	65.60	0.11	0.59	0.38	
		1203A	1204A	0.40	58	0.40	58			8.04		4.64	4.64	5.63	5.04	13.08	4.32	9.95	81.00	375.00	0.14	65.60	0.15	0.59	0.42
		1204A	1205A	0.89	129	1.29	187	3.53	2.14		8.04		4.64	5.63	0.89	13.97	4.61	12.38	111.00	375.00	0.14	65.60	0.19	0.59	0.45
		1205A	1206A	0.83	120	2.12	307	3.46	3.44		8.04		4.64	5.63	0.83	14.80	4.88	13.95	74.00	375.00	0.14	65.60	0.21	0.59	0.47
		1206A	1207A	1.03	149	3.15	456	3.40	5.02		8.04		4.64	5.63	1.03	15.83	5.22	15.87	75.00	375.00	0.14	65.60	0.24	0.59	0.48
		1207A	1208A			3.15	456	3.40	5.02		8.04		4.64	5.63	0.00	15.83	5.22	15.87	100.50	375.00	0.14	65.60	0.24	0.59	0.48

DESIGN PARAMETERS										Designed:		PROJECT:					
Park Flow =	9300	L/ha/da	0.108	Harmon Correction Factor =	0.800			A.S.		Orleans EUC MUC							
Average Daily Flow =	280	l/p/day		Industrial Peak Factor =	as per MOE Graph			Checked:		City of Ottawa							
Comm/Inst Flow =	35000	L/ha/da	0.405	Extraneous Flow =	0.330 L/s/ha			V.C.		LOCATION:							
Industrial Flow =	35000	L/ha/da	0.405	Minimum Velocity =	0.600 m/s			Dwg. Reference:		File Ref:		Date:		Sheet No.			
Max Res. Peak Factor =	4.00			Manning's n = (Conc)	0.013 (Pvc)	0.013					14-733		October, 2018		1		
Commercial/Inst./Park Peak Factor =	1.50	if ICI >20%	1.00	if ICI <20%											of		
Mixed Use	28000.00	L/ha/da													2		
Institutional =	0.405	l/s/ha															

Novatech Project #: 118224  
 Project Name: 0 Innes Road (Former BMR Lands)  
 Date Prepared: 10/4/2019  
 Date Revised:  
 Input By: Ben Sweet  
 Reviewed By: Sam Bahia  
 Drawing Reference: 118224-GP AND 118224-SAN

Legend: PROJECT SPECIFIC INFO  
 USER DESIGN INPUT  
 CUMULATIVE CELL  
 CALCULATED DESIGN CELL OUTPUT  
 CALCULATED ANNUAL CELL OUTPUT  
 CALCULATED RARE CELL OUTPUT  
 USER AS-BUILT INPUT



LOCATION				DEMAND													DESIGN CAPACITY									
STREET	AREA	FROM MH	TO MH	RESIDENTIAL FLOW									EXTRANOUS FLOW		TOTAL DESIGN FLOW	PROPOSED SEWER PIPE SIZING / DESIGN										
				SINGLES	SEMI/TOWNS	APARTS	PARK AREA (ha)	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW Q(q) (L/s)	PEAKED DESIGN POP FLOW Q(p) (L/s)	RESIDENTIAL DRAINAGE AREA (ha.)	CUMULATIVE RES DRAINAGE AREA (ha.)		CUMULATIVE EXTRANOUS DRAINAGE AREA (ha.)	DESIGN EXTRAN. FLOW Q(e) (L/s)	LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap	
Street 9	A1, A2	143	144			42		0.088	0.088	4.00	0.29	0.91	0.983		0.983	0.32	1.24	82.8	200 PVC	0.203	0.013	0.32	19.4	0.60	6.4%	
	A3	144	146			42		0.088	0.176	4.00	0.57	1.83	0.583		1.566	0.52	2.35	40.6	200 PVC	0.203	0.013	0.32	19.4	0.60	12.1%	
	A4	146	141			84		0.176	0.353	4.00	1.14	3.66	1.170		2.736	0.90	4.56	51.0	200 PVC	0.203	0.013	0.32	19.4	0.60	23.6%	
	A5	141	15		4			0.014	0.366	4.00	1.19	3.80	0.180		2.916	0.96	4.76	50.3	200 PVC	0.203	0.013	0.32	19.4	0.60	24.6%	
	A6	15	52		7			0.024	0.390	4.00	1.26	4.05	0.300		3.216	1.06	5.11	53.0	200 PVC	0.203	0.013	0.32	19.4	0.60	26.4%	
	A7	52	54		3			0.010	0.400	4.00	1.30	4.15	0.190		3.406	1.12	5.28	14.4	200 PVC	0.203	0.013	0.32	19.4	0.60	27.3%	
	A8	54	22			27		0.073	0.473	3.99	1.53	4.89	0.780		4.186	1.38	6.27	113.2	200 PVC	0.203	0.013	0.32	19.4	0.60	32.4%	
	Street 2	A9	16	18		26		0.070	0.070	4.00	0.23	0.73	0.760		0.760	0.25	0.98	103.4	200 PVC	0.203	0.013	0.32	19.4	0.60	5.1%	
Street 2	A10	18	20		3		0.010	0.080	4.00	0.26	0.83	0.180		0.940	0.31	1.14	11.5	200 PVC	0.203	0.013	0.32	19.4	0.60	5.9%		
	A11	20	22		7		0.024	0.104	4.00	0.34	1.08	0.300		1.240	0.41	1.49	65.4	200 PVC	0.203	0.013	0.32	19.4	0.60	7.7%		
Street 2	A12	22	24		7		0.024	0.601	3.93	1.95	6.13	0.350		5.776	1.91	8.04	76.0	200 PVC	0.203	0.013	0.32	19.4	0.60	41.5%		
Street 1	A13	48	49		18		0.049	0.049	4.00	0.16	0.50	0.640		0.640	0.21	0.72	80.1	200 PVC	0.203	0.013	0.32	19.4	0.60	3.7%		
	A14	49	24		21		0.057	0.105	4.00	0.34	1.09	0.570		1.210	0.40	1.49	79.7	200 PVC	0.203	0.013	0.32	19.4	0.60	7.7%		
Street 3	A15	24	26		8		0.022	0.728	3.88	2.36	7.33	0.330		7.316	2.41	9.75	76.0	200 PVC	0.203	0.013	0.32	19.4	0.60	50.4%		
Street 4	A19	26	57		19		0.065	0.793	3.86	2.57	7.94	0.810		8.126	2.68	10.62	113.6	250 PVC	0.254	0.013	0.24	30.4	0.60	34.9%		
	A20	57	59		2		0.007	0.800	3.86	2.59	8.00	0.200		8.326	2.75	10.75	13.6	250 PVC	0.254	0.013	0.24	30.4	0.60	35.4%		
	A21	59	30		5		0.017	0.817	3.86	2.65	8.16	0.260		8.586	2.83	10.99	64.1	250 PVC	0.254	0.013	0.24	30.4	0.60	36.2%		
Street 3	A16	26	28		9		0.024	0.024	4.00	0.08	0.25	0.290		0.290	0.10	0.35	57.1	200 PVC	0.203	0.013	0.65	27.6	0.85	1.3%		
Street 5	A17	140	28		3		0.010	0.010	4.00	0.03	0.11	0.150		0.150	0.05	0.16	30.0	200 PVC	0.203	0.013	0.65	27.6	0.85	0.6%		
Street 5	A18	28	30		21		0.071	0.106	4.00	0.34	1.10	0.840		1.280	0.42	1.52	124.7	200 PVC	0.203	0.013	0.32	19.4	0.60	7.9%		
Street 4	A22	30	135		6		0.020	0.943	3.82	3.06	9.33	0.330		10.196	3.36	12.69	72.6	250 PVC	0.254	0.013	0.24	30.4	0.60	41.8%		
	A23	135	32		9		0.031	0.974	3.81	3.15	9.61	0.400		10.596	3.50	13.11	53.5	250 PVC	0.254	0.013	0.24	30.4	0.60	43.1%		
	A24	32	34		3		0.010	0.984	3.80	3.19	9.70	0.180		10.776	3.56	13.26	14.0	250 PVC	0.254	0.013	0.24	30.4	0.60	43.6%		
	A25	34	36		3		0.010	0.994	3.80	3.22	9.80	0.150		10.926	3.61	13.40	25.9	250 PVC	0.254	0.013	0.24	30.4	0.60	44.1%		
	A26	36	38		14		0.048	1.042	3.79	3.38	10.23	0.600		11.526	3.80	14.03	93.7	250 PVC	0.254	0.013	0.24	30.4	0.60	46.2%		
Street 6	A27	62	63		16		0.054	0.054	4.00	0.18	0.56	0.710		0.710	0.23	0.80	103.8	200 PVC	0.203	0.013	0.32	19.4	0.60	4.1%		
	A28	63	65		2		0.007	0.061	4.00	0.20	0.63	0.160		0.870	0.29	0.92	12.6	200 PVC	0.203	0.013	0.32	19.4	0.60	4.8%		
	A29	65	38		6		0.020	0.082	4.00	0.26	0.85	0.310		1.180	0.39	1.24	64.2	200 PVC	0.203	0.013	0.32	19.4	0.60	6.4%		
Street 6	A30	38	1107A		6		0.020	1.144	3.76	3.71	11.15	0.310		13.016	4.30	15.45	72.2	250 PVC	0.254	0.013	0.32	35.1	0.69	44.0%		
TO TRUNK SANITARY SEWER																										
Street 8	A31 + EXT	CAP2	70		127		0.432	0.432	4.00	1.40	4.48	4.260		4.260	1.41	5.88	40.4	200 PVC	0.203	0.013	0.32	19.4	0.60	30.4%		
	-	-	68		-		0.000	0.432	4.00	1.40	4.48	0.000		4.260	1.41	5.88	12.5	200 PVC	0.203	0.013	0.32	19.4	0.60	30.4%		
	-	-	68	1107A		-		0.000	0.432	4.00	1.40	4.48	0.000		4.260	1.41	5.88	46.0	200 PVC	0.203	0.013	0.32	19.4	0.60	30.4%	
TO TRUNK SANITARY SEWER																										
Street 7	A32, A33	201	203		13		0.044	0.044	4.00	0.14	0.46	0.560		0.560	0.18	0.64	70.2	200 PVC	0.203	0.013	0.32	19.4	0.60	3.3%		
	A34	203	205		3		0.010	0.054	4.00	0.18	0.56	0.130		0.690	0.23	0.79	19.1	200 PVC	0.203	0.013	0.32	19.4	0.60	4.1%		
	A36	205	207			1.010	0.003	0.058	4.00	0.19	0.60	1.010		1.700	0.56	1.16	12.0	200 PVC	0.203	0.013	0.32	19.4	0.60	6.0%		
	A35	207	209		5		0.017	0.075	4.00	0.24	0.78	0.220		1.920	0.63	1.41	38.1	200 PVC	0.203	0.013	0.32	19.4	0.60	7.3%		
Street 7	-	209	1A		-		0.000	0.075	4.00	0.24	0.78	0.000		1.920	0.63	1.41	38.1	200 PVC	0.203	0.013	0.32	19.4	0.60	7.3%		
TO TRUNK SANITARY SEWER																										
<b>TOTALS</b>						294	109	168	1.010			1.651														

**DEMAND EQUATION**  
 Design Parameters:  
 1. Q(D), Q(A), Q(R) = Q(p) + Q(fd) + Q(ici) + Q(e)  
 2. Q(p) = (P x q x M x K / 86,400)  
 3. q Avg capita flow = 280 L/per/day (design)  
 4. M = Harmon Formula (maximum of 4.0)  
 5. K = 0.8 (design)  
 6. Park flow is considered equivalent to a single unit / ha  
 7. Foundation Drains = 0.45 L/unit  
 8. Q(ici) = ICI Area x ICI Flow x ICI Peak  
 9. Q(e) = 0.33 L/sec/ha (design)  
 0.30 L/sec/ha (annual)  
 0.55 L/sec/ha (rare)

**Definitions:**  
 Q(D) = Peak Design Flow (L/sec)  
 Q(e) = Extraneous Flow (L/sec)  
 Q(p) = Population Flow (L/sec)  
 K = Harmon Correction Factor  
 P = Residential Population  
 Typ Service Diameter (mm)  
 Typ Service Length (m)  
 I/I Pipe Rate (L/mm dia/m/hr) = 0.007  
 Q(fd) = Foundation Flow (L/sec)  
 Q(ici) = Industrial / Commercial / Institutional Flow (L/sec)  
**Institutional / Commercial / Industrial**  
 Design = 35000 L/gHa/d  
 Annual / Rare = 10000 L/gHa/d  
**ICI Peak \***  
 Design = Std ICI -->  
 Annual / Rare = 1.0

**Singles** 3.4  
**Semis/Towns** 2.7  
**Apts (2-BR)** 2.1

**Industrial** 28000 L/gHa/d  
**Commercial / Institutional** 17000 L/gHa/d

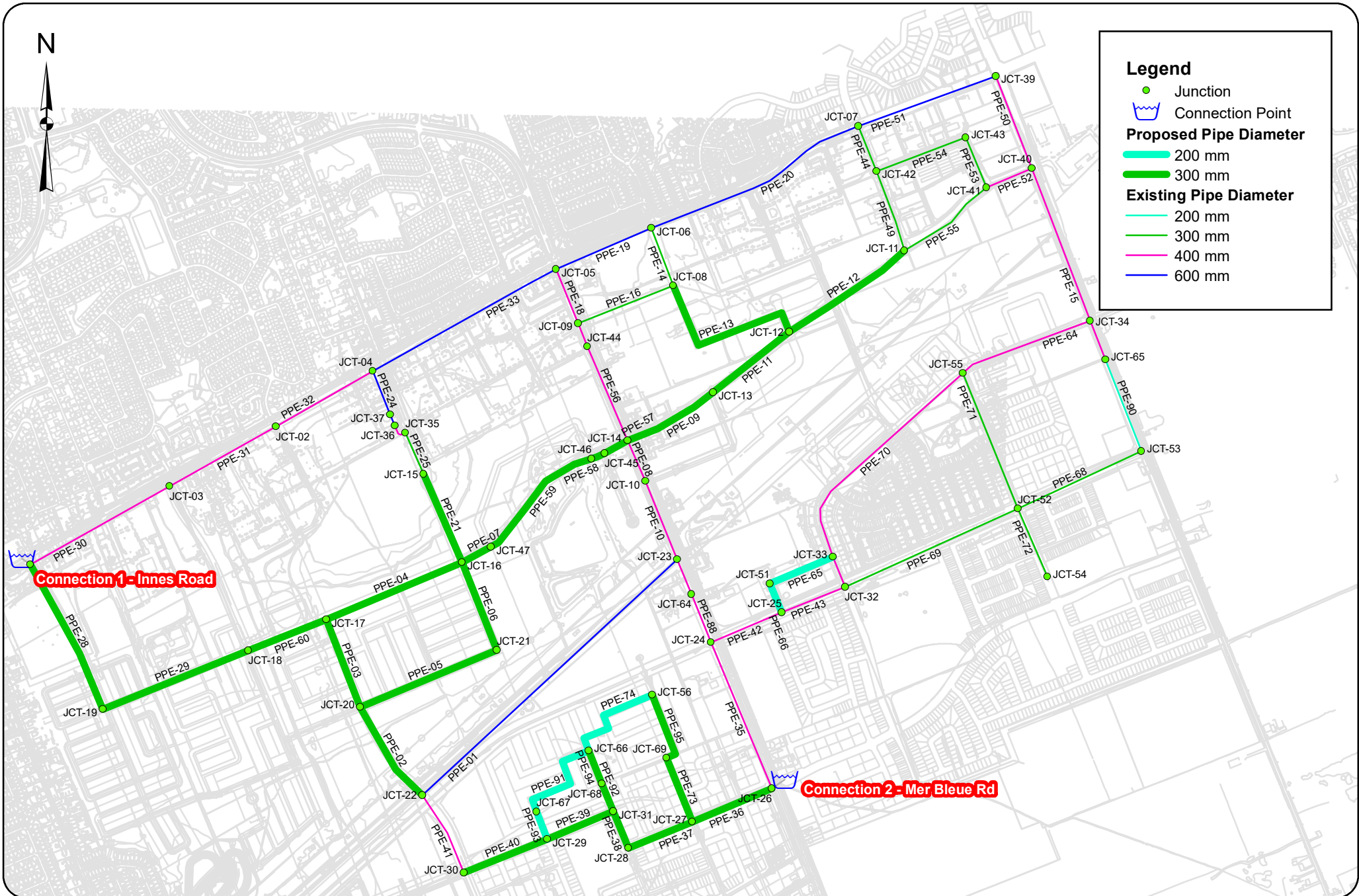
\* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)

**CAPACITY EQUATION**  
 Q full= (1/n) A R^(2/3) So^(1/2)  
 Where : Q full = Capacity (L/s)  
 n = Manning coefficient of roughness (0.013)  
 A = Flow area (m<sup>2</sup>)  
 R = Wetted perimeter (m)  
 So = Pipe Slope/gradient

NOTES  
 External Flows to be determined as part of detailed design process. Further coordination with DSEL required.

**Appendix E**  
**Water Demand Calculations and Hydraulic Modeling**

N



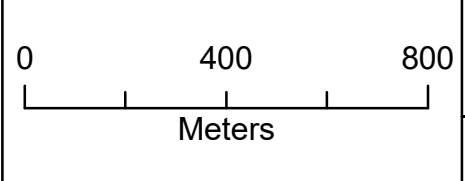
Connection 1 - Innes Road

Connection 2 - Mer Bleue Rd



Project: **Hydraulic Capacity and Modeling Analysis East Urban Community Mixed-Use Centre Development**  
 Client: **David Schaeffer Engineering Ltd.**  
 Date: **July 2018**  
 Created by: **AM**  
 Reviewed by: **WdS**

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.



**Site Layout and Connection Points**  
**Figure 1.1**

## Boundary Conditions for BMR Lands

Date Provided

September-19

Scenario	Demand	
	L/min	L/s
Average Daily Demand	306.06	5.101
Maximum Daily Demand	765.06	12.751
Peak Hour	1683.18	28.053
Fire Flow Demand #1	10020	167
Fire Flow Demand #2	13020	217
Fire Flow Demand #3	15000	250

# of connections

2

### Location:



## Results:

### Connection 1 - Jargeau Road

Demand Scenario	Head (m)	Pressure <sup>1</sup> (psi)
Maximum HGL	130.9	61.0
Peak Hour	127.0	55.4
Max Day plus Fire 1	122.5	49.1
Max Day plus Fire 3	116.5	40.5

<sup>1</sup> Ground Elevation = 88.0 m

Max Day Plus Fire 2 = 118.9, 43.9

### Connection 2 - Beaugency Street

Demand Scenario	Head (m)	Pressure <sup>1</sup> (psi)
Maximum HGL	130.9	61.0
Peak Hour	127.0	55.4
Max Day plus Fire 1	120.9	46.8
Max Day plus Fire 3	113.2	35.9

<sup>1</sup> Ground Elevation = 88.0 m

Max Day Plus Fire 2 = 116.3, 40.2

### Connection 3 - Innes Rd (Optional)

Demand Scenario	Head (m)	Pressure <sup>1</sup> (psi)
Maximum HGL	130.9	56.4
Peak Hour	127.0	50.9
Max Day plus Fire 1	127.1	51.0
Max Day plus Fire 3	126.0	49.5

<sup>1</sup> Ground Elevation = 91.2 m

Max Day Plus Fire 2 = 126.4, 50.1

## Notes:

1. Please interpolate to estimate HGL elevations at fire flow demand 2.

## Disclaimer

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

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines



Engineers, Planners &amp; Landscape Architects

**Novatech Project #:** 118224  
**Project Name:** 0 Innes Road (Former BMR Lands)  
**Date:** 10/4/2019  
**Input By:** BCS  
**Reviewed By:** BHB

Legend

**Building Description:** Lots 35 to 55 - Single Family  
**Wood frame**

Step	Input		Value Used	Total Fire Flow (L/min)		
<b>Base Fire Flow</b>						
1	<b>Construction Material</b>		<b>Multiplier</b>	1.5		
	<b>Coefficient related to type of construction</b> <b>C</b>	Wood frame	Yes		1.5	
		Ordinary construction			1	
		Non-combustible construction			0.8	
		Modified Fire resistive construction (2 hrs)			0.6	
Fire resistive construction (> 3 hrs)			0.6			
2	<b>Floor Area</b>		6,594	27,000		
	<b>A</b>	Building Footprint (m <sup>2</sup> )			3297	
		Number of Floors/Storeys			2	
		Area of structure considered (m <sup>2</sup> )				
<b>F</b>	<b>Base fire flow without reductions</b>		<b>F = 220 C (A)<sup>0.5</sup></b>			
<b>Reductions or Surcharges</b>						
3	<b>Occupancy hazard reduction or surcharge</b>		<b>Reduction/Surcharge</b>	22,950		
	<b>(1)</b>	Non-combustible			-25%	
		Limited combustible	Yes		-15%	
		Combustible			0%	
		Free burning			15%	
Rapid burning			25%			
4	<b>Sprinkler Reduction</b>		<b>Reduction</b>	0		
	<b>(2)</b>	Adequately Designed System (NFPA 13)	No		-30%	
		Standard Water Supply	No		-10%	
		Fully Supervised System	No		-10%	
<b>Cumulative Total</b>			<b>0%</b>			
5	<b>Exposure Surcharge (cumulative %)</b>		<b>Surcharge</b>	13,770		
	<b>(3)</b>	North Side	3.1 - 10 m		20%	
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	10.1 - 20 m		15%	
<b>Cumulative Total</b>			<b>60%</b>			
<b>Results</b>						
6	<b>(1) + (2) + (3)</b>	<b>Total Required Fire Flow, rounded to nearest 1000L/min</b>		<b>L/min</b>	<b>37,000</b>	
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	<b>L/s</b>	<b>617</b>
				or	<b>USGPM</b>	<b>9,775</b>
7	<b>Storage Volume</b>	Required Duration of Fire Flow (hours)		Hours	8.5	
		Required Volume of Fire Flow (m <sup>3</sup> )		m <sup>3</sup>	18870	

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines



Engineers, Planners &amp; Landscape Architects

**Novatech Project #:** 118224  
**Project Name:** 0 Innes Road (Former BMR Lands)  
**Date:** 10/4/2019  
**Input By:** BCS  
**Reviewed By:** BHB

Legend

**Building Description:** Lots 164 to 180 - Single Family, Block 183 - 15 Townhouses  
**Wood frame**

Step	Input		Value Used	Total Fire Flow (L/min)		
<b>Base Fire Flow</b>						
1	<b>Construction Material</b>		<b>Multiplier</b>	1.5		
	<b>Coefficient related to type of construction</b> <b>C</b>	Wood frame	Yes		1.5	
		Ordinary construction			1	
		Non-combustible construction			0.8	
		Modified Fire resistive construction (2 hrs)			0.6	
Fire resistive construction (> 3 hrs)			0.6			
2	<b>Floor Area</b>			31,000		
	<b>A</b>	Building Footprint (m <sup>2</sup> )	4544			
		Number of Floors/Storeys	2			
		Area of structure considered (m <sup>2</sup> )			9,088	
<b>F</b>	<b>Base fire flow without reductions</b>					
<b>Reductions or Surcharges</b>						
3	<b>Occupancy hazard reduction or surcharge</b>		<b>Reduction/Surcharge</b>	26,350		
	<b>(1)</b>	Non-combustible			-25%	
		Limited combustible	Yes		-15%	
		Combustible			0%	
		Free burning			15%	
Rapid burning			25%			
4	<b>Sprinkler Reduction</b>		<b>Reduction</b>	0		
	<b>(2)</b>	Adequately Designed System (NFPA 13)	No		-30%	
		Standard Water Supply	No		-10%	
		Fully Supervised System	No		-10%	
<b>Cumulative Total</b>			<b>0%</b>			
5	<b>Exposure Surcharge (cumulative %)</b>		<b>Surcharge</b>	14,493		
	<b>(3)</b>	North Side	3.1 - 10 m		20%	
		East Side	10.1 - 20 m		15%	
		South Side	20.1 - 30 m		10%	
		West Side	20.1 - 30 m		10%	
<b>Cumulative Total</b>			<b>55%</b>			
<b>Results</b>						
6	<b>(1) + (2) + (3)</b>	<b>Total Required Fire Flow, rounded to nearest 1000L/min</b>		<b>L/min</b>	<b>41,000</b>	
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	<b>L/s</b>	<b>683</b>
				or	<b>USGPM</b>	<b>10,832</b>
7	<b>Storage Volume</b>	Required Duration of Fire Flow (hours)		Hours	9.5	
		Required Volume of Fire Flow (m <sup>3</sup> )		m <sup>3</sup>	23370	

# FUS - Fire Flow Calculations

As per 1999 Fire Underwriter's Survey Guidelines



Engineers, Planners &amp; Landscape Architects

**Novatech Project #:** 118224  
**Project Name:** 0 Innes Road (Former BMR Lands)  
**Date:** 10/4/2019  
**Input By:** BCS  
**Reviewed By:** BHB

Legend

**Building Description:** Lots 79 to 96 - Single Family  
**Wood frame**

Step	Input		Value Used	Total Fire Flow (L/min)		
<b>Base Fire Flow</b>						
1	<b>Construction Material</b>		<b>Multiplier</b>	1.5		
	<b>Coefficient related to type of construction</b> <b>C</b>	Wood frame	Yes		1.5	
		Ordinary construction			1	
		Non-combustible construction			0.8	
		Modified Fire resistive construction (2 hrs)			0.6	
Fire resistive construction (> 3 hrs)			0.6			
2	<b>Floor Area</b>		2,198	15,000		
	<b>A</b>	Building Footprint (m <sup>2</sup> )			1099	
		Number of Floors/Storeys			2	
		Area of structure considered (m <sup>2</sup> )				
<b>F</b>	<b>Base fire flow without reductions</b>		$F = 220 C (A)^{0.5}$			
<b>Reductions or Surcharges</b>						
3	<b>Occupancy hazard reduction or surcharge</b>		<b>Reduction/Surcharge</b>	12,750		
	<b>(1)</b>	Non-combustible			-25%	
		Limited combustible	Yes		-15%	
		Combustible			0%	
		Free burning			15%	
Rapid burning			25%			
4	<b>Sprinkler Reduction</b>		<b>Reduction</b>	0		
	<b>(2)</b>	Adequately Designed System (NFPA 13)	No		-30%	
		Standard Water Supply	No		-10%	
		Fully Supervised System	No		-10%	
<b>Cumulative Total</b>			<b>0%</b>			
5	<b>Exposure Surcharge (cumulative %)</b>		<b>Surcharge</b>	7,013		
	<b>(3)</b>	North Side	20.1 - 30 m		10%	
		East Side	20.1 - 30 m		10%	
		South Side	10.1 - 20 m		15%	
		West Side	3.1 - 10 m		20%	
<b>Cumulative Total</b>			<b>55%</b>			
<b>Results</b>						
6	<b>(1) + (2) + (3)</b>	<b>Total Required Fire Flow, rounded to nearest 1000L/min</b>		<b>L/min</b>	<b>20,000</b>	
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	<b>L/s</b>	<b>333</b>
				or	<b>USGPM</b>	<b>5,284</b>
7	<b>Storage Volume</b>	Required Duration of Fire Flow (hours)		Hours	4.5	
		Required Volume of Fire Flow (m <sup>3</sup> )		m <sup>3</sup>	5400	

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**OVERALL WATER DEMAND**

RESIDENTIAL				POP'N	BASIC DAY	MAX. DAY	PEAK HOUR
NUMBER OF UNITS					DEMAND	DEMAND	DEMAND
SINGLE DWELLING	ROW TOWNHOME	MULTI-RESIDENTIAL	PARK	(pers)	(L/s)	(L/s)	(L/s)
					RES.	RES.	RES.
180	109	168	1	1263	5.11	12.79	28.13

**ASSUMPTIONS:**

- RESIDENTIAL POPULATION:
  - Single Dwelling 3.4 people/unit
  - Semi-Detached 2.7 people/unit
  - Row Townhome 2.7 people/unit
  - Multi-Residential 2.1 people/unit
  - Park demands, equivalent to Single Dwelling
  
- BASIC DAY DEMAND: - Residential 350 L / c / d
  
- MAXIMUM DAY DEMAND: - Residential 2.50 \* basic day
  
- PEAK HOUR DEMAND: - Residential 2.20 \* maximum day
  
- FIRE FLOW DEMAND:
  - Low Density Residential 10,000 L/min. = 167 L/s
  - Typ. Row Town Blocks 13,000 L/min. = 217 L/s
  - Stacked Row Town Blocks 15,000 L/min. = 250 L/s

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**JUNCTION DEMAND**

JUNCTION ID	RESIDENTIAL				POP'N (pers)	BASIC DAY DEMAND (L/s)	MAX. DAY DEMAND (L/s)	PEAK HOUR DEMAND (L/s)	FIRE FLOW DEMAND (L/s)
	NUMBER OF UNITS								
	SINGLE DWELLING	ROW TOWNHOME	MULTI-RESIDENTIAL	PARK					
1			84		176	0.71	1.79	3.93	167
2			84		176	0.71	1.79	3.93	167
3	8	12			60	0.24	0.60	1.33	167
4	6	14			58	0.24	0.59	1.30	167
5	6	13			56	0.22	0.56	1.24	167
6	8	14			65	0.26	0.66	1.45	167
7		25			68	0.27	0.68	1.50	167
8	3	17			56	0.23	0.57	1.25	167
9	13				44	0.18	0.45	0.98	167
10	10	10			61	0.25	0.62	1.36	167
11	15				51	0.21	0.52	1.14	167
12	15	4			62	0.25	0.63	1.38	167
13	14				48	0.19	0.48	1.06	167
14	15				51	0.21	0.52	1.14	167
15	14				48	0.19	0.48	1.06	167
16	17				58	0.23	0.59	1.29	167
17	10			1	37	0.15	0.38	0.83	167
18	14				48	0.19	0.48	1.06	167
19	12				41	0.17	0.41	0.91	167
20					0	0.00	0.00	0.00	167
21					0	0.00	0.00	0.00	167
22					0	0.00	0.00	0.00	167
<b>TOTAL</b>	<b>180</b>	<b>109</b>	<b>168</b>	<b>1</b>	<b>1,263</b>	<b>5.11</b>	<b>12.79</b>	<b>28.13</b>	

**ASSUMPTIONS:**

- RESIDENTIAL POPULATION DENSITY:
- Single Dwelling 3.4 people/unit
  - Semi-Detached 2.7 people/unit
  - Row Townhome 2.7 people/unit
  - Multi-Residential 2.1 people/unit
  - Park demands, equivalent to Single Dwelling
- BASIC DAY DEMAND:
- Residential 350 L / c / d
- MAXIMUM DAY DEMAND:
- Residential 2.50 \* basic day
- PEAK HOUR DEMAND:
- Residential 2.20 \* maximum day
- FIRE FLOW DEMAND:
- Low Density Residential 10,000 L/min. = 167 L/s
  - Typ. Row Town Blocks 13,000 L/min. = 217 L/s
  - Stacked Row Town Blocks 15,000 L/min. = 250 L/s

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**MAX PRESSURES DURING BSDY CONDITIONS**

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)
1	90.90	0.71	131.30	40.40	57
2	90.50	0.71	131.30	40.79	58
3	90.30	0.24	131.30	40.99	58
4	90.00	0.24	131.30	41.29	59
5	90.20	0.22	131.30	41.09	58
6	89.70	0.26	131.30	41.59	59
7	88.40	0.27	131.30	42.90	61
8	89.30	0.23	131.30	42.00	60
9	88.60	0.18	131.30	42.69	61
10	89.20	0.25	131.30	42.09	60
11	88.60	0.21	131.30	42.69	61
12	88.90	0.25	131.30	42.39	60
13	88.20	0.19	131.30	43.10	61
14	88.10	0.21	131.30	43.20	61
15	88.00	0.19	131.30	43.30	62
16	87.80	0.23	131.30	43.50	62
17	87.70	0.15	131.30	43.60	62
18	87.50	0.19	131.30	43.80	62
19	87.40	0.17	131.30	43.90	62
20	89.70	0.00	131.30	41.60	59
21	88.10	0.00	131.30	43.19	61
22	87.60	0.00	131.30	43.70	62
23	87.90	0.00	131.30	43.40	62
24	88.00	0.00	131.30	43.30	62
25	91.00	0.00	131.30	40.30	57

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Date Revised:



**MIN PRESSURES DURING PKHR CONDITIONS**

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)
1	90.90	3.91	130.08	39.18	56
2	90.50	3.91	130.06	39.56	56
3	90.30	1.32	130.06	39.76	57
4	90.00	1.32	130.06	40.06	57
5	90.20	1.21	130.06	39.86	57
6	89.70	1.43	130.06	40.36	57
7	88.40	1.49	130.08	41.68	59
8	89.30	1.27	130.07	40.77	58
9	88.60	0.99	130.06	41.46	59
10	89.20	1.38	130.06	40.86	58
11	88.60	1.16	130.06	41.46	59
12	88.90	1.38	130.06	41.16	59
13	88.20	1.05	130.07	41.87	60
14	88.10	1.16	130.07	41.97	60
15	88.00	1.05	130.07	42.07	60
16	87.80	1.27	130.08	42.28	60
17	87.70	0.83	130.18	42.48	60
18	87.50	1.05	130.10	42.60	61
19	87.40	0.94	130.10	42.70	61
20	89.70	0.00	130.07	40.37	57
21	88.10	0.00	130.06	41.96	60
22	87.60	0.00	130.10	42.50	60
23	87.90	0.00	130.22	42.32	60
24	88.00	0.00	130.09	42.09	60
25	91.00	0.00	130.24	39.24	56

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**AVAILABLE FLOW AT 20psi DURING MXDY+FF CONDITIONS**

JUNCTION ID	ELEVATION (m)	STATIC DEMAND (L/s)	STATIC HEAD (m)	STATIC PRESSURE (m)	STATIC PRESSURE (psi)	FIRE FLOW DEMAND (L/s)	FIRE FLOW DEMAND (L/min)	AVAILABLE FLOW (L/min)
1	90.90	1.78	130.98	40.08	57	167	10,000	13,710
2	90.50	1.78	130.97	40.47	58	167	10,000	13,692
3	90.30	0.60	130.97	40.67	58	167	10,000	14,724
4	90.00	0.60	130.97	40.97	58	167	10,000	13,602
5	90.20	0.55	130.97	40.77	58	167	10,000	13,392
6	89.70	0.65	130.97	41.27	59	167	10,000	16,962
7	88.40	0.68	130.98	42.58	61	167	10,000	33,948
8	89.30	0.58	130.98	41.67	59	167	10,000	28,008
9	88.60	0.45	130.97	42.37	60	167	10,000	13,860
10	89.20	0.63	130.97	41.77	59	167	10,000	16,974
11	88.60	0.53	130.97	42.37	60	167	10,000	15,138
12	88.90	0.63	130.97	42.07	60	167	10,000	13,896
13	88.20	0.48	130.97	42.77	61	167	10,000	14,232
14	88.10	0.53	130.97	42.87	61	167	10,000	12,606
15	88.00	0.48	130.97	42.97	61	167	10,000	12,678
16	87.80	0.58	130.98	43.18	61	167	10,000	14,166
17	87.70	0.38	131.00	43.30	62	167	10,000	18,834
18	87.50	0.48	130.98	43.48	62	167	10,000	14,772
19	87.40	0.43	130.98	43.58	62	167	10,000	10,770
20	89.70	0.00	130.98	41.27	59	167	10,000	25,194
21	88.10	0.00	130.97	42.87	61	167	10,000	11,658
22	87.60	0.00	130.98	43.38	62	167	10,000	12,012

**Appendix F**  
**Geotechnical Investigation (soft copy)**