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SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

GREATWISE DEVELOPMENTS 2795 BASELINE ROAD – PHASE 2

CITY OF OTTAWA

PROJECT NO.: 18-1055
DEVELOPMENT FILE NO.: D07-XX-XX-XXXX

SEPTEMBER 2019 – REV. 1

SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
2795 BASELINE ROAD – PHASE 2
GREATWISE DEVELOPMENTS

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2795 BASELINE ROAD – PHASE 2
GREATWISE DEVELOPMENTS
SEPTEMBER 2019 – REV. 1

CITY OF OTTAWA
PROJECT NO.: 18-1055

1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Greatwise Developments to prepare a Servicing and Stormwater Management report in support of the application for Part Lot Control (PLC) and for Site Plan Control (SPC) for the Fresh Towns III development at 2795 Baseline Road.

The subject property is located within the City of Ottawa urban boundary, in Ward 8 - College. As illustrated in ***Figure 1***, below, the site is bound by Morrison Drive to the west, Baseline Road to the south, and an existing residential development is located to the east, and an existing residential development to the North. Comprised of a single parcel of land, the subject site measures approximately ***0.42 ha*** and is zoned High Density Residential [R5A].

Figure 1: Site Location

The existing SPC (***Previously Approved Brief***) for 2781 Baseline Road allowed for the Phase 1 and Phase 2 developments, Building E and Building F, respectively. Building E has been constructed and is now part of OC1791074. The ***Previously Approved Brief*** proposed ***80*** apartment units within Building E, and ***80*** apartment units and ***598 m²*** of commercial space within Building F.

The proposed PLC and SPC for Fresh Towns Phase III would allow for the development of ***32*** slab on grade townhome units. Minor revisions to the above-ground parking lot within 2781 Baseline Road are proposed. A copy of the Site Plan is included in ***Drawings/Figures***.

The objective of this report is to provide sufficient detail to demonstrate that the existing municipal services provide sufficient capacity to support the PLC and SPC for the proposed Fresh Towns Phase III development at 2795 Baseline Road.

1.1 Existing Conditions

The existing site contains a temporary stormwater management pond to service the existing development at 2781 Baseline Road. The elevations range between 75.20 m and 77.57 m with a minimal grade change of approximately 2.37 m from the Northeast to the Southwest corner of the property.

An existing 200 mm diameter sanitary sewer and an existing 300 mm diameter storm sewer are located within both 2710 Draper Avenue and 2795 Baseline Road. The existing sewers were previously approved with the existing 2781 Baseline Road SPC and installed to support both the 2781 Baseline Road and 2795 Baseline Road developments.

Sewer and watermain mapping collected from the City of Ottawa indicate that the following services exist across the property frontages, within the adjacent municipal right-of-ways:

Morrison Drive:

- 203 mm diameter cast iron watermain;
- 300 mm diameter storm sewer, tributary to Ottawa Central sub-watershed; and
- 225 mm diameter concrete sanitary sewer, tributary to the Pinecrest Collector.

Baseline Road:

- 406 mm diameter cast iron watermain;
- 1200 mm diameter AWWA C301 watermain;
- 300 mm diameter storm sewer, tributary to the Graham Creek sub-watershed; and
- 375 mm diameter storm sewer, tributary to the Graham Creek sub-watershed.

2795 Baseline Road:

- 200 mm diameter PVC sanitary sewer, within 2795 Baseline Road and 2710 Draper Avenue, tributary to the Pinecrest Collector;
- 300 mm diameter PVC storm sewer, within the 2795 Baseline Road and 2710 Draper Avenue, tributary to the Ottawa Central sub-watershed.

1.2 Required Permits / Approvals

The proposed development is subject to the site plan control approval process. The City of Ottawa must approve the engineering design drawings and reports prior to the issuance of site plan control.

It is anticipated that an Environmental Compliance Application (ECA) will be required for the proposed development as the proposed sewers will service multiple parcels of land. The Ministry of the Environment, Conservation, and Parks (MECP) has been contacted to confirm the requirement for the ECA, however, no response was received at the time of publication. Correspondence with the MECP is included in ***Appendix A***.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Ottawa River watershed and is therefore, subject to review by the Rideau Valley Conservation Authority (RVCA). Correspondence with the RVCA is included in ***Appendix A***.

1.3 Pre-consultation

Pre-consultation correspondence, along with the servicing guidelines checklist, is located in ***Appendix A***.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- **Ottawa Sewer Design Guidelines**
  City of Ottawa, *SDG002*, October 2012.
  (City Standards)
  - **Technical Bulletin ISTB-2018-01**
    City of Ottawa, March 21, 2018.
    (*ISTB-2018-01*)
  - **Technical Bulletin ISTB-2018-04**
    City of Ottawa, June 27, 2018.
    (*ISTB-2018-04*)
- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, July 2010.
  (Water Supply Guidelines)
  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISD-2010-2*)
  - **Technical Bulletin ISDTB-2014-02**
    City of Ottawa, May 27, 2014.
    (*ISDTB-2014-02*)
  - **Technical Bulletin ISDTB-2018-02**
    City of Ottawa, March 21, 2018.
    (*ISDTB-2018-02*)
- **Design Guidelines for Sewage Works**
  Ministry of the Environment, 2008.
  (MOE* Design Guidelines*)
- **Stormwater Planning and Design Manual**
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)
- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update.
  (OBC)

- **Morrison Court Development Wastewater Servicing Study**
  Novatech Engineering Consultants Ltd., January 2009.
  (Existing Wastewater Study)

- **Geotechnical Investigation, Proposed Residential Development – Phase 3-3**
  Paterson Group, Inc., PG1630-5, January 14, 2019.
  (Geotechnical Investigation)

- **Functional Servicing and Stormwater Management Brief in support of Site Plan Amendment for 2781 Baseline Road**
  David Schaeffer Engineering Ltd., April 2016.
  (Previously Approved Brief)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 1W pressure zone, as shown by the Pressure Zone Map located in ***Appendix B***. Potable water is available to the development via an existing 203 mm diameter watermain within the Morrison Drive right-of-way and an existing 406 mm diameter watermain within the Baseline Road right-of-way.

3.2 Water Supply Servicing Design

It is proposed that the development will have an internal watermain network with two connections to the existing 203 mm diameter watermain within Morrison Drive. Townhomes will have independent connections to the internal watermain network via 19 mm diameter service laterals. Refer to drawing ***SSP-1,*** accompanying this report, for a detailed servicing layout.

Table 1, below, summarizes the ***Water Supply Guidelines*** employed in the preparation of the preliminary water demand estimate.

Table 1
Water Supply Design Criteria

Design Parameter	Value
Residential Townhome	2.7 P/unit
Residential Average Daily Demand	350 L/d/P
Residential Maximum Daily Demand	4.9 x Average Daily *
Residential Maximum Hourly	7.4 x Average Daily *
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	275 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa
Daily average based on Appendix 4-A from **Water Supply Guidelines* *** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.* *-Table updated to reflect ISD-2010-2*	

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in ***Table 2.*** No response was received at the time of publication, and as a result boundary conditions received for the development at 2710 Draper Avenue were utilized. Correspondence with the City has been included in ***Appendix B***.

Table 2, below, summarizes the water supply demand and boundary conditions for the proposed development based on the ***Water Supply Guidelines***.

Table 2
Water Demand - Proposed Site Conditions

Design Parameter	Estimated Demand[1] (L/min)	Boundary Condition[2] Connection 1 (Morrison Drive - Northern) (m H_2O / kPa)	Boundary Condition[2] Connection 2 (Morrison Drive - Southern) (m H_2O / kPa)
Average Daily Demand	21.1	39.8 / 390.6	39.1 / 383.4
Max Day + Fire Flow	103.6 + 12,000 = 12,103.6	19.8 / 194.4	19.1 / 187.2
Peak Hour	156.5	30.2 / 296.5	29.5 / 289.2

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 75.7m and 76.4m for Connection 1 and 2, respectively. See ***Appendix B.***

As indicated in ***Table 2,*** above, the estimated average daily demand for the proposed development based on the site statistics provided by RLA Architecture is ***21.1 L/min***.

Fire flow requirements are to be determined in accordance with City of Ottawa ***Water Supply Guidelines***, and the Ontario Building Code.

Fire flow requirements were estimated per City of Ottawa Technical Bulletin ***ISTB-2018-02***. The following parameters were established by Roderick Lahey Architects:

- Type of construction – Ordinary Construction;
- Occupancy type – Limited Combustible; and
- Sprinkler Protection – Non-Sprinkler System.

Table 3, below, summarizes the estimated fire flow demands based on the FUS method and summarizes the available fire hydrants within 75 and 150 meters from each block. Detailed calculations can be found in ***Appendix B***.

Table 3
FUS Estimated Fire Flow Summary

Phase	Estimated Demand (L/min)	Fire Hydrant(s) within 75 Meters (5,700 L/min)	Fire Hydrant(s) within 150 Meters (3,800 L/min)	Combined Fire Flow Available (L/min)
Block 12 & Block 13	12,000	FH1, EX. FH2	EX. FH3	15,200
Block 14 & Block 15	12,000	FH1	EX. FH2, EX. FH3, EX. FH4	17,100

The above assumptions result in a maximum fire flow of approximately ***12,000 L/min***, noting that actual building materials selected will affect the estimated flow. Based on ***Table 3***, there are a sufficient number of fire hydrants, proposed and existing, to support the Phase 3-3 development. Hydrant locations are identified on drawing ***SSP-1,*** accompanying this report, and on the *Existing Fire Hydrants* figure included in ***Appendix B***.

The City provided both the anticipated minimum and maximum water pressures, as well as, the estimated water pressure during fire flow demand as indicated by the correspondence in ***Appendix B***. The minimum and maximum pressures fall within the required range identified in ***Table 1***.

3.3 EPANet Water Modelling

EPANet was utilized to determine pipe sizing and the availability of pressures throughout the system during average day demand, max day plus fire flow, and peak hour demands. The static model determines pressures based on the available head obtained from the boundary conditions provided by the City of Ottawa for 2710 Draper Avenue, as indicated in ***Table 2***.

The model utilizes the Hazen-Williams equation to determine pressure drop, while the pipe properties, including friction factors, have been selected in accordance with Table 4.4 of the ***Water Supply Guidelines***. The model was prepared to assess the available pressure at the finished first floor of each building, as well as, the pressures the watermain provides to fire hydrants during fire flow conditions.

For the purposes of determining sufficient fire flow, ***6,000 L/min*** for a total of ***12,000 L/min*** was modelled at the proposed fire hydrant, FH1, and the existing fire hydrant, EX. FH2. Refer to the *Existing Fire Hydrants* figure, located in ***Appendix B,*** for the location of the existing fire hydrants, EX. FH2, EX. FH3, and EX. FH4.

Table 4, below, summarizes the model results. ***Appendix B*** contains output reports and model schematics for each scenario.

Table 4: Model Simulation Output Summary

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
EX.FH2	421.0	181.3	326.9
FH1	401.9	186.1	307.7
N1	414.7	216.1	320.5
N2	409.1	202.5	314.9
N3	403.4	187.6	309.2
N4	405.2	201.7	311.0
N5	411.7	213.0	317.0
N6	406.5	199.6	311.8
N8	401.8	197.9	306.6
N9	400.5	184.1	305.3

Based on the EPANET model, pressures during average day, max day + fire flow and peak hour, and peak hour respect the requirements of the ***Water Supply Guidelines***. As demonstrated in ***Table 4****,* the local fire hydrants can provide each block with the required fire flows indicated in ***Table 3.***

3.4 Water Supply Conclusion

The FUS assumptions result in an estimated fire flow of approximately ***12,000 L/min***. The proposed average day water supply demand for the Phase 3-3 development based on the site plan is calculated to be ***21.1 L/min,*** as indicated in ***Table 2***.

Based on the EPANET model, pressures during average day, max day + fire flow and peak hour, and peak hour respect the requirements of the ***Water Supply Guidelines*** and the proposed hydrants can provide each block with the require fire flows.

The proposed water supply design conforms to all relevant City Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Pinecrest Collector Sewer catchment area, as shown by the City sewer mapping, included in ***Appendix C***. An existing 225 mm diameter sanitary sewer within Morrison Drive and an existing 200 mm diameter sanitary sewer within the subject site are available to service the proposed development.

Currently, 2781 Baseline Road is serviced by the existing 200 mm diameter sanitary sewer located across the subject site. The sanitary sewer is tributary to the Pinecrest Collector sewer, which is located approximately 1.4 km downstream of the site.

An assessment of the existing Morrison Drive sanitary sewer capacity was conducted for the development at Fresh Towns - Phase 1 and Phase 2. As indicated by the ***Previously Approved Brief***; the analysis identified that there is an available capacity within the Morrison Drive sanitary sewer, of ***8.0 L/s***. Refer to Section 4.3 for further discussion.

4.2 Wastewater Design

It is proposed that the development will have an internal sanitary sewer network with a connection to the existing 200 mm diameter sanitary sewer within the subject site. Townhomes will have independent connections to the internal 200 mm diameter sanitary sewer network via 135 mm diameter service laterals.

The adjacent development, within the 2781 Baseline Road lands, will be serviced via a connection to the internal sanitary sewer network within the subject site. Sanitary calculation sheet employed in the design of the internal network is included in ***Appendix C***. Refer to drawing ***SSP-1,*** accompanying this report, for a detailed servicing layout.

Table 5, below, summarizes the ***City Standards*** employed in the design of the proposed wastewater sewer system.

Table 5
Wastewater Design Criteria

Design Parameter	Value
Residential Townhome	2.7 P/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon's Correction Factor 0.8
Infiltration and Inflow Allowance	0.05 L/s/ha (Dry Weather) 0.28 L/s/ha (Wet Weather) 0.33 L/s/ha (Total)
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size (Inside Greenbelt)	200 mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5 m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6 m/s
Maximum Full Flowing Velocity	3.0 m/s

Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012
*Please note that the residential average daily flow uses 280 L/person/d in line with proposed updates to City Design Guidelines.

Table 6, below, demonstrates the estimated peak flow from the proposed development based on the site statistics provided by RLA Architecture. See ***Appendix C*** for associated calculations.

Table 6
Summary of Estimated Peak Wastewater Flow - Ultimate

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	1.46
Estimated Peak Dry Weather Flow	5.06
Estimated Peak Wet Weather Flow	5.67

DSEL estimated the peak wet weather flow based on the development statistics provided by RLA Architecture for the existing development at 2781 Baseline Road and the proposed developments at 2710 Draper Avenue (City File No. D07-12-17-0076) and 2795 Baseline Road. As indicated by ***Table 6***, the subject sites propose a peak wet weather sanitary flow of ***5.67 L/s***.

4.3 Morrison Drive Sanitary Sewer Hydraulic Grade Line Assessment

A preliminary assessment of the existing Morrison drive sanitary sewer capacity was conducted by Novatech. This analysis is provided in ***Appendix C*** in the report ***Morrison Court Development Wastewater Servicing Study***, dated January 26, 2009. The Novatech study used GIS data provided by the City to model the existing sewer network. This study found that under existing conditions, the minimum freeboard between the

hydraulic grade line (HGL) and the lowest connected underside of footing (USF) elevation was **0.33 m**.

To support this study, J.F. Sabourin and Associates (JFSA) was retained by Greatwise to re-create the Novatech model of the Morrison Drive sanitary sewer under both existing and proposed Phase 1 and Phase 2 conditions. JFSA recreated the Novatech model using XPSWMM, while Novatech had previously used H2OMAP Sewer/Pro. It was, therefore, anticipated that JFSA would arrive at slightly different results than Novatech when modelling the same system. In the JFSA model it was found that the minimum freeboard was **0.37 m**.

To verify existing sanitary pipe inverts and sizes, Stantec Geomatics Ltd. (Stantec) was retained by Greatwise to conduct a field survey along the Morrison Drive sewer. Several differences were present between the existing conditions data provided by Novatech and the survey performed by Stantec. When the surveyed data was input into the model it was found that the minimum freeboard was **0.48 m**.

In proposed Phase 1 and Phase 2 scenarios, it was found that the minimum freeboard between the HGL and the lowest connected USF was **0.44 m**. This is greater than the City of Ottawa's minimum allowable value of 0.30 m. An email report from JFSA, as well as, detailed modeling information is provided in ***Appendix C***.

Based on the previous HGL assessment and the email from JFSA dated January 21, 2013, included in the ***Appendix C***, an available capacity of ***8.0 L/s*** was identified. As a result, no changes to the downstream sanitary network are required at this time. As indicated by ***Table 6,*** and the sanitary calculation sheet included in ***Appendix C***, there is sufficient capacity to support both the proposed development at 2795 Baseline Road and the existing development at 2781 Baseline Road.

4.4 Wastewater Servicing Conclusions

The site is tributary to the Pinecrest Trunk Collector sewer; based on the sanitary analysis provided by JFSA, sufficient capacity is available to accommodate the estimated ***5.67 L/s*** peak wet weather flow from the proposed developments at 2710 Draper Avenue, the proposed development at 2795 Baseline Road, and the existing development at 2781 Baseline Road.

The proposed wastewater design conforms to all relevant ***City Standards***.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Stormwater runoff from the subject property is tributary to the City of Ottawa sewer system and is located within the Ottawa Central sub-watershed. As such, approvals for proposed development within this area are under the approval authority of the City of Ottawa.

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Ottawa River watershed and is therefore subject to review by the Rideau Valley Conservation Authority (RVCA).

In the existing condition, stormwater runoff from the subject site and from the adjacent property (2781 Baseline Road) are collected by the temporary stormwater management pond within the subject site. Stormwater then outlets to the existing 300 mm diameter storm sewer located within the subject site, tributary to the existing 300 mm diameter storm sewer within the Morrison Drive right-of-way.

5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were established using the City of Ottawa standards, where the proposed development is required to:

- Meet an allowable release rate based on a Rational Method Coefficient of 0.50, employing the City of Ottawa IDF parameters for a 2-year storm with a calculated time of concentration greater than or equal to 10 minutes;
- Attenuate all storms up to and including the City of Ottawa 100-year design event on site; and
- Provide quality controls to an enhanced level of treatment due to the site's distance from the outlet and the current Site Plan; correspondence with the RVCA is included in ***Appendix A***.

Based on the above, the allowable release rate for the proposed development is ***88.0 L/s***.

5.3 Proposed Stormwater Management System

To meet the stormwater objectives the proposed development will utilize subsurface storage.

It is proposed that the stormwater outlet from the proposed development will be to the existing 300 mm diameter storm sewer within the subject site, tributary to the existing 300 mm diameter storm sewer within the Morrison Drive right-of-way.

The proposed stormwater management system will include private catch basins, an internal storm sewer network, and an underground storage unit to achieve the target release rates. Townhomes will have independent connections to the internal storm sewer network via 100 mm diameter service laterals. Refer to drawing ***SSP-1,*** accompanying this report, for detailed servicing layout.

Areas A1, A2, and EX1, as shown by drawing ***SWM-1,*** accompanying this report, are tributary to the internal storm sewer network, tributary to the Morrison Drive storm sewer. Brentwood ST-36 storage systems or an approved equivalent will provide ***238.5 m^3*** of underground storage which will be attenuated by a ***148 mm Plug Style ICD*** at the outlet side of storm maintenance structure ***CBMH106***.

To meet stormwater quality criteria specified by the RVCA, an oil/grit separator will be installed downstream of all catch basins, as shown by drawing ***SSP-1,*** accompanying this report. Based on Aqua-Swirl sizing, an ***Aqua-Swirl AS-3*** will provide an enhanced level of quality control (80% TSS removal) in accordance with the RVCA requirement. Stormceptor sizing has been included in ***Appendix D***.

Table 7, below, summarizes post-development flow rates for the proposed and existing developments at 2781 & 2795 Baseline Road. Refer to ***Appendix D*** for detailed calculations.

Table 7
Stormwater Flow Rate Summary

Control Area	5-Year Release Rate	5-Year Storage Required	100-Year Release Rate	100-Year Storage Required	100-Year Storage Available
	(L/s)	(m^3)	(L/s)	(m^3)	(m^3)
Unattenuated Areas	11.1	0.0	23.8	0.0	0.0
Attenuated Areas	40.3	97.6	63.3	232.7	238.5
Total	**51.5**	**97.6**	**87.2**	**232.7**	**238.5**

It is calculated that approximately ***233 m^3*** of storage will be required on site to attenuate flow to the established release rate of ***88.0 L/s***. Based on the information provided in ***Table 7, 238.5 m^3*** of storage is provided. Collaborating storage calculations are contained within ***Appendix D***.

5.4 Proposed Major System Flow

During storms in excess of the 100-year event or if catchbasins/manholes become blocked, stormwater runoff will spill towards the private right-of-ways. Stormwater from private right-of-ways will flow overland towards the municipal infrastructure within the Morrison Drive right-of-way and ultimately to Graham Creek, approximately 1.5 km downstream.

5.5 Stormwater Servicing Conclusions

In accordance with City of Ottawa, ***City Standards,*** post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm. The post-development allowable release rate was calculated as ***88.0 L/s***, for both the existing development at 2781 Baseline and the proposed development at 2795 Baseline Road. It is proposed to attenuated stormwater to the established release rate by utilizing ***238.5 m^3*** of underground storage.

Based on consultation with the RVCA, stormwater quality controls to an enhanced level of treatment are required and will be provided by an ***Aqua-Swirl AS-3*** oil/grit separator or an approved equivalent.

During storms in excess of the 100-year event or if catchbasins/manholes become blocked, stormwater runoff will spill towards the private right-of-ways. Stormwater from private right-of-ways will flow overland towards the municipal infrastructure within the Morrison Drive right-of-way and ultimately to Graham Creek, approximately 1.5 km downstream.

The proposed stormwater design conforms to all relevant ***City Standards*** and Policies for approval.

6.0 UTILITIES

Utility servicing will be coordinated with the individual utility companies prior to site development.

7.0 EROSION AND SEDIMENT CONTROL

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

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

Silt fence will be installed around the perimeter of the site and will be cleaned and maintained throughout construction. Silt fence will remain in place until the working areas have been stabilized and re-vegetated.

Catch basins will have SILTSACKs or an approved equivalent installed under the grate during construction to protect from silt entering the storm sewer system.

A mud mat will be installed at the construction access in order to prevent mud tracking onto adjacent roads.

Erosion and sediment controls must be in place during construction. The following recommendations to the contractor will be included in contract documents:

- Limit extent of exposed soils at any given time;
- Re-vegetate exposed areas as soon as possible;
- Minimize the area to be cleared and grubbed;
- Protect exposed slopes with plastic or synthetic mulches;
- Install silt fence to prevent sediment from entering existing ditches;
- No refueling or cleaning of equipment near existing watercourses;
- Provide sediment traps and basins during dewatering;
- Install filter cloth between catch basins and frames;
- Plan construction at proper time to avoid flooding; and
- Establish material stockpiles away from watercourses, so that barriers and filters may be installed.

The contractor will, at every rainfall, complete inspections and guarantee proper performance. The inspection is to include:

- Verification that water is not flowing under silt barriers; and
- Clean and change filter cloth at catch basins.

8.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Ltd. (DSEL) has been retained by Greatwise Developments to prepare a Servicing and Stormwater Management report in support of the application for a Part Lot Control (PLC) and a Site Plan Control (SPC) for the Fresh Towns Phase 3-3 development at 2795 Baseline Road. The preceding report outlines the following:

- The watermain boundary conditions have been requested from the City of Ottawa, however, they were unavailable at the time of this publication;
- Based on boundary conditions provided by the City for the development at 2710 Draper Avenue, the existing municipal water infrastructure is capable of providing the proposed development with water within the City's required pressure range;
- City of Ottawa Technical Bulletin ISTB-2018-02 indicated that the required fire flow for the development is ***12,000 L/min***. Based on the hydraulic model, there are a sufficient number of local and proposed fire hydrants to service the development;
- The proposed ultimate development, within 2710 Draper Avenue and 2781 & 2795 Baseline Road, is estimated to have a peak wet weather flow of ***5.67 L/s***; Based on the sanitary analysis prepared by JFSA, the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Based on consultation with the City of Ottawa, the proposed development will be required to attenuate post development flows to an equivalent release rate of ***88.0 L/s*** for all storms up to and including the 100-year storm event;
- Stormwater objectives will be met through storm water retention via subsurface storage, ***238.5 m³*** of underground storage will be provided to attenuate flow to the established release rate above; and
- Based on consultation with the RVCA, stormwater quality controls to an enhanced level of treatment are required. An Aqua-Swirl AS-3 oil/grit separator will be installed downstream of the stormwater control in order to meet this requirement.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alison J. Gosling, EIT.

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Stephen J. Pichette, P. Eng.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

18-1055 15/01/2019

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1, EX-1
☒	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	Section 1.0
☒	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.3
☒	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.	Section 2.1
☒	Statement of objectives and servicing criteria.	Section 1.0
☒	Identification of existing and proposed infrastructure available in the immediate area.	Sections 3.1, 4.1, 5.1, EX-1
☐	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).	N/A
☒	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 neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	GP-1
☐	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.	N/A
☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Section 2.1
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	SP-1

4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	N/A
☒	Availability of public infrastructure to service proposed development	Section 3.1
☒	Identification of system constraints	Section 3.1
☒	Identify boundary conditions	Section 3.1, 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.3, Appendix B

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	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.	Section 3.2
☐	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.	N/A
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	N/A
☐	Address reliability requirements such as appropriate location of shut-off valves	N/A
☐	Check on the necessity of a pressure zone boundary modification	N/A
☒	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	Section 3.2, 3.3
☒	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.	SSP-1
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2, Appendix B
☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	N/A

4.3 Development Servicing Report: Wastewater

☒	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).	Section 4.2
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	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.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	Section 4.1
☒	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)	Section 4.2
☒	Calculations related to dry-weather and wet-weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	Section 4.2, Appendix C
☒	Description of proposed sewer network including sewers, pumping stations, and forcemains.	Section 4.2
☐	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).	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations such as contamination, corrosive environment etc.	N/A

4.4 Development Servicing Report: Stormwater Checklist

☒	Description of drainage outlets and downstream constraints including legality of outlets (i.e. municipal drain, right-of-way, watercourse, or private property)	Section 5.1
☒	Analysis of available capacity in existing public infrastructure.	Section 5.1, Appendix D
☒	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Drawings/Figures
☒	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 sub-watersheds, taking into account long-term cumulative effects.	Section 5.2
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	Section 5.2, 5.3
☒	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3
☐	Set-back from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	Appendix A
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	N/A
☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	Section 5.2, 5.3
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	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.	Section 5.1, 5.3
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	N/A
☐	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.	N/A
☐	Identification of potential impacts to receiving watercourses	N/A
☐	Identification of municipal drains and related approval requirements.	N/A

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

☒	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3
☐	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	N/A
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
☐	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.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5 Approval and Permit Requirements: Checklist

☒	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 ct. 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.	Section 1.2
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	N/A
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	N/A

4.6 Conclusion Checklist

☒	Clearly stated conclusions and recommendations	Section 8.0
☐	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.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

*Extracted from the City of Ottawa-Servicing Study Guidelines for Development Applications

Alison Gosling

From: Jamie Batchelor <jamie.batchelor@rvca.ca>
Sent: Wednesday, October 18, 2017 11:49 AM
To: Alison Gosling
Subject: RE: 2710 Draper Avenue - RVCA

Hi Alison,

Thanks for providing the information and for the clarification on the stages. While there is no surface parking proposed in the traditional sense of a large parking lot, there are several driveways proposed which would be utilized for parking and the construction of new streets. Therefore the Conservation Authority would still advise the proponent that onsite water quality treatment of 80% TSS removal should be the water quality target for this site.

From: Alison Gosling [mailto:AGosling@dsel.ca]
Sent: Wednesday, October 18, 2017 10:35 AM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: RE: 2710 Draper Avenue - RVCA

Good morning Jamie,

As discussed, phase III of the development includes 91 townhome units and a community park post-development, with no proposed surface parking. The subject site contains 84 townhome pre-development, with surface parking.

Stormwater in the post-development will be runoff from rooftops and landscaped areas. It is not proposed to have surface ponding within the private streets.

Please note that Phase III will be independently serviced and not connected to the services within Phase I and Phase II.

Can you provide an updated recommendation regarding quality controls?

Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.542
fax: (613) 836-7183
email: agosling@dsel.ca

From: Jamie Batchelor [mailto:jamie.batchelor@rvca.ca]
Sent: Wednesday, June 21, 2017 2:19 PM
To: Alison Gosling <AGosling@dsel.ca>
Subject: RE: 2710 Draper Avenue - RVCA

Good Afternoon Alison,

Given that the site outlets to an existing storm sewer approximately 1.5 km to Graham Creek and there is no municipal facility which provides water quality treatment for the Stormwater entering the watercourse, we would advise the proponent that onsite water quality treatment of 80% TSS removal should be the water quality target for this site.

From: Alison Gosling [mailto:AGosling@dsel.ca]
Sent: Thursday, June 15, 2017 9:53 AM
To: Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: 2710 Draper Avenue - RVCA

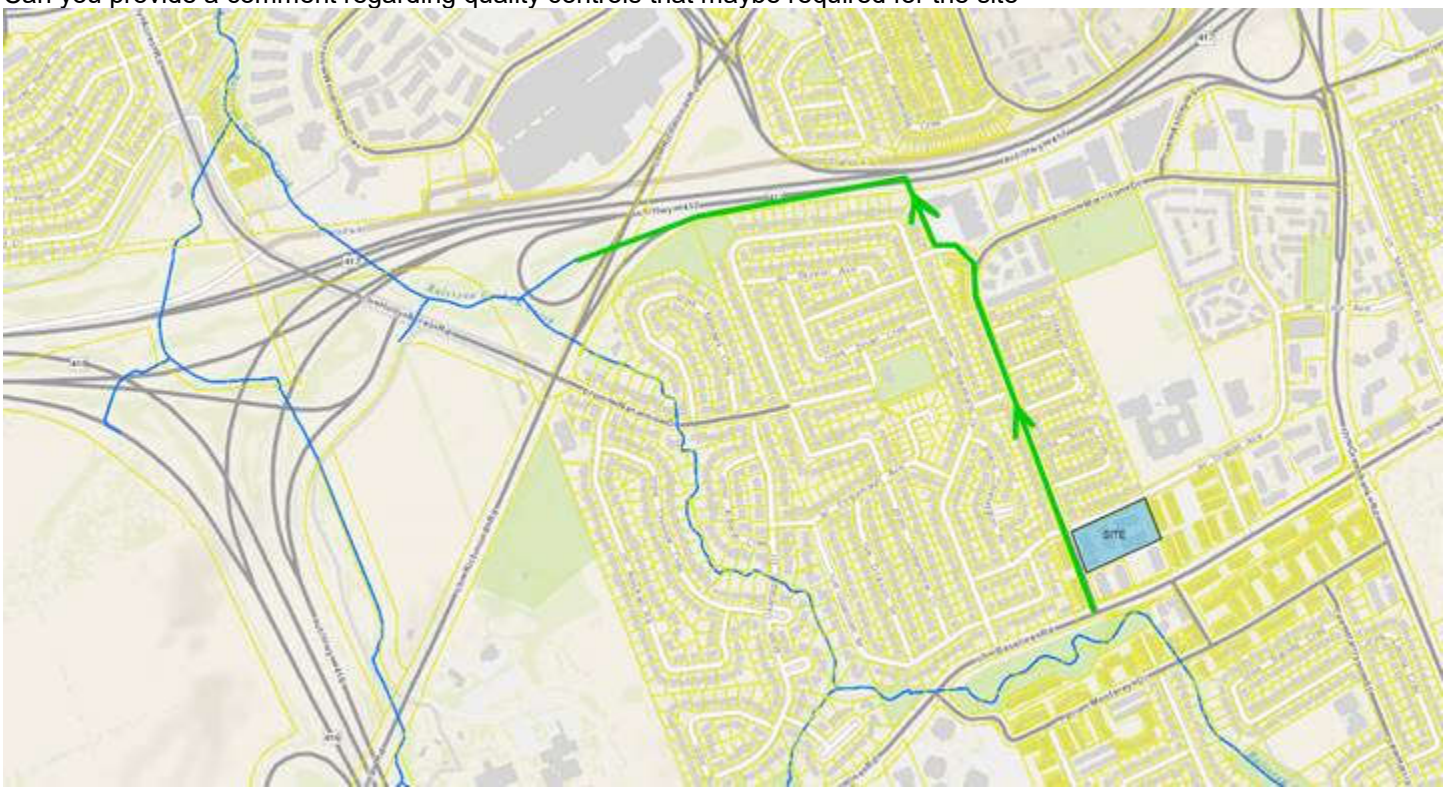
Good morning Jamie,

We wanted to touch base with you regarding a development we are working on located at 2710 Draper Avenue.

The stormwater collected from the site travels approximately 1.5 km to Graham Creek tributary to the Ottawa River.

The development proposes to construct a thirteen townhome blocks and a community park. The development will discharge stormwater to the existing 450 mm diameter storm sewer within Draper Avenue.

Can you provide a comment regarding quality controls that maybe required for the site



Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.542
fax: (613) 836-7183
email: agosling@DSEL.ca

Alison Gosling

From: Alison Gosling
Sent: Tuesday, January 15, 2019 11:08 AM
To: 'MOECCOttawaSewage (MOECC)'
Cc: 'Diamond, Emily (MOECC)'
Subject: 18-1055 2795 Baseline Road

Good morning,

We wanted to touch base with you regarding a proposed development at 2795 Baseline Road.

The existing 0.42 ha site currently consists of a stormwater management pond, servicing the lands at 2781 Baseline Road and is zoned Residential. The development proposes to construct a 32 townhome units.

It appears that the existing stormwater management system currently directs flow towards the municipal infrastructure within Morrison Drive. Proposed stormwater controls will use subsurface storage to attenuate the release rate to City of Ottawa requirements and will service 2795 and 2781 Baseline Road. As the proposed sewage works will service multiple parcels of land, it is anticipated that the subject site does not qualify for an ECA exemption set out in Ontario Regulation 525/98 as part of the Ontario Water Resources Act.

I hope you could comment on our assumption that this property would be exempt from requiring an ECA. Please feel free to call to discuss further.

Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

phone: (613) 836-0856 ext.542
fax: (613) 836-7183
email: agosling@dsel.ca

APPENDIX B

Water Supply

Greatwise Developments
2795 Baseline Road
Proposed Site Conditions - Freshtowns III

Water Demand Design Flows per Unit Count
City of Ottawa - Water Distribution Guidelines, July 2010

Domestic Demand

Type of Housing	Per / Unit	Units	Pop
Single Family	3.4		0
Semi-detached	2.7		0
Townhouse	2.7	32	87
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day †		Peak Hour ††	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	87	30.5	21.1	149.2	103.6	225.3	156.5
Total Demand		**30.5**	**21.1**	**149.2**	**103.6**	**225.3**	**156.5**

Max Day Peaking Factor (Residential) † = 4.9 **Peak Hour Peaking Factor (Residential)†† =** 7.4

Greatwise Developments
2795 Baseline Road
Proposed Site Conditions - Freshtowns
Block 12 Block 13

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min

*Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	2039.7	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	9935.8	L/min	
	10000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**8500.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Non-Combustible	20.1m-30m	62	3	186	10%	
S	Non-Combustible	10.1m-20m	62	3	186	15%	
E	Non-Combustible	20.1m-30m	15.5	3	47	8%	
W	Non-Combustible	30.1m-45m	15.5	1	16	5%	
		% Increase				**38%**	*value not to exceed 75%*

Increase	**3230.0**	**L/min**

Lw = Length of the Exposed Wall (of the ajacent structure)
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	11730.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided by _____.
-Calculations based on Fire Underwriters Survey - Part II

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

1. Base Requirement

$$F = 220C\sqrt{A}$$ L/min

*Where **F** is the fire flow, **C** is the Type of construction and **A** is the Total floor area*

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	1601.1	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	8802.9	L/min	
	9000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Adjustments

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**7650.0**	**L/min**

3. Reduction for Sprinkler Protection

Non-Sprinklered	0%	
Reduction	**0**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC	
N	Wood Frame	30.1m-45m	33.5	1	34	5%	
S	Non-Combustible	10.1m-20m	119	3	357	15%	
E	Non-Combustible	10.1m-20m	45	3	135	15%	
W	Non-Combustible	0m-3m	143	3	429	25%	
		% Increase				**60%**	*value not to exceed 75%*

Increase	**4590.0**	**L/min**

Lw = Length of the Exposed Wall
Ha = number of storeys of the adjacent structure (maximum 5 stories)
LH = Length-height factor of exposed wall. Value rounded up.
EC = Exposure Charge

Total Fire Flow

Fire Flow	12240.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	12000.0	**L/min**	*rounded to the nearest 1,000 L/min*

Notes:
-Type of construction, Occupancy Type and Sprinkler Protection information provided Roderick Lahey Architects.
-Calculations based on Fire Underwriters Survey - Part II

Boundary Conditions Unit Conversion

Connection 1 (Morrison Drive - Northern Connection)

	Height (m)	Elevation (m	m H_2O	PSI	kPa
Avg. DD	115.5	75.7	39.8	56.7	390.6
Fire Flow	95.5	75.7	19.8	28.2	194.4
Peak Hour	105.9	75.7	30.2	43.0	296.5

Connection 2 (Morrison Drive - Southern Connection)

	Height (m)	Elevation (m	m H_2O	PSI	kPa
Avg. DD	115.5	76.4	39.1	55.6	383.4
Fire Flow	95.5	76.4	19.1	27.2	187.2
Peak Hour	105.9	76.4	29.5	42.0	289.2

Minor Loss Coefficients

Fitting	Loss Coefficient
Globe valve, fully open	10
Angle valve, fully open	5
Swing check valve, fully open	2.5
Gate valve, fully open	0.2
Short-radius elbow	0.9
Medium-radius elbow	0.8
Long-radius elbow	0.6
45 degree elbow	0.4
Closed return bend	2.2
Standard tee - flow through run	0.6
Standard tee - flow through branch	1.8
Square Entrance	0.5
Exit	1

*Minor loss coefficients based on EPANET 2 USERS MANUAL, dated September 2000

Pipe Diameter vs. "C" Factor

Pipe Diameter (m)	C-Factor
150	100
200 to 250	110
300 to 600	120
Over 600	130

Node Pressures

Kpa	Pressure (kPa)	Pressure (m H20)
Max	552	56.3
Rec Max	480	49.0
Rec Min	350	35.7
Min	275	28.1

Location	Average Day (L/min)	Max Day + Fire Flow (L/min)	Peak Hour (L/min)
EX.FH2	0.0	6000.0	0.0
FH1	0.0	6000.0	0.0
N1	2.6	13.0	19.6
N2	2.0	9.7	14.7
N3	7.3	35.6	53.8
N4	6.6	32.4	48.9
N5	0.7	3.2	4.9
N6	0.7	3.2	4.9
N8	0.7	3.2	4.9
N9	0.7	3.2	4.9

Location	Average Day (kPa)	Max Day + Fire Flow (kPa)	Peak Hour (kPa)
EX.FH2	421.0	181.3	326.9
FH1	401.9	186.1	307.7
N1	414.7	216.1	320.5
N2	409.1	202.5	314.9
N3	403.4	187.6	309.2
N4	405.2	201.7	311.0
N5	411.7	213.0	317.0
N6	406.5	199.6	311.8
N8	401.8	197.9	306.6
N9	400.5	184.1	305.3

```
[TITLE]


[JUNCTIONS]
;ID                     Elev            Demand          Pattern
 N4                     74.20           6.6                                ;
 N1                     73.23           2.6                                ;
 N3                     74.38           7.3                                ;
 FH1                    74.53           0                                  ;
 N2                     73.80           2                                  ;
 N5                     73.53           0.7                                ;
 N6                     74.06           0.7                                ;
 N9                     74.67           0.7                                ;
 N8                     74.54           0.7                                ;
 EX.FH2                 72.58           0                                  ;

[RESERVOIRS]
;ID                     Head            Pattern
 R1                     115.5                                   ;
 R2                     115.5                                   ;

[TANKS]
;ID                     Elevation       InitLevel       MinLevel        MaxLevel
Diameter        MinVol          VolCurve

[PIPES]
;ID                     Node1                   Node2                   Length
Diameter        Roughness       MinorLoss       Status
 P5                     R2                      N4                      10.4
200             110             2               Open    ;
 P4                     N4                      N3                      40.3
200             110             0.6             Open    ;
 P10                    N3                      FH1                     2.7
150             100             5.9             Open    ;
 P1                     R1                      N1                      10.4
200             110             2               Open    ;
 P2                     N2                      N1                      82.1
200             110             0.6             Open    ;
 P3                     N3                      N2                      82.4
200             110             2.4             Open    ;
 P6                     N5                      N1                      3.7
19              100             2               Open    ;
 P7                     N6                      N2                      3.7
19              100             2               Open    ;
 P9                     N9                      N3                      7.7
19              100             2               Open    ;
 P8                     N8                      N4                      7.7
19              100             2               Open    ;
```

```
 P11                    EX.FH2                  R1                      18.5
200             100             5.9             Open    ;

[PUMPS]
;ID                     Node1                   Node2                   Parameters

[VALVES]
;ID                     Node1                   Node2                   Diameter
Type    Setting         MinorLoss

[TAGS]

[DEMANDS]
;Junction               Demand          Pattern                 Category

[STATUS]
;ID                     Status/Setting

[PATTERNS]
;ID                     Multipliers

[CURVES]
;ID                     X-Value         Y-Value

[CONTROLS]

[RULES]

[ENERGY]
 Global Efficiency      75
 Global Price           0
 Demand Charge          0

[EMITTERS]
;Junction               Coefficient

[QUALITY]
;Node                   InitQual

[SOURCES]
;Node                   Type            Quality         Pattern

[REACTIONS]
;Type           Pipe/Tank               Coefficient


[REACTIONS]
 Order Bulk             1
```

```
 Order Tank             1
 Order Wall             1
 Global Bulk            0
 Global Wall            0
 Limiting Potential     0
 Roughness Correlation  0

[MIXING]
;Tank                   Model

[TIMES]
 Duration               0
 Hydraulic Timestep     1:00
 Quality Timestep       0:05
 Pattern Timestep       1:00
 Pattern Start          0:00
 Report Timestep        1:00
 Report Start           0:00
 Start ClockTime        12 am
 Statistic              None

[REPORT]
 Status                 No
 Summary                No
 Page                   0

[OPTIONS]
 Units                  LPM
 Headloss               H-W
 Specific Gravity       1
 Viscosity              1
 Trials                 40
 Accuracy               0.001
 CHECKFREQ              2
 MAXCHECK               10
 DAMPLIMIT              0
 Unbalanced             Continue 10
 Pattern                1
 Demand Multiplier      1
 Emitter Exponent       0.5
 Quality                None mg/L
 Diffusivity            1
 Tolerance              0.01

[COORDINATES]
;Node                   X-Coord                 Y-Coord
 N4                     3194.44                 3733.33
 N1                     3116.67                 6322.22
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 N3                     5816.67                3700.00
 FH1                    5807.58                4246.54
 N2                     5650.00                6366.67
 N5                     3105.56                5833.33
 N6                     5705.56                5822.22
 N9                     5850.00                3000.00
 N8                     3216.67                2988.89
 EX.FH2                 2346.21                7441.65
 R1                     1916.67                6333.33
 R2                     2005.56                3733.33

[VERTICES]
;Link                   X-Coord                Y-Coord
 P3                     7350.00                3677.78
 P3                     7527.78                3888.89
 P3                     7483.33                6144.44
 P3                     7305.56                6344.44

[LABELS]
;X-Coord           Y-Coord          Label & Anchor Node

[BACKDROP]
 DIMENSIONS             0.00                   0.00                   10000.00
        10000.00
 UNITS                  None
 FILE
 OFFSET                 0.00                   0.00

[END]
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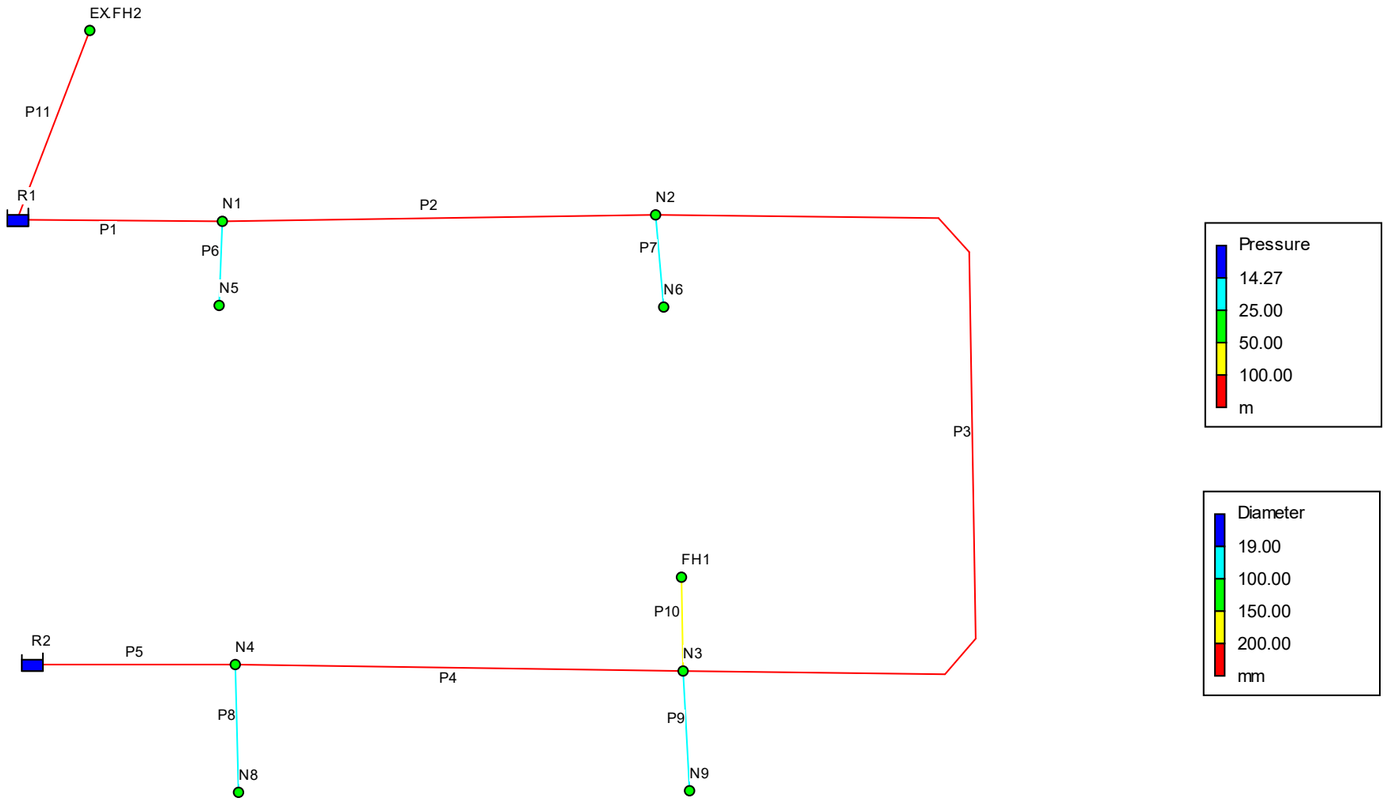
2795 BASELINE ROAD - AVERAGE DAY DEMAND

Day 1, 12:00 AM



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**************************************************************
*                          E P A N E T                       *
*                  Hydraulic and Water Quality               *
*                  Analysis for Pipe Networks                *
*                        Version 2.0                         *
**************************************************************

Input File: 2019-01-14_AVG.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P5	R2	N4	10.4	200
P4	N4	N3	40.3	200
P10	N3	FH1	2.7	150
P1	R1	N1	10.4	200
P2	N2	N1	82.1	200
P3	N3	N2	82.4	200
P6	N5	N1	3.7	19
P7	N6	N2	3.7	19
P9	N9	N3	7.7	19
P8	N8	N4	7.7	19
P11	EX.FH2	R1	18.5	200

Node Results:

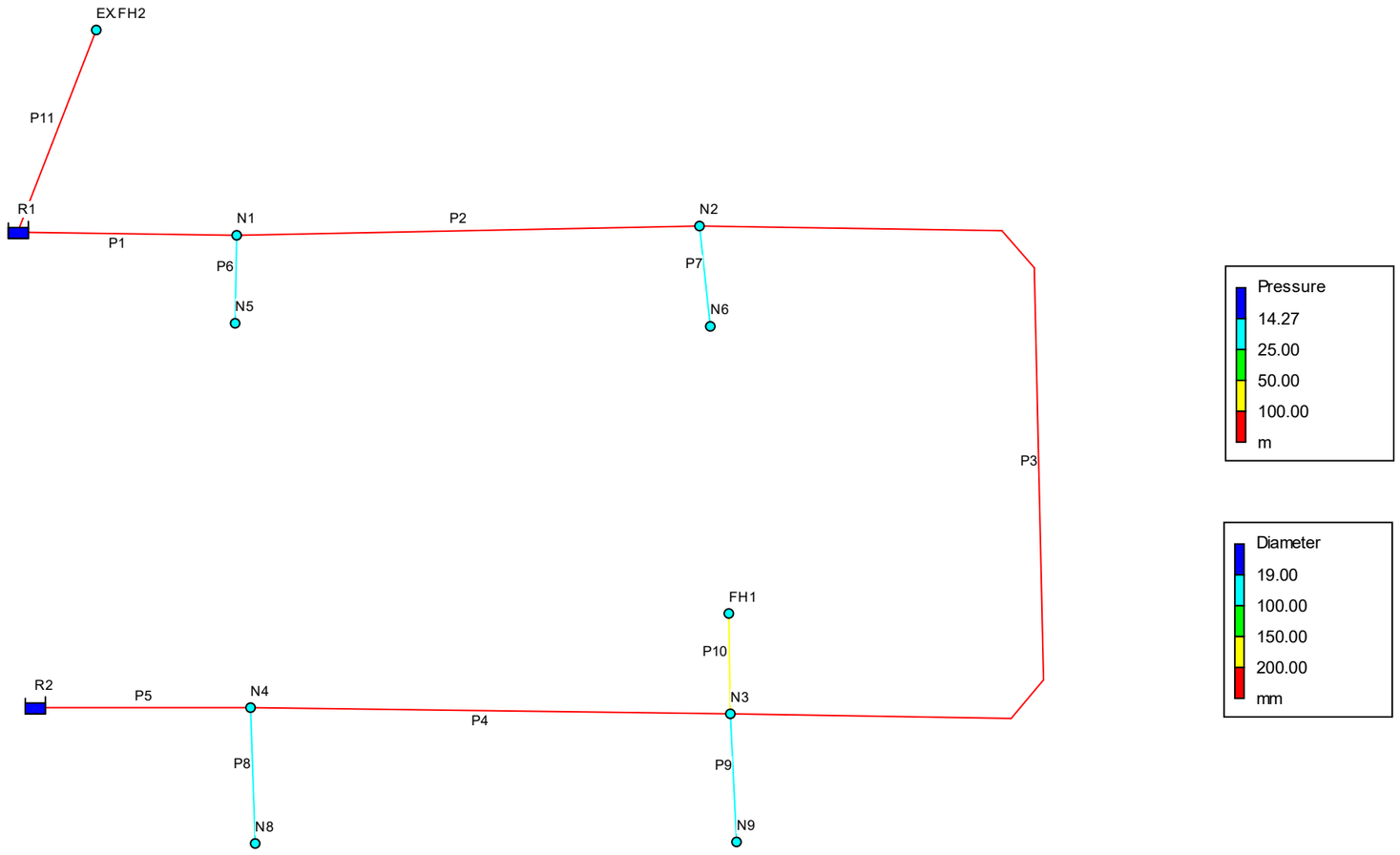
Node ID	Demand LPM	Head m	Pressure m	Quality	
N4	6.60	115.50	41.30	0.00	
N1	2.60	115.50	42.27	0.00	
N3	7.30	115.50	41.12	0.00	
FH1	0.00	115.50	40.97	0.00	
N2	2.00	115.50	41.70	0.00	
N5	0.70	115.50	41.97	0.00	
N6	0.70	115.50	41.44	0.00	
N9	0.70	115.50	40.83	0.00	
N8	0.70	115.50	40.96	0.00	
EX.FH2	0.00	115.50	42.92	0.00	
R1	-8.37	115.50	0.00	0.00	Reservoir
R2	-12.93	115.50	0.00	0.00	Reservoir

Page 2
Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
P5	12.93	0.01	0.00	Open
P4	5.63	0.00	0.00	Open
P10	0.00	0.00	0.00	Open
P1	8.37	0.00	0.00	Open
P2	-5.07	0.00	0.00	Open
P3	-2.37	0.00	0.00	Open
P6	-0.70	0.04	0.42	Open
P7	-0.70	0.04	0.42	Open
P9	-0.70	0.04	0.40	Open
P8	-0.70	0.04	0.40	Open
P11	0.00	0.00	0.00	Open

2795 BASELINE ROAD - MAX DAY + FIRE FLOW

Day 1, 12:00 AM



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**************************************************************
*                          E P A N E T                       *
*                  Hydraulic and Water Quality               *
*                  Analysis for Pipe Networks                *
*                        Version 2.0                         *
**************************************************************

Input File: 2019-01-14_MAX.net
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P5	R2	N4	10.4	200
P4	N4	N3	40.3	200
P10	N3	FH1	2.7	150
P1	R1	N1	10.4	200
P2	N2	N1	82.1	200
P3	N3	N2	82.4	200
P6	N5	N1	3.7	19
P7	N6	N2	3.7	19
P9	N9	N3	7.7	19
P8	N8	N4	7.7	19
P11	EX.FH2	R1	18.5	200

Node Results:

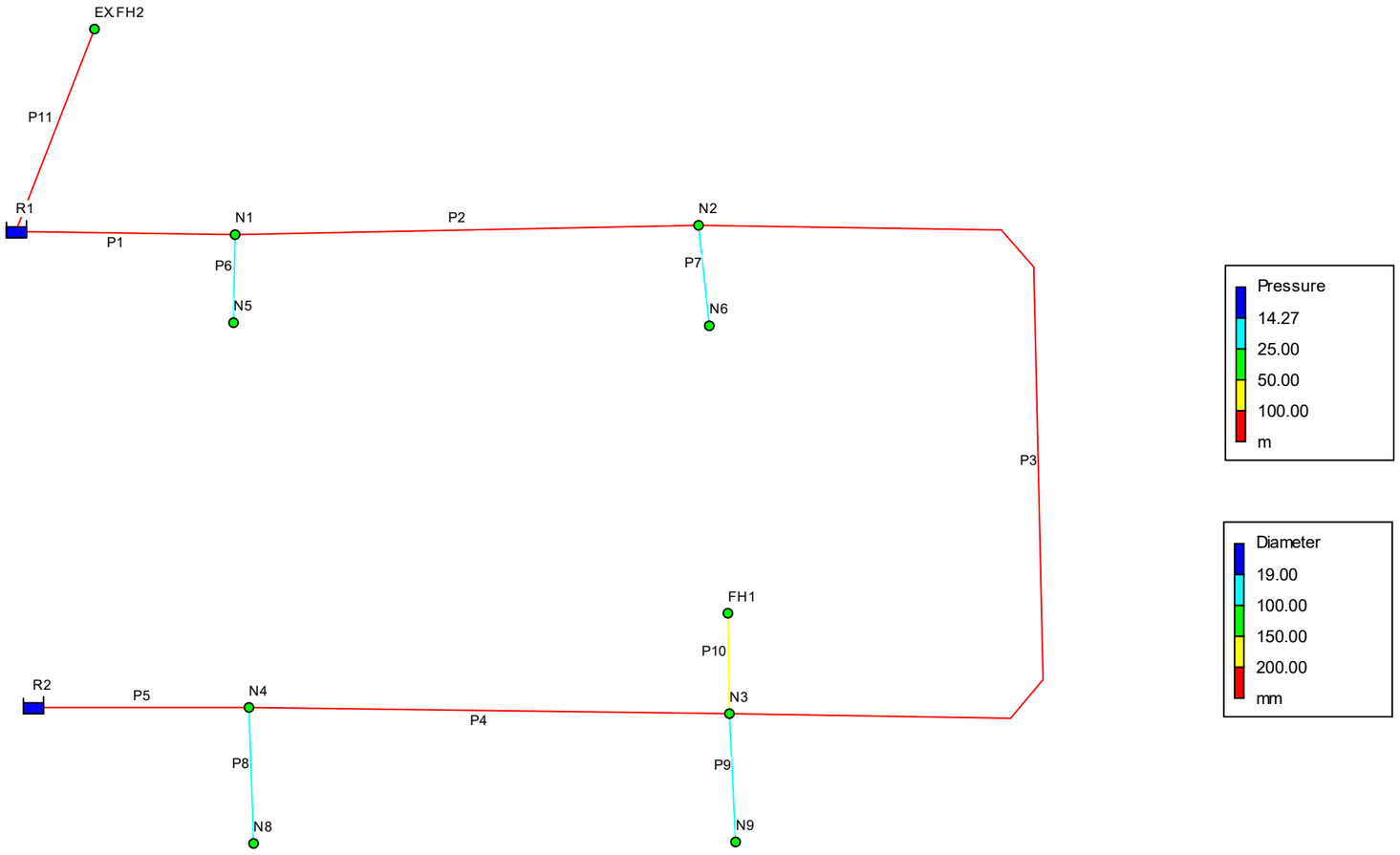
Node ID	Demand LPM	Head m	Pressure m	Quality	
N4	32.40	94.76	20.56	0.00	
N1	13.00	95.26	22.03	0.00	
N3	6035.60	93.50	19.12	0.00	
FH1	0.00	93.50	18.97	0.00	
N2	9.70	94.44	20.64	0.00	
N5	3.20	95.24	21.71	0.00	
N6	3.20	94.41	20.35	0.00	
N9	3.20	93.44	18.77	0.00	
N8	3.20	94.71	20.17	0.00	
EX.FH2	6000.00	91.06	18.48	0.00	
R1	-8184.11	95.50	0.00	0.00	Reservoir
R2	-3919.40	95.50	0.00	0.00	Reservoir

Page 2
Link Results:

Link ID	Flow LPM	Velocity m/s	Unit Headloss m/km	Status
P5	3919.40	2.08	71.03	Open
P4	3883.80	2.06	31.42	Open
P10	0.00	0.00	0.00	Open
P1	2184.11	1.16	22.86	Open
P2	-2167.91	1.15	10.07	Open
P3	-2155.01	1.14	11.41	Open
P6	-3.20	0.19	7.21	Open
P7	-3.20	0.19	7.21	Open
P9	-3.20	0.19	6.70	Open
P8	-3.20	0.19	6.70	Open
P11	-6000.00	3.18	239.89	Open

2795 BASELINE ROAD - PEAK HOUR DEMAND

Day 1, 12:00 AM



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******************************************************************
*                          E P A N E T                           *
*                  Hydraulic and Water Quality                   *
*                  Analysis for Pipe Networks                    *
*                        Version 2.0                             *
******************************************************************

Input File: 2019-01-14_PEAK.net
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
P5	R2	N4	10.4	200
P4	N4	N3	40.3	200
P10	N3	FH1	2.7	150
P1	R1	N1	10.4	200
P2	N2	N1	82.1	200
P3	N3	N2	82.4	200
P6	N5	N1	3.7	19
P7	N6	N2	3.7	19
P9	N9	N3	7.7	19
P8	N8	N4	7.7	19
P11	EX.FH2	R1	18.5	200

Node Results:

Node ID	Demand LPM	Head m	Pressure m	Quality	
N4	48.90	105.90	31.70	0.00	
N1	19.60	105.90	32.67	0.00	
N3	53.80	105.90	31.52	0.00	
FH1	0.00	105.90	31.37	0.00	
N2	14.70	105.90	32.10	0.00	
N5	4.90	105.84	32.31	0.00	
N6	4.90	105.84	31.78	0.00	
N9	4.90	105.79	31.12	0.00	
N8	4.90	105.79	31.25	0.00	
EX.FH2	0.00	105.90	33.32	0.00	
R1	-62.14	105.90	0.00	0.00	Reservoir
R2	-94.46	105.90	0.00	0.00	Reservoir

Page 2
Link Results:

Link ID	Flow LPM	VelocityUnit m/s	Headloss m/km	Status
P5	94.46	0.05	0.05	Open
P4	40.66	0.02	0.01	Open
P10	0.00	0.00	0.00	Open
P1	62.14	0.03	0.02	Open
P2	-37.64	0.02	0.01	Open
P3	-18.04	0.01	0.00	Open
P6	-4.90	0.29	16.00	Open
P7	-4.90	0.29	16.00	Open
P9	-4.90	0.29	14.82	Open
P8	-4.90	0.29	14.82	Open
P11	0.00	0.00	0.00	Open

Alison Gosling

From: Alison Gosling
Sent: Wednesday, January 9, 2019 12:55 PM
To: 'Fraser, Mark'
Subject: 18-1055 2795 Baseline Road - Boundary Condition Request
Attachments: wtr-2019-01-09_1055.pdf

Good afternoon Mark,

We would like to request updated water boundary conditions for Morrison Drive using the following proposed development demands:

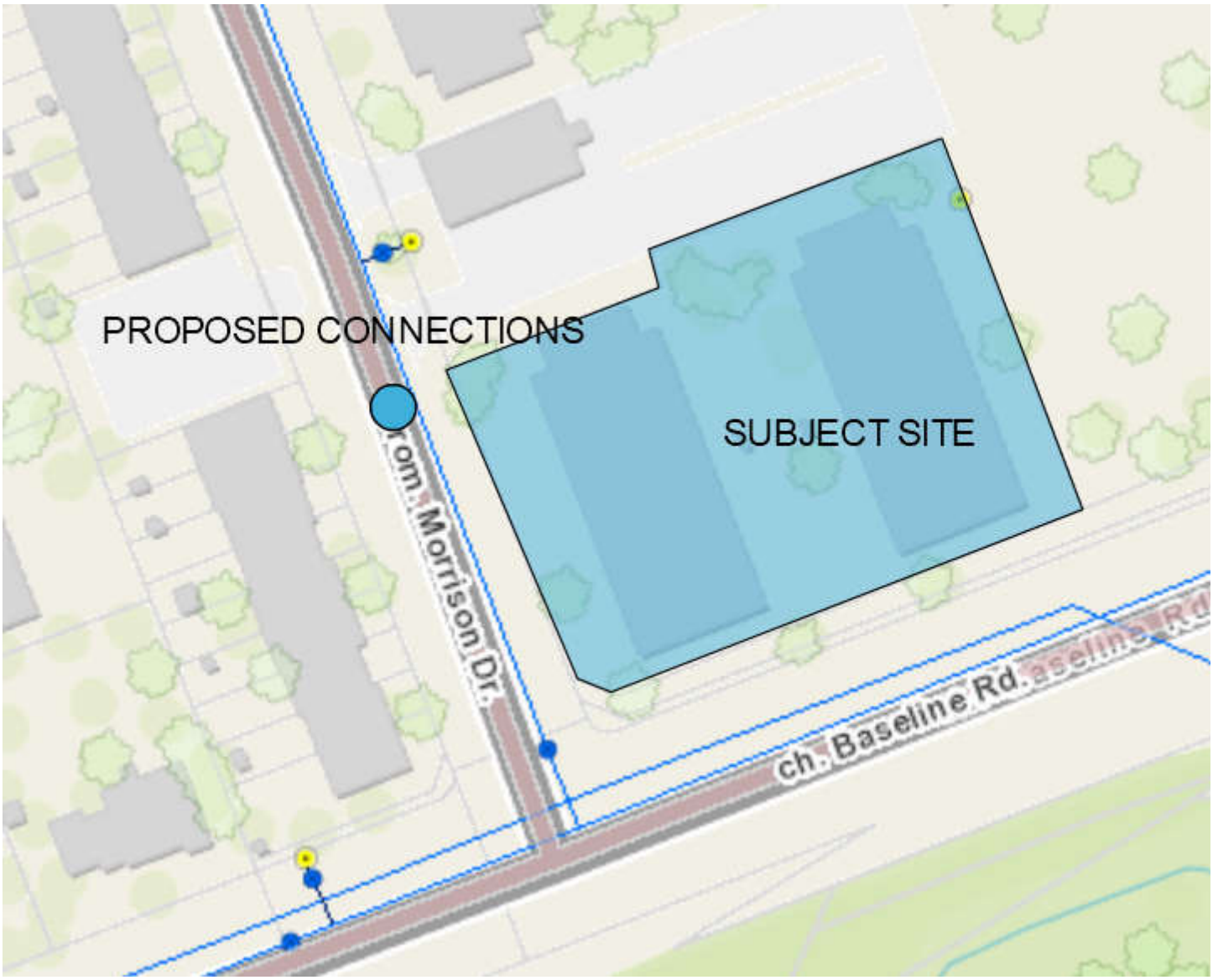
1. Location of Service / Street Number: 2795 Baseline Road

2. Type of development and the amount of fire flow required for the proposed development:

- The proposed Fresh Towns development consists of 32 townhomes.
- It is proposed that the development will have a dual connection to be serviced from the existing 200 mm diameter watermain within Morrison Drive, as shown by the map below.
- City of Ottawa Technical Bulletin ISTB-2018-02 has been used to calculate an estimated fire demand of ***12,000 L/min*** for the development. Refer to attached for the detailed calculations.

3.

	L/min	L/s
Avg. Daily	**21.1**	**0.35**
Max Day	**103.6**	**1.73**
Peak Hour	**156.5**	**2.61**



Thank you,

Alison Gosling, E.I.T.
Project Coordinator / Junior Designer

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

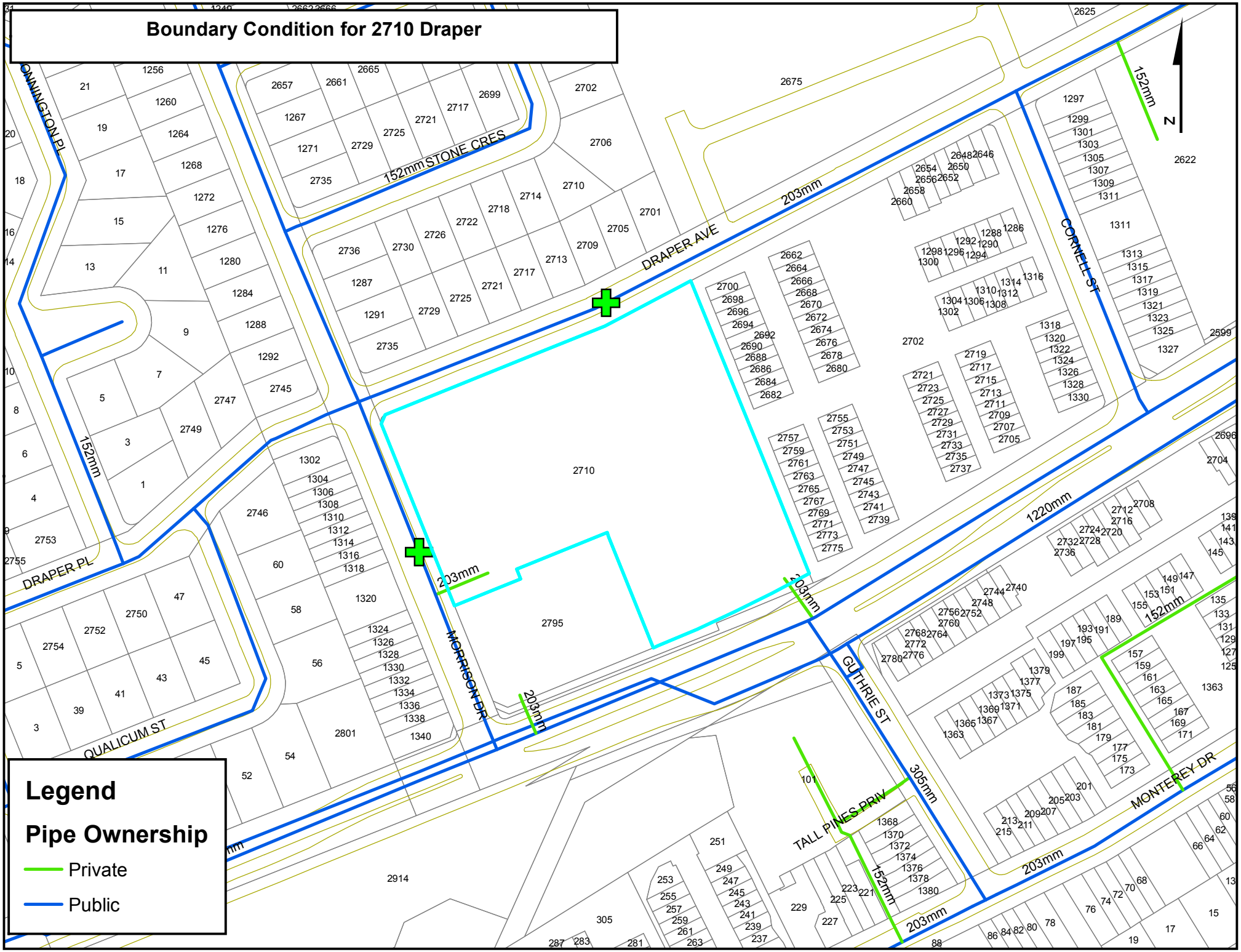
phone: (613) 836-0856 ext.542
fax: (613) 836-7183
email: agosling@dsel.ca

Please update the hydraulic analysis based on the below updated boundary conditions which are based on the proposed water demand requirements presented in Appendix B. **The boundary conditions have been provided in advance of a formal request to expedite to the update.**

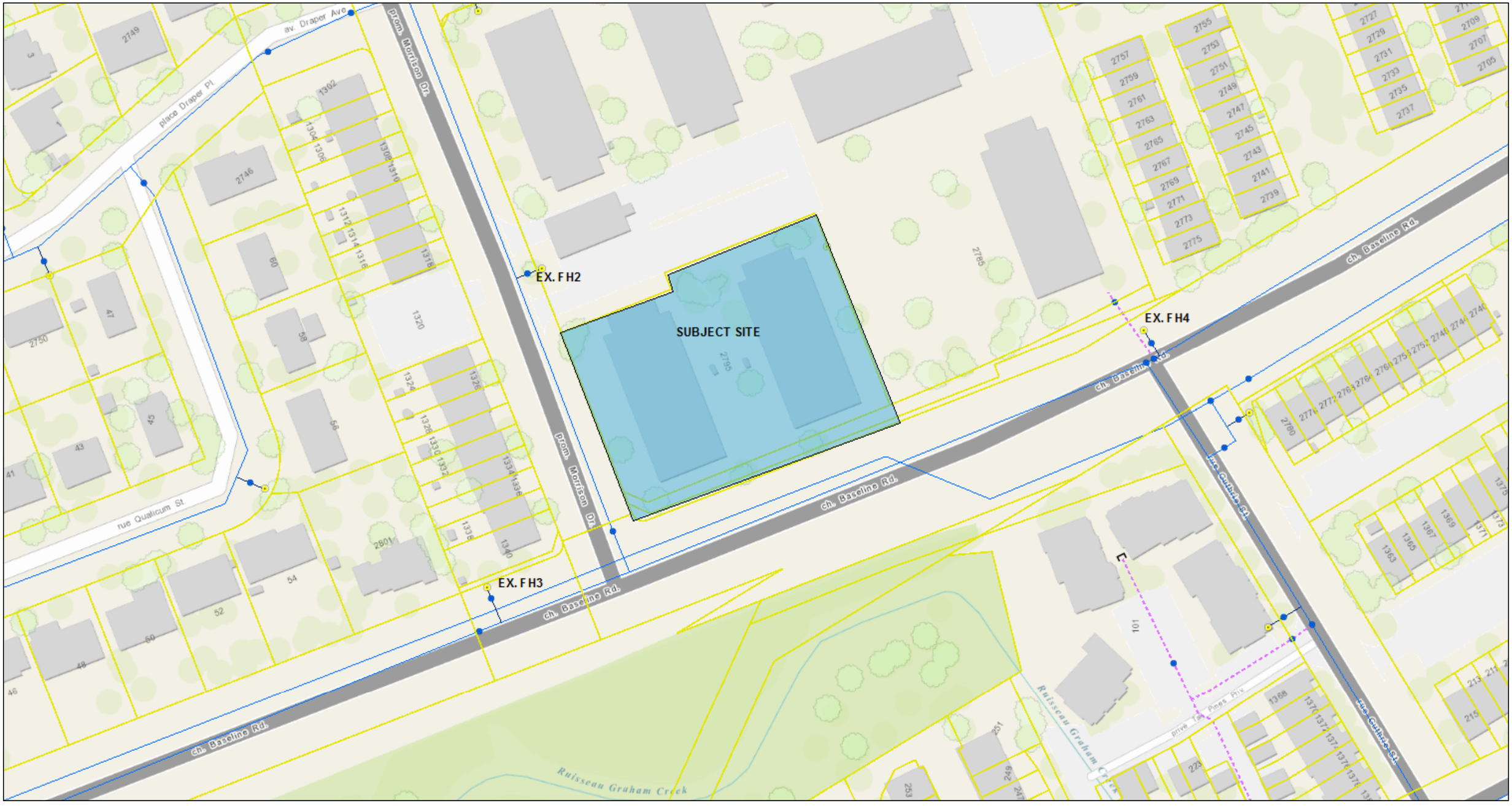
Interim Site Conditions – Phase 3-1
Average Day Demand: 0.35 L/s (21.1 L/min)
Maximum Daily Demand: 1.26 L/s (76.1 L/min)
Maximum Hourly Demand: 1.90 L/s (114.2 L/min)
Fire Flow: 10,000 L/min
Minimum HGL = 106.2m, same at all connections
Maximum HGL = 115.5m, same at all connections
Max Day + Fire Flow (167L/s) = 97.8m, southern connection on Morrison
Max Day + Fire Flow (167L/s) = 97.0m, northern connection on Morrison
Max Day + Fire Flow (167L/s) = 96.5m, Draper connection

Ultimate Site Conditions – Phase 3-1 & Phase 3-2
Average Day Demand: 0.94 L/s (56.6 L/min)
Maximum Daily Demand: 3.40 L/s (203.9 L/min)
Maximum Hourly Demand: 5.09 L/s (305.8 L/min)
Fire Flow: 11,000 L/min
Minimum HGL = 105.9m, same at all connections
Maximum HGL = 115.5m, same at all connections
Max Day + Fire Flow (183L/s) = 95.5m, southern connection on Morrison
Max Day + Fire Flow (183L/s) = 94.5m, northern connection on Morrison
Max Day + Fire Flow (183L/s) = 94.0m, Draper connection

Boundary Condition for 2710 Draper



EXISTING FIRE HYDRANTS



January 14, 2019

1:1,433

0 0.0175 0.035 0.07 mi

0 0.0275 0.055 0.11 km

City of Ottawa

- Property Parcels

Valves / Vannes

- Valve / Vanne
- TVS, A, D

Water Fittings / Raccords de conduite d'eau

- Cap / bouchon
- Reducer / réducteur
- Hydrants / Bornes-fontaines
- Hydrant Laterals / Branchements de borne-fontaine

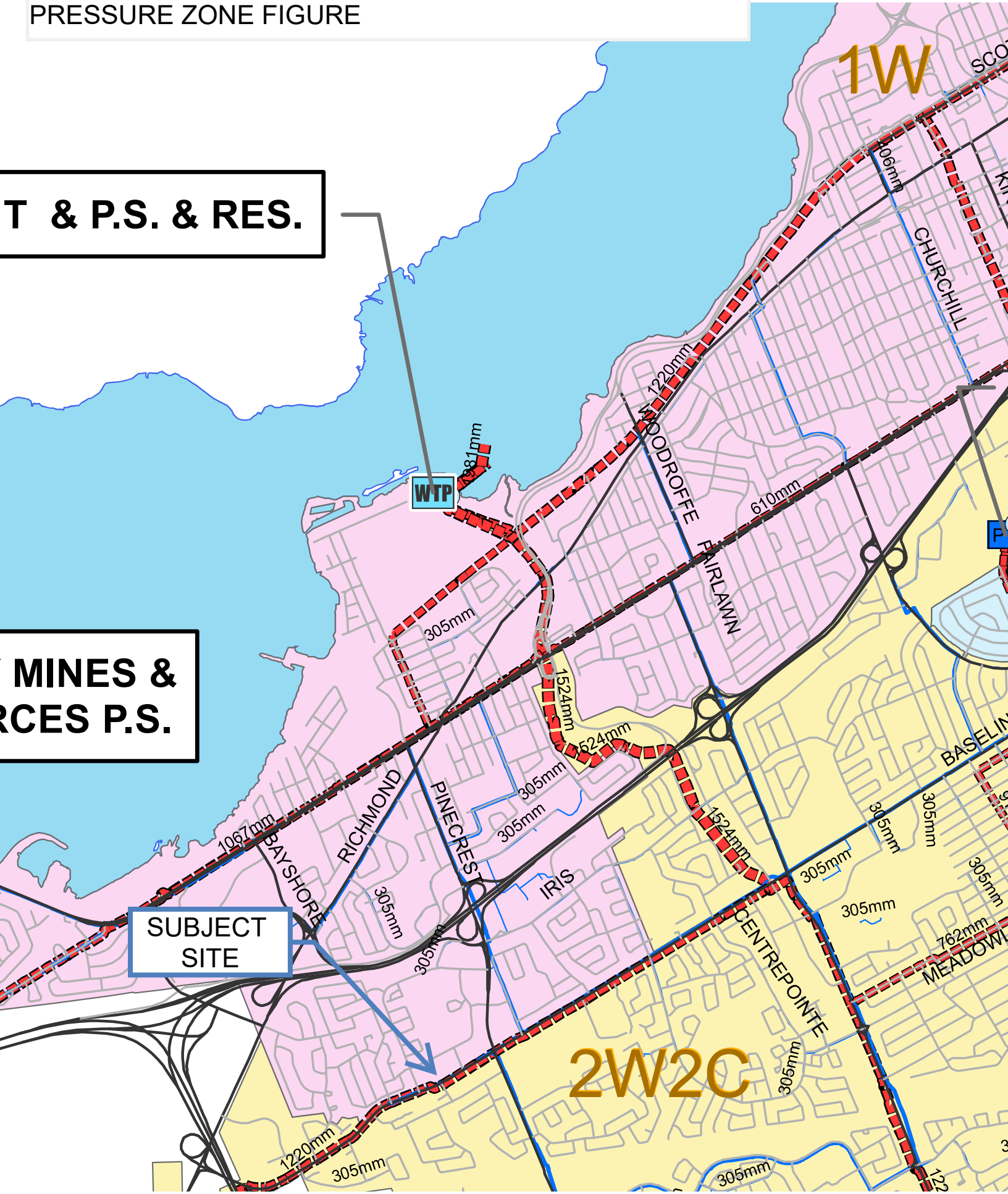
Water Mains / Conduites d'eau principales

- Private / Branchement privé
- Public / Branchement public

Misc. Water Structures / Structures d'aqueduc - divers

- Pumping Station / Station de pompage des eaux
- Well Supply / Alimentation par puits
- Elevated Tank / Château d'eau
- In Ground Tank / Réservoir souterrain
- Water Treatment Plant / Usine d'épuration des eaux

CITY OF OTTAWA - WATER DISTRIBUTION SYSTEM
PRESSURE ZONE FIGURE



APPENDIX C

Wastewater Collection

Greatwise Developments
Fresh Towns III - 2795 Baseline Road
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2012

Site Area	2.172	**ha**

Extraneous Flow Allowances

Infiltration / Inflow (Dry)	0.11	L/s
Infiltration / Inflow (Wet)	0.61	L/s
Infiltration / Inflow (Total)	**0.72**	**L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**	
Single Family	3.4		0	
Semi-detached and duplex	2.7		0	
Townhouse	2.7	86	233	*Phase 3-1 & 3-2 Townhomes*
Stacked Townhouse	2.3		0	
Apartment				
Existing CCC 994 Lands (Building E)				
1 Bedroom	1.4	56	79	
2 Bedroom	2.1	24	51	
Townhomes	2.7			
1 Bedroom	2.7	32	87	
2 Bedroom				

Total Pop	**450**	
Average Domestic Flow	**1.46**	**L/s**
Peaking Factor	**3.40**	
Peak Domestic Flow	**4.96**	**L/s**

Total Estimated Average Dry Weather Flow Rate	**1.46 L/s**
Total Estimated Peak Dry Weather Flow Rate	**5.06 L/s**
Total Estimated Peak Wet Weather Flow Rate	**5.67 L/s**

Residential demands, Harmon's Correction Factor, Extraneous Flow Rates and Commercial Peaking Factor established by the City of Ottawa Technical Bulletin ISTB-2018-01. Commercial demands established by City of Ottawa Sewer Design Guidelines Appendix 4A.

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Unknown Road2 - 02																											
	1A	2A	0.29		62	0.29	62	3.4	0.69		0.00		0.00		0.00	0.00	0.29	0.29	0.08	0.77	65.3	200	0.65	26.44	0.03	0.84	0.37
To Unknown Road3 - 03, Pipe 2A - 3A						0.29	62				0.00		0.00		0.00			0.29									
Unknown Road3 - 03																											
Contribution From Unknown Road2 - 02, Pipe 1A - 2A						0.29	62				0.00		0.00		0.00		0.29	0.29									
	2A	3A				0.29	62	3.4	0.69		0.00		0.00		0.00	0.00	0.00	0.29	0.08	0.77	12.0	200	0.40	20.74	0.04	0.66	0.31
	3A	4A	0.42		130	0.71	192	3.3	2.07		0.00		0.00		0.00	0.00	0.42	0.71	0.20	2.27	18.3	200	0.40	20.74	0.11	0.66	0.43
To Unknown Road1 - 01, Pipe 4A - 5A						0.71	192				0.00		0.00		0.00			0.71									
Unknown Road1 - 01																											
Contribution From Unknown Road3 - 03, Pipe 3A - 4A						0.71	192				0.00		0.00		0.00		0.71	0.71									
	4A	5A	0.13		25	0.84	217	3.3	2.33		0.00		0.00		0.00	0.00	0.13	0.84	0.24	2.57	72.0	200	0.40	20.74	0.12	0.66	0.45

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.286	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4		

Designed: AJG

Checked: ADF

Dwg. Reference: **SAN-1**

PROJECT: **Fresh Towns III - 2795 Baseline Road**

LOCATION: **City of Ottawa**

File Ref: 18-1055

Date: **14 Jan 2019**

Sheet No. 1 of 1

Existing Conditions (Reproduction of Novatech Table 2.2)

City MH ID	Pipe ID	Population		Local Area (ha)						Cumulative Area (ha)	Design Flow (L/S)
		Local	Cumulative	Res.	Com.	Com. Cumul.	Inst.	Inst. Cumul.	Total		
Morrison Drive Sewer (Upper Reach)											
25698	1	113	113	1.39		0		0	1.39	1.39	1.8
25699	2	592	705	7.91		0	8.21	8.21	16.12	17.51	16.4
25700	3	71	776	1.55		0		8.21	1.55	19.06	17.8
25701	4	85	861	1.7		0		8.21	1.7	20.76	19.4
25702	5	58	919	1.05		0		8.21	1.05	21.81	20.5
25703	6	27	946	0.59		0		8.21	0.59	22.4	21.0
25704	7	160	1106	3.22		0		8.21	3.22	25.62	24.0
25706	8	43	1149	0.57		0		8.21	0.57	26.19	24.6
43673	9	162	1311	2.17	2.38	2.38		8.21	4.55	30.74	28.8
25709	10		1311	0.76	0.39	2.77		8.21	1.15	31.89	29.4
25710	11		1311	0.71	1.05	3.82		8.21	1.76	33.65	30.5
25711	12		1311	1.29	0.8	4.62		8.21	2.09	35.74	31.7
25713	13	378	1689	3.19		4.62		8.21	3.19	38.93	36.5
25715	14	2294	3983	34.61	6.5	11.12	1.39	9.6	42.5	81.43	77.2
Draper Avenue Sewer System											
	15A	38	38	1.38		0	1.47	1.47	2.85	2.85	2.0
	15B	135	173	2.2		0		1.47	2.2	5.05	4.4
	15C	230	403	0.54		0		1.47	0.54	5.59	6.9
	15D	360	763	0.84		0		1.47	0.84	6.43	10.6
	15E	905	1668	4.13		0		1.47	4.13	10.56	20.4
	15F	251	1919	2.98		0	0.5	1.97	3.48	14.04	24.3
	15G	111	2030	0.94		0	0.25	2.22	1.19	15.23	25.8
Morrison Drive Sewer (Lower Reach)											
25723	15		6013			11.12		11.82	0	96.66	100.4
25722	16		6013	0.38	1.88	13		11.82	2.26	98.92	101.4
25720	17	154	6167	2.07	0.84	13.84		11.82	2.91	101.83	104.2

Domestic Flow	300	(L/per/day)
Correction Factor Dom (Harmon Equation)	0.6	
Extraneous Flow	0.5	L/s/ha
Commercial	17000	L/ha/day
Institutional	10000	
Industrial	10000	
Peaking Factor non-res	1	

Population density	
Single Family	3.4
Townhouse	2.7
Apartment Units	1.4

Phase 1 Conditions as per DSEL 2012

City MH ID	Pipe ID	Population		Local Area (ha)						Cumulative Area (ha)	Design Flow (L/S)
		Local	Cumulative	Res.	Com.	Com. Cumul.	Inst.	Inst. Cumul.	Total		
Morrison Drive Sewer (Upper Reach)											
25698	1	305	305	1.33	0.06	0.06		0	1.39	1.39	4.0
25699	2	592	897	7.91		0.06	8.21	8.21	16.12	17.51	20.3
25700	3	71	968	1.55		0.06		8.21	1.55	19.06	21.7
25701	4	85	1053	1.7		0.06		8.21	1.7	20.76	23.3
25702	5	58	1111	1.05		0.06		8.21	1.05	21.81	24.3
25703	6	27	1138	0.59		0.06		8.21	0.59	22.4	24.8
25704	7	160	1298	3.22		0.06		8.21	3.22	25.62	27.7
25706	8	43	1341	0.57		0.06		8.21	0.57	26.19	28.4
43673	9	162	1503	2.17	2.38	2.44		8.21	4.55	30.74	32.5
25709	10		1503	0.76	0.39	2.83		8.21	1.15	31.89	33.1
25710	11		1503	0.71	1.05	3.88		8.21	1.76	33.65	34.2
25711	12		1503	1.29	0.8	4.68		8.21	2.09	35.74	35.4
25713	13	378	1881	3.19		4.68		8.21	3.19	38.93	40.1
25715	14	2294	4175	34.61	6.5	11.18	1.39	9.6	42.5	81.43	80.5
Draper Avenue Sewer System											
	15A	38	38	1.38		0	1.47	1.47	2.85	2.85	4.5
	15B	135	173	2.2		0		1.47	2.2	5.05	6.9
	15C	230	403	0.54		0		1.47	0.54	5.59	9.2
	15D	360	763	0.84		0		1.47	0.84	6.43	12.8
	15E	905	1668	4.13		0		1.47	4.13	10.56	22.5
	15F	251	1919	2.98		0	0.5	1.97	3.48	14.04	26.3
	15G	111	2030	0.94		0	0.25	2.22	1.19	15.23	27.8
Morrison Drive Sewer (Lower Reach)											
25723	15		6205			11.18		11.82	0	96.66	103.0
25722	16		6205	0.38	1.88	13.06		11.82	2.26	98.92	104.5
25720	17	154	6359	2.07	0.84	13.9		11.82	2.91	101.83	107.2

Population increase based on Phase I proposed development, net population increase of 220.

Domestic Flow - Existing	300	(L/per/day)
Domestic Flow Proposed	350	(L/per/day)
Correction Factor Dom[1] (Harmon Equation)	0.6	
Extraneous Flow	0.5	L/s/ha
Commercial	17000	L/ha/day
Institutional	10000	
Industrial	10000	
Peaking Factor non-res	1	

[1]Correction factor for proposed buildings = 1.0

Population density

Townhouse	2.7
Apartment 1 Bedroom	1.4
Apartment 2 Bedroom	2.1
Apartment 3 Bedroom	3.1

Total Population Increase

Existing Townhouses 5*12 units	162	persons
Proposed	354	persons
Difference	192	
100 % will be added at Link 1	354	persons

Ultimate Proposed Conditions - as per DSEL 2012

City MH ID	Pipe ID	Population		Local Area (ha)						Cumulative Area (ha)	Design Flow (L/S)
		Local	Cumulative	Res.	Com.	Com. Cumul.	Inst.	Inst. Cumul.	Total		
Morrison Drive Sewer (Upper Reach)											
25698	1	347	347	1.33	0.06	0.06		0	1.39	1.39	4.6
25699	2	1060	1407	7.91		0.06	8.21	8.21	16.12	17.51	28.0
25700	3	71	1478	1.55		0.06		8.21	1.55	19.06	29.3
25701	4	85	1563	1.7		0.06		8.21	1.7	20.76	30.9
25702	5	58	1621	1.05		0.06		8.21	1.05	21.81	31.9
25703	6	27	1648	0.59		0.06		8.21	0.59	22.4	32.4
25704	7	160	1808	3.22		0.06		8.21	3.22	25.62	35.2
25706	8	43	1851	0.57		0.06		8.21	0.57	26.19	35.9
43673	9	162	2013	2.17	2.38	2.44		8.21	4.55	30.74	39.9
25709	10		2013	0.76	0.39	2.83		8.21	1.15	31.89	40.5
25710	11		2013	0.71	1.05	3.88		8.21	1.76	33.65	41.6
25711	12		2013	1.29	0.8	4.68		8.21	2.09	35.74	42.8
25713	13	378	2391	3.19		4.68		8.21	3.19	38.93	47.4
25715	14	2294	4685	34.61	6.5	11.18	1.39	9.6	42.5	81.43	87.1
Draper Avenue Sewer System											
	15A	38	38	1.38		0	1.47	1.47	2.85	2.85	8.6
	15B	135	173	2.2		0		1.47	2.2	5.05	10.8
	15C	230	403	0.54		0		1.47	0.54	5.59	13.0
	15D	360	763	0.84		0		1.47	0.84	6.43	16.4
	15E	905	1668	4.13		0		1.47	4.13	10.56	25.8
	15F	251	1919	2.98		0	0.5	1.97	3.48	14.04	29.6
	15G	111	2030	0.94		0	0.25	2.22	1.19	15.23	31.1
Morrison Drive Sewer (Lower Reach)											
25723	15		6715			11.18		11.82	0	96.66	109.3
25722	16		6715	0.38	1.88	13.06		11.82	2.26	98.92	110.8
25720	17	154	6869	2.07	0.84	13.9		11.82	2.91	101.83	113.5

Population increase based on proposed development, net population increase of 702, new pop = 929.

Domestic Flow - Existing	300	(L/per/day)
Domestic Flow Proposed	350	(L/per/day)
Correction Factor Dom[1] (Harmon Equation)	0.6	
Extraneous Flow	0.5	L/s/ha
Commercial	17000	L/ha/day
Institutional	10000	
Industrial	10000	
Peaking Factor non-res	1	

[1]Correction factor for proposed buildings = 1.0

Population density

Townhouse	2.7
Apartment 1 Bedroom	1.4
Apartment 2 Bedroom	2.1
Apartment 3 Bedroom	3.1

Total Population Increase

Existing Townhouses 7*12 units	227	persons
Proposed	929	persons
Difference	702	
1/3 will be added at Link 1	310	persons
2/3 will be added at Link 2	619	L/s

Phase X Conditions - Max Flow increase to not exceed 0.30 m freeboard

City MH ID	Pipe ID	Population		Local Area (ha)						Cumulative Area (ha)	Design Flow (L/S)
		Local	Cumulative	Res.	Com.	Com. Cumul.	Inst.	Inst. Cumul.	Total		
Morrison Drive Sewer (Upper Reach)											
25698	1	276	276	1.33	0.06	0.06		0	1.39	1.39	4.9
25699	2	917	1193	7.91		0.06	8.21	8.21	16.12	17.51	24.6
25700	3	71	1264	1.55		0.06		8.21	1.55	19.06	25.9
25701	4	85	1349	1.7		0.06		8.21	1.7	20.76	27.5
25702	5	58	1407	1.05		0.06		8.21	1.05	21.81	28.5
25703	6	27	1434	0.59		0.06		8.21	0.59	22.4	29.0
25704	7	160	1594	3.22		0.06		8.21	3.22	25.62	31.9
25706	8	43	1637	0.57		0.06		8.21	0.57	26.19	32.6
43673	9	162	1799	2.17	2.38	2.44		8.21	4.55	30.74	36.6
25709	10		1799	0.76	0.39	2.83		8.21	1.15	31.89	37.3
25710	11		1799	0.71	1.05	3.88		8.21	1.76	33.65	38.3
25711	12		1799	1.29	0.8	4.68		8.21	2.09	35.74	39.5
25713	13	378	2177	3.19		4.68		8.21	3.19	38.93	44.1
25715	14	2294	4471	34.61	6.5	11.18	1.39	9.6	42.5	81.43	84.2
Draper Avenue Sewer System											
	15A	38	38	1.38		0	1.47	1.47	2.85	2.85	6.6
	15B	135	173	2.2		0		1.47	2.2	5.05	8.9
	15C	230	403	0.54		0		1.47	0.54	5.59	11.1
	15D	360	763	0.84		0		1.47	0.84	6.43	14.7
	15E	905	1668	4.13		0		1.47	4.13	10.56	24.2
	15F	251	1919	2.98		0	0.5	1.97	3.48	14.04	28.0
	15G	111	2030	0.94		0	0.25	2.22	1.19	15.23	29.5
Morrison Drive Sewer (Lower Reach)											
25723	15		6501			11.18		11.82	0	96.66	106.5
25722	16		6501	0.38	1.88	13.06		11.82	2.26	98.92	108.0
25720	17	154	6655	2.07	0.84	13.9		11.82	2.91	101.83	110.7

Population increase based on JFSA XPSWMM Modelling - max allowable increase for freeboard >= 0.30 m.

Domestic Flow - Existing	300	(L/per/day)
Domestic Flow Proposed	350	(L/per/day)
Correction Factor Dom[1] (Harmon Equation)	0.6	
Extraneous Flow	0.5	L/s/ha
Commercial	17000	L/ha/day
Institutional	10000	
Industrial	10000	
Peaking Factor non-res	1	

[1]Correction factor for proposed buildings = 1.0

Population density

Townhouse	2.7
Apartment 1 Bedroom	1.4
Apartment 2 Bedroom	2.1
Apartment 3 Bedroom	3.1

Total Population Increase

Existing Townhouses 5*12 units	162	persons
Proposed New	650	persons
Difference	488	
1/3 will be added at Link 1	217	persons
2/3 will be added at Link 2	433	L/s

Table 1 - Comparison of Existing Conditions HGL results based on different Sanitary Sewer pipe layouts and Modelling Programs.

City MH ID	Underside of Footing Elevation (m)[1]	Novatech 2009 Existing Conditions[2]		XPSWMM Replica of Novatech 2009 Model[2]		XPSWMM Model with Stantec 2012 Survey data[3]	
		HGL (m)	Freeboard (m)	HGL (m)	Freeboard (m)	HGL (m)	Freeboard (m)
25697	N/A	73.87	N/A	73.77	N/A	N/A	N/A
25698	N/A	71.28	N/A	71.20	N/A	71.30	N/A
25699	N/A	68.75	N/A	68.69	N/A	69.18	N/A
25700	N/A	67.88	N/A	67.81	N/A	68.99	N/A
25701	67.50	66.07	1.43	66.00	1.50	66.07	1.43
25702	66.65	65.68	0.97	65.61	1.04	65.69	0.96
25703	66.25	65.44	0.81	65.38	0.87	65.44	0.81
25704	66.50	65.12	1.38	65.12	1.39	65.20	1.30
25704i[4]	N/A	N/A	N/A	N/A	N/A	64.95	N/A
25705	65.50	65.09	0.41	64.97	0.53	64.93	0.57
25706	65.40	65.07	0.33	64.94	0.46	64.92	0.48
25707	N/A	64.90	N/A	64.90	N/A	64.87	N/A
25708	N/A	64.85	N/A	64.82	N/A	64.74	N/A
43673	65.15	64.82	0.33	64.78	0.37	64.67	0.48
25709	67.08	64.77	2.31	64.74	2.34	64.63	2.45
25710	N/A	64.69	N/A	64.66	N/A	64.55	N/A
25711	N/A	64.59	N/A	64.57	N/A	64.46	N/A
25712	N/A	64.57	N/A	64.55	N/A	64.43	N/A
25713	N/A	64.55	N/A	64.53	N/A	64.41	N/A
25714	N/A	64.54	N/A	64.53	N/A	64.41	N/A
25715	N/A	64.54	N/A	64.52	N/A	64.40	N/A
25723	N/A	64.53	N/A	64.52	N/A	64.39	N/A
25722	N/A	64.51	N/A	64.51	N/A	64.37	N/A
25721	N/A	64.50	N/A	64.51	N/A	64.37	N/A
25720	N/A	64.49	N/A	64.50	N/A	64.36	N/A
25719	N/A	64.48	N/A	64.50	N/A	64.36	N/A

[1]Underside of footing elevation as estimated by Novatech in their January 2009 report titled *Morrison Court Development Wastewater servicing Study* .

[2]Sanitary sewer layout as per Novatech 2009 survey

[3]Sanitary sewer layout as per a survey conducted by Stantec in August 2012.

[4]During the survey conducted by Stantec in August 2012, they identified a maintenance hole between City structures 25704 and 25705. This structure is refered to as 25704i for the purposes of this study.

Note 1: Freeboard distances have only been calculated at maintenance holes where Novatech calculated/reported an underside of footing elevation. N/A in the freeboard column denotes missing USF data.

Note 2: Hydraulic Gradeline elevations have not been calculated at all location in each model due to data gaps. N/A in the HGL column denotes missing pipe data for that particular model.

Table 2 - Existing Conditions, Phase 1 and Phase X Hydraulic Gradeline Results

City MH ID	Underside of Footing Elevation (m)[1]	Novatech 2009 Existing Conditions[2]		XPSWMM Model Existing Condition[3]		XPSWMM Proposed Phase I Condition[3]		XPSWMM Proposed Phase X Condition[4]	
		HGL (m)	Freeboard (m)	HGL (m)	Freeboard (m)	HGL (m)	Freeboard (m)	HGL (m)	Freeboard (m)
25697	N/A	73.87	N/A	N/A	N/A	N/A	N/A	N/A	N/A
25698	N/A	71.28	N/A	71.30	N/A	71.32	N/A	71.32	N/A
25699	N/A	68.75	N/A	69.18	N/A	69.27	N/A	69.38	N/A
25700	N/A	67.88	N/A	68.99	N/A	69.00	N/A	69.00	N/A
25701	67.50	66.07	1.43	66.07	1.43	66.09	1.41	66.11	1.39
25702	66.65	65.68	0.97	65.69	0.96	65.71	0.94	65.73	0.92
25703	66.25	65.44	0.81	65.44	0.81	65.47	0.78	65.49	0.76
25704	66.50	65.12	1.38	65.20	1.30	65.21	1.29	65.23	1.27
25704i[5]	N/A	N/A	N/A	64.95	N/A	64.97	N/A	65.03	N/A
25705	65.50	65.09	0.41	64.93	0.57	64.96	0.54	65.04	0.47
25706	65.40	65.07	0.33	64.92	0.48	64.94	0.46	65.02	0.39
25707	N/A	64.9	N/A	64.87	N/A	64.89	N/A	64.96	N/A
25708	N/A	64.85	N/A	64.74	N/A	64.80	N/A	64.90	N/A
43673	65.15	64.82	0.33	64.67	0.48	64.75	0.40	64.84	0.31
25709	67.08	64.77	2.31	64.63	2.45	64.70	2.38	64.77	2.31
25710	N/A	64.69	N/A	64.55	N/A	64.59	N/A	64.64	N/A
25711	N/A	64.59	N/A	64.46	N/A	64.47	N/A	64.49	N/A
25712	N/A	64.57	N/A	64.43	N/A	64.44	N/A	64.46	N/A
25713	N/A	64.55	N/A	64.41	N/A	64.42	N/A	64.43	N/A
25714	N/A	64.54	N/A	64.41	N/A	64.41	N/A	64.42	N/A
25715	N/A	64.54	N/A	64.40	N/A	64.41	N/A	64.42	N/A
25723	N/A	64.53	N/A	64.39	N/A	64.39	N/A	64.40	N/A
25722	N/A	64.51	N/A	64.37	N/A	64.37	N/A	64.38	N/A
25721	N/A	64.50	N/A	64.37	N/A	64.37	N/A	64.37	N/A
25720	N/A	64.49	N/A	64.36	N/A	64.36	N/A	64.36	N/A
25719	N/A	64.48	N/A	64.36	N/A	64.36	N/A	64.36	N/A

[1]Underside of footing elevation as estimated by Novatech in their January 2009 report titled *Morrison Court Development Wastewater servicing Study* .

[2]Sanitary sewer layout as per Novatech 2009 survey

[3]Sanitary sewer layout as per a survey conducted by Stantec in August 2012.

[4]Phase X condition is a test case to determine the maximum sanitary flow increase from the proposed development that will result in a minimum freeboard of no less than 0.30 m. Modelled flow increase = 8 L/s.

[5]During the survey conducted by Stantec in August 2012, they identified a maintenance hole between City structures 25704 and 25705. This structure is refered to as 25704i for the purposes of this study.

Note 1: Freeboard distances have only been calculated at maintenance holes where Novatech calculated/reported an underside of footing elevation. N/A in the freeboard column denotes missing USF data.

Note 2: Hydraulic Gradeline elevations have not been calculated at all location in each model due to data gaps. N/A in the HGL column denotes missing pipe data for that particular model.

Alison Gosling

From: C. Brennan <cbrennan@jfsa.com>
Sent: January-21-13 2:51 PM
To: 'natan'; 'Andrew Finnson'
Cc: 'J.F. Sabourin'; 'Lloyd Phillips'
Subject: RE: Morrison Drive MH's
Attachments: 20130114 - Hydraulic Gradeline Results + Sanitary Design.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Andrew,

As requested by your office and Greatwise Developments Corporation (Greatwise), J.F. Sabourin and Associates Inc. (JFSA) have completed our hydraulic analysis of the existing Morrison Drive sanitary sewer system. This analysis is meant to augment the findings that JFSA provided to Greatwise in August 2012. During the previous analysis it was determined that the existing sanitary sewer along Morrison Drive had sufficient capacity to convey the sanitary flow increases from Phase I of the proposed Morrison Court development while maintaining a freeboard of greater than 0.30 m at the critical location, MHSA43673. The current analysis has been undertaken to determine the maximum peak sanitary flow increase from the proposed development that would still result in a freeboard of greater than 0.30 m along the existing Morrison Drive sanitary sewer.

JFSA updated the sanitary sewer design calculations and XPSWMM model of the existing sanitary sewer to determine the maximum flow increase that would meet the 0.30 m freeboard criterion. Based on that analysis it was determined that an overall peak sanitary flow increase of **8 L/s** will result in a freeboard of 0.31 m at the critical location, MHSA43673, along the existing sanitary sewer. Please refer to the Hydraulic Gradeline Results and Sanitary Design sheets attached, these results supersede the tables that were submitted in August 2012. As is illustrated in the sanitary design table for Phase X, the scenario that was used to arrive at the max allowable peak flow increase of 8 L/s is a new development with a population of 650 replacing five (5) of the existing townhouses (population of 162) for a net population increase of 488. Please note that the freeboard calculations are based on the hydraulic gradeline results from JFSA's XPSWMM model and the underside of footing determinations made by Novatech in their January 26, 2009 report titled *Morrison Court Development Wastewater Servicing Study*.

Please contact me if you have any questions or comments,
Kind Regards

Colin Brennan, B.A.Sc.
Water Resources EIT

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

From: natan [mailto:natan@gsregalgroup.com]
Sent: Tuesday, January 08, 2013 3:21 PM
To: 'Andrew Finnson'

Cc: 'J.F. Sabourin'; 'Lloyd Phillips'; cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Andrew
Can we start with a conference call on Thursday Jan 10th
I recommend for Colin, you, Lloyd and me to be there.
Do we need James!
If the time is acceptable to all I will send the conference access info to ALL
Regards
Natan

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: January-08-13 1:43 PM
To: cbrennan@jfsa.com; 'natan'
Cc: 'J.F. Sabourin'; 'Lloyd Phillips'
Subject: RE: Morrison Drive MH's

Hi Natan,
Colin's email below states that they would like to have a meeting to discuss the sanitary analysis and make sure that we're all on the same page. Can you suggest a time that would work for you so we can try to set something up?

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Tuesday, December 18, 2012 7:00 PM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'; 'natan'; 'Lloyd Phillips'
Subject: RE: Morrison Drive MH's

Hello Andrew,

We can perform such an analysis. It would involve additional work in comparison to the quote provided below and we would like to have a brief meeting with the team to confirm the conclusions that can be drawn from such an analysis and how the project could progress from there. To perform the aforementioned our fee would be $1,250 + tax. A meeting with the City may be required to confirm that our approach will be acceptable to them, which would be charged at our standard hourly rates.

Kind Regards,
Colin

Colin Brennan, B.A.Sc.
Water Resources EIT

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Thursday, December 13, 2012 9:56 AM
To: cbrennan@jfsa.com
Cc: 'J.F. Sabourin'; 'natan'; 'Lloyd Phillips'
Subject: RE: Morrison Drive MH's

Hi Colin,
I've discussed this with Natan at Greatwise and what they'd like to see (since we're looking at this again) is a maximum number of units, or maximum population that could be accommodated without the need for a downstream upgrade. This analysis should show that the additional units can be accommodated, as well as give a bit of a buffer in the event that there are any site plan changes. Are you able to complete this analysis for the fee quoted below or would additional fees be required to complete this type of analysis?

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Wednesday, December 12, 2012 3:14 PM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hi Andrew,

I can introduce that flow increase into our hydraulic model and confirm if Phase I can still go ahead without improving the existing sanitary sewer system. It will take about a half day to update everything and respond via email. To perform this check our fee would be $ 500.

Let me know if you would like me to proceed.

Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Monday, December 10, 2012 11:11 AM

To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Hi Colin,
I've been told that they are making some minor adjustments to unit counts for the Greatwise - Morrison Drive development. Basically they are converting 5 - 2 bedroom units to 10 – 1 bedroom units. They have asked me to confirm that this will still work without upgrading the downstream sewer. Are you able to confirm that this should still work?

Give me a call if you have any questions.

Thanks,

Andrew Finnson, P.Eng.

DSEL
david schaeffer engineering ltd

phone: (613) 836-0856 ext 229
cell: (613) 222-4957
e-mail: afinnson@DSEL.ca

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Friday, August 24, 2012 11:07 AM
To: 'Andrew Finnson'
Cc: jfsabourin@jfsa.com
Subject: RE: Morrison Drive MH's

Hi Andrew,

As requested, we have assessed the HGL elevations along the Morrison Drive sanitary sewer under ultimate (Phase I and II) flow conditions. Sanitary flows are based on Novatech's 2009 design, with a peak flow of 112.4 L/s at the downstream end of the system. The minimum freeboard for this condition at MHSA43673 is 0.26 m, less than the City's minimum allowable freeboard of 0.30 m.

Regards,

Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Friday, August 24, 2012 9:19 AM
To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Colin,
The latest sanitary design sheets are attached. The ultimate flow from the site is 12.08 L/s.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Wednesday, August 22, 2012 2:27 PM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hello Andrew,

As requested by your office, on behalf of Greatwise Developments Corporation, J.F. Sabourin and Associates Inc. (JFSA) have completed our modelling exercise along the Morrison Drive sanitary sewer line under both existing and proposed phase I development conditions. A preliminary assessment of the sanitary sewer capacity was previously undertaken by Novatech Engineering Consultants Ltd. (Novatech) as described in their January 26, 2009 report titled *Morrison Court Development Wastewater Servicing Study*. In that study, Novatech found that at the most critical location, MHSA43673, the existing freeboard between the Hydraulic Gradeline (HGL) in the sanitary sewer system and the lowest connected underside of footing (USF) elevation is 0.33 m. Novatech also assessed the HGL within the system under proposed development flows whereby seven (7) 12-unit townhomes (population of 223) would be replaced with a new development having a total population of 929 (representing a population increase of 702 persons). Novatech found that the peak flow at the Pinecrest Trunk confluence would increase from 104.2 L/s under existing conditions to 112.4 L/s under proposed conditions. They found that this flow increase resulted in increased HGL elevations such that, the minimum freeboard at MHSA43673 would be reduced to 0.12 m. Novatech therefore concluded that the existing system does not have adequate capacity for the entire proposed development and recommended increasing the diameter of 423 m of pipe between MHSA25705 and MHSA25711 to 375 mm at 0.14% slope, which would provide a minimum freeboard of 0.41 m.

JFSA conducted our modelling of the sanitary sewer system using XPSWMM version 10.6, while Novatech had previously used H2OMAP Sewer/Pro. It is therefore anticipated that JFSA will arrive at slightly different results than Novatech when modelling the same system. Table 1, attached, indicates that at MHSA43673 where Novatech modelled a freeboard of 0.33 m, the JFSA XPSWMM model indicates that there is a 0.37 m freeboard. Previous modelling was based on a survey conducted by Novatech during the work for their January 2009 report. Pipe lengths and dimensions from the Novatech survey and As Built plans agree with one another and have been taken as correct in JFSA's work. The sanitary pipe inverts were verified/confirmed however, using the results from a field survey conducted by Stantec Consulting Ltd. in August 2012. It is important to note that Stantec located a maintenance hole between MHSA25704 and MHSA25705, this maintenance hole has been included in JFSA's models and labelled as 25704i for the purposes of this work. Furthermore,Stantec's structure SMH2 (correlates to city MHSA25697) was not included in the JFSA modelling as: 1) the measured invert does not agree well with the As Built data and 2) that pipe is upstream of the proposed site and lowest freeboard locations. Similarly, Stantec structures SMH38, SMH39 and SMH40 appear to be a parallel sanitary line to the Morrison sewer and do not appear to have City structure ID's, therefore, JFSA was instructed by DSEL to neglect these three (3) structures as noted in the correspondence below. A graph demonstrating the Morrison Drive sanitary sewer invert elevation as per the: Novatech 2009 survey, Stantec 2012 survey and As Built plans is attached for reference, note that the first node is MHSA25698 and the final node is MHSA25759. The final two columns of attached Table 1 provide JFSA's modelling results under existing flow conditions based on the Stantec surveyed inverts. In updating the XPSWMM model to reflect the Stantec 2012 survey rather than the Novatech 2009 survey the modelled HGL elevations were reduced, such that, the minimum freeboard at MHSA43673 based on JFSA's model is 0.49 m. This freeboard is above the minimum allowable freeboard of 0.30 m as per the *City of Ottawa Sewer Design Guidelines* (November 2004).

JFSA was retained to assess the HGL elevations under the currently proposed Phase I development conditions rather than ultimate development conditions. The proposed Phase I construction will result in the demolition of four (4) existing townhouse buildings and the construction of three (3) 4-storey buildings two of which are for residential use while one is to be mixed use commercial/residential. The net impact of the proposed Phase I development is a population increase of 220 persons (350 - 130) and 600 m^2 of Commercial floor space (equivalent to 10L/s of sanitary flow), which results in a peak flow at the confluence with the Pinecrest trunk sewer of 106.2 L/s. Sanitary flow sheets

are attached for both existing and Phase I development conditions. Table 2, attached, provides a comparison the HGL results from the Novatech 2009 existing modelling, the JFSA XPSWMM existing modelling and the JFSA XPSWMM modelling for proposed Phase I flow conditions. The minimum freeboard calculated along the existing Morrison Drive sanitary sewer under Phase I flows was 0.44 m, which occurs at MHSA43673. Therefore, based on the JFSA XPSWMM model, and the Novatech 2009 USF elevations, the minimum freeboard under Phase I development flows will be 0.44 m, which is greater than the City of Ottawa's minimum allowable value of 0.30 m.

Please contact myself if you have any questions or comments.
Kind Regards,

Colin Brennan, B.A.Sc.
Water Resources EIT

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Wednesday, August 22, 2012 10:13 AM
To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Colin,
Jamie at Stantec has confirmed that it is in fact a typo. It's 1 metre high. The actual invert is 64.53.

Andrew

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Wednesday, August 22, 2012 10:02 AM
To: 'cbrennan@jfsa.com'
Subject: RE: Morrison Drive MH's

Colin,
I've left a message with Jamie. Please proceed. I'll make sure we get confirmation from him asap.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Wednesday, August 22, 2012 8:32 AM
To: 'Andrew Finnson'
Subject: RE: Morrison Drive MH's

Thanks Andrew.

Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Wednesday, August 22, 2012 8:29 AM
To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Hi Colin,
Your assumptions below are correct. 3 townhouse buildings will remain in Phase I and 4 will be demolished.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Wednesday, August 22, 2012 8:25 AM
To: 'Andrew Finnson'
Subject: RE: Morrison Drive MH's

Hi Andrew,

No problem including the new Phase 1 population numbers. Just to confirm though, from the in-progress base plan I received from you it seems like Phase 1 construction will replace four (4) of the existing Townhouses (4*12units*2.7 = 130 persons). Will the other three (3) existing townhouses remain during Phase 1 (3*12*2.7=97 persons), is this correct?

I am assuming that the proposed Phase 1 buildings will contribute flow from 350 persons which replaces flow from 130 persons, representing a net increase of 220 persons for Phase I.

Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Tuesday, August 21, 2012 9:29 AM
To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Hi Colin,
We've just received a new plan with minor revisions to the unit counts for phase 1, and therefore minor revisions to the sanitary flow. If it's possible to revise the flows to match the updated plan without causing you further delay please do so, otherwise please proceed with the previous numbers you have.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Tuesday, August 21, 2012 9:31 AM
To: 'Andrew Finnson'
Cc: jfsabourin@jfsa.com; spichette@dsel.ca
Subject: RE: Morrison Drive MH's

Hi Andrew,

I am currently running various modelling scenarios for Monahan to respond to the RVCA letter from Bruce Reid. Therefore, I will not be able to provide the Sanitary modelling results to you today. Sorry for the delay, I will plan to return to that file first thing tomorrow morning.

Regards,
Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Tuesday, August 21, 2012 8:17 AM
To: cbrennan@jfsa.com
Subject: RE: Morrison Drive MH's

Hi Colin,
Do you have something you can send me today? I need to get this incorporated into a report which needs to be submitted to the client tomorrow.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Friday, August 17, 2012 1:09 PM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hi Andrew,

I've just come across another discrepancy. Where Stantec picks up three (3) sanitary manholes, SMH25, SMH26 and SMH27, the Novatech drawings and model only show two manholes (25705 and 25706). I'm inclined to trust the Stantec survey and add another manhole and pipe (approx. 17 m long) to the model.

Could you please check with Stantec and advise if the above assumption should be used or not.

Regards,
Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Friday, August 17, 2012 11:20 AM
To: cbrennan@jfsa.com
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hi Colin,
I will follow up with Stantec but according to the as-builts the below assumptions are correct. Please proceed on that basis.

Thanks,
Andrew

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Friday, August 17, 2012 11:21 AM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hi Andrew,

As a follow-up to our phone conversation I would like to confirm the assumptions that I am to make with respect to the sanitary survey data prepared by Stantec.

1. Due to a discrepancy between the new and old inverts at SMH2 (25697) and the second south invert at SMH4 (25698), JFSA will only model from SMH4 (25698) downstream pending clarification from DSEL/Stantec.
2. The following three (3) manholes seem to be a parallel line which are not noted on the As Built drawings in DSEL's possession, SMH 38, SMH 39 and SMH 40. Therefore these manholes will be neglected in our analysis. We are under the assumption that SMH37 corresponds to the City MH 25711 and SMH41 corresponds to City MH 25712 and that these two manholes are connected by a 63.5 m long 375 mm diameter concrete sanitary pipe.
3. There is a discrepancy from SMH37 to SMH49 with respect to pipe sizes. The sizes recorded by Stantec will be neglected in favour of the sizes included in DSEL's EPA SWMM model, which are based on the As Built Drawings. Pipe diameters to be used are as follows:
   SMH37 (25711) to SMH44 (25715) - 375 mm concrete
   SMH44 (25715) to SMH49 (25719 - 600 mm concrete
4. Except as noted above, the pipe inverts and top of grate elevations recorded by Stantec will be taken as correct and used in all subsequent hydraulic (XPSWMM) modelling.

Please advise if any of the preceding assumptions are incorrect, or if clarification is provided by Stantec.

Regards,
Colin

Colin Brennan, B.A.Sc.
Water Resources EIT

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive , Ottawa , ON K2S 1B9
tel.: 613.836.3884 ext. 224, fax: 613.836.0332, **www.jfsa.com**

From: C. Brennan [mailto:cbrennan@jfsa.com]
Sent: Friday, August 17, 2012 10:05 AM
To: 'Andrew Finnson'
Cc: 'J.F. Sabourin'
Subject: RE: Morrison Drive MH's

Hi Andrew,

I've been reviewing the Stantec Storm and Sanitary manhole survey and would like a few clarifications.

specifically:

1. there two (2) pipes coming into the South side of Structure 4. What is the second pipe, and which one represents the main sewer line.
2. There are more sanitary manholes in the NE portion of Morrison Road than recorded by Novatech. STM 38, 39 and 40 all seem like additions.
3. Several pipe size and invert comments are included on the attached drawing as well.

I have attached a CAD Drawing with City Structure labels included where I believe they may apply, I will call to discuss.

Colin

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Monday, August 13, 2012 2:30 PM
To: cbrennan@jfsa.com
Subject: FW: Morrison Drive MH's

Colin,
See the attached survey from Stantec.
If anything is unclear let me know.

Thanks,
Andrew

From: Leslie, Jamie [mailto:Jamie.Leslie@stantec.com]
Sent: Monday, August 13, 2012 2:24 PM
To: Andrew Finnson
Subject: RE: Morrison Drive MH's

Hi Andrew,

Sorry for the delay. Here is the CAD file for our MH pickup and invert measurements. Let me know if you have any questions. Thank you.

Jamie Leslie, OLS, OLIP, EIT
Project Manager
Stantec Geomatics Ltd.
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 722-4420 Ext. 592
Fx: (613) 722-2799
Jamie.Leslie@stantec.com
stantec.com

From: Andrew Finnson [mailto:afinnson@dsel.ca]
Sent: Friday, August 10, 2012 11:08 AM
To: Leslie, Jamie
Subject: RE: Morrison Drive MH's

Monday morning is fine Jamie. Have a good weekend.

Thanks,
Andrew

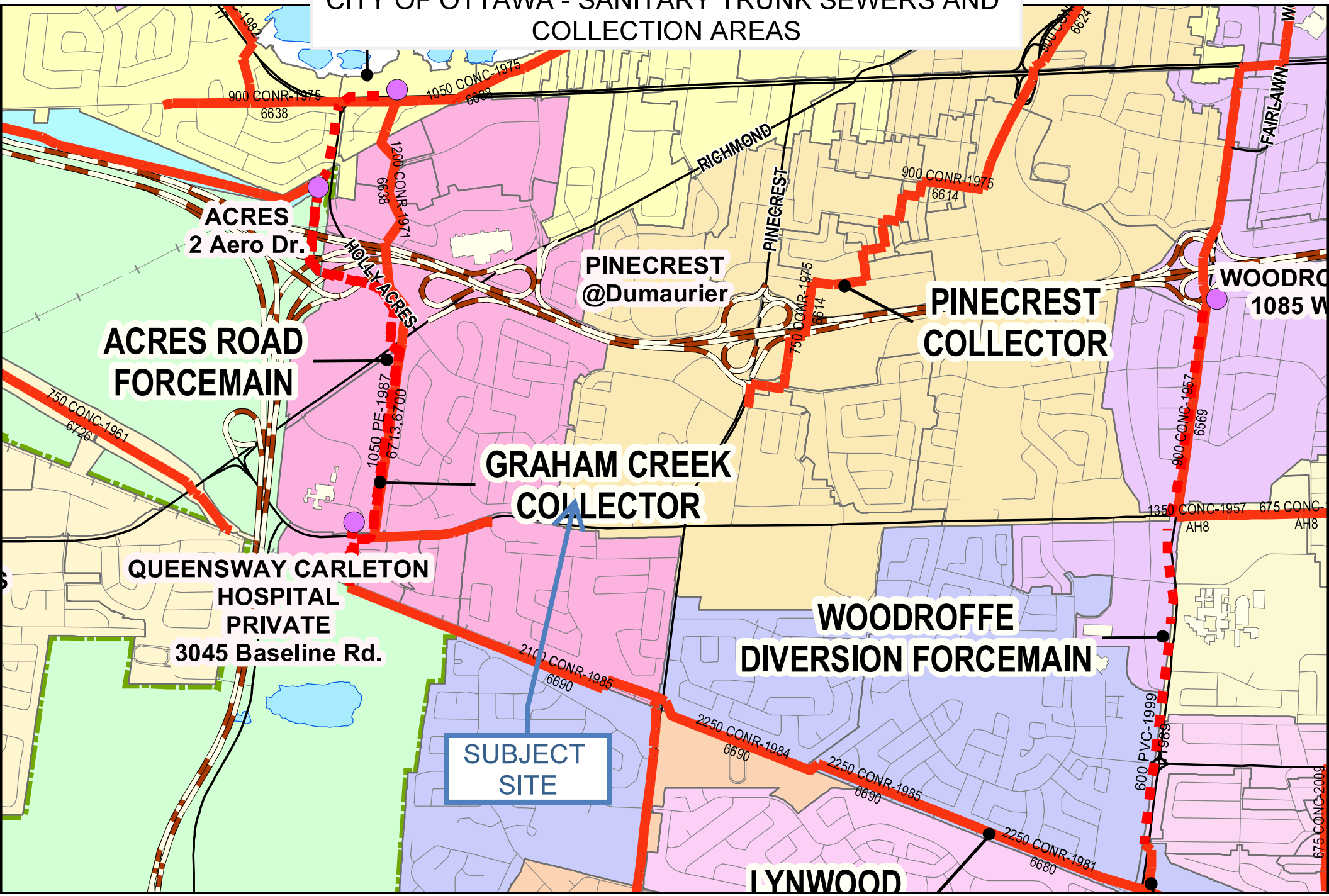
From: Leslie, Jamie [mailto:Jamie.Leslie@stantec.com]
Sent: Friday, August 10, 2012 11:10 AM
To: Andrew Finnson (afinnson@dsel.ca)
Subject: Morrison Drive MH's

Hi Andrew,

I just wanted to update you on the status of the Morrison Drive MH pickup. We are finalizing the CAD file now. I do have to step out shortly for a meeting this afternoon. I'm not sure if I will return to the office this afternoon. Unless you require this information later this afternoon, I will forward you the drawing first thing Monday morning. If you do require it, I will have it sent to you by my CAD person when it is finished. Let me know your thoughts. Thank you.

Jamie Leslie, OLS, OLIP, EIT
Project Manager
Stantec Geomatics Ltd.
1505 Laperriere Avenue
Ottawa ON K1Z 7T1
Ph: (613) 722-4420 Ext. 592
Fx: (613) 722-2799
Jamie.Leslie@stantec.com
stantec.com

CITY OF OTTAWA - SANITARY TRUNK SEWERS AND COLLECTION AREAS



APPENDIX D

Stormwater Management

Stormwater - Proposed Development
City of Ottawa Sewer Design Guidelines, 2012

Target Flow Rate (2781 Baseline Road)

Area	0.415	ha
C	0.50	Rational Method runoff coefficient
t_c	10.0	min
	2-year	
i	76.8	mm/hr
Q	44.3	L/s

Target Flow Rate (2795 Baseline Road)

Area	0.410	ha
C	0.50	Rational Method runoff coefficient
t_c	10.0	min
	2-year	
i	76.8	mm/hr
Q	43.7	L/s

Target Flow Rate (Total)

Q	88.0	L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Area ID	**U1**		
Total Area	0.082	ha	
C	0.53	Rational Method runoff coefficient	

U1	**Imp.**	**Perv.**	**Total**
Area	0.039	0.043	0.082
C	0.9	0.2	0.53

	5-year					**100-year**				
t_c (min)	**i (mm/hr)**	**Q_{actual} (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**	**i (mm/hr)**	**Q_{actual}* (L/s)**	**$Q_{release}$ (L/s)**	**Q_{stored} (L/s)**	**V_{stored} (m^3)**
12.7	91.6	11.1	11.1	0.0	0.0	156.9	23.8	23.8	0.0	0.0

Note:
C value for the 100-year storm is increased by 25%, to a maximum of 1.0 per Ottawa Sewer Design Guidelines (5.4.5.2.1)

Estimated Post Development Peak Flow from Attenuated Areas

Area ID

EX1	Imp.	Perv.	Total
Area	0.318	0.025	0.343
C	0.9	0.2	0.85

A1	Imp.	Perv.	Total
Area	0.162	0.023	0.185
C	0.9	0.2	0.81

A2	Imp.	Perv.	Total
Area	0.195	0.032	0.227
C	0.9	0.2	0.80

Total	Imp.	Perv.	Total
Area	0.675	0.080	0.755
C	0.9	0.2	0.83

Total Subsurface Storage (m^3) 238.5

Stage Attenuated Areas Storage Summary

		Surface Storage			Surface and Subsurface Storage			
	Stage	Ponding	h_o	delta d	V*	V_{acc}**	$Q_{release}$†	$V_{drawdown}$
	(m)	(m^2)	(m)	(m)	(m^3)	(m^3)	(L/s)	(hr)
Orifice INV	72.97		0.00			0.0	0.0	0.00
U/G Storage INV	73.05		0.08	0.08	0.0	0.0	13.1	0.00
U/G Storage SL	73.96		0.99	0.91	119.2	119.2	46.3	0.71
U/G Storage OBV	74.88		1.91	0.91	119.2	238.5	64.2	1.03
T/L	75.59		2.62	0.71	0.0	238.5	75.2	0.88

* V=Incremental storage volume

**V_{acc}=Total surface and sub-surface

† $Q_{release}$ = Release rate calculated from orifice equation

Orifice Location **MH105** **Dia** 148

Total Area 0.755 ha

C 0.83 Rational Method runoff coefficient *Note: Rational Method Coefficient "C" increased by 25% for 100-year calculations*

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	180.3	40.3	140.0	84.0	178.6	374.3	63.3	311.0	186.6
15	83.6	144.6	40.3	104.3	93.9	142.9	299.6	63.3	236.2	212.6
20	70.3	121.6	40.3	81.3	97.5	120.0	251.5	63.3	188.1	225.8
25	60.9	105.4	40.3	65.1	97.6	103.8	217.7	63.3	154.4	231.6
30	53.9	93.3	40.3	53.0	95.4	91.9	192.6	63.3	129.3	232.7
35	48.5	84.0	40.3	43.7	91.7	82.6	173.1	63.3	109.8	230.6
40	44.2	76.5	40.3	36.2	86.8	75.1	157.5	63.3	94.2	226.1
45	40.6	70.3	40.3	30.0	81.0	69.1	144.8	63.3	81.4	219.8
50	37.7	65.2	40.3	24.8	74.5	64.0	134.1	63.3	70.7	212.2
55	35.1	60.8	40.3	20.5	67.5	59.6	125.0	63.3	61.7	203.5
60	32.9	57.0	40.3	16.7	60.1	55.9	117.2	63.3	53.8	193.8
65	31.0	53.7	40.3	13.4	52.3	52.6	110.4	63.3	47.0	183.4
70	29.4	50.8	40.3	10.5	44.2	49.8	104.4	63.3	41.0	172.4
75	27.9	48.3	40.3	7.9	35.8	47.3	99.1	63.3	35.7	160.8
80	26.6	46.0	40.3	5.7	27.1	45.0	94.3	63.3	31.0	148.7
85	25.4	43.9	40.3	3.6	18.3	43.0	90.1	63.3	26.7	136.2
90	24.3	42.0	40.3	1.7	9.3	41.1	86.2	63.3	22.9	123.4
95	23.3	40.3	40.3	0.0	0.1	39.4	82.7	63.3	19.3	110.2
100	22.4	38.8	38.8	0.0	0.0	37.9	79.5	63.3	16.1	96.7
105	21.6	37.4	37.4	0.0	0.0	36.5	76.5	63.3	13.2	83.0
110	20.8	36.0	36.0	0.0	0.0	35.2	73.8	63.3	10.5	69.1

5-year $Q_{attenuated}$ **40.32 L/s** **100-year $Q_{attenuated}$** **63.34 L/s**

5-year Max. Storage Required **97.6 m^3** **100-year Max. Storage Required** **232.7 m^3**

Est. 5-year Storage Elevation **73.80 m** **Est. 100-year Storage Elevation** **74.83 m**

Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Required Storage (m^3)	100-Year Release Rate (L/s)	100-Year Required Storage (m^3)	100-Year Available Storage (m^3)
Unattenuated Areas	11.1	0.0	23.8	0.0	0.0
Attenutated Areas	40.3	97.6	63.3	232.7	238.5
Total	**51.5**	**97.6**	**87.2**	**232.7**	**238.5**

										Sewer Data								
Area ID	**Up**	**Down**	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C**	**$I_{2\text{-year}}$**	**Q**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
			(ha)	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
Unknown Road2 - 02																		
	100	101	0.227	0.80	0.18	0.18	10.0	76.8	38.7	300	0.35	69.4	0.071	0.075	0.81	57.2	1.4	0.68
To Unknown Road3 - 03, Pipe 101 - 102							11.4											
Unknown Road3 - 03																		
	101	102	0.343	0.85	0.29	0.47	11.4	71.7	94.3	375	0.45	26.8	0.110	0.094	1.06	117.6	0.4	0.80
	102	103				0.47	11.8	70.4	92.5	375	0.43	6.5	0.110	0.094	1.04	115.0	0.1	0.80
To Unknown Road1 - 01, Pipe 103 - 104							12.0											
Unknown Road1 - 01																		
	103	104				0.47	12.0	70.0	92.1	450	0.30	34.3	0.159	0.113	0.98	156.2	0.6	0.59
	104	105	0.185	0.81	0.15	0.62	12.5	68.3	118.1	450	1.42	35.6	0.159	0.113	2.14	339.7	0.3	0.35
	105	106				0.62	12.8	67.5	116.7	450	1.00	6.1	0.159	0.113	1.79	285.1	0.1	0.41
	106	AS-3				0.62	12.9	67.3	116.5	450	1.00	1.1	0.159	0.113	1.79	285.1	0.0	0.41
	AS-3	107				0.62	12.9	67.3	116.4	450	1.00	5.5	0.159	0.113	1.79	285.1	0.1	0.41
							12.9											

STORMTANK® Module Volume Calculator

Inputs

Project Name:	2795 BASELINE ROAD		
Engineer:	DSEL	Date:	1/14/2019
Units:	SI	Shape:	Square/Rectangle
Liner:	No	Location:	N/A
Stacking:	Double	Height:	1828.8
Stone Storage:	All	Porosity:	40%

Dimensions

Module		
Length:	28.363	m
Width:	3.664	m
Excavation		
Length:	28.963	m
Width:	4.264	m
Stone		
Leveling Bed:	0.5	m
Top Backfill:	0.3	m
Compacted Fill:	0.3	m

Results

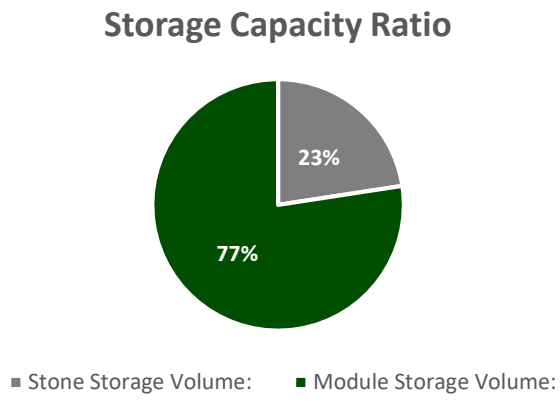
Capacity:

Stone Storage Volume:	53.84	m^3
Module Storage Volume:	184.63	m^3
Total Storage Volume:	238.47	m^3

Quantities:

Required Excavation:	361.70	m^3
Required Stone Volume:	134.60	m^3
Estimated Geotextile:	829.64	m^2
Estimated Liner:	0.00	m^2

(Estimations include 10% for scrap and overlap)

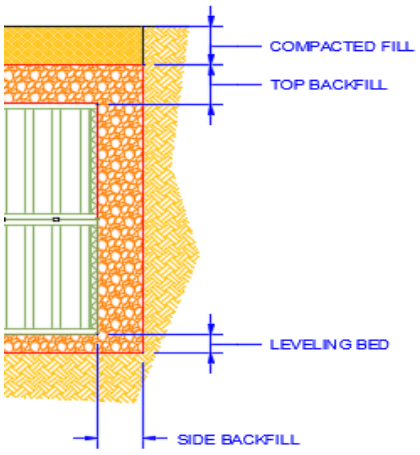


Basin Detail

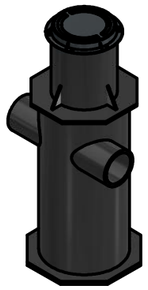
Component Quantities:

	Bottom Layer	Top Layer	Total
Height	914.4	914.4	1,828.8
# of Modules	249	249	497
# of Platens	497	497	994
# of Side Panels	140	140	280
# of Columns	1,988	1,988	3,977
# of Stacking Pins	497	N/A	497

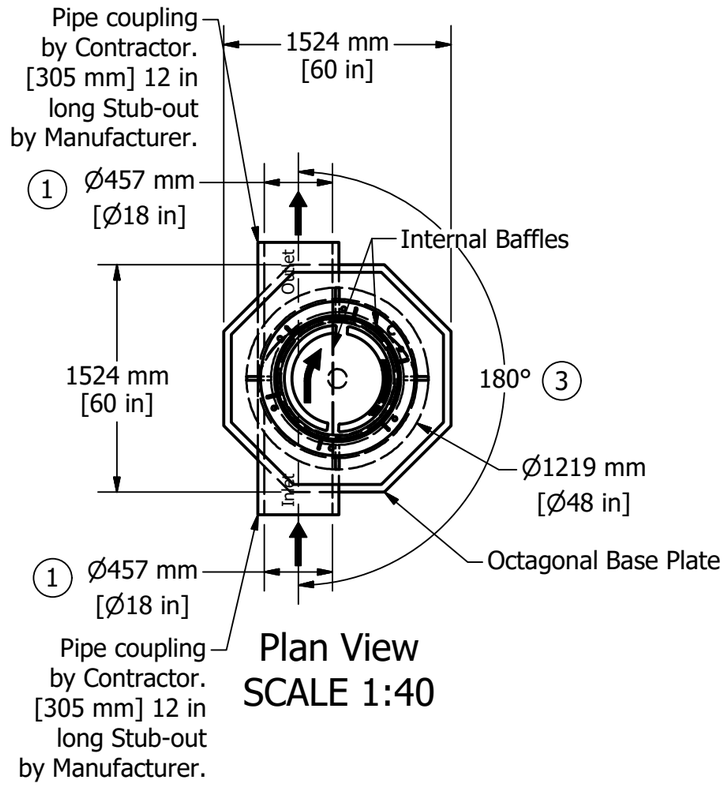
Cross-Section:



Aqua-Swirl High Density Polyethylene (HDPE)
Stormwater Treatment System

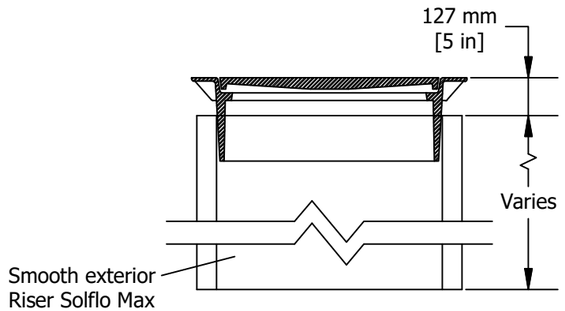


Projected View
SCALE 1:80



Plan View
SCALE 1:40

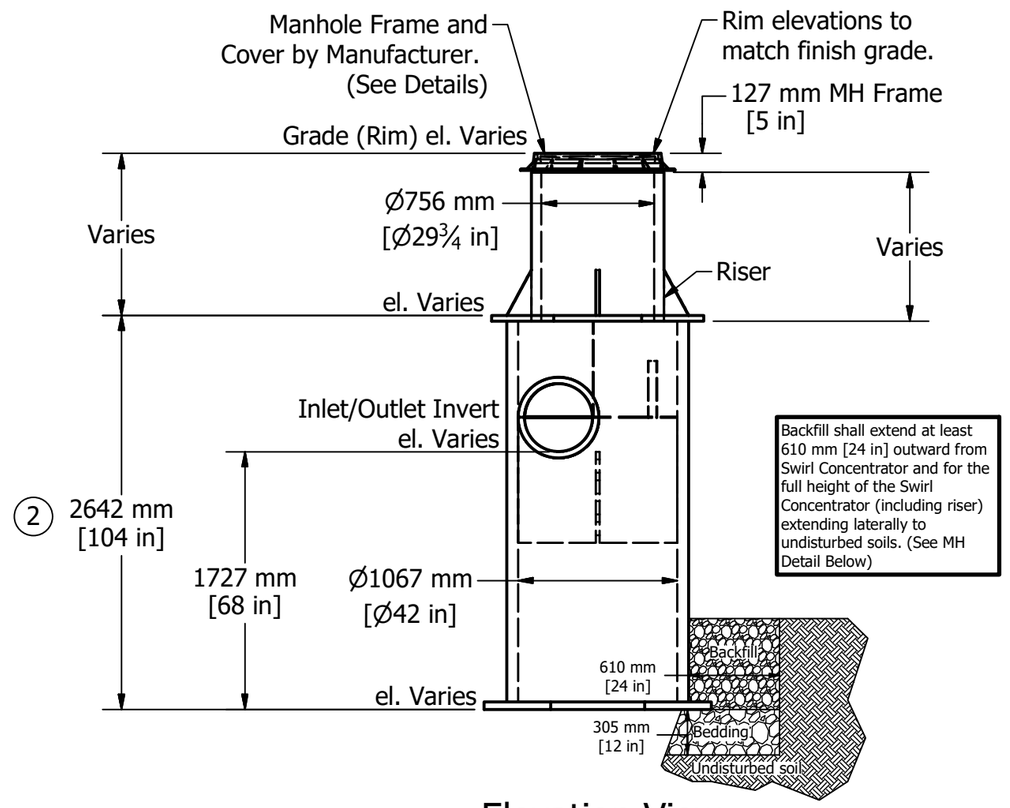
Please see accompanied Aqua-Swirl specification notes. See Site Plan for actual system orientation.
Approximate dry (pick) weight: 700 kg [1600 lbs].



Adjustable Frame and Cover

System shall be designed for the following capacities:
Swirl Treatment Flow: 51 L/s [1.8 cfs]
Swirl Sediment Storage: 0.57 m³ [20 ft³]
Swirl Oil/Debris Storage: 416 L [110 gal]

1. AS-3 BYP inlet/outlet pipe size ranges from 254 mm [10 in] to 533 mm [21 in].
2. AS-3 chamber height may vary from 2286 mm [90 in] to 2642 mm [104 in], depending on inlet/outlet pipe size.
3. Orientation may vary from a minimum of 90° to a maximum of 180°.



Elevation View
SCALE 1:40

AquaShield
WATER TREATMENT SOLUTIONS
2733 Kanasita Drive, Suite 111, Chattanooga, TN 37343
Phone (888) 344-9044 Fax (423) 826-2112
www.aquashieldinc.com

Aqua-Swirl Concentrator
AS-3 BYP CW STD

Standard Detail

Structure #:	AS-3 STD	Rvwed	Rvw. Date
Drawn By:	OFlores		
Scale:	As Shown		
Date:	3/8/2018		

AquaShield™ STORMWATER TREATMENT SOLUTIONS

Sizing Report

2733 Kanasita Drive • Suite 111 • Chattanooga, TN 37343 • Phone: (423) 870-8888 • Fax: (423) 826-2112 • www.aquashieldinc.com

Site Information

Project Name: **New Development**

Site Area (hectacres): **0.753**

Unit Label: **AS**

Runoff Coeff. : **.82**

Unit Location: **Ottawa, ON**

Target Removal Efficiency(%): **80% based on NJDEP**

Product Recommendation

Aqua-Swirl™ Model	Net Annual TSS Removal Efficiency	Chamber Diameter	Maximum Inside Diameter (mm)		Oil/Debris Storage Capacity	Sediment Storage Capacity
			Offline	BYP[5]		
AS-3	**83.13 %**	991 mm.	251 mm.	535 mm.	417 L	0.56 m^3

Rainfall Information

NCDC Station[1]: **OTTAWA MACDONALD-CARTIER INT'L A**

Data Range[4]: **261,759 readings taken hourly between 1967 to 2007 (~40 years)**

Rainfall Event Range (mm/hre)	Rainfall Interval Point (mm/hre)	Operating Rate (Lps/m^2)	Total Rainfall (%)	Removal Efficiency (%)[2]	Relative Efficiency(%)
02.00 - 03.00	02.50	04.80	44.18	92.43	40.84
03.00 - 04.00	03.50	06.72	21.52	89.05	19.16
04.00 - 05.00	04.50	08.64	11.68	85.03	09.93
05.00 - 06.00	05.50	10.56	06.68	80.40	05.37
06.00 - 07.00	06.50	12.47	04.03	75.14	03.03
07.00 - 08.00	07.50	14.39	01.99	69.26	01.38
08.00 - 09.00	08.50	16.31	01.84	62.75	01.15
09.00 - 10.00	09.50	18.23	01.81	55.62	01.01
10.00 - 15.00	12.50	23.99	04.12	30.49	01.26
		Total Cumulative Rainfall %:	**97.85[3]**	**Net Annual %:**	**83.13**

Sales Agent Information

Agent Name: **Kevin Dutrisac**

Phone: **613-323-0364**

Company Name: **Soleno**

Fax:

Address:

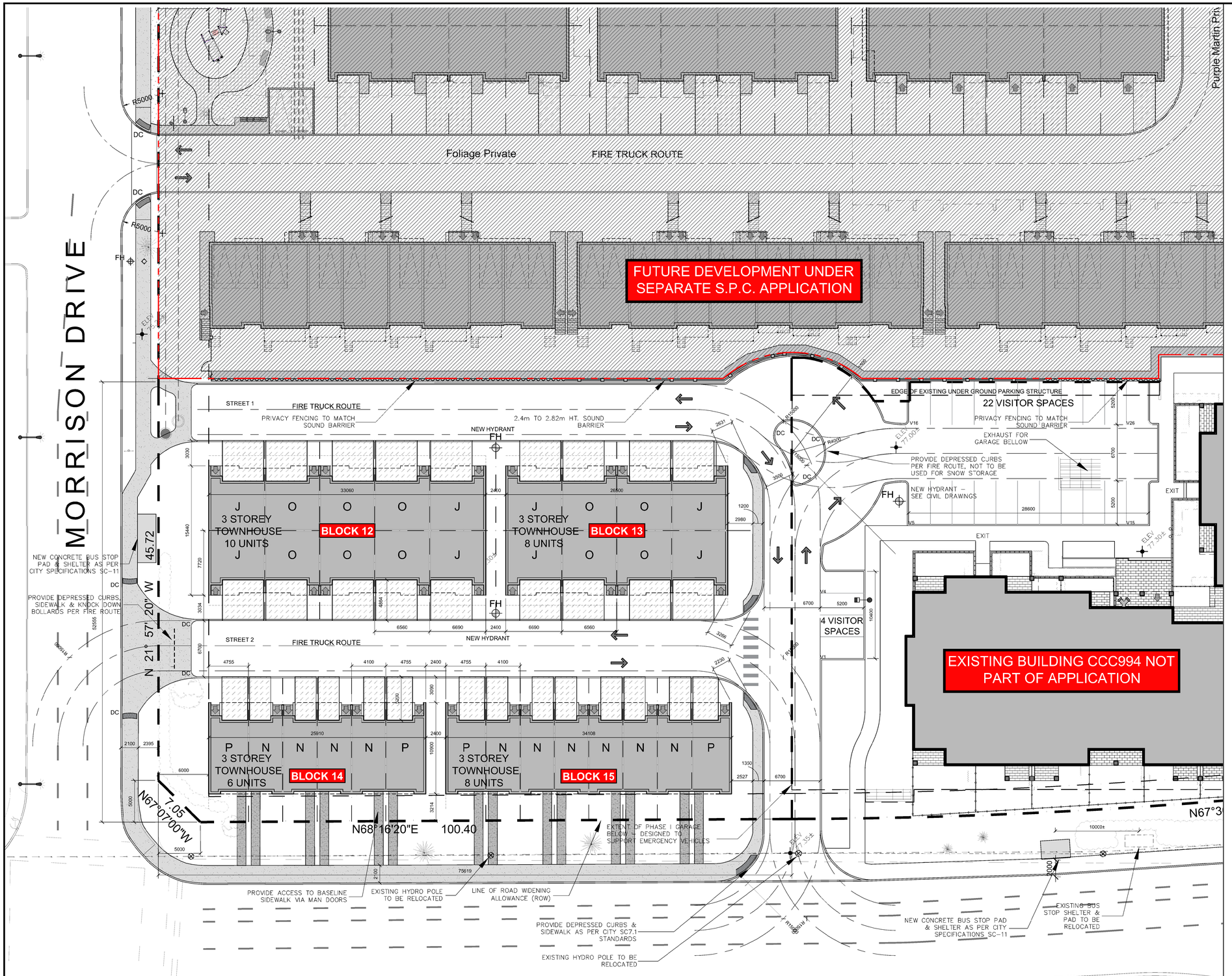
E-mail: **kdutrisac@soleno.com**

City, State Zip: **, QC**

Footnotes

1. Recorded as hourly precipitation rainfall data (inches), National Climatic Data Center (NCDC)
2. Based on Tennessee Tech University laboratory testing of the AquaSwirl™ Model AS-3 for OK-110 silica particles 50-125 microns(Neary, 2002)
3. 90% Rainfall Event, calculated as a cumulative percentile of individual events, www.stormwatercenter.net, sizing criteria (Center for Watershed Protection)
4. NCDC data may not be consecutive, skipping days, months and/or years in the range of dates.
5. The Aqua-Swirl™ Internal Bypass (BYP) provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.
6. When applicable, the performance curve was adjusted via Peclet Scaling to provide estimated sizing per NJDEP PSD (d50 = 67 microns).

DRAWINGS / FIGURES



SITE PLAN

0m 2m 4m 6m 8m 10 20

PROJECT INFORMATION

ZONING	Zoning By-Law 2008-250	R5A[17C0] S247, S282
SITE AREA	INCLUDING ORIGINAL PHASES	21,252.5 sq. m. (228,760) sq. ft.
BUILDING HEIGHT	5 STOREY	18.0 M

OVERALL SITE SETBACK (PHASE 1, 2 & 3)	PROVODED	REQUIRED
FRONT YARD SETBACK (BASELINE ROAD)	3.0 M	3.0 M
MORRISON DRIVE SETBACK	6.0 M	6.0 M
DRAPER AVENUE SETBACK	6.0 M	6.0 M
INTERIOR SIDE YARD SETBACK	6.0 M	6.0 M

PROJECT INFORMATION - PHASE 2 (TOWNHOUSE)

ZONING	Zoning By-Law 2008-250	R5A[170] S247, S282
SITE AREA - PHASE 2		3,947.5 sq. m. (42,491) sq. ft.
BUILDING HEIGHT	3 STOREY	9.0 M
FRONT YARD SETBACK (BASELINE ROAD)		3.0 M
FRONT YARD SETBACK (MORRISON DRIVE)		6.0 M
FRONT YARD SETBACK (DRAPER AVENUE)		6.0 M
INTERIOR SIDE YARD SETBACK		6.0 M

LOT COVERAGE

PAVED SURFACE (ROADS) =	1,094.8 sq. m.	27.7%
PAVED SURFACE (DRIVEWAY) =	624.9 sq. m.	15.8%
BUILDING FOOTPRINT =	1,260.2 sq. m.	31.9%
LANDSCAPE OPEN SPACE =	967.6 sq. m.	24.6%
LANDSCAPE PARK =	0.0 sq. m.	0.0%
TOTAL =	3,947.5 sq. m.	100.0%

BUILDING STATISTICS

		UNIT COUNT		TOTAL UNIT AREA
TOWNHOUSE TYPE 'J' (WITH GARAGE)	1,180 sq. ft.	8	9,940 sq. ft.	923.5 m²
TOWNHOUSE TYPE 'O' (WITH GARAGE)	1,158 sq. ft.	10	11,580 sq. ft.	1,075.8 m²
TOWNHOUSE TYPE 'P' (WITH GARAGE)	1,235 sq. ft.	4	4,940 sq. ft.	458.9 m²
TOWNHOUSE TYPE 'N' (WITH GARAGE)	1,081 sq. ft.	10	10,810 sq. ft.	1,004.3 m²
TOTAL UNITS		32	37,270 sq. ft./	3,462.5 m²

CAR PARKING

REQUIRED		
RESIDENCE	- 1.0 PER UNIT (32 UNITS)	32
VISITOR	- NOT REQUIRED	0
TOTAL		32

PROVIDED		
RESIDENCE	- PRIVATE GARAGE	32
VISITOR	- PRIVATE IN DRIVEWAY (BLOCKS 14 & 15 ONLY)	14
VISITOR	- COMMUNAL AT PARK (PHASE 1)	4
TOTAL		50

ENTRANCE DRIVEWAY TO PHASE 2 AND CONDO BECOMES SHARED PROPERTY

PROVIDE TACTILE WALKING SURFACE INDICATOR AT EACH UNCONTROLLED INTERSECTION

**BLOCK 12 IS SUBJECT TO THE APPROVAL OF A MINOR VARIANCE (OVER MAX 8 UNITS PER BLOCK)

**BLOCK 13 IS SUBJECT TO THE APPROVAL OF A MINOR VARIANCE (NORTH-EAST AND SOUTH-EAST BALCONY CORNERS ARE OVER 1800mm SETBACK FROM EDGE OF DRIVING SURFACE REQUIRED IN A P.U.D.)

IT IS THE RESPONSIBILITY OF THE APPROPRIATE CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE AND TO REPORT ALL ERRORS AND/OR OMISSIONS TO THE ARCHITECT.

ALL CONTRACTORS MUST COMPLY WITH ALL PERTINENT CODES AND BY-LAWS.

THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION UNTIL SIGNED BY THE ARCHITECT.

DO NOT SCALE DRAWINGS.

NOTATION SYMBOLS:

- (00) INDICATES DRAWING NOTES, LISTED ON EACH SHEET.
- <00> INDICATES ASSEMBLIE TYPE; REFER TO TYPICAL ASSEMBLIES SCHEDULE.
- (W) INDICATES WINDOW TYPE; REFER TO WINDOW ELEVATIONS AND DETAILS ON A900 SERIES.
- 000 INDICATES DOOR TYPE; REFER TO DOOR SCHEDULE AND DETAILS ON A900 SERIES.
- 00 DETAIL NUMBER
- A201 TITLE
- 9/A17 DETAIL REFERENCE PAGE
- DETAIL CROSS REFERENCE PAGE

GENERAL NOTES:

A. REFER TO TYPICAL ASSEMBLIES SHEET FOR WALL, PARTITION, ROOF CEILING & FLOOR TYPES.

B. FOR DOOR TYPES AND HARDWARE REQUIREMENTS REFER TO DOOR SCHEDULE ON A900 SERIES.

C. ALL INTERIOR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD

D. ALL EXTER OR DIMENSIONS ARE TAKEN FROM THE FACE OF STUD

E. ALL EXTER OR WALLS ARE TO BE TYPE 'W1' UNLESS NOTED OTHER WISE.

F. ALL INTERIOR PARTITIONS ARE TO BE TYPE 'P1' UNLESS NOTED OTHER WISE.

G. ALL REINFORCED CONCRETE SUSPENDED SLABS, COLUMNS & BEAMS HAVE A MIN. FIR OF 1.5 HRS (AS DETERMINED BY OBC SB-2) UNLESS OTHERWISE STATED.

No.	DESCRIPTION	DD-MM-YYYY
3	ISSUED FOR COORDINATION	05-09-2019
2	ISSUED FOR USE AS BASE SITE PLAN	08-07-2019
1	ISSUED FOR USE IN T.I.A. REPORT	18-06-2019

REVISIONS:

ARCHITECT SEAL: ONTARIO ASSOCIATION OF ARCHITECTS - RODERICK J. LAHEY - LICENCE 4375 - SEAL DATE: STAMP DATE

NORTH ARROW:

CLIENT: Greatwise DEVELOPMENTS

ARCHITECT:
rla/architecture
roderick lahey architect inc.
56 beech street, ottawa, ontario K1S 3J6
t. 613.724.9932 f. 613.724.1209 rlaarchitecture.ca

PROJECT TITLE:
FRESH TOWNS
MODERN URBAN LIVING
2710 DRAPER AVENUE
OTTAWA ONTARIO

SHEET TITLE:
SITE PLAN - FRESH TOWNS PHASE 2

DRAWN:	CHECKED:
L.M.	RLA
SCALE: 1:200	SHEET No. SP-01
PROJECT No. 1733	

PROJECT DEVELOPER	SURVEYOR	LANDSCAPE ARCHITECT	CIVIL ENGINEER
GreatWise Developments 333 Wilson Avenue Toronto, ON, M3H 1T2 Phone: (416) 630-6767 Fax: (416) 630-6304	Annis O'Sullivan Vollebekk Ltd. Ontario Land Surveyors 14 Concourse Gate, Suite 500, Nepean, Ontario K2E 7S6 Tel: (613) 727-0850 Fax: (613) 727-1079	Larocque Levstek 5871 Hugh Crescent Ottawa, (Osgoode) ON K0A 2W0 **Tel:** (613) 826-0518	David Schaeffer Engineering Ltd. 120 Iber Road, Unit 203 Stittsville . Ontario . Canada . K2S 1E9 Tel: (613) 836-0856 Fax: (613) 836-7183

SITE PLAN SYMBOLS

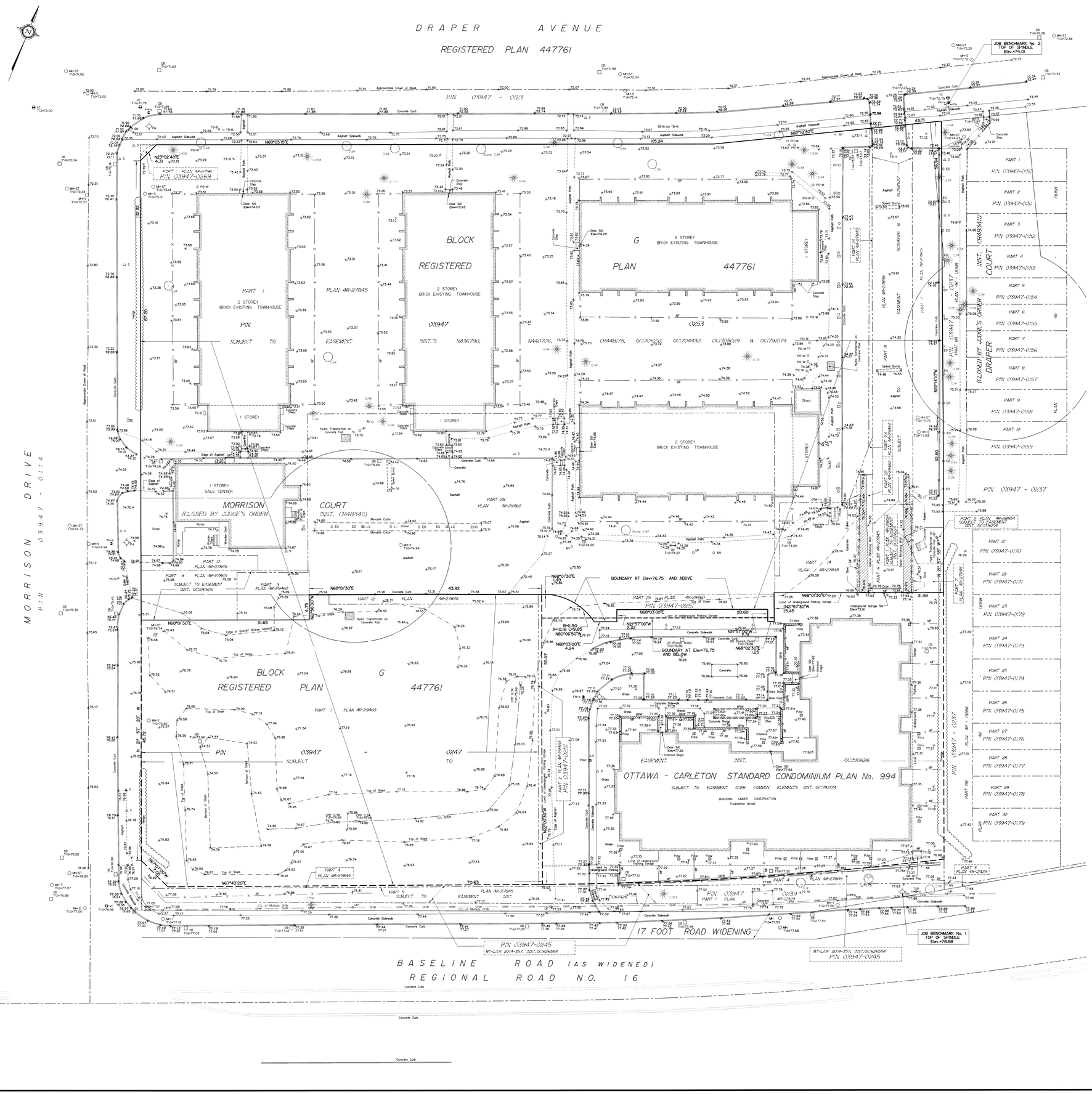
- HARD SURFACE WALKWAY
- NEW CITY CONCRETE SIDEWALK
- EXISTING CITY STREET LIGHT
- LIGHT STANDARD
- TWO WAY VEHICLE CIRCULATION
- ENTRANCE LOCATION
- BOLLARD STYLE BIKE RACK
- FH FIRE HYDRANT
- DC DEPRESSED CURB
- STOP SIGN

TOPOGRAPHICAL SKETCH OF:

MORRISON COURT & PART OF DRAPER COURT
(Closed by Judge-s Order CR483411)
PART OF BLOCK G, REGISTERED PLAN 447761
OTTAWA-CARLETON STANDARD CONDOMINIUM PLAN No. 994, CITY OF OTTAWA
Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed May 4, 2017

PLOT DATE: Thursday, September 05, 2019

Plan No.: #_____ D0__



TOPOGRAPHICAL SKETCH OF

MORRISON COURT & PART OF DRAPER COURT (Closed by Judge's Order CR483411) PART OF BLOCK G REGISTERED PLAN 447761 AND OTTAWA-CARLETON STANDARD CONDOMINIUM PLAN No. 994 CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.
Field Work Completed May 4, 2017

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

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

Notes & Legend

Denotes		
MH-ST	-	Maintenance Hole (Storm Sewer)
MH-S	-	Maintenance Hole (Sanitary)
MH-T	-	Maintenance Hole (Traffic)
MH	-	Maintenance Hole (Unidentified)
CB	-	Catch Basin
CBI	-	Catch Basin Inlet
VC	-	Valve Chamber (Watermain)
FH	-	Fire Hydrant
WV	-	Water Valve
GV	-	Gas Valve
GM	-	Gas Meter
TSP	-	Traffic Signal Post
S	-	Sign
CPP	-	Corrugated Plastic Pipe
T/P	-	Top of Pipe
T/G	-	Top of Grate
	-	Deciduous Tree
	-	Coniferous Tree
MF	-	Metal Fence
BF	-	Board Fence
UP	-	Utility Pole
AN	-	Anchor
LS	-	Light Standard
PO-W	-	Wood Pole
EO	-	Electrical Outlet
TB-B	-	Bell Terminal Box
Ø	-	Diameter
+68.00	-	Location of Elevations
+68.00	-	Top of Wall Elevations
+68.00	-	Top of Concrete Curb Elevation
C/L	-	Centreline
	-	Property Line
BRW	-	Brick Retaining Wall
CRW	-	Concrete Retaining Wall

BOUNDARY INFORMATION SHOWN HEREON HAS BEEN COMPILED FROM FIELD SURVEY AND EXISTING DOCUMENTS.

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
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Ontario Land Surveyors

Job No. 19356-17 DWG PREL C PL 447761 T F