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ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES

FOR

LÉPINE CORPORATION

3490 INNES ROAD

CITY OF OTTAWA

PROJECT NO.: 18-1007

MAY 2019 – REV 1

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ASSESSMENT OF ADEQUACY OF PUBLIC SERVICES FOR

LÉPINE CORPORATION

3490 INNES ROAD

MAY 2019 – REV 1

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FOR
LEPINE CORPORATION
3490 INNES ROAD

MAY 2019
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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained to prepare an Assessment of Adequacy of Public Services report in support of the application for a Zoning By-law Amendment (ZBLA) of Blocks 149 ,150, 148 and 147 of 3490 Innes Road on behalf of the Lépine Corporation.

The subject property is located within the City of Ottawa urban boundary in the Innes Ward and is in conformance with the approved 3490 Innes Road Plan of Subdivision. The subject property includes blocks 149, 150, 148 and 147 (also referred to as 369, 370, 368 and 367 respectively) per the *Design Brief for 3490 Innes Road* (DSEL, May 2018). As illustrated in ***Figure 1: Site Location***, the subject property is located south of Innes Road, and east of Pagé Road. The subject property is currently zoned DR (Development Reserve Zone) and IL2H(14)-h (Light Industrial Zone). The subject property lies within the Orleans Village (OV) development and measures approximately ***11.41*** ha. The subject property is within the jurisdiction of the Rideau Valley Conservation Authority.

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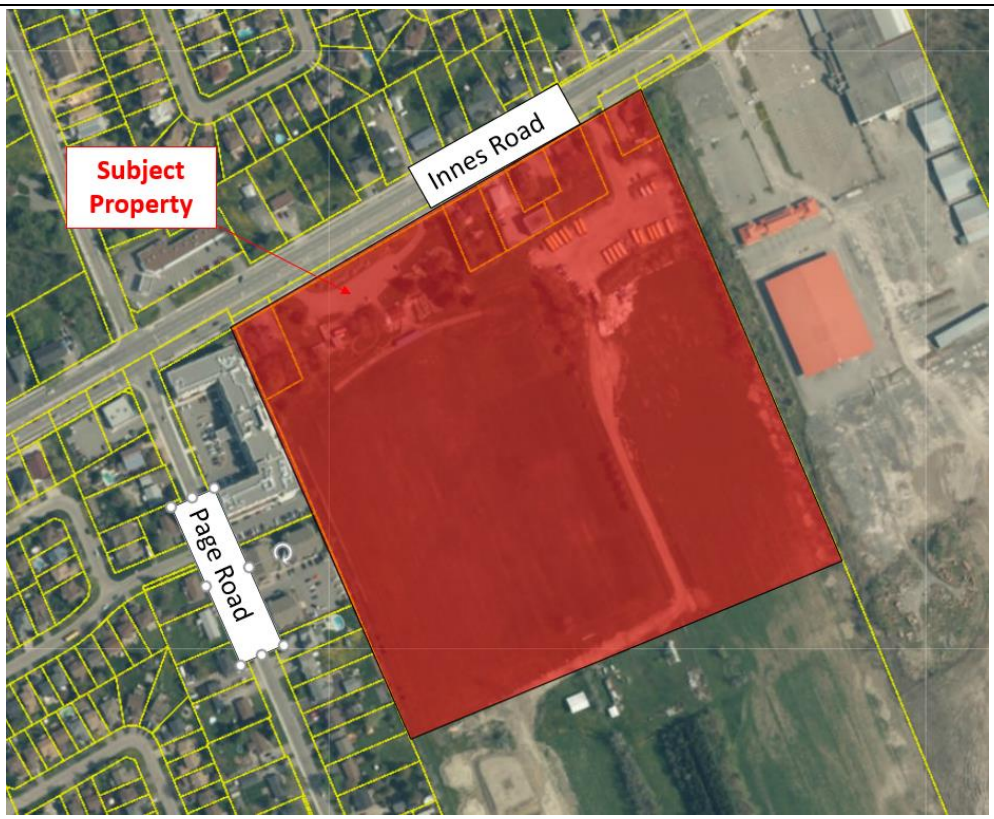

Figure 1: Site Location

The contemplated development consists of 13 mixed-use buildings with approximately 2615 apartment units and 5,300m^2 of commercial space as well as underground parking.

1.1 Existing Conditions

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

Innes Road:

- 406mm diameter ductile iron watermain;
- 1050mm diameter concrete storm sewer;
- 250mm diameter sanitary sewer.

Pagé Road:

- 305mm diameter watermain;
- 450mm diameter storm sewer;
- 250mm diameter sanitary sewer.

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1.2 Required Permits / Approvals

The contemplated development is subject to the site plan control approval process. The City of Ottawa must approve the engineering reports and drawings prior to issuing a ZBLA approval.

1.3 Pre-consultation

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

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2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

The following documents were referenced in the preparation of this report:

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

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

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

  - **Technical Bulletin ISTB-2018-01, Revisions to *Ottawa Design Guidelines* – Sewer dated 2012,**
    City of Ottawa, March 21, 2018.
    (ISTB SEWER-2018-01)

  - **Technical Bulletin ISTB-2018-04, Revisions to *Ottawa Design Guidelines* – Sewer dated 2012,**
    City of Ottawa, June 27, 2018.
    (ISTB SEWER-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.
    (*ISDTB-2010-2*)

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

  - **Technical Bulletin ISDTB-2018-02,**
    City of Ottawa, March 21, 2018.
    (*ISDTB-2018-02*)

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- **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)

- **Gloucester and Cumberland, East Urban Community Expansion Area and Bilberry Creek Industrial Park, Master Servicing Update,**
  Stantec, July 2006.
  (MSU)

- **Functional Servicing Report for Innes Development Corp. – Rev 2,**
  (DSEL, August 2017).
  (FSR)

- **Stormwater Management Report for the Orleans Village Subdivision,**
  JFSA, July 2018.
  (OV SWM Report)

- **Design Brief for Caivan (Orleans Village) Limited 3490 Innes Road – Rev 2**
  DSEL, May 2018.
  (Design Brief)

- **Design Brief for the Interim Stormwater Management Pond for the Orleans Village Subdivision,**
  JFSA, January 19, 2018.

- **Innes Road Widening Environmental Study Report,**
  Delcan, February 2002.

- **Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond**
  DSEL/JFSA, March 2014.

- **Orleans Village Subdivision / Forest Valley Sanitary Trunk Sewer Hydraulic Gradeline Analysis Test**
  JFSA, June 27, 2018.
  (FVT HGL Analysis)

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3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 2E pressure zone. A local 406mm diameter ductile iron watermain exists within the Innes Road right-of-way and a 305mm diameter watermain exists within the Pagé Road right-of-way, as shown by the City Water Distribution Mapping in Appendix B.

A 300mm watermain within the future Avenue de Lamarche fronting the subject site is under construction at the time of this publication. The installation of the 300mm watermain is in accordance with the ***Design Brief.***

3.2 Water Supply Servicing Design

It is contemplated to service the development through a looped 300mm watermain connection to the future 300mm watermain within Avenue de Lamarche.

Table 1 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 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Residential 3 Bedroom Apartment	3.1 P/unit
Residential Average Daily Demand	280 L/d/P
Residential Maximum Daily Demand	2.5 x Average Daily *
Residential Maximum Hourly	5.5 x Average Daily *
Commercial Space	28,000 L/Ha/day
Minimum Watermain Size	150mm diameter
Minimum Depth of Cover	2.4m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350kPa and 480kPa
During normal operating conditions pressure must not drop below	275kPa
During normal operating conditions pressure must not exceed	552kPa
During fire flow operating pressure must not drop below	140kPa
Daily average based on Appendix 4-A from **Water Supply Guidelines*	

Table 2 summarizes the anticipated water supply demand, the water demand contemplated in the ***Design Brief,*** and the resulting pressures determined in the ***Design Brief*** at the connection point to the future 300mm watermain within Avenue de Lamarche.

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Table 2
Water Demand and Boundary Conditions
Proposed Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Contemplated Demand from Blocks 147-150 per Design Brief (L/min)	Pressure @ Subject Site Boundary per (Node COM1 per Design Brief) (kPa)
Average Daily Demand	935.9	1013.1	429.8
Max Day + Fire Flow	2329.3 + 13,000.0 = 15,329.3	2427.6 + 13,000.0 = 15,427.6	226.1
Peak Hour	5118.4	5277.8	366.3

1) Water demand calculation per Water Supply Guidelines. See **Appendix B** for detailed calculations.

Proposed average daily water demand is anticipated to be 7.6% lower than the predicted water demand from blocks 147 to 150 per the ***Design Brief.***

Fire flow had been contemplated at ***13,000 L/min*** per the ***Design Brief***. Sufficient pressure is available to accommodate a ***13,000 L/min*** fire flow. If the fire flow of the subject property exceeds ***13,000 L/min*** a revised boundary condition request will be required to ensure sufficient pressure exists. Pressure in the Average Day and Peak Hour demand fall within the desired pressure range per ***Table 1***.

Internal private hydrants along with future hydrants on Avenue de Lamarche will be required to service the contemplated development.

3.2 Water Servicing Conclusion

The subject site was contemplated in the ***Design Brief*** to connect to the future 300mm watermain within Avenue de Lamarche. Adequate pressure in the Average Day and Max Day scenario and a fire flow of ***13,000 L/min*** is available within the future watermain network to support the development.

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

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4.0 WASTWEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Forest Valley Trunk (FVT) catchment area, as shown by the ***Sanitary & Storm Collection System Maps,*** included in ***Appendix C***. 250mm diameter sanitary sewers exist on Innes Road and Pagé Road, north of Silverbirch Street. The 900mm diameter FVT sanitary sewer exists on Pagé Road, south of Silverbirch Street.

The subject site was contemplated in the ***Design Brief*** and the construction of a 250mm sanitary sewer within Avenue de Lamache is underway at the time of this publication. The 250mm diameter sanitary sewer is designed to support the contemplated development.

4.2 Wastewater Design

Wastewater services are available for the development within the future Avenue de Lamache as contemplated in the ***Design Brief***.

Table 3 summarizes the ***City Standards*** employed in the preparation of the preliminary wastewater analysis.

Table 3
Wastewater Design Criteria

Design Parameter	Value
Residential 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Residential 3 Bedroom Apartment	3.1 P/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 3.8, Min 2.0
Commercial Floor Space	28,000 L/Ha/d
Infiltration and Inflow Allowance	0.33L/s/ha
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	250mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.	

Table 4 demonstrates the anticipated peak flow from the contemplated development as well as the flow anticipated in the ***Design Brief***. See ***Appendix C*** for associated calculations.

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Table 4
Summary of Estimated Peak Wastewater Flow

Design Parameter	Proposed Total Flow (L/s)	Predicted Total Flow from Blocks 147 to 150 per Design Brief (L/s)
Estimated Average Dry Weather Flow	15.77	18.63
Estimated Peak Dry Weather Flow	43.89	47.90
Estimated Peak Wet Weather Flow	47.65	51.66

Based on ***Table 4*** above, the contemplated development results in a wastewater flow reduction of 7.8% compared to the ***Design Brief.***

As discussed in ***Section 4.1***, the future sanitary sewers contemplated for *Orleans Village* have been sized to convey the flow from the subject site. Design sheets from the ***Design Brief*** have been included in ***Appendix C,*** which demonstrate that the subject property has been contemplated in the design. The anticipated wastewater flow from the development are less than contemplated in the ***Design Brief***, therefore, sufficient capacity within the local infrastructure is available to service the development.

An analysis of the downstream Forest Valley Trunk (FVT) hydraulic grade line (HGL) was originally completed by Stantec in October 2003. An update to the HGL analysis was completed by JFSA in June 2018, refer to ***Appendix C*** for a copy of the report. The revised HGL analysis was updated to include the contributions from the subject property in accordance with the ***Design Brief.*** The ***Design Brief*** estimated a total peak flow that matches scenario 2 in the ***FVT HGL Analysis*** (approximately ***179 L/s*** from the Orleans village and EUC developments)***,*** which suggests that a higher HGL within some nodes are anticipated resulting in a maximum of 10cm surcharge above the obvert of eight sewer pipes. The analysis assumed that homes with basements contributing flow to the ***FVT*** have underside of footings (USF's) 1.8m below the centerline of road. Therefore, the surcharged sewer would still be lower than existing USF's of the homes contributing to the FVT.

4.3 Wastewater Servicing Conclusions

The contemplated development is anticipated to be serviced by the future 250mm sanitary sewer, which is currently under construction within Avenue de Lamache.

As outlined in the ***Design Brief***, the local sewers were sized to convey wastewater from the subject property. An HGL analysis of the ***FVT*** was completed to include the flow from the subject property. The HGL increased along a portion of the ***FVT***, however, the HGL is still below the assumed contributing USF elevations.

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5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The existing site drains via sheet flow from north to south to the existing EUC Pond 1, which outlets to Mud Creek.

The subject site was contemplated in the ***Design Brief*** and construction of a storm sewer varying from 300mm to 1350mm in diameter, fronting the subject site within Avenue de Lamache is underway during the time of publication of this report.

5.2 Post-Development Stormwater Management Targets

Stormwater management for the subject property has been contemplated in the ***Design Brief*** and ***OV SWM Report***. The site is required to provide:

- Quantity controls to attenuate stormwater runoff to capture rates for Blocks 147 to 150 per ***Table 5*** for all storms up to and including the 100-year event;
- Provide an estimated storage volume of ***1780m^3*** (based on preliminary analysis of the ***OV SWM Report***)***,*** to be confirmed with detailed analysis and actual percent imperviousness during detailed design;

Table 5
Summary of Stormwater Management Targets

	Area (ha)	Capture Rate* (L/s)	Storage Required (m^3)
Block 147	2.16	405	380
Block 148	2.54	457	470
Block 149	2.86	501	545
Block 150	2.17	406	385
External Area**	0.75	73	0

Capture rates per JFSA **OV SWM Report*
*** 2-Year Capture contemplated in the storm sewer design from the **Design Brief***

- Approximately ***0.64 Ha*** and ***0.11 Ha*** of external residential properties fronting Innes Road was contemplated to drain to Blocks 147 & 148 and Blocks 149 & 150, respectively. The 2-year flow rate from the external areas is proposed to be added to the allowable release rates for Blocks 147,148, 149 and 150 described above.

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5.3 Proposed Stormwater Management System

The subject property is anticipated to discharge to the future 825mm storm sewer within Avenue de Lamache. The storm sewers have been sized to convey the 2-year flow from the subject site, refer to ***Appendix D*** for stormwater drainage plans and design sheets extracted from the ***Design Brief***.

The quantity and quality control has been prescribed by the ***Design Brief*** and ***OV SWM Report.*** It is anticipated to use a combination of surface, rooftop and subsurface storage to provide the ***1780m^3*** of preliminary required storage to control the flow to a maximum of ***1842 L/s***.

5.4 Stormwater Servicing Conclusions

Stormwater management for the subject site was contemplated in the ***Design Brief*** and ***OV SWM Report***. Minor system flow is anticipated to be directed to a future 825mm storm sewer within Avenue de Lamache, the subject site was contemplated in the minor system design of the subdivision.

To accommodate the 100-year storm event, it is anticipated to use a combination of surface, rooftop and subsurface storage to provide the ***1780m^3*** of preliminary required on-site storage to control the release rate to a maximum of the 2-year storm event or a total flow of ***1842 L/s*** per the ***OV SWM Report***.

Quality control to be provided by the EUC Pond 1 in accordance with the ***Design Brief.***

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

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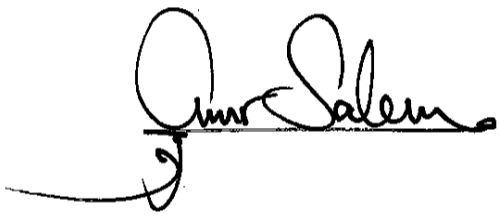
6.0 CONCLUSION AND RECOMMENDATIONS

David Schaeffer Engineering Limited (DSEL) has been retained to prepare an Assessment of Adequacy of Public Services report in support of the application for a Zoning By-law Amendment (ZBLA) of Blocks 149, 150, 148 and 147 (also referred to as 369, 370, 368 and 367 respectively) of 3490 Innes Road on behalf of Lépine Corporation. The preceding report outlines the following:

- The concept plan results in a reduction in water demand compared to that contemplated in the ***Design Brief***, pressure falls within the desired range in the Average Day and Peak Hour scenarios;
- Per the ***Design Brief***, ***13,000 L/min*** in fire flow is available to service the subject property;
- Local sanitary sewers designed in the ***Orleans Village*** development have been sized to convey the flow from the subject property,
- An HGL Analysis was completed to confirm adequate capacity within the Forest Valley Trunk sewer and confirmed that there is available capacity within the FVT to convey the flow from the subject property;
- Quantity controls are required to control the release rate from the site to a total flow of ***1842 L/s*** for Blocks 147 to 150, for all storms up to the 100-year storm event, it is contemplated to use surface, rooftop and subsurface storage to provide a total storage of ***1780m³*** on-site;

Prepared by,

David Schaeffer Engineering Ltd.



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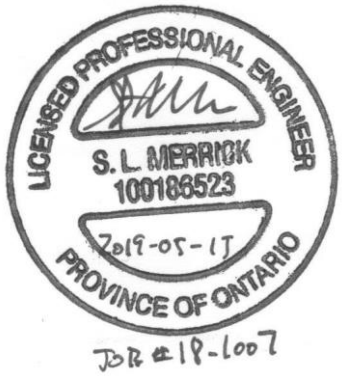
Reviewed by,

David Schaeffer Engineering Ltd.



Per: Steven L. Merrick, P.Eng.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

18-1007 06/07/2018

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
☒	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
☐	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.	N/A
☐	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.	N/A
☐	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	N/A

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

*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.	N/A
☐	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
☐	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 subwatersheds, 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
☒	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 5.3
☐	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 6.0
☐	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

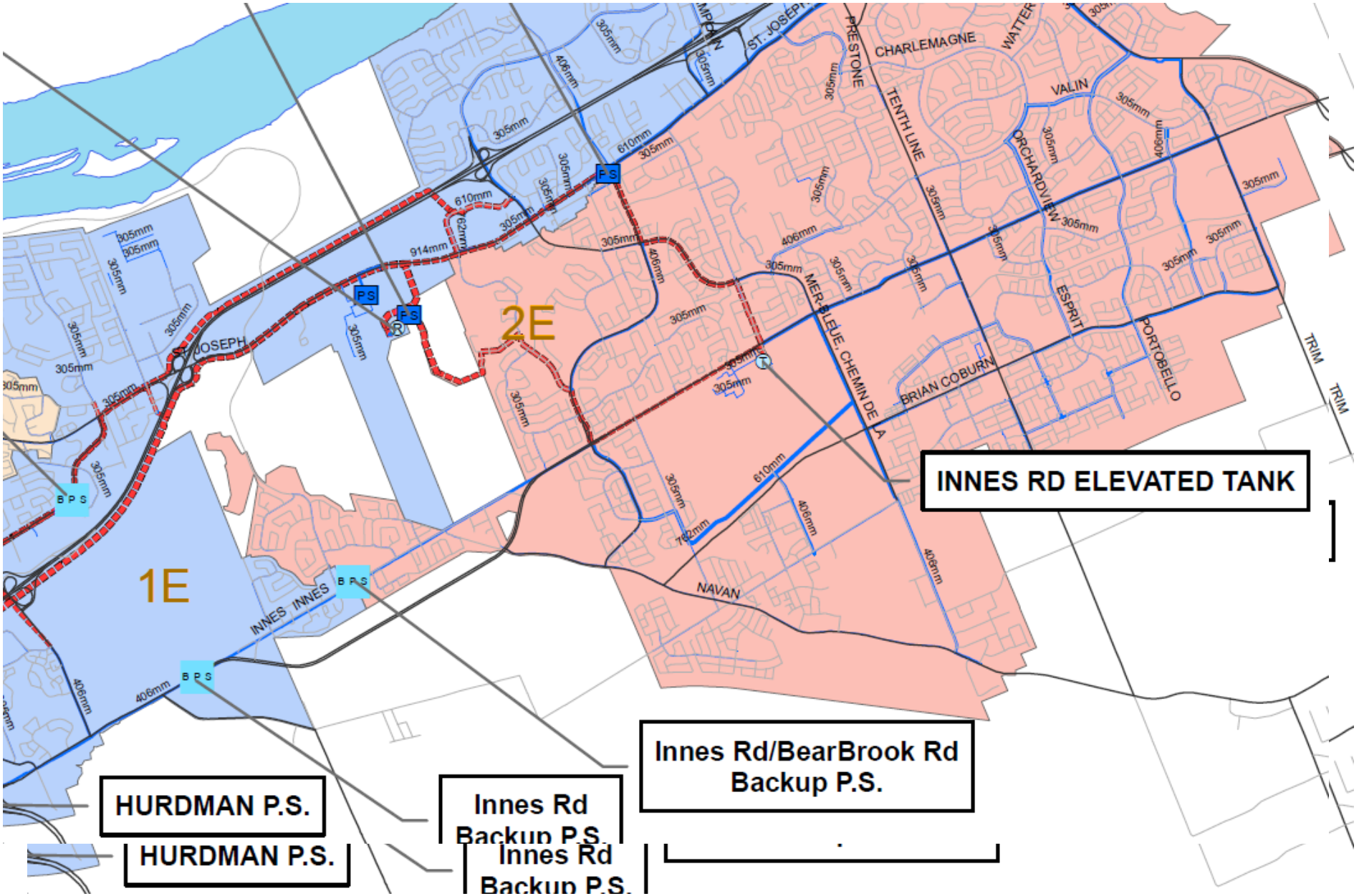
☒	Clearly stated conclusions and recommendations	Section 8.0
☐	Comments received from review agencies including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	

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

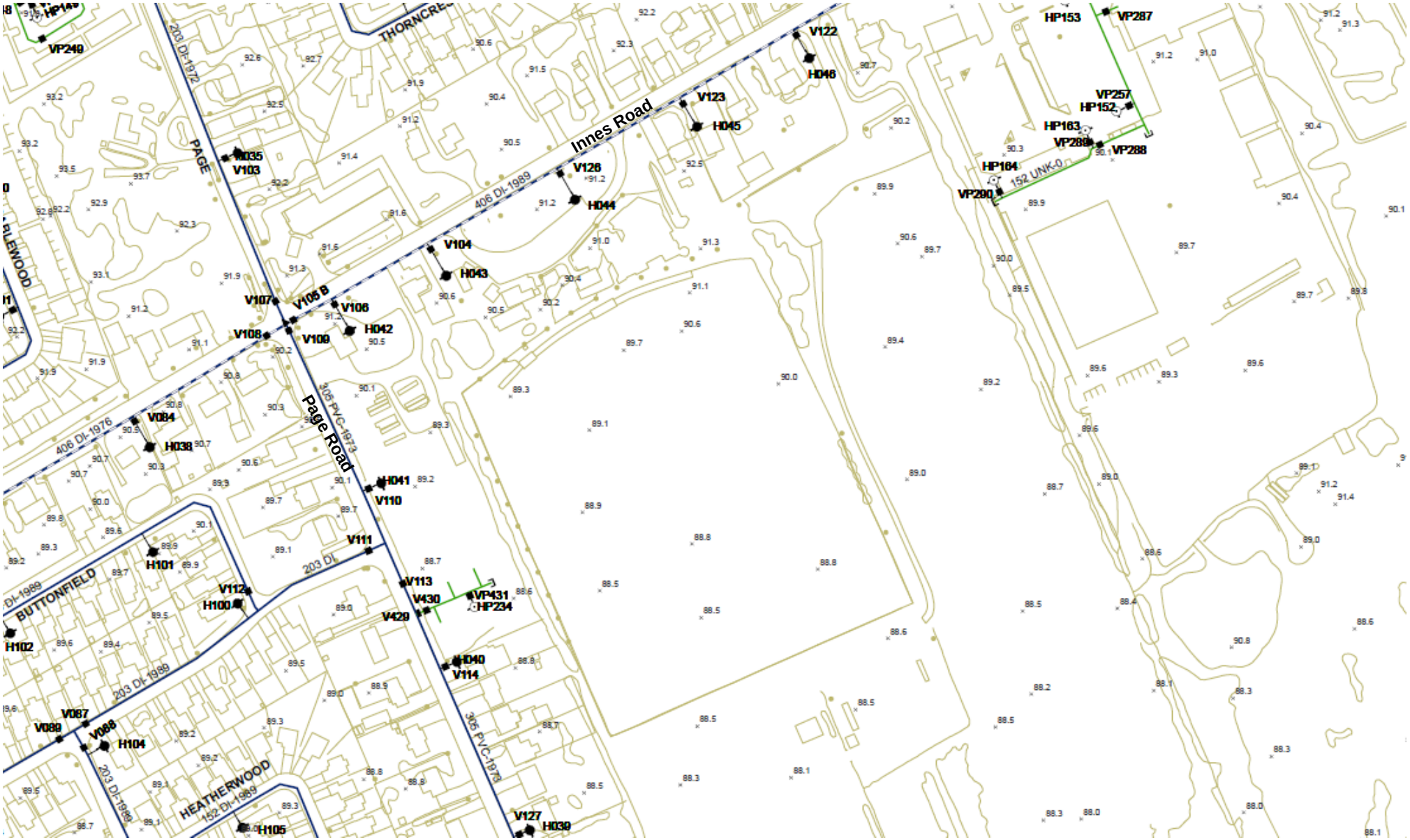
APPENDIX B

Water Supply

City of Ottawa Pressure Zone Map



City Water Distribution Mapping



Lepine Corporation
3490 Innes Road Blocks 147-150
Contemplated Water Demand

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		0	
Apartment			4670	<-- Population per Design Brief for 3490 Innes Road prepared by
Bachelor	1.4		0	DSEL, May 2018
1 Bedroom	1.4		0	
2 Bedroom	2.1		0	
3 Bedroom	3.1		0	
4 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	4670	1307.6	908.1	3269.0	2270.1	7191.8	4994.3

Institutional / Commercial / Industrial Demand

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space*	28,000.0 L/ha/day	5.40	151.20	105.0	226.8	157.5	408.2	283.5
			0.00	0.0	0.0	0.0	0.0	0.0
			0.00	0.0	0.0	0.0	0.0	0.0
			0.00	0.0	0.0	0.0	0.0	0.0
	Total I/CI Demand		151.2	105.0	226.8	157.5	408.2	283.5
	Total Demand		**1458.8**	**1013.1**	**3495.8**	**2427.6**	**7600.0**	**5277.8**

* Commercial space only contemplated for Blocks fronting Innes Road, noted as Blocks 149 and 148 on General Plan dated 2018-05-09 prepared by DSEL

Lepine Corporation
3490 Innes Road Blocks 147-150
Proposed Water Demand

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		0
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4	1045	1463
2 Bedroom	2.1	1570	3297
3 Bedroom	3.1		0
4 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	4760	1332.8	925.6	3332.0	2313.9	7330.4	5090.6

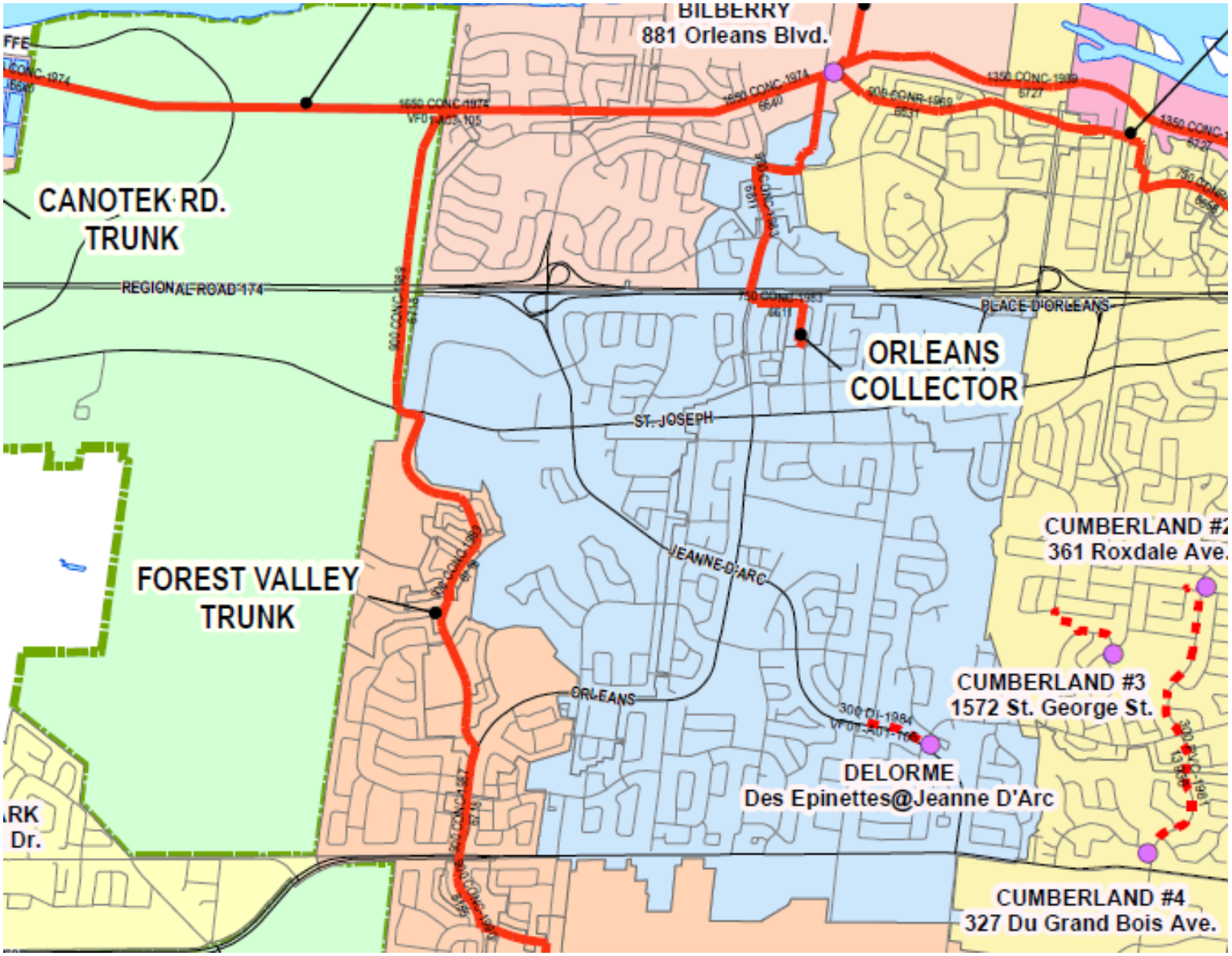
Institutional / Commercial / Industrial Demand

			Avg. Daily		Max Day		Peak Hour	
Property Type	**Unit Rate**	**Units**	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Commercial floor space	28,000.0 L/ha/day	0.53	14.84	10.3	22.3	15.5	40.1	27.8
			0.00	0.0	0.0	0.0	0.0	0.0
			0.00	0.0	0.0	0.0	0.0	0.0
			0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	14.8	10.3	22.3	15.5	40.1	27.8
		Total Demand	**1347.6**	**935.9**	**3354.3**	**2329.3**	**7370.5**	**5118.4**

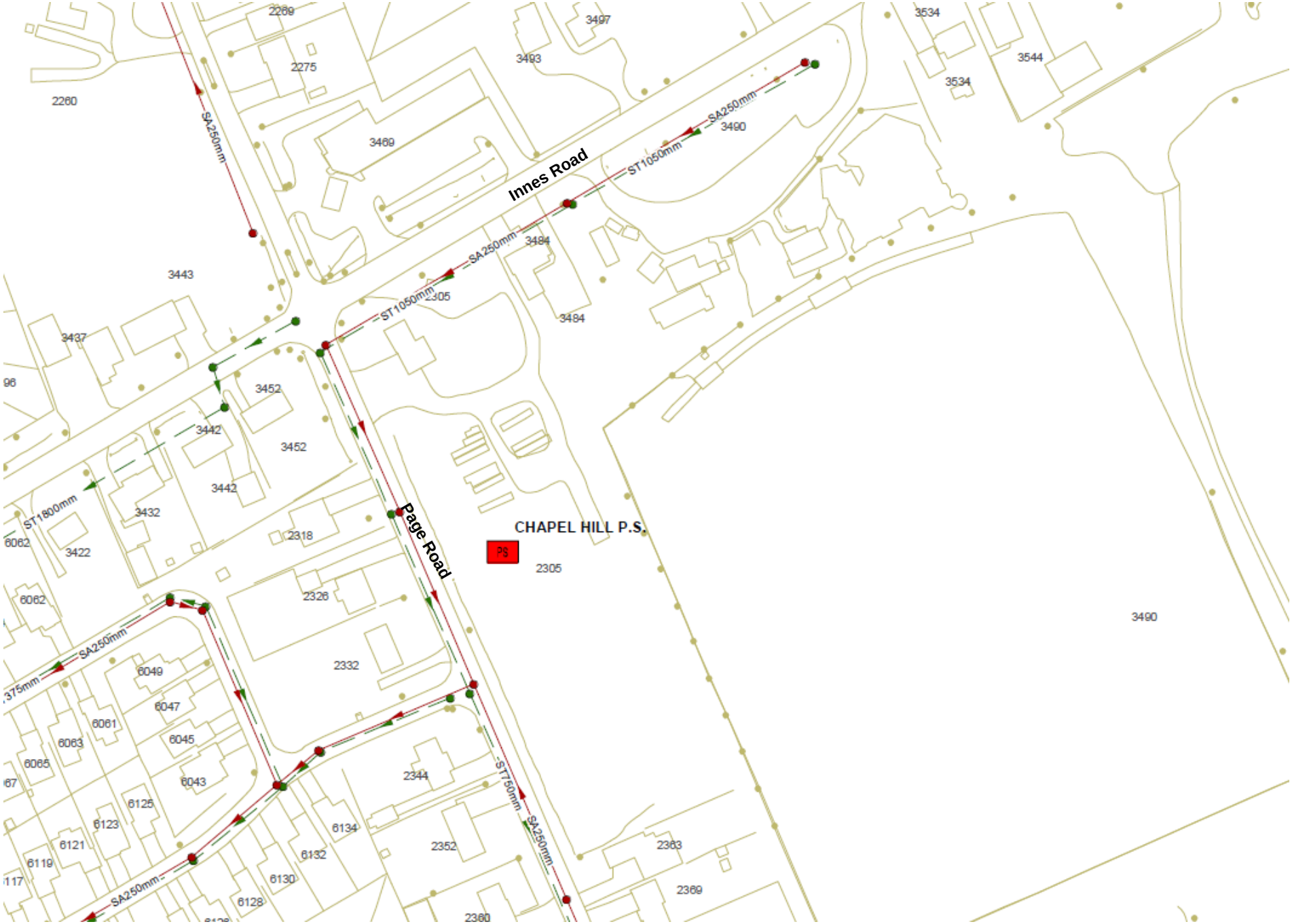
APPENDIX C

Wastewater Collection

Sanitary and Storm Collection System Map



City Sanitary and Storm Distribution Mapping



Lepine Corporation
3490 Innes Road Blocks 149-150
Contemplated Wastewater Flow

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 11.407 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **3.76 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		0	
Stacked Townhouse	2.3		0	
Apartment			4670	<-- Population per Design Brief for 3490 Innes
Bachelor	1.4		0	Road prepared by DSEL, May 2018
1 Bedroom	1.4		0	
2 Bedroom	2.1		0	
3 Bedroom	3.1		0	
Average	1.8		0	

Total Pop **4670**

Average Domestic Flow **15.13 L/s**

Peaking Factor **2.82**

Peak Domestic Flow **42.65 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**	**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space*	28,000 L/gross ha/d	5.40	3.50

Average I/C/I Flow **3.50**

Peak Institutional / Commercial Flow 5.25
Peak Industrial Flow** 0.00
Peak I/C/I Flow **5.25**

* Commercial space only contemplated for Block fronting Innes Road, noted as Blocks 149 and 148 on General Plan dated 2018-05-09 prepared by DSEL

Total Estimated Average Dry Weather Flow Rate	**18.63 L/s**
Total Estimated Peak Dry Weather Flow Rate	**47.90 L/s**
Total Estimated Peak Wet Weather Flow Rate	**51.66 L/s**

DSEL©

3490 Innes Road Blocks 147-150
Proposed Site Conditions

Wastewater Design Flows per Unit Count
City of Ottawa Sewer Design Guidelines, 2004

Site Area 11.41 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **3.76 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		0
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	1045	1463
2 Bedroom	2.1	1570	3297
3 Bedroom	3.1		0
Average	1.8		0

Total Pop **4760**

Average Domestic Flow **15.43 L/s**

Peaking Factor **2.81**

Peak Domestic Flow **43.37 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Commercial floor space*	28,000 L/gross ha/d	0.53	0.34

Average I/C/I Flow **0.34**

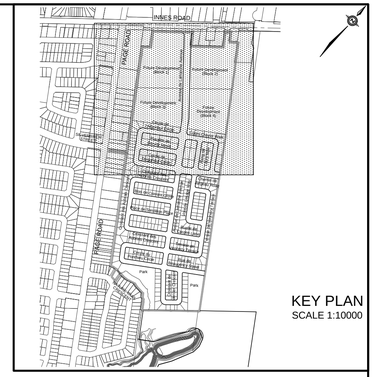
Peak Institutional / Commercial Flow 0.52

Peak I/C/I Flow **0.52**

** assuming a 12 hour commercial operation*

Total Estimated Average Dry Weather Flow Rate	**15.77 L/s**
Total Estimated Peak Dry Weather Flow Rate	**43.89 L/s**
Total Estimated Peak Wet Weather Flow Rate	**47.65 L/s**

DSEL©



KEY PLAN
SCALE 1:10000

LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB–DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — POP=5739
- DENSITY (PERSONS/HECTARE) — 107
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — 200mm SDR 35 — MH202A
- CAP

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16–10–116–00. SURVEYS DATED NOVEMBER 30, 2017.

LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16–10–116–00 (PHASE 1 & 2) DATED MARCH 08, 2018.

ISSUED FOR MOE APPROVAL 18–05–09

NOT FOR CONSTRUCTION

ELEVATION NOTE ELEVATION = 86.12 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM SITE BENCHMARK NCC CONTROL POINT 00119630229 HAVING A PUBLISHED ELEVATION OF 86.12m

No.	DATE	BY	DESCRIPTION
2.	18–05–09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18–01–24	M.Z.	1st SUBMISSION

EAST URBAN COMMUNITY
MIXED USE CENTRE
REFER TO
DAVID SCHAEFFER ENGINEERING LIMITED
PROJECT No. 14-733

Ottawa CITY OF OTTAWA

PROJECT No. 16–881

LICENSED PROFESSIONAL ENGINEER
M.M.ZDRAVEVSKI
100130902
18-05-09
PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

© DSEL

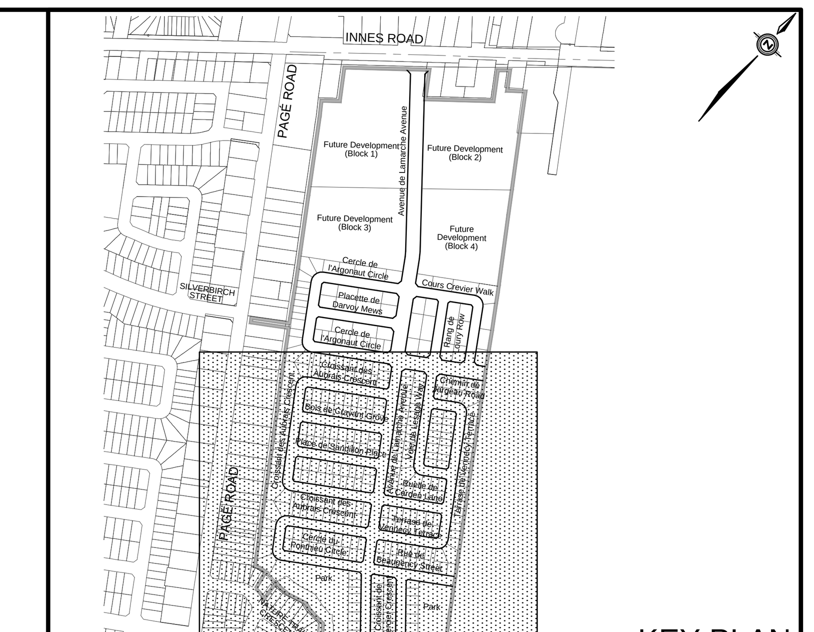
CAIVAN (ORLEANS VILLAGE) LIMITED

ORLEANS VILLAGE

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

DRAWN BY: M.Z./J.Y.	CHECKED BY: P.P.	DRAWING NO.	SHEET NO.
DESIGNED BY: P.P.	CHECKED BY: M.Z.		65
SCALE: 1:1000	DATE: JANUARY 2018		

CITY FILE No. D07-16-16-0022 CITY PLAN No. XXXXX



KEY PLAN
SCALE 1:10000

LEGEND

- SANITARY DRAINAGE BOUNDARY
- SANITARY SUB–DRAINAGE BOUNDARY
- SANITARY DRAINAGE BOUNDARY (OTHER PHASES)
- UPSTREAM MH TO DOWNSTREAM MH — 43A - 44A
- AREA IN HECTARES — 0.78
- POPULATION — 61
- UPSTREAM MH TO DOWNSTREAM MH — 43A–44A
- AREA IN OTHER PHASES IN HECTARES — 0.78
- POPULATION — 61
- EXTERNAL AREA IN HECTARES — A=53.63
- EXTERNAL POPULATION — POP=5739
- DENSITY (PERSONS/HECTARE) — 107
- EXTERNAL LAND USE — RESIDENTIAL
- MAINTENANCE HOLE — MH202A (200mmø SAN)
- CAP

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16–10–116–00. SURVEYS DATED NOVEMBER 30, 2017.

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2.	18–05–09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18–01–24	M.Z.	1st SUBMISSION

Ottawa CITY OF OTTAWA

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DESIGNED BY: P.P.	CHECKED BY: M.Z.		66
SCALE: 1:1000	DATE: JANUARY 2018		

CITY PLAN No. XXXXX

CITY FILE No. D07-16-16-0022

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)
Rang de Loury Row - 03																										
	200A	19A	0.42		44.00	0.42	44.00	3.66	0.52								0.42	0.42	0.14	0.66	77.50	200.00	0.90	31.12	0.02	0.99	0.39
To Street 9, Pipe 19A - 34A						0.42	44.00											0.42								
	200A	20A	0.18		17.00	0.18	17.00	3.71	0.20								0.18	0.18	0.06	0.26	40.50	200.00	0.65	26.44	0.01	0.84	0.27
To Street 7, Pipe 20A - 24A						0.18	17.00											0.18								
Cercle de l'Argonaut Circle - 12																										
	27A	26A	0.08		4.00	0.08	4.00	3.76	0.05								0.08	0.08	0.03	0.08	10.00	200.00	0.65	26.44	0.00	0.84	0.05
			0.05		4.00	0.13	8.00										0.05	0.13								
	26A	25A	0.41		44.00	0.54	52.00	3.65	0.62								0.41	0.54	0.18	0.80	71.00	200.00	0.65	26.44	0.03	0.84	0.37
	25A	24A	0.38		38.00	0.92	90.00	3.60	1.05								0.38	0.92	0.30	1.35	74.00	200.00	0.35	19.40	0.07	0.62	0.35
To Street 1, Pipe 24A - 21A						0.92	90.00											0.92								
	27A	29A	0.23		17.00	0.23	17.00	3.71	0.20								0.23	0.23	0.08	0.28	51.50	200.00	0.65	26.44	0.01	0.84	0.27
	29A	30A	0.26		14.00	0.49	31.00	3.68	0.37								0.26	0.49	0.16	0.53	51.50	200.00	0.60	25.41	0.02	0.81	0.32
	30A	31A	0.18		11.00	0.67	42.00	3.66	0.50								0.18	0.67	0.22	0.72	11.00	200.00	0.35	19.40	0.04	0.62	0.30
	31A	32A	0.38		34.00	1.05	76.00	3.62	0.89								0.38	1.05	0.35	1.24	65.50	200.00	0.35	19.40	0.06	0.62	0.34
	32A	34A	0.39		34.00	1.44	110.00	3.59	1.28								0.39	1.44	0.48	1.76	81.50	200.00	0.35	19.40	0.09	0.62	0.38
To Street 1, Pipe 34A - 35A						1.44	110.00											1.44								
Placette de Darvoy Mews - 13																										
	29A	28A	0.37		38.00	0.37	38.00	3.67	0.45								0.37	0.37	0.12	0.57	71.50	200.00	0.75	28.40	0.02	0.90	0.35
	28A	21A	0.42		44.00	0.79	82.00	3.61	0.96								0.42	0.79	0.26	1.22	80.50	200.00	0.35	19.40	0.06	0.62	0.34
To Street 1, Pipe 21A - 33A						0.79	82.00											0.79								
Croissant des Aubrais Crescent - 10																										
	8A	9A	0.55		41.00	0.55	41.00	3.67	0.49								0.55	0.55	0.18	0.67	75.00	200.00	0.65	26.44	0.03	0.84	0.37
	9A	35A	0.30		24.00	0.85	65.00	3.63	0.76								0.30	0.85	0.28	1.04	72.50	200.00	0.35	19.40	0.05	0.62	0.32
To Street 1, Pipe 35A - 36A						0.85	65.00											0.85								
	8A	7A	0.13		7.00	0.13	7.00	3.74	0.08								0.13	0.13	0.04	0.12	10.00	200.00	0.65	26.44	0.00	0.84	0.05
	7A	38A	0.23		14.00	0.36	21.00	3.70	0.25								0.23	0.36	0.12	0.37	51.50	200.00	0.35	19.40	0.02	0.62	0.24
To Street 3, Pipe 38A - 37A						0.36	21.00											0.36								
	38A	40A	0.25		17.00	0.25	17.00	3.71	0.20								0.25	0.25	0.08	0.28	59.00	200.00	0.65	26.44	0.01	0.84	0.27
	40A	41A	0.22		14.00	0.47	31.00	3.68	0.37								0.22	0.47	0.16	0.53	51.50	200.00	0.35	19.40	0.03	0.62	0.27
	41A	42A	0.14		7.00	0.61	38.00	3.67	0.45								0.14	0.61	0.20	0.65	10.00	200.00	0.35	19.40	0.03	0.62	0.27
	42A	43A	0.40		34.00	1.01	72.00	3.62	0.84								0.40	1.01	0.33	1.17	69.00	200.00	0.35	19.40	0.06	0.62	0.34
	43A	52A	0.36		31.00	1.37	103.00	3.59	1.20								0.36	1.37	0.45	1.65	78.00	200.00	0.35	19.40	0.09	0.62	0.38
To Street 1, Pipe 52A - 53A						1.37	103.00											1.37								
Bois de Cravant Grove - 14																										
Contribution From Street 4, Pipe 7A - 38A						0.36	21.00										0.36	0.36								
	38A	37A	0.39		34.00	0.75	55.00	3.64	0.65								0.39	0.75	0.25	0.90	69.50	200.00	0.35	19.40	0.05	0.62	0.32
	37A	36A	0.34		28.00	1.09	83.00	3.61	0.97								0.34	1.09	0.36	1.33	85.00	200.00	0.35	19.40	0.07	0.62	0.35
To Street 1, Pipe 36A - 44A						1.09	83.00											1.09								

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	0.5787	l/s/Ha	Extraneous Flow =	0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4		

Designed: P.P.

Checked: M.Z.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 68-70

PROJECT: **Caivan Communities - Orleans Village**

LOCATION: **City of Ottawa**

File Ref: 16-881

Date: May, 2018

Sheet No. 1 of 4

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	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)
Place de Sandillon Place - 11																											
	40A	39A	0.38		34.00	0.38	34.00	3.68	0.41								0.38	0.38	0.13	0.54	69.50	200.00	0.65	26.44	0.02	0.84	0.33
	39A	44A	0.34		28.00	0.72	62.00	3.64	0.73								0.34	0.72	0.24	0.97	85.00	200.00	0.40	20.74	0.05	0.66	0.34
To Street 1, Pipe 44A - 52A						0.72	62.00											0.72									
Cours Crevier Walk- 02																											
	18A	17A	0.07		6.00	0.07	6.00	3.75	0.07								0.07	0.07	0.02	0.09	10.00	200.00	0.65	26.44	0.00	0.84	0.05
	17A	16A	0.65		65.00	0.72	71.00	3.63	0.84								0.65	0.72	0.24	1.08	111.50	200.00	0.35	19.40	0.06	0.62	0.34
To Street 9, Pipe 16A - 19A						0.72	71.00											0.72									
	18A	20A	0.19		17.00	0.19	17.00	3.71	0.20								0.19	0.19	0.06	0.26	51.50	200.00	0.80	29.34	0.01	0.93	0.30
Contribution From Street 8, Pipe 200A - 20A						0.18	17.00										0.18	0.37									
	20A	24A	0.20		17.00	0.57	51.00	3.65	0.60								0.20	0.57	0.19	0.79	62.50	200.00	0.45	22.00	0.04	0.70	0.34
To Street 1, Pipe 24A - 21A						0.57	51.00											0.57									
Chemin de Jargeau Road - 04																											
	10A	16A	0.12		7.00	0.12	7.00	3.74	0.08								0.12	0.12	0.04	0.12	26.50	200.00	0.65	26.44	0.00	0.84	0.05
Contribution From Street 7, Pipe 17A - 16A						0.72	71.00										0.72	0.84									
	16A	19A	0.23		14.00	1.07	92.00	3.60	1.07								0.23	1.07	0.35	1.42	58.50	200.00	0.35	19.40	0.07	0.62	0.35
Contribution From Street 8, Pipe 200A - 19A						0.42	44.00										0.42	1.49									
	19A	34A	0.11		1.00	1.60	137.00	3.56	1.58								0.11	1.60	0.53	2.11	59.00	200.00	0.35	19.40	0.11	0.62	0.40
To Street 1, Pipe 34A - 35A						1.60	137.00											1.60									
Voie de Lesage Way - 05																											
	190A	15A	0.21		14.00	0.21	14.00	3.72	0.17								0.21	0.21	0.07	0.24	42.50	200.00	0.65	26.44	0.01	0.84	0.27
	15A	14A	0.60		55.00	0.81	69.00	3.63	0.81								0.60	0.81	0.27	1.08	106.50	200.00	0.35	19.40	0.06	0.62	0.34
	14A	13A	0.13		7.00	0.94	76.00	3.62	0.89								0.13	0.94	0.31	1.20	11.50	200.00	0.35	19.40	0.06	0.62	0.34
	13A	45A	0.16		11.00	1.10	87.00	3.61	1.02								0.16	1.10	0.36	1.38	49.00	200.00	0.35	19.40	0.07	0.62	0.35
To Street 11, Pipe 45A - 47A						1.10	87.00											1.10									
Terrase de Vennecy Terrace - 06																											
	15A	11A	0.15		11.00	0.15	11.00	3.73	0.13								0.15	0.15	0.05	0.18	49.00	200.00	0.65	26.44	0.01	0.84	0.27
	11A	12A	0.11		7.00	0.26	18.00	3.71	0.22								0.11	0.26	0.09	0.31	11.50	200.00	0.35	19.40	0.02	0.62	0.24
	12A	45A	0.64		55.00	0.90	73.00	3.62	0.86								0.64	0.90	0.30	1.16	106.50	200.00	0.35	19.40	0.06	0.62	0.34
Contribution From Street 10, Pipe 13A - 45A						1.10	87.00										1.10	2.00									
	45A	47A	0.43		31.00	2.43	191.00	3.52	2.18								0.43	2.43	0.80	2.98	111.00	250.00	0.30	32.57	0.09	0.66	0.41
	47A	48A	0.12		7.00	2.55	198.00	3.52	2.26								0.12	2.55	0.84	3.10	10.50	250.00	0.30	32.57	0.10	0.66	0.42
	48A	53A	0.59		55.00	3.14	253.00	3.49	2.86								0.59	3.14	1.04	3.90	108.50	250.00	0.30	32.57	0.12	0.66	0.44
To Street 1, Pipe 53A - 55A						3.14	253.00											3.14									
Ruelle de Carden Lane - 07																											
	46A	52A	0.56		48.00	0.56	48.00	3.65	0.57								0.56	0.56	0.18	0.75	105.50	200.00	0.65	26.44	0.03	0.84	0.37
To Street 1, Pipe 52A - 53A						0.56	48.00											0.56									
Croissant de Mercier Crescent- 09																											
	4A	5A	0.13		7.00	0.13	7.00	3.74	0.08								0.13	0.13	0.04	0.12	11.00	200.00	0.95	31.97	0.00	1.02	0.06
	5A	6A	0.61		48.00	0.74	55.00	3.64	0.65								0.61	0.74	0.24	0.89	106.50	200.00	0.50	23.19	0.04	0.74	0.36
To Street 2, Pipe 6A - 55A						0.74	55.00											0.74									

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	0.5787	l/s/Ha	Extraneous Flow =	0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4		

Designed: P.P.

Checked: M.Z.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 68-70

PROJECT: **Caivan Communities - Orleans Village**

LOCATION: **City of Ottawa**

File Ref: 16-881

Date: May, 2018

Sheet No. 2 of 4

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	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)
	4A	3A	0.21		11.00	0.21	11.00	3.73	0.13								0.21	0.21	0.07	0.20	42.00	200.00	0.65	26.44	0.01	0.84	0.27
	3A	2A	0.08		4.00	0.29	15.00	3.72	0.18								0.08	0.29	0.10	0.28	10.50	200.00	0.35	19.40	0.01	0.62	0.20
	2A	54A	0.60		51.00	0.89	66.00	3.63	0.78								0.60	0.89	0.29	1.07	100.50	200.00	0.35	19.40	0.06	0.62	0.34
	54A	55A	0.05		4.00	0.94	70.00	3.63	0.82								0.05	0.94	0.31	1.13	13.50	200.00	0.35	19.40	0.06	0.62	0.34
To Street 2, Pipe 55A - 58A						0.94	70.00											0.94									
Avenue de Lamarche Avenue - 01																											
			0.60		1.00	0.60	1.00			2.54	2.54						3.14	3.14									
			2.54		1222.00	3.14	1223.00			2.86	5.40						5.40	8.54									
	22A	230A	2.86		1376.00	6.00	2599.00	3.00	25.27		5.40					1.75	2.86	11.40	3.76	30.78	76.50	250.00	1.20	65.14	0.47	1.33	1.30
	230A	23A	0.15		1.00	6.15	2600.00	3.00	25.28		5.40					1.75	0.15	11.55	3.81	30.84	63.50	250.00	0.85	54.83	0.56	1.12	1.15
			0.13		1.00	6.28	2601.00				5.40						0.13	11.68									
			2.16		1039.00	8.44	3640.00				5.40						2.16	13.84									
	23A	24A	2.17		1044.00	10.61	4684.00	2.82	42.81		5.40					1.75	2.17	16.01	5.28	49.84	59.50	375.00	0.29	94.42	0.53	0.85	0.86
Contribution From Street 7, Pipe 20A - 24A						0.57	51.00										0.57	16.58									
Contribution From Street 5, Pipe 25A - 24A						0.92	90.00										0.92	17.50									
	24A	21A	0.23		17.00	12.33	4842.00	2.81	44.09		5.40					1.75	0.23	17.73	5.85	51.69	58.50	375.00	0.30	96.03	0.54	0.87	0.89
Contribution From Street 6, Pipe 28A - 21A						0.79	82.00										0.79	18.52									
	21A	33A	0.19		14.00	13.31	4938.00	2.80	44.81		5.40					1.75	0.19	18.71	6.17	52.73	42.50	375.00	0.20	78.41	0.67	0.71	0.76
	33A	34A	0.03		1.00	13.34	4939.00	2.80	44.82		5.40					1.75	0.03	18.74	6.18	52.75	17.00	375.00	0.42	113.63	0.46	1.03	1.01
Contribution From Street 9, Pipe 19A - 34A						1.60	137.00										1.60	20.34									
Contribution From Street 5, Pipe 32A - 34A						1.44	110.00										1.44	21.78									
	34A	35A	0.29		24.00	16.67	5210.00	2.78	46.94		5.40					1.75	0.29	22.07	7.28	55.97	59.00	375.00	0.20	78.41	0.71	0.71	0.77
Contribution From Street 4, Pipe 9A - 35A						0.85	65.00										0.85	22.92									
	35A	36A	0.31		28.00	17.83	5303.00	2.78	47.78		5.40					1.75	0.31	23.23	7.67	57.20	58.50	375.00	0.20	78.41	0.73	0.71	0.77
Contribution From Street 3, Pipe 37A - 36A						1.09	83.00										1.09	24.32									
	36A	44A	0.32		28.00	19.24	5414.00	2.77	48.60		5.40					1.75	0.32	24.64	8.13	58.48	58.50	375.00	0.20	78.41	0.75	0.71	0.78
Contribution From Street 14, Pipe 39A - 44A						0.72	62.00										0.72	25.36									
	44A	52A	0.29		24.00	20.25	5500.00	2.77	49.37		5.40					1.75	0.29	25.65	8.46	59.58	58.50	450.00	0.15	110.42	0.54	0.69	0.70
Contribution From Street 4, Pipe 43A - 52A						1.37	103.00										1.37	27.02									
Contribution From Street 12, Pipe 46A - 52A						0.56	48.00										0.56	27.58									
	52A	53A	0.09		1.00	22.27	5652.00	2.76	50.55		5.40					1.75	0.09	27.67	9.13	61.43	58.50	450.00	0.15	110.42	0.56	0.69	0.71
Contribution From Street 11, Pipe 48A - 53A						3.14	253.00										3.14	30.81									
Contribution From Street 2, Pipe 51A - 53A						0.80	69.00										0.80	31.61									
	53A	55A	0.09		1.00	26.30	5975.00	2.74	53.06		5.40					1.75	0.09	31.70	10.46	65.27	61.50	450.00	0.15	110.42	0.59	0.69	0.72
To Street 2, Pipe 55A - 58A						26.30	5975.00				5.40							31.70									
Cercle du Ponthieu Circle - 08																											
	50A	51A	0.25		21.00	0.25	21.00	3.70	0.25								0.25	0.25	0.08	0.33	41.50	200.00	0.70	27.44	0.01	0.87	0.28
	51A	53A	0.55		48.00	0.80	69.00	3.63	0.81								0.55	0.80	0.26	1.07	98.50	200.00	0.55	24.32	0.04	0.77	0.37
To Street 1, Pipe 53A - 55A						0.80	69.00											0.80									
	490A	49A	0.14		7.00	0.14	7.00	3.74	0.08								0.14	0.14	0.05	0.13	11.00	200.00	0.65	26.44	0.00	0.84	0.05
	49A	57A	0.24		14.00	0.38	21.00	3.70	0.25								0.24	0.38	0.13	0.38	50.50	200.00	0.35	19.40	0.02	0.62	0.24
	57A	58A	0.09		4.00	0.47	25.00	3.69	0.30								0.09	0.47	0.16	0.46	14.00	200.00	0.35	19.40	0.02	0.62	0.24
To Nature Trail Crescent, Pipe 58A - 59A						0.47	25.00											0.47									

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	0.5787	l/s/Ha	Extraneous Flow =	0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4		

Designed: P.P.	PROJECT: **Caivan Communities - Orleans Village**		
Checked: M.Z.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 68-70	File Ref: 16-881	Date: May, 2018	Sheet No. 3 of 4

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE					VEL.	
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	(FULL) (m/s)	(ACT.) (m/s)
Rue de Beaugency Street - 08																										
	500A	501A	0.33		24.00	0.33	24.00	3.70	0.29					0.65	0.65	0.07	0.98	0.98	0.32	0.68	62.50	200.00	0.65	26.44	0.03	0.84	0.37
	501A	502A	0.19		14.00	0.52	38.00	3.67	0.45						0.65	0.07	0.19	1.17	0.39	0.91	78.50	200.00	0.35	19.40	0.05	0.62	0.32
	502A	55A				0.52	38.00	3.67	0.45						0.65	0.07	0.00	1.17	0.39	0.91	2.50	200.00	1.65	42.13	0.02	1.34	0.52
Cercle du Ponthieu Circle - 08																										
	503A	504A	0.25		17.00	0.25	17.00	3.71	0.20								0.25	0.25	0.08	0.28	57.50	200.00	0.65	26.44	0.01	0.84	0.27
	504A	505A	0.26		17.00	0.51	34.00	3.68	0.41					0.77	0.77	0.08	1.03	1.28	0.42	0.91	69.50	200.00	0.50	23.19	0.04	0.74	0.36
	505A	58A				0.51	34.00	3.68	0.41						0.77	0.08	0.00	1.28	0.42	0.91	3.00	200.00	1.00	32.80	0.03	1.04	0.46
To Nature Trail Crescent, Pipe 58A - 59A						0.51	34.00								0.77			1.28								
	1A	6A	63.57		6462.00	63.57	6462.00	2.71	56.75	53.65	53.65			10.45	10.45	18.51	127.67	127.67	42.13	117.39	88.50	675.00	0.11	278.79	0.42	0.78	0.74
Contribution From Street 13, Pipe 5A - 6A						0.74	55.00										0.74	128.41								
	6A	55A				64.31	6517.00	2.71	57.23		53.65				10.45	18.51	0.00	128.41	42.38	118.12	57.00	675.00	0.11	278.79	0.42	0.78	0.74
Contribution From Street 1, Pipe 53A - 55A						26.30	5975.00				5.40						31.70	160.11								
Contribution From Street 13, Pipe 54A - 55A						0.94	70.00										0.94	161.05								
	55A	58A				92.07	12600.00	2.48	101.27		59.05				11.10	20.33	0.00	161.05	53.15	174.75	143.00	675.00	0.11	278.79	0.63	0.78	0.83
To Nature Trail Crescent, Pipe 58A - 59A						92.07	12600.00				59.05				11.10			161.05								
Nature Trail Crescent - 20																										
Contribution From Street 2, Pipe 505A - 58A						0.51	34.00								0.77		1.28	1.28		0.00						
Contribution From Street 2, Pipe 55A - 58A						92.07	12600.00				59.05				11.10		161.05	162.33		0.00						
Contribution From Street 2, Pipe 57A - 58A						0.47	25.00										0.47	162.80								
	58A	59A	0.07		1.00	93.12	12660.00	2.48	101.75		59.05				11.87	20.41	0.07	162.87	53.75	175.91	48.00	675.00	0.11	278.79	0.63	0.78	0.83
			0.01		1.00	93.13	12661.00				59.05				11.87		0.01	162.88								
	59A	60A	0.05		1.00	93.18	12662.00	2.48	101.76		59.05				11.87	20.41	0.05	162.93	53.77	175.94	33.00	675.00	0.11	278.79	0.63	0.78	0.83
To Noblewood Way, Pipe 60A - 61A						93.18	12662.00				59.05				11.87			162.93		0.00						
Noblewood Way - 21																										
Contribution From Nature Trail Crescent, Pipe 59A - 60A						93.18	12662.00				59.05				11.87		162.93	162.93		0.00						
			0.06		4.00	93.24	12666.00				59.05				11.87		0.06	162.99								
	60A	61A	1.47		82.00	94.71	12748.00	2.48	102.46		59.05				11.87	20.41	1.47	164.46	54.27	177.14	11.00	675.00	0.11	278.79	0.64	0.78	0.83
	61A	62A	0.59		47.00	95.30	12795.00	2.48	102.83		59.05				11.87	20.41	0.59	165.05	54.47	177.71	73.50	675.00	0.11	278.79	0.64	0.78	0.83

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha	Industrial Peak Factor = as per MOE Graph		
Average Daily Flow =	280	l/p/day			Extraneous Flow =	0.330	L/s/ha
Comm/Inst Flow =	28000	L/ha/da	0.5787	l/s/Ha	Minimum Velocity =	0.600	m/s
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Manning's n = (Conc)	0.013 (Pvc)	0.013
Max Res. Peak Factor =	4.00				Townhouse coeff=	2.7	
Commercial/Inst./Park Peak Factor =	1.00				Single house coeff=	3.4	
Institutional =	0.32	l/s/Ha					

Designed: P.P.

Checked: M.Z.

Dwg. Reference: Sanitary Drainage Plan, Dwgs. No. 68-70

PROJECT: **Caivan Communities - Orleans Village**

LOCATION: **City of Ottawa**

File Ref: 16-881

Date: May, 2018

Sheet No. 4 of 4

J.F. Sabourin and Associates Inc.
WATER RESOURCES AND ENVIRONMENTAL CONSULTANTS

52 Springbrook Drive
Ottawa (Stittsville), ON K2S 1B9
TEL: (613) 836-3884
FAX: (613) 836-0332
WEB: www.jfsa.com

July 5, 2018

David Schaeffer Engineering Limited
120 Iber Road, Unit 103
Ottawa, Ontario K2S 1E9

Attention: **Laura Maxwell, B.Sc., M.Pl.**

Subject: **Orleans Village Subdivision / Forest Valley Sanitary Trunk Sewer Hydraulic Gradeline Analysis Test** *our file:883-10*

As requested by your office, based on the provided information as described below, we have evaluated the potential impact of redirecting sanitary flow contributions from the Orleans Village subdivision and East Urban Community (EUC) development to an inflow point approximately 458 m upstream of that previously considered on the existing Forest Valley sanitary trunk sewer.

The impact of these proposed developments on the hydraulic gradeline in the Forest Valley trunk sewer was evaluated based on spreadsheet calculations for a range of scenarios in the October 2003 *Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis* by Stantec Consulting Ltd.. Refer to Attachment A for key excerpts from the report. We understand from DSEL that the contributions from the Orleans Village and EUC developments make up approximately 165.2 L/s of the inflow to node fv07400 at the intersection of Pagé Road and Silverbirch Street in the "Monitored & Design" flows scenario, with the remaining 15.8 L/s contributed by 1.4 ha of industrial land and 10.3 ha of existing residential land to the east of Pagé Road.

For comparison with the sanitary sewer hydraulic gradeline elevations, the October 2003 report estimated underside of footing elevations for lots connected to the sanitary sewer system as 3.3 m below the trunk sewer top of manhole elevations. Note that this assumption has not been carried forward in the present study, as it is unclear why the estimate is so much more conservative than typical approximations. For example, we understand from DSEL that standard low-rise residential underside of footing elevations are generally shallower than 1.8 m below the road centreline elevation. The impact of relocating sanitary flow contributions from the Orleans Village and EUC developments has instead been evaluated based on differences in hydraulic gradeline elevation and pipe surcharge, with the understanding that a survey may be undertaken if needed to confirm underside of footing elevations in areas where the trunk sewer is surcharged (i.e. the hydraulic gradeline is above the obvert of the pipe).

A model of the Forest Valley sanitary trunk sewer between fv08100 and fv00100 was created in XPSWMM for comparison with the "Monitored & Design" flows scenario from the October 2003 report. Refer to Attachment B for an XPSWMM model schematic. As presented in Table B-1 of Attachment B, the XPSWMM-simulated hydraulic gradeline elevations are between 3 cm and 70 cm lower than those presented in Table 5-1 of the October 2003 report (included in Attachment A), except at fv04200 where the XPSWMM hydraulic gradeline is 4 cm higher. The sanitary trunk sewer is not surcharged based on the XPSWMM analysis, with the exception of two pipes between fv04200 and fv04000, where the hydraulic gradeline is 3-4 cm above the pipe obverts.

The XPSWMM model was then modified based on direction from DSEL, wherein the 165.2 L/s sanitary flow contribution from the Orleans Village and EUC developments was redirected from fv07400 to an upstream inflow point at fv07700, at the north intersection of Nature Trail Crescent and Pagé Road. As a result of this relocation of inflow, the sanitary hydraulic gradeline elevations increase by up to 15.5 cm between fv08100 and fv7500, and are otherwise unaffected. The simulated hydraulic gradeline elevations are still between 3 cm and 70 cm lower than those

presented in Table 5-1 of the October 2003 report for this scenario, except at fv04200 where the XPSWMM hydraulic gradeline is 4 cm higher. Similarly, the sanitary trunk sewer pipes are still surcharged by 3-4 cm in two pipes between fv04200 and fv04000 under this scenario, and the hydraulic gradeline is otherwise contained below the obverts of the trunk sewer pipes.

Yours truly,
J.F. Sabourin and Associates Inc.

Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.
Director of Water Resources Projects

Attachment A: Excerpts from *Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis* (Stantec Consulting Ltd., October 2003)
Attachment B: XPSWMM Model Schematic; Pipe Data and Hydraulic Simulation Results

ATTACHMENT

A

Excerpts from Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis
(Stantec Consulting Ltd., October 2003)

JFSA Water Resources and Environmental Consultants

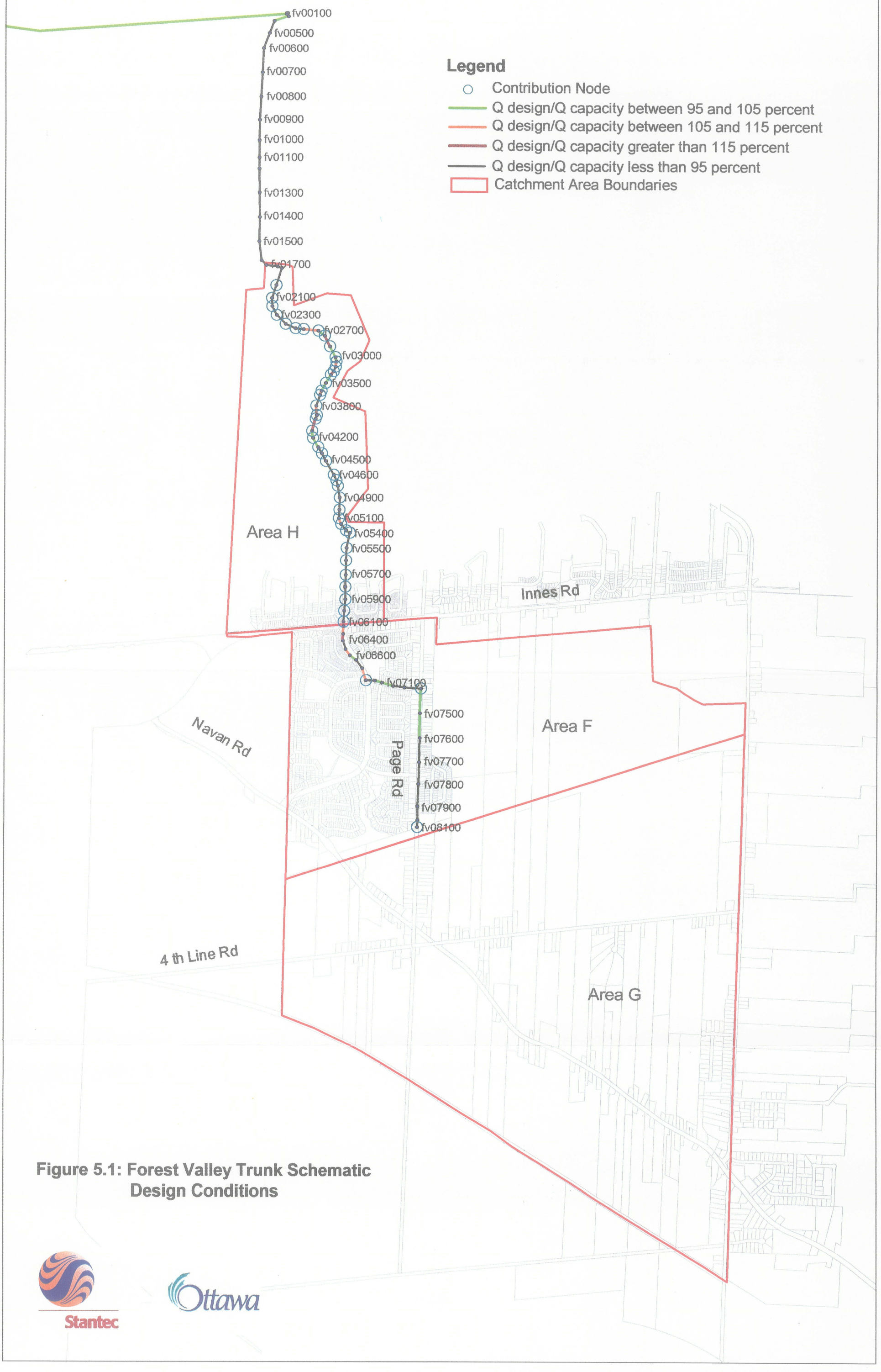


Figure 5.1: Forest Valley Trunk Schematic Design Conditions

Stantec

Ottawa

TABLE 5-1
Summary of FVT Wasterwater Flows and HGL

LEGEND

- Catchment Node
- Q/Qcap between 95% and105%
- Q/Qcap between 105% and115%
- Q/Qcap greater than 115%
- Q/Qcap greater than 95% and HGL is above basement elevation (OG-3.3m)

USMH	DSMH	LENGTH	USINV	USOBV	GROUND	USF Elev. (3.3m below OG)	Qcap Manning's (L/s)	Design				Monitored (300Lpcd, 0.50L/s/ha, K=0.60)				Monitored & Design			
								HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)
Forest Valley																			
fv00100	oc00400	-	44.8	45.7	52.0		7843	45.7	0.00	859	11%	45.7	0.00	739	9%	45.7	0.00	904	12%
fv00200	fv00100	8	46.1	47.0	52.0		6005	47.0	0.00	859	14%	47.0	0.00	739	12%	47.0	0.00	904	15%
fv00300	fv00200	30	47.0	47.9	52.2		2831	47.9	0.00	859	30%	47.9	0.00	739	26%	47.9	0.00	904	32%
fv00400	fv00300	123	47.7	48.6	52.5		830	48.6	0.01	859	103%	48.6	0.00	739	89%	48.6	0.03	904	109%
fv00500	fv00400	203	48.1	49.1	53.1		1293	49.1	0.00	859	66%	49.1	0.00	739	57%	49.1	0.00	904	70%
fv00600	fv00500	303	48.6	49.5	53.9		1163	49.5	0.00	859	74%	49.5	0.00	739	64%	49.5	0.00	904	78%
fv00700	fv00600	453	49.0	49.9	54.1		1223	49.9	0.00	859	70%	49.9	0.00	739	60%	49.9	0.00	904	74%
fv00800	fv00700	604	49.7	50.6	54.3		1208	50.6	0.00	859	71%	50.6	0.00	739	61%	50.6	0.00	904	75%
fv00900	fv00800	753	50.3	51.2	54.6		1193	51.2	0.00	859	72%	51.2	0.00	739	62%	51.2	0.00	904	76%
fv01000	fv00900	880	50.9	51.8	55.1		1178	51.8	0.00	859	73%	51.8	0.00	739	63%	51.8	0.00	904	77%
fv01100	fv01000	984	51.4	52.4	56.4		1193	52.4	0.00	859	72%	52.4	0.00	739	62%	52.4	0.00	904	76%
fv01200	fv01100	1,053	51.9	52.8	58.1		1461	52.8	0.00	859	59%	52.8	0.00	739	51%	52.8	0.00	904	62%
fv01300	fv01200	1,202	52.3	53.2	59.5		1208	53.2	0.00	859	71%	53.2	0.00	739	61%	53.2	0.00	904	75%
fv01400	fv01300	1,353	52.9	53.9	63.8		1208	53.9	0.00	859	71%	53.9	0.00	739	61%	53.9	0.00	904	75%
fv01500	fv01400	1,503	53.6	54.5	63.8		1178	54.5	0.00	859	73%	54.5	0.00	739	63%	54.5	0.00	904	77%
fv01600	fv01500	1,624	56.0	56.9	62.0		1178	56.9	0.00	859	73%	56.9	0.00	739	63%	56.9	0.00	904	77%
fv01700	fv01600	1,663	58.1	59.0	63.2		1265	59.0	0.00	859	68%	59.0	0.00	739	58%	59.0	0.00	904	71%
fv01800	fv01700	1,736	58.6	59.6	62.9		1033	59.6	0.00	859	83%	59.6	0.00	739	72%	59.6	0.00	904	88%
fv01900	fv01800	1,764	59.0	60.0	63.2		1193	60.0	0.00	859	72%	60.0	0.00	739	62%	60.0	0.00	904	76%
fv02000	fv01900	1,884	61.7	62.6	66.3	63.0	1987	62.6	0.00	859	43%	62.6	0.00	739	37%	62.6	0.00	904	45%
fv02100	fv02000	1,969	64.7	65.6	70.4	67.1	1969	65.6	0.00	859	44%	65.6	0.00	739	38%	65.6	0.00	904	46%
fv02200	fv02100	2,019	68.6	69.5	71.9	68.6	1951	69.5	0.00	858	44%	69.5	0.00	739	38%	69.5	0.00	904	46%
fv02300	fv02200	2,079	69.8	70.7	73.3	70.0	1886	70.7	0.00	858	46%	70.7	0.00	739	39%	70.7	0.00	903	48%
fv02400	fv02300	2,158	71.6	72.5	76.9	73.6	1951	72.5	0.00	858	44%	72.5	0.00	738	38%	72.5	0.00	903	46%
fv02500	fv02400	2,225	74.6	75.6	80.3	77.0	2151	75.6	0.00	858	40%	75.6	0.00	738	34%	75.6	0.00	903	42%
fv02600	fv02500	2,275	75.7	76.6	82.7	79.4	980	76.6	0.00	858	88%	76.6	0.00	738	75%	76.6	0.00	903	92%
fv02700	fv02600	2,368	75.9	76.8	83.6	80.3	755	76.9	0.04	858	114%	76.8	0.00	738	98%	76.9	0.06	903	120%
fv02800	fv02700	2,418	76.0	76.9	83.8	80.5	844	77.0	0.05	857	102%	76.9	0.00	737	87%	77.0	0.08	902	107%
fv02900	fv02800	2,492	76.2	77.1	83.7	80.4	680	77.1	0.05	855	126%	77.0	0.04	735	108%	77.2	0.10	900	132%
fv03000	fv02900	2,568	76.4	77.3	83.9	80.6	864	77.3	0.00	854	99%	77.3	0.00	733	85%	77.3	0.08	898	104%
fv03100	fv03000	2,596	76.4	77.3	83.8	80.5	885	77.3	0.00	853	96%	77.3	0.00	733	83%	77.4	0.07	897	101%
fv03200	fv03100	2,630	76.5	77.4	84.0	80.7	800	77.4	0.01	853	107%	77.4	0.00	732	91%	77.5	0.04	897	112%
fv03300	fv03200	2,662	76.6	77.5	84.0	80.7	905	77.5	0.00	853	94%	77.5	0.00	732	81%	77.5	0.00	896	99%
fv03400	fv03300	2,690	76.6	77.6	83.8	80.5	597	77.6	0.03	852	143%	77.6	0.01	731	122%	77.6	0.03	895	150%
fv03500	fv03400	2,749	76.8	77.7	84.0	80.7	885	77.7	0.00	852	96%	77.7	0.00	730	83%	77.7	0.04	895	101%
fv03600	fv03500	2,804	76.9	77.8	83.7	80.4	822	77.8	0.01	850	103%	77.8	0.00	728	89%	77.9	0.06	893	109%
fv03700	fv03600	2,831	76.9	77.8	83.6	80.3	755	77.9	0.02	850	113%	77.8	0.00	728	97%	77.9	0.07	892	118%
fv03800	fv03700	2,902	77.1	78.0	83.6	80.3	980	78.0	0.00	849	87%	78.0	0.00	727	74%	78.0	0.00	891	91%
fv03900	fv03800	2,963	77.2	78.1	83.9	80.6	778	78.2	0.02	847	109%	78.1	0.00	725	93%	78.2	0.03	889	114%
fv04000	fv03900	2,984	77.3	78.2	84.1	80.8	844	78.2	0.00	847	100%	78.2	0.00	725	86%	78.2	0.02	889	105%
fv04100	fv04000	3,063	77.4	78.3	84.6	81.3	653	78.4	0.06	843	129%	78.3	0.02	720	110%	78.4	0.09	884	135%
fv04200	fv04100	3,106	77.5	78.4	84.5	81.2	885	78.4	0.00	843	95%	78.4	0.00	720	81%	78.4	0.00	883	100%
fv04300	fv04200	3,161	77.7	78.6	84.0	80.7	838	78.6	0.00	843	101%	78.6	0.00	720	86%	78.6	0.01	883	105%
fv04400	fv04300	3,202	77.8	78.7	84.4	81.1	936	78.7	0.00	800	85%	78.7	0.00	669	71%	78.7	0.00	828	88%
fv04500	fv04400	3,250	77.9	78.8	84.8	81.5	903	78.8	0.00	796	88%	78.8	0.00	664	73%	78.8	0.00	823	91%
fv04600	fv04500	3,331	78.1	79.0	84.4	81.1	899	79.0	0.00	796	89%	79.0	0.00	663	74%	79.0	0.00	823	92%
fv04700	fv04600	3,369	78.2	79.1	84.3	81.0	885	79.1	0.00	795	90%	79.1	0.00	663	75%	79.1	0.00	822	93%
fv04800	fv04700	3,405	78.3	79.2	84.3	81.0	844	79.2	0.00	795	94%	79.2	0.00	663	79%	79.2	0.00	822	97%
fv04900	fv04800	3,479	78.5	79.4	84.8	81.5	864	79.4	0.00	795	92%	79.4	0.00	662	77%	79.4	0.00	822	95%
fv05000	fv04900	3,555	78.7	79.6	84.4	81.1	844	79.6	0.00	794	94%	79.6	0.00	661	78%	79.6	0.00	820	97%

TABLE 5-1
Summary of FVT Wasterwater Flows and HGL

LEGEND
- Catchment Node
- Q/Qcap between 95% and105%
- Q/Qcap between 105% and115%
- Q/Qcap greater than 115%
- Q/Qcap greater than 95% and HGL is above basement elevation (OG-3.3m)

USMH	DSMH	LENGTH	USINV	USOBV	GROUND	USF Elev. (3.3m below OG)	Qcap Manning's (L/s)	Design				Monitored (300Lpcd, 0.50L/s/ha, K=0.60)				Monitored & Design			
								HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)	HGL (m)	Surcharge (m)	Q (L/s)	Q/Qc (%)
fv05100	fv05000	3,608	78.8	79.7	84.0	80.7	924	79.7	0.00	793	86%	79.7	0.00	661	71%	79.7	0.00	820	89%
fv05200	fv05100	3,646	78.9	79.8	84.3	81.0	731	79.8	0.01	793	109%	79.8	0.00	660	90%	79.8	0.02	819	112%
fv05300	fv05200	3,698	79.1	80.0	84.7	81.4	924	80.0	0.00	793	86%	80.0	0.00	660	71%	80.0	0.00	819	89%
fv05400	fv05300	3,724	79.1	80.0	85.5	82.2	822	80.0	0.00	792	96%	80.0	0.00	659	80%	80.0	0.00	819	100%
fv05500	fv05400	3,821	79.4	80.3	86.9	83.6	924	80.3	0.00	783	85%	80.3	0.00	649	70%	80.3	0.00	807	87%
fv05600	fv05500	3,898	79.6	80.5	87.9	84.6	844	80.5	0.00	783	93%	80.5	0.00	648	77%	80.5	0.00	807	96%
fv05700	fv05600	3,989	79.8	80.7	89.1	85.8	962	80.7	0.00	783	81%	80.7	0.00	648	67%	80.7	0.00	806	84%
fv05800	fv05700	4,063	80.0	80.9	89.0	85.7	864	80.9	0.00	773	89%	80.9	0.00	636	74%	80.9	0.00	794	92%
fv05900	fv05800	4,140	80.2	81.1	88.6	85.3	885	81.1	0.00	773	87%	81.1	0.00	636	72%	81.1	0.00	794	90%
fv06000	fv05900	4,210	80.3	81.2	88.6	85.3	885	81.2	0.00	773	87%	81.2	0.00	636	72%	81.2	0.00	793	90%
fv06100	fv06000	4,280	80.5	81.4	88.9	85.6	822	81.4	0.00	772	94%	81.4	0.00	636	77%	81.4	0.00	793	96%
fv06200	fv06100	4,306	80.5	81.4	88.8	85.5	864	81.4	0.00	772	89%	81.4	0.00	635	74%	81.4	0.00	793	92%
fv06300	fv06200	4,354	80.6	81.5	88.6	85.3	731	81.5	0.01	772	106%	81.5	0.00	635	87%	81.5	0.01	793	109%
fv06400	fv06300	4,397	80.6	81.5	88.5	85.2	653	81.6	0.02	772	118%	81.5	0.00	635	97%	81.6	0.02	793	121%
fv06500	fv06400	4,448	80.8	81.7	88.2	84.9	1016	81.7	0.00	772	76%	81.7	0.00	635	63%	81.7	0.00	793	78%
fv06600	fv06500	4,495	80.8	81.8	88.1	84.8	731	81.8	0.01	772	106%	81.8	0.00	635	87%	81.8	0.01	793	109%
fv06700	fv06600	4,544	80.9	81.8	87.8	84.5	778	81.8	0.00	772	99%	81.8	0.00	635	82%	81.9	0.02	793	102%
fv06800	fv06700	4,609	81.1	82.0	87.7	84.4	885	82.0	0.00	772	87%	82.0	0.00	635	72%	82.0	0.00	793	90%
fv06900	fv06800	4,688	81.2	82.1	87.0	83.7	706	82.1	0.02	772	109%	82.1	0.00	635	90%	82.2	0.03	793	112%
fv07000	fv06900	4,744	81.3	82.3	87.3	84.0	800	82.3	0.00	714	89%	82.3	0.00	561	70%	82.3	0.00	714	89%
fv07100	fv07000	4,791	81.4	82.4	87.6	84.3	680	82.4	0.01	714	105%	82.4	0.00	561	83%	82.4	0.01	714	105%
fv07200	fv07100	4,863	81.6	82.5	87.5	84.2	731	82.5	0.00	714	98%	82.5	0.00	561	77%	82.5	0.00	714	98%
fv07300	fv07200	4,934	81.8	82.7	87.8	84.5	1016	82.7	0.00	714	70%	82.7	0.00	561	55%	82.7	0.00	714	70%
fv07400	fv07300	5,037	81.9	82.9	88.0	84.7	1790	82.9	0.00	714	40%	82.9	0.00	561	31%	82.9	0.00	714	40%
fv07500	fv07400	5,189	82.224	83.138	87.8	84.5	706	83.1	0.00	533	76%	83.1	0.00	458	65%	83.1	0.00	533	76%
fv07600	fv07500	5,342	82.450	83.364	87.7	84.4	731	83.4	0.00	533	73%	83.4	0.00	458	63%	83.4	0.00	533	73%
fv07700	fv07600	5,495	82.608	83.522	87.8	84.5	597	83.5	0.00	533	89%	83.5	0.00	458	77%	83.5	0.00	533	89%
fv07800	fv07700	5,627	82.751	83.665	87.6	84.3	626	83.7	0.00	533	85%	83.7	0.00	458	73%	83.7	0.00	533	85%
fv07900	fv07800	5,766	82.877	83.791	87.1	83.8	1790	83.8	0.00	533	30%	83.8	0.00	458	26%	83.8	0.00	533	30%
fv08000	fv07900	5,852	82.965	83.879	86.4	83.1	1790	83.9	0.00	533	30%	83.9	0.00	458	26%	83.9	0.00	533	30%
fv08100	fv08000	5,897	83.011	83.925	86.0	82.7	597	83.9	0.00	533	89%	83.9	0.00	458	77%	83.9	0.00	533	89%

SANITARY SEWER CHARACTERISTICS

Street	Manhole ID		Invert Elevation (m)				Ground Elevation (m)		Length (m)	Diameter (mm)	Slope (%)
	U/S	D/S	U/S		D/S		U/S	D/S			
Vanguard Drive	700	800	81.675	(E)	81.603	(W)	88.38	88.7	36	525	0.20
Tenth Line Road	800	Plug	81.550	(S)	81.51	(N)	88.70	-	20	525	0.20
Page Road	fv08100	fv08000	83.011	(N)	82.965	(N)	86.00	86.40	45	900	0.10
Page Road	fv08000	fv07900	82.965	(N)	82.877	(S)	86.40	87.10	86	900	0.10
Page Road	fv07900	fv07800	82.877	(N)	82.751	(S)	87.10	87.60	139	900	0.09
Page Road	fv07800	fv07700	82.751	(N)	82.608	(S)	87.60	87.80	132	900	0.11
Page Road	fv07700	fv07600	82.608	(N)	82.45	(S)	87.80	87.70	153	900	0.10
Page Road	fv07600	fv07500	82.45	(N)	82.224	(N)	87.70	87.80	153	900	0.15
Page Road	fv07500	fv07400	82.224	(N)	81.9	(S)	87.80	88.00	152	900	0.21
Silverbich	fv07400	fv07300	81.9	(W)	81.8	(E)	88.00	87.80	103	900	0.10
Silverbich	fv07300	fv07200	81.8	(W)	81.6	(E)	87.80	87.50	71	900	0.28
Silverbich	fv07200	fv07100	81.6	(W)	81.4	(E)	87.50	87.60	72	900	0.28
Silverbich	fv07100	fv07000	81.4	(W)	81.3	(E)	87.60	87.30	47	900	0.21
Silverbich	fv07000	fv06900	81.3	(W)	81.2	(E)	87.30	87.00	56	900	0.18
Orleans Blvd.	fv06900	fv06800	81.2	(N)	81.1	(S)	87.00	87.70	79	900	0.12
Orleans Blvd.	fvo6800	fvo6700	81.1	(N)	80.95	(S)	87.7	87.8	65	900	0.31
Orleans Blvd.	fv06700	fv06600	80.9	(N)	80.8	(S)	87.80	88.10	49	900	0.20
Orleans Blvd.	fv06600	fv06500	80.8	(N)	80.8	(S)	88.10	88.2	47	900	0.00
Orleans Blvd.	fv06500	fv06400	80.8	(N)	80.6	(S)	88.20	88.50	51	900	0.39
Orleans Blvd.	fv06400	fv06300	80.6	(N)	80.6	(N)	88.50	88.60	43	900	0.00
Orleans Blvd.	fv06300	fv06200	80.6	(N)	80.5	(S)	88.60	88.80	48	900	0.21
Orleans Blvd.	fv06200	fv06100	80.5	(N)	80.5	(S)	88.8	88.9	26	900	0.00
Orleans Blvd.	fv06100	fv06000	80.5	(N)	80.3	(S)	88.9	88.6	70	900	0.29
	4	5	82.06	(W)	81.62	(E)	87.50	87.60	310	375	0.14
	5	6	81.62	(W)	81.21	(E)	87.60	87.50	295	375	0.14
	6	7	81.13	(W)	81.01	(E)	87.50	87.50	115	450	0.11
	7	8	81.01	(W)	80.75	(E)	87.50	86.90	235	450	0.11
	8	9	80.37	(S)	80.20	(N)	86.90	87.00	170	525	0.10
	9	10	80.20	(S)	79.92	(N)	87.00	87.00	275	525	0.10
	10	11	79.92	(W)	79.52	(E)	87.00	85.50	405	525	0.10
	11	12	79.44	(W)	79.21	(N)	85.50	83.90	230	600	0.100
	LOCAL PS 2	25C					82.00	86.00	300		
	LOCAL PS 1	25C					81.00	86.00	340		
	25B	25A	80.62	(W)	80.21	(E)	86.50	86.50	295	375	0.14

ATTACHMENT

B

XPSWMM Model Schematic

Pipe Data and Hydraulic Simulation Results

JFSA Water Resources and Environmental Consultants

Figure B-1: XPSWMM MODEL SCHEMATIC

JFSA Water Resources and Environmental Consultants

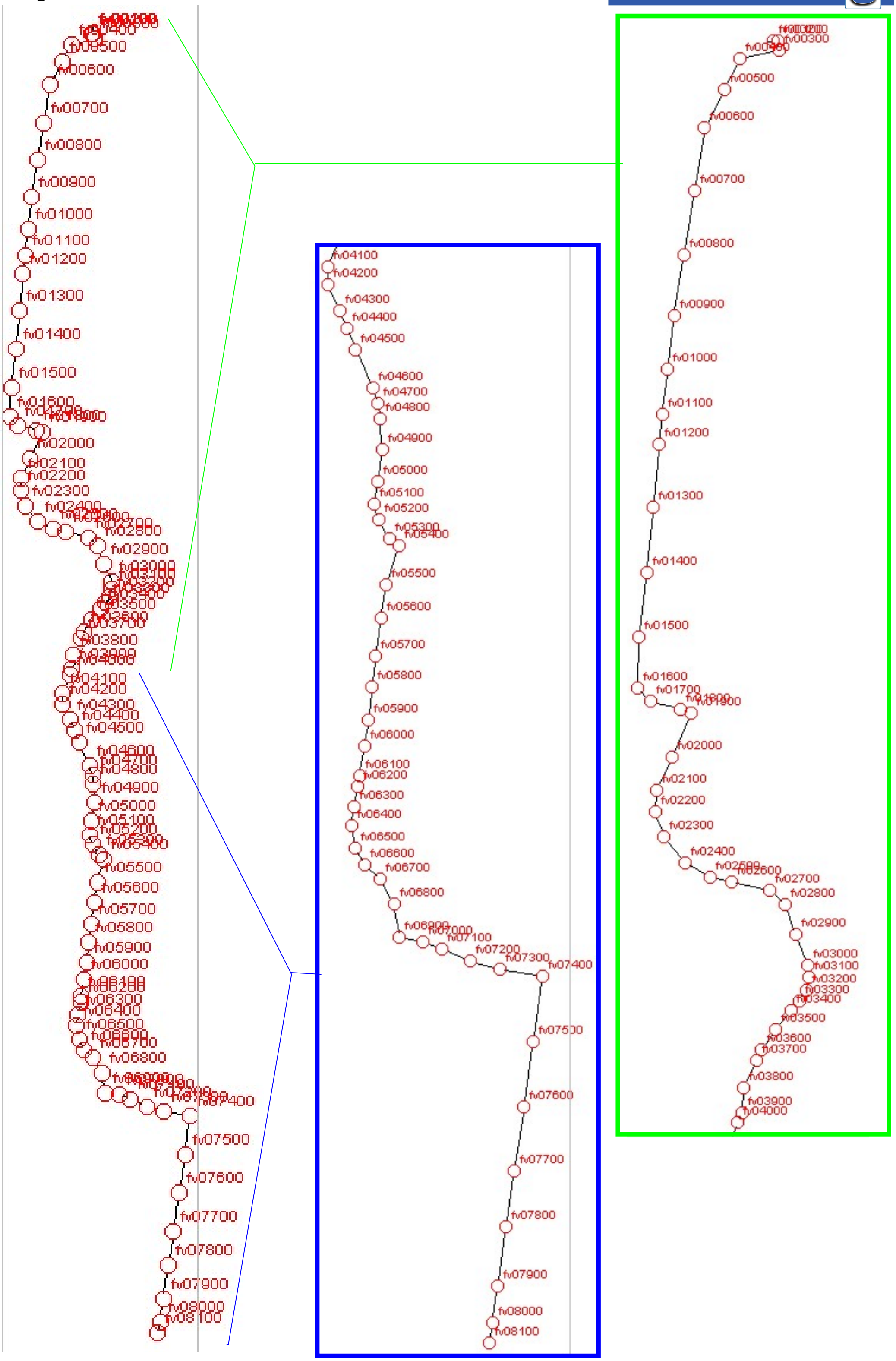


Table B-1: Pipe Data and Hydraulic Simulation Results for the Sanitary Trunk Sewer (Monitored & Design Scenario, Original Flows)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover [2] (m)	Compare to 2003 HGL Results (m)	
																		U/S HGL [3] (m)	Difference (m)
fv08100	fv08000	83.011	82.965	900	45.0	0.1	0.013	86.000	86.400	0.900	0.572	0.533	0.9	-0.217	83.694	83.647	2.306	83.9	-0.206
fv08000	fv07900	82.965	82.877	900	86.0	0.1	0.013	86.400	87.100	0.900	0.572	0.533	0.9	-0.218	83.647	83.558	2.753	83.9	-0.253
fv07900	fv07800	82.877	82.751	900	139.0	0.1	0.013	87.100	87.600	0.854	0.543	0.533	1.0	-0.219	83.558	83.407	3.542	83.8	-0.242
fv07800	fv07700	82.751	82.608	900	132.0	0.1	0.013	87.600	87.800	0.944	0.600	0.533	0.9	-0.244	83.407	83.255	4.193	83.7	-0.293
fv07700	fv07600	82.608	82.450	900	153.0	0.1	0.013	87.800	87.700	0.900	0.572	0.533	0.9	-0.253	83.255	83.063	4.545	83.5	-0.245
fv07600	fv07500	82.450	82.224	900	153.0	0.2	0.013	87.700	87.800	1.102	0.701	0.533	0.8	-0.287	83.063	82.867	4.637	83.4	-0.337
fv07500	fv07400	82.224	81.900	900	152.0	0.2	0.013	87.800	88.000	1.304	0.830	0.533	0.6	-0.257	82.867	82.637	4.933	83.1	-0.233
fv07400	fv07300	81.900	81.800	900	103.0	0.1	0.013	88.000	87.800	0.900	0.572	0.714	1.2	-0.163	82.637	82.442	5.363	82.9	-0.263
fv07300	fv07200	81.800	81.600	900	71.0	0.3	0.013	87.800	87.500	1.506	0.958	0.714	0.7	-0.258	82.442	82.306	5.358	82.7	-0.258
fv07200	fv07100	81.600	81.400	900	72.0	0.3	0.013	87.500	87.600	1.506	0.958	0.714	0.7	-0.194	82.306	82.201	5.194	82.5	-0.194
fv07100	fv07000	81.400	81.300	900	47.0	0.2	0.013	87.600	87.300	1.304	0.830	0.714	0.9	-0.099	82.201	82.133	5.399	82.4	-0.199
fv07000	fv06900	81.300	81.200	900	56.0	0.2	0.013	87.300	87.000	1.207	0.768	0.714	0.9	-0.067	82.133	81.994	5.167	82.3	-0.167
fv06900	fv06800	81.200	81.100	900	79.0	0.1	0.013	87.000	87.700	0.986	0.627	0.793	1.3	-0.106	81.994	81.834	5.006	82.2	-0.206
fv06800	fv06700	81.100	80.900	900	65.0	0.3	0.013	87.700	87.800	1.584	1.008	0.793	0.8	-0.166	81.834	81.713	5.866	82.0	-0.166
fv06700	fv06600	80.900	80.800	900	49.0	0.2	0.013	87.800	88.100	1.273	0.810	0.793	1.0	-0.087	81.713	81.621	6.087	81.9	-0.187
fv06600	fv06500	80.800	80.800	900	47.0	0.0	0.013	88.100	88.200	0.090	0.060	0.793	13.2	-0.079	81.621	81.515	6.479	81.8	-0.179
fv06500	fv06400	80.800	80.600	900	51.0	0.4	0.013	88.200	88.500	1.777	1.131	0.793	0.7	-0.185	81.515	81.422	6.685	81.7	-0.185
fv06400	fv06300	80.600	80.600	900	43.0	0.0	0.013	88.500	88.600	0.090	0.060	0.793	13.2	-0.078	81.422	81.335	7.078	81.6	-0.178
fv06300	fv06200	80.600	80.500	900	48.0	0.2	0.013	88.600	88.800	1.304	0.830	0.793	1.0	-0.165	81.335	81.241	7.265	81.5	-0.165
fv06200	fv06100	80.500	80.500	900	26.0	0.0	0.013	88.800	88.900	0.090	0.060	0.793	13.2	-0.159	81.241	81.174	7.559	81.4	-0.159
fv06100	fv06000	80.500	80.300	900	70.0	0.3	0.013	88.900	88.600	1.520	0.970	0.793	0.8	-0.226	81.174	81.023	7.726	81.4	-0.226
fv06000	fv05900	80.300	80.200	900	70.0	0.1	0.013	88.600	88.600	1.080	0.680	0.793	1.2	-0.177	81.023	80.858	7.577	81.2	-0.177
fv05900	fv05800	80.200	80.000	900	77.0	0.3	0.013	88.600	89.000	1.450	0.920	0.794	0.9	-0.242	80.858	80.669	7.742	81.1	-0.242
fv05800	fv05700	80.000	79.800	900	74.0	0.3	0.013	89.000	89.100	1.480	0.940	0.794	0.8	-0.231	80.669	80.500	8.331	80.9	-0.231
fv05700	fv05600	79.800	79.600	900	91.0	0.2	0.013	89.100	87.900	1.330	0.850	0.806	0.9	-0.200	80.500	80.296	8.600	80.7	-0.200
fv05600	fv05500	79.600	79.400	900	77.0	0.3	0.013	87.900	86.900	1.450	0.920	0.807	0.9	-0.204	80.296	80.126	7.604	80.5	-0.204
fv05500	fv05400	79.400	79.100	900	97.0	0.3	0.013	86.900	85.500	1.580	1.010	0.807	0.8	-0.174	80.126	79.840	6.774	80.3	-0.174
fv05400	fv05300	79.100	79.100	900	26.0	0.0	0.013	85.500	84.700	0.090	0.060	0.819	13.7	-0.160	79.840	79.744	5.660	80.0	-0.160
fv05300	fv05200	79.100	78.900	900	52.0	0.4	0.013	84.700	84.300	1.760	1.120	0.819	0.7	-0.256	79.744	79.615	4.956	80.0	-0.256
fv05200	fv05100	78.900	78.800	900	38.0	0.3	0.013	84.300	84.000	1.460	0.930	0.819	0.9	-0.185	79.615	79.513	4.685	79.8	-0.185
fv05100	fv05000	78.800	78.700	900	53.0	0.2	0.013	84.000	84.400	1.240	0.790	0.820	1.0	-0.187	79.513	79.383	4.487	79.7	-0.187
fv05000	fv04900	78.700	78.500	900	76.0	0.3	0.013	84.400	84.800	1.460	0.930	0.820	0.9	-0.217	79.383	79.198	5.017	79.6	-0.217
fv04900	fv04800	78.500	78.300	900	74.0	0.3	0.013	84.800	84.300	1.480	0.940	0.822	0.9	-0.202	79.198	79.033	5.602	79.4	-0.202
fv04800	fv04700	78.300	78.200	900	36.0	0.3	0.013	84.300	84.300	1.500	0.950	0.822	0.9	-0.167	79.033	78.956	5.267	79.2	-0.167
fv04700	fv04600	78.200	78.100	900	38.0	0.3	0.013	84.300	84.400	1.460	0.930	0.822	0.9	-0.144	78.956	78.882	5.344	79.1	-0.144
fv04600	fv04500	78.100	77.900	900	81.0	0.3	0.013	84.400	84.800	1.410	0.900	0.823	0.9	-0.118	78.882	78.735	5.518	79.0	-0.118
fv04500	fv04400	77.900	77.800	900	48.0	0.2	0.013	84.800	84.400	1.300	0.830	0.823	1.0	-0.065	78.735	78.648	6.065	78.8	-0.065
fv04400	fv04300	77.800	77.700	900	41.0	0.2	0.013	84.400	84.000	1.410	0.890	0.828	0.9	-0.052	78.648	78.572	5.752	78.7	-0.052
fv04300	fv04200	77.700	77.500	900	55.0	0.4	0.013	84.000	84.500	1.720	1.090	0.883	0.8	-0.028	78.572	78.443	5.428	78.6	-0.028
fv04200	fv04100	77.500	77.400	900	43.0	0.2	0.013	84.500	84.600	1.370	0.870	0.883	1.0	0.043	78.443	78.329	6.057	78.4	0.043
fv04100	fv04000	77.400	77.300	900	79.0	0.1	0.013	84.600	84.100	1.010	0.640	0.884	1.4	0.029	78.329	78.140	6.271	78.4	-0.071
fv04000	fv03900	77.300	77.200	900	21.0	0.5	0.013	84.100	83.900	1.960	1.250	0.889	0.7	-0.060	78.140	78.088	5.960	78.2	-0.060
fv03900	fv03800	77.200	77.100	900	61.0	0.2	0.013	83.900	83.600	1.150	0.730	0.889	1.2	-0.012	78.088	77.934	5.812	78.2	-0.112
fv03800	fv03700	77.100	76.900	900	71.0	0.3	0.013	83.600	83.600	1.510	0.960	0.891	0.9	-0.066	77.934	77.781	5.666	78.0	-0.066
fv03700	fv03600	76.900	76.900	900	27.0	0.0	0.013	83.600	83.700	0.090	0.060	0.892	14.9	-0.019	77.781	77.709	5.819	77.9	-0.119
fv03600	fv03500	76.900	76.800	900	55.0	0.2	0.013	83.700	84.000	1.210	0.770	0.893	1.2	-0.091	77.709	77.583	5.991	77.9	-0.191
fv03500	fv03400	76.800	76.600	900	59.0	0.3	0.013	84.000	83.800	1.660	1.050	0.895	0.9	-0.117	77.583	77.458	6.417	77.7	-0.117

Table B-1: Pipe Data and Hydraulic Simulation Results for the Sanitary Trunk Sewer (Monitored & Design Scenario, Original Flows)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover [2] (m)	Compare to 2003 HGL Results (m)	
																		U/S HGL [3] (m)	Difference (m)
fv03400	fv03300	76.600	76.600	900	28.0	0.0	0.013	83.800	84.000	0.090	0.060	0.895	14.9	-0.042	77.458	77.385	6.342	77.6	-0.142
fv03300	fv03200	76.600	76.500	900	32.0	0.3	0.013	84.000	84.000	1.590	1.010	0.896	0.9	-0.115	77.385	77.304	6.615	77.5	-0.115
fv03200	fv03100	76.500	76.400	900	34.0	0.3	0.013	84.000	83.800	1.540	0.980	0.897	0.9	-0.096	77.304	77.219	6.696	77.5	-0.196
fv03100	fv03000	76.400	76.400	900	28.0	0.0	0.013	83.800	83.900	0.090	0.060	0.897	15.0	-0.081	77.219	77.135	6.581	77.4	-0.181
fv03000	fv02900	76.400	76.200	900	76.0	0.3	0.013	83.900	83.700	1.460	0.930	0.898	1.0	-0.165	77.135	76.947	6.765	77.3	-0.165
fv02900	fv02800	76.200	76.000	900	74.0	0.3	0.013	83.700	83.800	1.480	0.940	0.900	1.0	-0.153	76.947	76.747	6.753	77.2	-0.253
fv02800	fv02700	76.000	75.900	900	50.0	0.2	0.013	83.800	83.600	1.270	0.810	0.902	1.1	-0.153	76.747	76.571	7.053	77.0	-0.253
fv02700	fv02600	75.900	75.700	900	93.0	0.2	0.013	83.600	82.700	1.320	0.840	0.903	1.1	-0.229	76.571	76.088	7.029	76.9	-0.329
fv02600	fv02500	75.700	74.600	900	50.0	2.2	0.013	82.700	80.300	4.220	2.690	0.903	0.3	-0.512	76.088	74.897	6.612	76.6	-0.512
fv02500	fv02400	74.600	71.600	900	67.0	4.5	0.013	80.300	76.900	6.020	3.830	0.903	0.2	-0.603	74.897	71.957	5.403	75.6	-0.703
fv02400	fv02300	71.600	69.800	900	79.0	2.3	0.013	76.900	73.300	4.300	2.730	0.903	0.3	-0.543	71.957	70.221	4.943	72.5	-0.543
fv02300	fv02200	69.800	68.600	900	60.0	2.0	0.013	73.300	71.900	4.020	2.560	0.903	0.4	-0.479	70.221	68.858	3.079	70.7	-0.479
fv02200	fv02100	68.600	64.700	900	50.0	7.8	0.013	71.900	70.400	7.950	5.060	0.904	0.2	-0.642	68.858	65.017	3.042	69.5	-0.642
fv02100	fv02000	64.700	61.700	900	85.0	3.5	0.013	70.400	66.300	5.350	3.400	0.904	0.3	-0.583	65.017	62.084	5.383	65.6	-0.583
fv02000	fv01900	61.700	59.000	900	120.0	2.3	0.013	66.300	63.200	4.270	2.720	0.904	0.3	-0.516	62.084	59.445	4.216	62.6	-0.516
fv01900	fv01800	59.000	58.600	900	28.0	1.4	0.013	63.200	62.900	3.400	2.160	0.904	0.4	-0.455	59.445	59.161	3.755	60.0	-0.555
fv01800	fv01700	58.600	58.100	900	73.0	0.7	0.013	62.900	63.200	2.360	1.500	0.904	0.6	-0.339	59.161	58.393	3.739	59.6	-0.439
fv01700	fv01600	58.100	56.000	900	39.0	5.4	0.013	63.200	62.000	6.600	4.200	0.904	0.2	-0.607	58.393	56.370	4.807	59.0	-0.607
fv01600	fv01500	56.000	53.600	900	121.0	2.0	0.013	62.000	63.800	4.010	2.550	0.904	0.4	-0.530	56.370	54.177	5.630	56.9	-0.530
fv01500	fv01400	53.600	52.900	900	150.0	0.5	0.013	63.800	63.800	1.940	1.240	0.904	0.7	-0.323	54.177	53.520	9.623	54.5	-0.323
fv01400	fv01300	52.900	52.300	900	151.0	0.4	0.013	63.800	59.500	1.790	1.140	0.904	0.8	-0.280	53.520	52.995	10.280	53.9	-0.380
fv01300	fv01200	52.300	51.900	900	149.0	0.3	0.013	59.500	58.100	1.470	0.940	0.904	1.0	-0.205	52.995	52.411	6.505	53.2	-0.205
fv01200	fv01100	51.900	51.400	900	69.0	0.7	0.013	58.100	56.400	2.420	1.540	0.904	0.6	-0.389	52.411	51.969	5.689	52.8	-0.389
fv01100	fv01000	51.400	50.900	900	104.0	0.5	0.013	56.400	55.100	1.970	1.260	0.904	0.7	-0.331	51.969	51.476	4.431	52.4	-0.431
fv01000	fv00900	50.900	50.300	900	127.0	0.5	0.013	55.100	54.600	1.960	1.240	0.904	0.7	-0.324	51.476	50.905	3.624	51.8	-0.324
fv00900	fv00800	50.300	49.700	900	149.0	0.4	0.013	54.600	54.300	1.810	1.150	0.904	0.8	-0.295	50.905	50.289	3.695	51.2	-0.295
fv00800	fv00700	49.700	49.000	900	151.0	0.5	0.013	54.300	54.100	1.940	1.230	0.904	0.7	-0.311	50.289	49.705	4.011	50.6	-0.311
fv00700	fv00600	49.000	48.600	900	150.0	0.3	0.013	54.100	53.900	1.470	0.930	0.904	1.0	-0.195	49.705	49.168	4.395	49.9	-0.195
fv00600	fv00500	48.600	48.100	900	100.0	0.5	0.013	53.900	53.100	2.010	1.280	0.904	0.7	-0.332	49.168	48.712	4.732	49.5	-0.332
fv00500	fv00400	48.100	47.700	900	80.0	0.5	0.013	53.100	52.500	2.010	1.280	0.904	0.7	-0.288	48.712	48.270	4.388	49.1	-0.388
fv00400	fv00300	47.700	47.000	900	93.0	0.8	0.013	52.500	52.200	2.470	1.570	0.904	0.6	-0.330	48.270	47.548	4.230	48.6	-0.330
fv00300	fv00200	47.000	46.100	900	22.0	4.1	0.013	52.200	52.000	5.760	3.660	0.904	0.2	-0.352	47.548	46.356	4.652	47.9	-0.352
fv00200	fv00100	46.100	44.800	900	8.0	16.3	0.013	52.000	52.000	11.470	7.300	0.904	0.1	-0.644	46.356	45.700	5.644	47.0	-0.644

Note:

[1] A negative surcharge implies that the pipe is not flowing full.

[2] Freeboard between upstream hydraulic gradeline elevation and upstream manhole cover elevation.

[3] HGL elevations at U/S MH for "Monitored & Design" scenario as reported in Table 5-1 of the *Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis* (Stantec Consulting Ltd., October 2003).

Table B-2: Pipe Data and Hydraulic Simulation Results for the Sanitary Trunk Sewer (Monitored & Design Scenario, 165.2 L/s Redirected from fv07400 to fv07700)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover [2] (m)	Compare to 2003 HGL Results (m)	
																		U/S HGL [3] (m)	Difference (m)
fv08100	fv08000	83.011	82.965	900	45.0	0.1	0.013	86.000	86.400	0.900	0.572	0.533	0.9	-0.166	83.745	83.705	2.255	83.9	-0.155
fv08000	fv07900	82.965	82.877	900	86.0	0.1	0.013	86.400	87.100	0.900	0.572	0.533	0.9	-0.160	83.705	83.631	2.695	83.9	-0.195
fv07900	fv07800	82.877	82.751	900	139.0	0.1	0.013	87.100	87.600	0.854	0.543	0.533	1.0	-0.146	83.631	83.515	3.469	83.8	-0.169
fv07800	fv07700	82.751	82.608	900	132.0	0.1	0.013	87.600	87.800	0.944	0.600	0.533	0.9	-0.136	83.515	83.410	4.085	83.7	-0.185
fv07700	fv07600	82.608	82.450	900	153.0	0.1	0.013	87.800	87.700	0.900	0.572	0.698	1.2	-0.098	83.410	83.194	4.390	83.5	-0.090
fv07600	fv07500	82.450	82.224	900	153.0	0.2	0.013	87.700	87.800	1.102	0.701	0.698	1.0	-0.156	83.194	82.968	4.506	83.4	-0.206
fv07500	fv07400	82.224	81.900	900	152.0	0.2	0.013	87.800	88.000	1.304	0.830	0.698	0.8	-0.156	82.968	82.637	4.832	83.1	-0.132
fv07400	fv07300	81.900	81.800	900	103.0	0.1	0.013	88.000	87.800	0.900	0.572	0.714	1.2	-0.163	82.637	82.442	5.363	82.9	-0.263
fv07300	fv07200	81.800	81.600	900	71.0	0.3	0.013	87.800	87.500	1.506	0.958	0.714	0.7	-0.258	82.442	82.306	5.358	82.7	-0.258
fv07200	fv07100	81.600	81.400	900	72.0	0.3	0.013	87.500	87.600	1.506	0.958	0.714	0.7	-0.194	82.306	82.201	5.194	82.5	-0.194
fv07100	fv07000	81.400	81.300	900	47.0	0.2	0.013	87.600	87.300	1.304	0.830	0.714	0.9	-0.099	82.201	82.133	5.399	82.4	-0.199
fv07000	fv06900	81.300	81.200	900	56.0	0.2	0.013	87.300	87.000	1.207	0.768	0.714	0.9	-0.067	82.133	81.994	5.167	82.3	-0.167
fv06900	fv06800	81.200	81.100	900	79.0	0.1	0.013	87.000	87.700	0.986	0.627	0.793	1.3	-0.106	81.994	81.834	5.006	82.2	-0.206
fv06800	fv06700	81.100	80.900	900	65.0	0.3	0.013	87.700	87.800	1.584	1.008	0.793	0.8	-0.166	81.834	81.713	5.866	82.0	-0.166
fv06700	fv06600	80.900	80.800	900	49.0	0.2	0.013	87.800	88.100	1.273	0.810	0.793	1.0	-0.087	81.713	81.621	6.087	81.9	-0.187
fv06600	fv06500	80.800	80.800	900	47.0	0.0	0.013	88.100	88.200	0.090	0.060	0.793	13.2	-0.079	81.621	81.515	6.479	81.8	-0.179
fv06500	fv06400	80.800	80.600	900	51.0	0.4	0.013	88.200	88.500	1.777	1.131	0.793	0.7	-0.185	81.515	81.422	6.685	81.7	-0.185
fv06400	fv06300	80.600	80.600	900	43.0	0.0	0.013	88.500	88.600	0.090	0.060	0.793	13.2	-0.078	81.422	81.335	7.078	81.6	-0.178
fv06300	fv06200	80.600	80.500	900	48.0	0.2	0.013	88.600	88.800	1.304	0.830	0.793	1.0	-0.165	81.335	81.241	7.265	81.5	-0.165
fv06200	fv06100	80.500	80.500	900	26.0	0.0	0.013	88.800	88.900	0.090	0.060	0.793	13.2	-0.159	81.241	81.174	7.559	81.4	-0.159
fv06100	fv06000	80.500	80.300	900	70.0	0.3	0.013	88.900	88.600	1.520	0.970	0.793	0.8	-0.226	81.174	81.023	7.726	81.4	-0.226
fv06000	fv05900	80.300	80.200	900	70.0	0.1	0.013	88.600	88.600	1.080	0.680	0.793	1.2	-0.177	81.023	80.858	7.577	81.2	-0.177
fv05900	fv05800	80.200	80.000	900	77.0	0.3	0.013	88.600	89.000	1.450	0.920	0.794	0.9	-0.242	80.858	80.669	7.742	81.1	-0.242
fv05800	fv05700	80.000	79.800	900	74.0	0.3	0.013	89.000	89.100	1.480	0.940	0.794	0.8	-0.231	80.669	80.500	8.331	80.9	-0.231
fv05700	fv05600	79.800	79.600	900	91.0	0.2	0.013	89.100	87.900	1.330	0.850	0.806	0.9	-0.200	80.500	80.296	8.600	80.7	-0.200
fv05600	fv05500	79.600	79.400	900	77.0	0.3	0.013	87.900	86.900	1.450	0.920	0.807	0.9	-0.204	80.296	80.126	7.604	80.5	-0.204
fv05500	fv05400	79.400	79.100	900	97.0	0.3	0.013	86.900	85.500	1.580	1.010	0.807	0.8	-0.174	80.126	79.840	6.774	80.3	-0.174
fv05400	fv05300	79.100	79.100	900	26.0	0.0	0.013	85.500	84.700	0.090	0.060	0.819	13.7	-0.160	79.840	79.744	5.660	80.0	-0.160
fv05300	fv05200	79.100	78.900	900	52.0	0.4	0.013	84.700	84.300	1.760	1.120	0.819	0.7	-0.256	79.744	79.615	4.956	80.0	-0.256
fv05200	fv05100	78.900	78.800	900	38.0	0.3	0.013	84.300	84.000	1.460	0.930	0.819	0.9	-0.185	79.615	79.513	4.685	79.8	-0.185
fv05100	fv05000	78.800	78.700	900	53.0	0.2	0.013	84.000	84.400	1.240	0.790	0.820	1.0	-0.187	79.513	79.383	4.487	79.7	-0.187
fv05000	fv04900	78.700	78.500	900	76.0	0.3	0.013	84.400	84.800	1.460	0.930	0.820	0.9	-0.217	79.383	79.198	5.017	79.6	-0.217
fv04900	fv04800	78.500	78.300	900	74.0	0.3	0.013	84.800	84.300	1.480	0.940	0.822	0.9	-0.202	79.198	79.033	5.602	79.4	-0.202
fv04800	fv04700	78.300	78.200	900	36.0	0.3	0.013	84.300	84.300	1.500	0.950	0.822	0.9	-0.167	79.033	78.956	5.267	79.2	-0.167
fv04700	fv04600	78.200	78.100	900	38.0	0.3	0.013	84.300	84.400	1.460	0.930	0.822	0.9	-0.144	78.956	78.882	5.344	79.1	-0.144
fv04600	fv04500	78.100	77.900	900	81.0	0.3	0.013	84.400	84.800	1.410	0.900	0.823	0.9	-0.118	78.882	78.735	5.518	79.0	-0.118
fv04500	fv04400	77.900	77.800	900	48.0	0.2	0.013	84.800	84.400	1.300	0.830	0.823	1.0	-0.065	78.735	78.648	6.065	78.8	-0.065
fv04400	fv04300	77.800	77.700	900	41.0	0.2	0.013	84.400	84.000	1.410	0.890	0.828	0.9	-0.052	78.648	78.572	5.752	78.7	-0.052
fv04300	fv04200	77.700	77.500	900	55.0	0.4	0.013	84.000	84.500	1.720	1.090	0.883	0.8	-0.028	78.572	78.443	5.428	78.6	-0.028
fv04200	fv04100	77.500	77.400	900	43.0	0.2	0.013	84.500	84.600	1.370	0.870	0.883	1.0	0.043	78.443	78.329	6.057	78.4	0.043
fv04100	fv04000	77.400	77.300	900	79.0	0.1	0.013	84.600	84.100	1.010	0.640	0.884	1.4	0.029	78.329	78.140	6.271	78.4	-0.071
fv04000	fv03900	77.300	77.200	900	21.0	0.5	0.013	84.100	83.900	1.960	1.250	0.889	0.7	-0.060	78.140	78.088	5.960	78.2	-0.060
fv03900	fv03800	77.200	77.100	900	61.0	0.2	0.013	83.900	83.600	1.150	0.730	0.889	1.2	-0.012	78.088	77.934	5.812	78.2	-0.112
fv03800	fv03700	77.100	76.900	900	71.0	0.3	0.013	83.600	83.600	1.510	0.960	0.891	0.9	-0.066	77.934	77.781	5.666	78.0	-0.066
fv03700	fv03600	76.900	76.900	900	27.0	0.0	0.013	83.600	83.700	0.090	0.060	0.892	14.9	-0.019	77.781	77.709	5.819	77.9	-0.119
fv03600	fv03500	76.900	76.800	900	55.0	0.2	0.013	83.700	84.000	1.210	0.770	0.893	1.2	-0.091	77.709	77.583	5.991	77.9	-0.191
fv03500	fv03400	76.800	76.600	900	59.0	0.3	0.013	84.000	83.800	1.660	1.050	0.895	0.9	-0.117	77.583	77.458	6.417	77.7	-0.117

Table B-2: Pipe Data and Hydraulic Simulation Results for the Sanitary Trunk Sewer (Monitored & Design Scenario, 165.2 L/s Redirected from fv07400 to fv07700)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m^3/s)	Peak Pipe Flow (m^3/s)	Peak / Design Flow	Surcharge U/S [1] (m)	Max. U/S HGL (m)	Max. D/S HGL (m)	Freeboard U/S HGL and MH Cover [2] (m)	Compare to 2003 HGL Results (m)	
																		U/S HGL [3] (m)	Difference (m)
fv03400	fv03300	76.600	76.600	900	28.0	0.0	0.013	83.800	84.000	0.090	0.060	0.895	14.9	-0.042	77.458	77.385	6.342	77.6	-0.142
fv03300	fv03200	76.600	76.500	900	32.0	0.3	0.013	84.000	84.000	1.590	1.010	0.896	0.9	-0.115	77.385	77.304	6.615	77.5	-0.115
fv03200	fv03100	76.500	76.400	900	34.0	0.3	0.013	84.000	83.800	1.540	0.980	0.897	0.9	-0.096	77.304	77.219	6.696	77.5	-0.196
fv03100	fv03000	76.400	76.400	900	28.0	0.0	0.013	83.800	83.900	0.090	0.060	0.897	15.0	-0.081	77.219	77.135	6.581	77.4	-0.181
fv03000	fv02900	76.400	76.200	900	76.0	0.3	0.013	83.900	83.700	1.460	0.930	0.898	1.0	-0.165	77.135	76.947	6.765	77.3	-0.165
fv02900	fv02800	76.200	76.000	900	74.0	0.3	0.013	83.700	83.800	1.480	0.940	0.900	1.0	-0.153	76.947	76.747	6.753	77.2	-0.253
fv02800	fv02700	76.000	75.900	900	50.0	0.2	0.013	83.800	83.600	1.270	0.810	0.902	1.1	-0.153	76.747	76.571	7.053	77.0	-0.253
fv02700	fv02600	75.900	75.700	900	93.0	0.2	0.013	83.600	82.700	1.320	0.840	0.903	1.1	-0.229	76.571	76.088	7.029	76.9	-0.329
fv02600	fv02500	75.700	74.600	900	50.0	2.2	0.013	82.700	80.300	4.220	2.690	0.903	0.3	-0.512	76.088	74.897	6.612	76.6	-0.512
fv02500	fv02400	74.600	71.600	900	67.0	4.5	0.013	80.300	76.900	6.020	3.830	0.903	0.2	-0.603	74.897	71.957	5.403	75.6	-0.703
fv02400	fv02300	71.600	69.800	900	79.0	2.3	0.013	76.900	73.300	4.300	2.730	0.903	0.3	-0.543	71.957	70.221	4.943	72.5	-0.543
fv02300	fv02200	69.800	68.600	900	60.0	2.0	0.013	73.300	71.900	4.020	2.560	0.903	0.4	-0.479	70.221	68.858	3.079	70.7	-0.479
fv02200	fv02100	68.600	64.700	900	50.0	7.8	0.013	71.900	70.400	7.950	5.060	0.904	0.2	-0.642	68.858	65.017	3.042	69.5	-0.642
fv02100	fv02000	64.700	61.700	900	85.0	3.5	0.013	70.400	66.300	5.350	3.400	0.904	0.3	-0.583	65.017	62.084	5.383	65.6	-0.583
fv02000	fv01900	61.700	59.000	900	120.0	2.3	0.013	66.300	63.200	4.270	2.720	0.904	0.3	-0.516	62.084	59.445	4.216	62.6	-0.516
fv01900	fv01800	59.000	58.600	900	28.0	1.4	0.013	63.200	62.900	3.400	2.160	0.904	0.4	-0.455	59.445	59.161	3.755	60.0	-0.555
fv01800	fv01700	58.600	58.100	900	73.0	0.7	0.013	62.900	63.200	2.360	1.500	0.904	0.6	-0.339	59.161	58.393	3.739	59.6	-0.439
fv01700	fv01600	58.100	56.000	900	39.0	5.4	0.013	63.200	62.000	6.600	4.200	0.904	0.2	-0.607	58.393	56.370	4.807	59.0	-0.607
fv01600	fv01500	56.000	53.600	900	121.0	2.0	0.013	62.000	63.800	4.010	2.550	0.904	0.4	-0.530	56.370	54.177	5.630	56.9	-0.530
fv01500	fv01400	53.600	52.900	900	150.0	0.5	0.013	63.800	63.800	1.940	1.240	0.904	0.7	-0.323	54.177	53.520	9.623	54.5	-0.323
fv01400	fv01300	52.900	52.300	900	151.0	0.4	0.013	63.800	59.500	1.790	1.140	0.904	0.8	-0.280	53.520	52.995	10.280	53.9	-0.380
fv01300	fv01200	52.300	51.900	900	149.0	0.3	0.013	59.500	58.100	1.470	0.940	0.904	1.0	-0.205	52.995	52.411	6.505	53.2	-0.205
fv01200	fv01100	51.900	51.400	900	69.0	0.7	0.013	58.100	56.400	2.420	1.540	0.904	0.6	-0.389	52.411	51.969	5.689	52.8	-0.389
fv01100	fv01000	51.400	50.900	900	104.0	0.5	0.013	56.400	55.100	1.970	1.260	0.904	0.7	-0.331	51.969	51.476	4.431	52.4	-0.431
fv01000	fv00900	50.900	50.300	900	127.0	0.5	0.013	55.100	54.600	1.960	1.240	0.904	0.7	-0.324	51.476	50.905	3.624	51.8	-0.324
fv00900	fv00800	50.300	49.700	900	149.0	0.4	0.013	54.600	54.300	1.810	1.150	0.904	0.8	-0.295	50.905	50.289	3.695	51.2	-0.295
fv00800	fv00700	49.700	49.000	900	151.0	0.5	0.013	54.300	54.100	1.940	1.230	0.904	0.7	-0.311	50.289	49.705	4.011	50.6	-0.311
fv00700	fv00600	49.000	48.600	900	150.0	0.3	0.013	54.100	53.900	1.470	0.930	0.904	1.0	-0.195	49.705	49.168	4.395	49.9	-0.195
fv00600	fv00500	48.600	48.100	900	100.0	0.5	0.013	53.900	53.100	2.010	1.280	0.904	0.7	-0.332	49.168	48.712	4.732	49.5	-0.332
fv00500	fv00400	48.100	47.700	900	80.0	0.5	0.013	53.100	52.500	2.010	1.280	0.904	0.7	-0.288	48.712	48.270	4.388	49.1	-0.388
fv00400	fv00300	47.700	47.000	900	93.0	0.8	0.013	52.500	52.200	2.470	1.570	0.904	0.6	-0.330	48.270	47.548	4.230	48.6	-0.330
fv00300	fv00200	47.000	46.100	900	22.0	4.1	0.013	52.200	52.000	5.760	3.660	0.904	0.2	-0.352	47.548	46.356	4.652	47.9	-0.352
fv00200	fv00100	46.100	44.800	900	8.0	16.3	0.013	52.000	52.000	11.470	7.300	0.904	0.1	-0.644	46.356	45.700	5.644	47.0	-0.644

Note:
[1] A negative surcharge implies that the pipe is not flowing full.
[2] Freeboard between upstream hydraulic gradeline elevation and upstream manhole cover elevation.
[3] HGL elevations at U/S MH for "Monitored & Design" scenario as reported in Table 5-1 of the *Forest Valley Trunk and Orleans Cumberland Collector Capacity Analysis* (Stantec Consulting Ltd., October 2003).

APPENDIX D

Stormwater Management

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

	LOCATION		AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA								
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.	Q/Q full
West Boundary STM System																													
Contribution From Subdrain System																				-29									
					0.00	0.00			0.00	0.00	0.95	0.55	1.45	1.45															
	C1	C4			0.00	0.00			0.00	0.00	0.19	0.50	0.26	1.72	10.00	76.81	104.19	0.00	178.56	278	450	450	CONC	1.70	76.5	372	2.34	0.55	0.75
To Alignment 2002, Pipe C4 - 2200						0.00				0.00				1.72	10.55					-29									
					0.00	0.00			0.00	0.00	0.29	0.50	0.40	0.40															
	C2	C4			0.00	0.00			0.00	0.00	0.70	0.55	1.07	1.47	10.00	76.81	104.19	0.00	178.56	263	525	525	CONC	0.50	142.0	304	1.40	1.68	0.87
To Alignment 2002, Pipe C4 - 2200						0.00				0.00				1.47	11.68														
					0.00	0.00			0.00	0.00	0.19	0.50	0.26	0.26															
	C5	C7			0.00	0.00			0.00	0.00	0.55	0.55	0.84	1.11	10.00	76.81	104.19	0.00	178.56	197	450	450	CONC	0.70	96.0	239	1.50	1.07	0.83
To Alignment 2003, Pipe C7 - C8						0.00				0.00				1.11	11.07														
					0.00	0.00			0.00	0.00	0.01	0.56	0.02	0.02															
					0.00	0.00			0.00	0.00	0.12	0.55	0.18	0.20															
					0.00	0.00			0.00	0.00	0.22	0.50	0.31	0.50															
	C6	C7			0.00	0.00			0.00	0.00	0.57	0.55	0.87	1.38	10.00	76.81	104.19	0.00	178.56	246	600	600	CONC	0.20	110.5	275	0.97	1.90	0.90
To Alignment 2003, Pipe C7 - C8						0.00				0.00				1.38	11.90														
Alignment 2002 - 2002																													
Contribution From West Boundary STM System, Pipe C1 - C4						0.00				0.00				1.72	10.55					-29									
Contribution From West Boundary STM System, Pipe C2 - C4						0.00				0.00				1.47	11.68														
	C4	2200			0.00	0.00			0.00	0.00			0.00	3.19	11.68	70.89	96.06	0.00	164.50	496	675	675	CONC	0.55	32.5	623	1.74	0.31	0.80
To cercle de L'Argonaut circle, Pipe 2200 - 27						0.00				0.00				3.19	12.00					-29									
cercle de L'Argonaut circle																													
					0.00	0.00	0.02	0.72	0.04	0.04			0.00	0.00															
			0.04	0.50	0.06	0.06			0.00	0.04			0.00	0.00															
			0.12	0.70	0.23	0.29			0.00	0.04			0.00	0.00															
			0.16	0.54	0.24	0.53			0.00	0.04			0.00	0.00															
	19	21	0.46	0.72	0.92	1.45			0.00	0.04			0.00	0.00	10.00	76.81	104.19	0.00	178.56	116	450	450	CONC	0.75	141.0	247	1.55	1.51	0.47
To avenue de Lamarche avenue, Pipe 21 - 24						1.45				0.04				0.00	11.51														
	19	26			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	0.35	9.5	57	0.81	0.20	0.00
			0.07	0.70	0.14	0.14			0.00	0.00			0.00	0.00															
	26	22	0.12	0.54	0.18	0.32			0.00	0.00			0.00	0.00	10.20	76.06	103.17	0.00	176.79	24	300	300	PVC	0.40	52.0	61	0.87	1.00	0.39
	22	2200			0.00	0.32			0.00	0.00			0.00	0.00	11.20	72.49	98.27	0.00	168.31	23	300	300	PVC	0.41	29.0	62	0.88	0.55	0.37
Contribution From Alignment 2002, Pipe C4 - 2200						0.00				0.00				3.19	12.00					-29									
	2200	27			0.00	0.32			0.00	0.00			0.00	3.19	12.00	69.91	94.71	0.00	162.17	510	675	675	CONC	0.50	19.0	594	1.66	0.19	0.86
	27	28			0.00	0.32			0.00	0.00			0.00	3.19	12.19	69.32	93.91	0.00	160.77	506	675	675	CONC	1.00	10.5	841	2.35	0.07	0.60
			0.15	0.50	0.21	0.52			0.00	0.00			0.00	3.19															
			0.15	0.54	0.23	0.75			0.00	0.00			0.00	3.19															
	28	30	0.67	0.70	1.30	2.05			0.00	0.00			0.00	3.19	12.26	69.09	93.60	0.00	160.23	624	750	750	CONC	0.50	142.5	787	1.78	1.33	0.79
To avenue de Lamarche avenue, Pipe 30 - 33						2.05				0.00				3.19	13.59					-29									
placette de Darvoy mews																													
	22	24	0.50	0.72	1.00	1.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	77	450	450	CONC	0.75	147.5	247	1.55	1.58	0.31
To avenue de Lamarche avenue, Pipe 24 - 25						1.00				0.00				0.00	11.58														
croissant des Aubrais crescent																													
			0.05	0.50	0.07	0.07			0.00	0.00			0.00	0.00															
			0.29	0.50	0.40	0.47			0.00	0.00			0.00	0.00															
	31	33	0.68	0.70	1.32	1.80			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	138	450	450	CONC	0.85	143.0	263	1.65	1.44	0.52
To avenue de Lamarche avenue, Pipe 33 - 34						1.80				0.00				0.00	11.44														

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 1 of 5

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA							
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.	Q/Q full
	31	35			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.05	9.5	99	1.40	0.11	0.00
	35	10			0.00	0.00			0.00	0.00			0.00	0.00	10.11	76.37	103.60	0.00	177.53	0	300	300	PVC	0.35	52.0	57	0.81	1.07	0.00
To bois de Cravant grove, Pipe 10 - 11						0.00				0.00				0.00	11.18														
	10	49	0.19	0.70	0.37	0.37			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	28	300	300	PVC	0.69	106.5	80	1.14	1.56	0.35
	49	50			0.00	0.37			0.00	0.00			0.00	0.00	11.56	71.29	96.61	0.00	165.44	26	300	300	PVC	0.35	9.5	57	0.81	0.20	0.46
			0.30	0.50	0.42	0.79			0.00	0.00			0.00	0.00															
	50	52	0.62	0.70	1.21	1.99			0.00	0.00			0.00	0.00	11.76	70.66	95.74	0.00	163.94	141	450	450	CONC	0.50	142.5	202	1.27	1.87	0.70
To avenue de Lamarche avenue, Pipe 52 - 56						1.99				0.00				0.00	13.63														
bois de Cravant grove																													
Contribution From croissant des Aubrais crescent, Pipe 35 - 10						0.00				0.00				0.00	11.18														
			0.12	0.50	0.17	0.17			0.00	0.00			0.00	0.00															
	10	11	0.26	0.70	0.51	0.67			0.00	0.00			0.00	0.00	11.18	72.54	98.33	0.00	168.42	49	375	375	PVC	0.38	69.0	108	0.98	1.18	0.45
			0.19	0.50	0.26	0.94			0.00	0.00			0.00	0.00															
	11	34	0.29	0.70	0.56	1.50			0.00	0.00			0.00	0.00	12.36	68.80	93.19	0.00	159.53	103	375	375	PVC	0.76	80.5	153	1.38	0.97	0.68
To avenue de Lamarche avenue, Pipe 34 - 38						1.50				0.00				0.00	13.33														
avenue de Lamarche avenue4																													
			0.12	0.50	0.17	0.17			0.00	0.00			0.00	0.00															
	36	37	0.26	0.70	0.51	0.67			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	52	300	300	PVC	0.68	59.0	80	1.13	0.87	0.65
			0.18	0.50	0.25	0.92			0.00	0.00			0.00	0.00															
	37	38	0.26	0.70	0.51	1.43			0.00	0.00			0.00	0.00	10.87	73.61	99.80	0.00	170.96	105	375	375	PVC	0.75	80.5	152	1.37	0.98	0.69
To avenue de Lamarche avenue, Pipe 38 - 52						1.43				0.00				0.00	11.85														
Alignment 2003																													
Contribution From West Boundary STM System, Pipe C5 - C7						0.00				0.00				1.11	11.07														
Contribution From West Boundary STM System, Pipe C6 - C7						0.00				0.00				1.38	11.90														
	C7	C8			0.00	0.00			0.00	0.00			0.00	2.48	11.90	70.22	95.14	0.00	162.90	404	675	675	CONC	0.35	42.5	497	1.39	0.51	0.81
	C8	5			0.00	0.00			0.00	0.00			0.00	2.48	12.41	68.66	93.00	0.00	159.20	395	675	675	CONC	0.30	28.0	460	1.29	0.36	0.86
To cercle du Ponthieu circle, Pipe 5 - 56						0.00				0.00				2.48	12.77														
rue de Beaugency street																													
	CTRL MH 106	4	0.66	0.40	0.73	0.73			0.00	0.00			0.00	0.00															
			0.25	0.70	0.49	1.22			0.00	0.00			0.00	0.00															
	4	58	0.13	0.50	0.18	1.40			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	108	375	375	PVC	0.70	81.5	147	1.33	1.02	0.73
			0.14	0.70	0.27	1.67			0.00	0.00			0.00	0.00															
	58	57	0.22	0.50	0.31	1.98			0.00	0.00			0.00	0.00	11.02	73.09	99.08	0.00	169.72	145	375	375	PVC	1.25	61.5	196	1.77	0.58	0.74
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						1.98				0.00				0.00	11.60														
cercle du Ponthieu circle																													
Contribution From Alignment 2003, Pipe C8 - 5						0.00				0.00				2.48	12.77														
			0.06	0.50	0.08	0.08			0.00	0.00			0.00	2.48															
			0.30	0.50	0.42	0.50			0.00	0.00			0.00	2.48															
	5	56	0.63	0.70	1.23	1.73			0.00	0.00			0.00	2.48	12.77	67.59	91.54	0.00	156.67	505	675	675	CONC	0.95	138.0	819	2.29	1.00	0.62
To avenue de Lamarche avenue, Pipe 56 - 57						1.73				0.00				2.48	13.77														
	5	6			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.00	14.5	97	1.37	0.18	0.00
	6	7			0.00	0.00			0.00	0.00			0.00	0.00	10.18	76.13	103.27	0.00	176.96	0	300	300	PVC	0.65	47.0	78	1.10	0.71	0.00
	7	8			0.00	0.00			0.00	0.00			0.00	0.00	10.89	73.56	99.73	0.00	170.84	0	300	300	PVC	0.55	12.0	72	1.01	0.20	0.00
			0.13	0.50	0.18	0.18			0.00	0.00			0.00	0.00															
	8	9	0.27	0.70	0.53	0.71			0.00	0.00			0.00	0.00	11.08	72.88	98.80	0.00	169.22	51	300	300	PVC	0.55	68.0	72	1.01	1.12	0.72
	CTRL MH 105	9	0.78	0.40	0.87	1.57			0.00	0.00			0.00	0.00															
			0.20	0.70	0.39	1.96			0.00	0.00			0.00	0.00															
	9	57	0.18	0.50	0.25	2.21			0.00	0.00			0.00	0.00	12.20	69.27	93.85	0.00	160.66	153	375	375	PVC	1.35	71.5	204	1.84	0.65	0.75
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						2.21				0.00				0.00	12.85														

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

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

Designed: P.P.
Checked: M.Z.
Dwg. Reference: 67-68

PROJECT: ORLEANS VILLAGE
LOCATION: City of Ottawa
File Ref: 16-881
Date: May 04/18
Sheet No. 2 of 5

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Manning 0.013

LOCATION			AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA								
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.	Q/Q full
rang de Loury row																													
	180	18	0.16	0.72	0.32	0.32			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	25	300	300	PVC	1.06	36.5	100	1.41	0.43	0.25
To cours Crevier walk, Pipe 18 - 21						0.32				0.00				0.00	10.43														
			0.19	0.54	0.29	0.29			0.00	0.00			0.00	0.00															
	180	41	0.23	0.72	0.46	0.75			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	57	300	300	PVC	0.88	77.0	91	1.28	1.00	0.63
To chemin de Jargeau road, Pipe 41 - 30						0.75				0.00				0.00	11.00														
cours Crevier walk																													
	17	16			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	2.00	9.5	137	1.93	0.08	0.00
			0.15	0.54	0.23	0.23			0.00	0.00			0.00	0.00															
	16	40	0.43	0.72	0.86	1.09			0.00	0.00			0.00	0.00	10.08	76.49	103.76	0.00	177.81	83	375	375	PVC	0.44	108.0	116	1.05	1.71	0.71
To chemin de Jargeau road, Pipe 40 - 41						1.09				0.00				0.00	11.79														
	17	18			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	0	300	300	PVC	1.09	48.0	101	1.43	0.56	0.00
Contribution From rang de Loury row, Pipe 180 - 18						0.32				0.00				0.00	10.43														
					0.00	0.32	0.02	0.72	0.04	0.04			0.00	0.00															
			0.15	0.54	0.23	0.55			0.00	0.04			0.00	0.00															
	18	21	0.21	0.72	0.42	0.97			0.00	0.04			0.00	0.00	10.56	74.72	101.32	0.00	173.60	76	375	375	PVC	0.54	67.0	129	1.17	0.96	0.59
To avenue de Lamarche avenue, Pipe 21 - 24						0.97				0.04				0.00	11.52														
chemin de Jargeau road																													
	39	40			0.00	0.00	0.04	0.54	0.06	0.06			0.00	0.00	10.00	76.81	104.19	0.00	178.56	6	300	300	PVC	1.60	27.0	122	1.73	0.26	0.05
Contribution From cours Crevier walk, Pipe 16 - 40						1.09				0.00				0.00	11.79														
			0.03	0.54	0.05	1.13			0.00	0.06			0.00	0.00															
	40	41			0.00	1.13	0.24	0.70	0.47	0.53			0.00	0.00	11.79	70.55	95.60	0.00	163.69	130	525	525	CONC	0.30	54.5	236	1.09	0.83	0.55
Contribution From rang de Loury row, Pipe 180 - 41						0.75				0.00				0.00	11.00														
			0.01	0.70	0.02	1.90			0.00	0.53			0.00	0.00															
			0.03	0.54	0.05	1.94			0.00	0.53			0.00	0.00															
	41	30			0.00	1.94	0.13	0.70	0.25	0.78			0.00	0.00	12.63	68.00	92.10	0.00	157.65	204	525	525	CONC	0.80	64.0	385	1.78	0.60	0.53
To avenue de Lamarche avenue, Pipe 30 - 33						1.94				0.78				0.00	13.23														
voi de Lesage way																													
	410	42	0.06	0.70	0.12	0.12			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	9	300	300	PVC	0.69	51.0	80	1.14	0.75	0.11
			0.16	0.50	0.22	0.34			0.00	0.00			0.00	0.00															
	42	45	0.35	0.70	0.68	1.02			0.00	0.00			0.00	0.00	10.75	74.05	100.40	0.00	172.00	76	375	375	PVC	0.35	103.0	104	0.94	1.83	0.73
	45	46			0.00	1.02			0.00	0.00			0.00	0.00	12.58	68.15	92.31	0.00	158.00	70	375	375	PVC	0.72	10.5	149	1.35	0.13	0.47
			0.06	0.50	0.08	1.10			0.00	0.00			0.00	0.00															
	46	47	0.25	0.70	0.49	1.59			0.00	0.00			0.00	0.00	12.71	67.77	91.79	0.00	157.10	108	450	450	CONC	0.47	45.5	195	1.23	0.62	0.55
To terrase de Vennecy terrace, Pipe 47 - 54						1.59				0.00				0.00	13.32														
terrase de Vennecy terrace																													
			0.22	0.50	0.31	0.31			0.00	0.00			0.00	0.00															
	42	43	0.27	0.70	0.53	0.83			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	64	375	375	PVC	0.66	45.5	142	1.29	0.59	0.45
	43	44			0.00	0.83			0.00	0.00			0.00	0.00	10.59	74.62	101.19	0.00	173.36	62	375	375	PVC	1.04	10.5	179	1.62	0.11	0.35
			0.13	0.50	0.18	1.01			0.00	0.00			0.00	0.00															
	44	47	0.34	0.70	0.66	1.67			0.00	0.00			0.00	0.00	10.70	74.23	100.65	0.00	172.44	124	450	450	CONC	0.38	103.0	176	1.11	1.55	0.71
Contribution From voi de Lesage way, Pipe 46 - 47						1.59				0.00				0.00	13.32														
			0.05	0.50	0.07	3.33			0.00	0.00			0.00	0.00															
			0.12	0.50	0.17	3.50			0.00	0.00			0.00	0.00															
			0.13	0.50	0.18	3.68			0.00	0.00			0.00	0.00															
	47	54	0.33	0.70	0.64	4.32			0.00	0.00			0.00	0.00	13.32	66.03	89.40	0.00	152.98	285	600	600	CONC	0.39	111.5	383	1.36	1.37	0.74
	54	55			0.00	4.32			0.00	0.00			0.00	0.00	14.69	62.50	84.56	0.00	144.63	270	600	600	CONC	0.35	10.0	363	1.28	0.13	0.74
			0.18	0.50	0.25	4.57			0.00	0.00			0.00	0.00															
	55	56	0.31	0.70	0.60	5.18			0.00	0.00			0.00	0.00	14.82	62.19	84.13	0.00	143.89	322	675	675	CONC	0.52	110.0	606	1.69	1.08	0.53
To avenue de Lamarche avenue, Pipe 56 - 57						5.18				0.00				0.00	15.91														

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 3 of 5

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha) 2 YEAR				AREA (Ha) 5 YEAR				AREA (Ha) 100 YEAR				FLOW						SEWER DATA								
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	Conc. (min)	2 Year (mm/h)	5 Year (mm/h)	10 Year (mm/h)	100 Year (mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
ruelle de Carden lane																													
			0.28	0.50	0.39	0.39			0.00	0.00			0.00	0.00															
	48	52	0.37	0.70	0.72	1.11			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	85	375	375	PVC	1.10	110.0	184	1.66	1.10	0.46
To avenue de Lamarche avenue, Pipe 52 - 56						1.11				0.00				0.00	11.10														
avenue de Lamarche avenue																													
			0.05	0.40	0.06	0.06			0.00	0.00			0.00	0.00															
	120	12	0.52	0.47	0.68	0.74			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	56	300	300	PVC	1.51	51.0	119	1.68	0.51	0.48
	12	13			0.00	0.74	0.35	0.85	0.83	0.83			0.00	0.00	10.51	74.92	101.60	0.00	174.06	139	375	375	PVC	2.00	76.0	248	2.25	0.56	0.56
	CTRL MH 101	13	2.54	0.85	6.00	6.74			0.00	0.83			0.00	0.00															
	CTRL MH 100	13	2.86	0.85	6.76	13.50			0.00	0.83			0.00	0.00															
			0.07	0.56	0.11	13.60			0.00	0.83			0.00	0.00															
			0.11	0.40	0.12	13.73			0.00	0.83			0.00	0.00															
	13	15			0.00	13.73	0.18	0.85	0.43	1.25			0.00	0.00	11.07	72.93	98.86	0.00	169.34	1125	825	825	CONC	1.10	139.0	1505	2.82	0.82	0.75
	CTRL MH 104	15	2.16	0.75	4.50	18.23			0.00	1.25			0.00	0.00															
	CTRL MH 103	15	2.17	0.75	4.52	22.75			0.00	1.25			0.00	0.00															
	15	21			0.00	22.75	0.30	0.85	0.71	1.96			0.00	0.00	11.89	70.23	95.16	0.00	162.93	1785	1350	1350	CONC	0.37	58.5	3247	2.27	0.43	0.55
Contribution From cours Crevier walk, Pipe 18 - 21						0.97				0.04				0.00	11.52														
Contribution From cercle de L'Argonaut circle, Pipe 19 - 21						1.45				0.04				0.00	11.51														
					0.00	25.17	0.05	0.72	0.10	2.14			0.00	0.00															
	21	24	0.18	0.54	0.27	25.44			0.00	2.14			0.00	0.00	12.32	68.91	93.34	0.00	159.79	1953	1350	1350	CONC	0.43	58.5	3500	2.45	0.40	0.56
Contribution From placette de Darvoy mews, Pipe 220 - 24						1.00				0.00				0.00	11.58														
					0.00	26.44	0.26	0.72	0.52	2.66			0.00	0.00															
	24	25	0.19	0.54	0.29	26.73			0.00	2.66			0.00	0.00	12.72	67.73	91.72	0.00	157.00	2054	1350	1350	CONC	0.50	41.5	3774	2.64	0.26	0.54
	25	30			0.00	26.73			0.00	2.66			0.00	0.00	12.98	66.98	90.69	0.00	155.22	2031	1350	1350	CONC	0.49	14.0	3736	2.61	0.09	0.54
Contribution From cercle de L'Argonaut circle, Pipe 28 - 30						2.05				0.00				3.19	13.59					-29									
Contribution From chemin de Jargeau road, Pipe 41 - 30						1.94				0.78				0.00	13.23														
	30	33			0.00	30.72			0.00	3.44			0.00	3.19	13.59	65.30	88.39	0.00	151.25	2764	1500	1500	CONC	0.20	63.5	3161	1.79	0.59	0.87
Contribution From croissant des Aubrais crescent, Pipe 31 - 33						1.80				0.00				0.00	11.44														
			0.25	0.50	0.35	32.86			0.00	3.44			0.00	3.19															
	33	34	0.31	0.70	0.60	33.47			0.00	3.44			0.00	3.19	14.19	63.76	86.29	0.00	147.60	2873	1500	1500	CONC	0.23	58.5	3390	1.92	0.51	0.85
Contribution From bois de Cravant grove, Pipe 11 - 34						1.50				0.00				0.00	13.33														
	34	38			0.00	34.97			0.00	3.44			0.00	3.19	14.69	62.50	84.56	0.00	144.63	2909	1500	1500	CONC	0.24	58.5	3463	1.96	0.50	0.84
Contribution From avenue de Lamarche avenue4, Pipe 37 - 38						1.43				0.00				0.00	11.85														
	38	52	0.28	0.70	0.54	36.94			0.00	3.44			0.00	3.19	15.19	61.32	82.95	0.00	141.84	2974	1650	1650	CONC	0.16	54.5	3646	1.71	0.53	0.82
Contribution From ruelle de Carden lane, Pipe 48 - 52						1.11				0.00				0.00	11.10														
Contribution From croissant des Aubrais crescent, Pipe 50 - 52						1.99				0.00				0.00	13.63														
	52	56			0.00	40.05			0.00	3.44			0.00	3.19	15.72	60.11	81.29	0.00	138.98	3101	1650	1650	CONC	0.18	58.5	3867	1.81	0.54	0.80
Contribution From cercle du Ponthieu circle, Pipe 5 - 56						1.73				0.00				2.48	13.77														
Contribution From terrase de Vennecy terrace, Pipe 55 - 56						5.18				0.00				0.00	15.91														
	56	57	0.11	0.70	0.21	47.16			0.00	3.44			0.00	5.67	16.26	58.94	79.69	0.00	136.22	3798	1650	1650	CONC	0.23	60.5	4371	2.04	0.49	0.87
To avenue de Lamarche avenue3, Pipe 57 - 1 TEE						47.16				3.44				5.67	16.76					-29									
avenue de Lamarche avenue3																													
Contribution From avenue de Lamarche avenue, Pipe 56 - 57						47.16				3.44				5.67	16.76					-29									
Contribution From cercle du Ponthieu circle, Pipe 58 - 57						1.98				0.00				0.00	11.60														
Contribution From cercle du Ponthieu circle, Pipe 9 - 57						2.21				0.00				0.00	12.85														
	57	1 TEE			0.00	51.35			0.00	3.44			0.00	5.67	16.76	57.91	78.28	0.00	133.79	3973	1650	1650	CONC	0.26	10.5	4647	2.17	0.08	0.85
			0.19	0.70	0.37	51.72			0.00	3.44			0.00	5.67															
	1 TEE	2	0.39	0.70	0.76	52.48			0.00	3.44			0.00	5.67	16.84	57.75	78.06	0.00	133.41	4027	1650	1650	CONC	0.26	105.0	4647	2.17	0.81	0.87
	2	3 TEE	0.25	0.50	0.35	52.83			0.00	3.44			0.00	5.67	17.64	56.16	75.89	0.00	129.67	3935	1800	1800	CONC	0.16	13.5	4598	1.81	0.12	0.86
	3 TEE	60			0.00	52.83			0.00	3.44			0.00	5.67	17.77	55.93	75.57	0.00	129.11	3918	1800	1800	CONC	0.16	41.5	4598	1.81	0.38	0.85
To Pond Outfall, Pipe 60 - 61 TEE						52.83				3.44				5.67	18.15					-29									

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 4 of 5

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

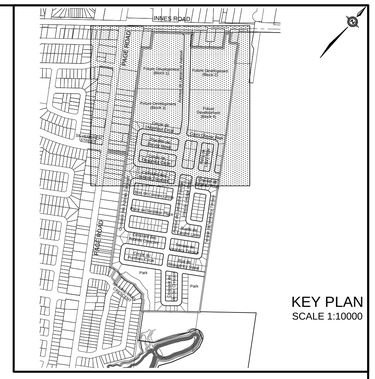
Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 5 years
Manning 0.013 Arterial Roads Return Frequency = 10 years

	LOCATION		AREA (Ha)												FLOW						SEWER DATA								
			2 YEAR				5 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year										
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.	Q/Q full
			0.20	0.50	0.28	0.28			0.00	0.00			0.00	0.00															
			0.24	0.50	0.33	0.61			0.00	0.00			0.00	0.00															
	590	59	0.39	0.70	0.76	1.37			0.00	0.00			0.00	0.00	10.00	76.81	104.19	0.00	178.56	105	375	375	PVC	0.85	100.5	162	1.46	1.14	0.65
	59	63			0.00	1.37			0.00	0.00			0.00	0.00	11.14	72.67	98.51	0.00	168.73	100	375	375	PVC	2.00	12.0	248	2.25	0.09	0.40
	63	60			0.00	1.37			0.00	0.00			0.00	0.00	11.23	72.37	98.10	0.00	168.02	99	375	375	PVC	0.90	5.5	166	1.51	0.06	0.60
To Pond Outfall, Pipe 60 - 61 TEE						1.37				0.00				0.00	11.29														
Pond Outfall - 51																													
Contribution From avenue de Lamarche avenue3, Pipe 3 TEE - 60						52.83				3.44				5.67	18.15					-29									
Contribution From avenue de Lamarche avenue3, Pipe 63 - 60						1.37				0.00				0.00	11.29														
	60	61 TEE			0.00	54.20			0.00	3.44			0.00	5.67	18.15	55.21	74.59	0.00	127.43	3943	1800	1800	CONC	0.16	30.5	4598	1.81	0.28	0.86
	61 TEE	62 TEE			0.00	54.20			0.00	3.44			0.00	5.67	18.43	54.70	73.90	0.00	126.23	3906	1800	1800	CONC	0.16	73.5	4598	1.81	0.68	0.85
	62 TEE	HW			0.00	54.20			0.00	3.44			0.00	5.67	19.11	53.51	72.27	0.00	123.43	3820	1800	1800	CONC	0.16	74.5	4598	1.81	0.69	0.83

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

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

Designed: P.P.	PROJECT: ORLEANS VILLAGE		
Checked: M.Z.	LOCATION: City of Ottawa		
Dwg. Reference: 67-68	File Ref: 16-881	Date: May 04/18	Sheet No. 5 of 5



LEGEND

STORM DRAINAGE BOUNDARY

STORM DRAINAGE BOUNDARY (OTHER PHASES)

UPSTREAM MH TO DOWNSTREAM MH — 43 - 44

AREA IN HECTARES — 0.37

RUNOFF COEFFICIENT — 0.51

EXTERNAL 2.78AC = 2.78BAC=14.40

EXTERNAL TIME OF CONCENTRATION — TC=14.5 MIN

EXTERNAL BLENDED RUNOFF COEFFICIENT — C= 0.70

STREET CATCHBASIN & LEAD

STREET CATCHBASIN WITH CLOSED LID & LEAD MAINTENANCE HOLE — MH202

CURB INLET CATCHBASIN & LEAD

CATCHBASIN/ MAINTENANCE HOLE — CBMH201

INTERCONNECTED CATCH BASIN & LEADS

CAP

OVERLAND FLOW DIRECTION

EXTERNAL OVERLAND FLOW DIRECTION

EMERGENCY OVERLAND FLOW DIRECTION

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00. SURVEYS DATED NOVEMBER 30, 2017.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16-10-116-00 (PHASE 1 & 2) DATED MARCH 08, 2018.

ISSUED FOR MOE APPROVAL 18-05-09

NOT FOR CONSTRUCTION

ELEVATION NOTE ELEVATION = 86.12 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM SITE BENCHMARK NCC CONTROL POINT 001196530229 HAVING A PUBLISHED ELEVATION OF 86.12m

No.	DATE	BY	DESCRIPTION
2.	18-05-09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18-01-24	M.Z.	1st SUBMISSION

CITY OF OTTAWA

PROJECT No. 16-881

LICENSED PROFESSIONAL ENGINEER M. ZDRAVEVSKI 100130902 18-05-09 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

© DSEL

CAIVAN (ORLEANS VILLAGE) LIMITED

ORLEANS VILLAGE

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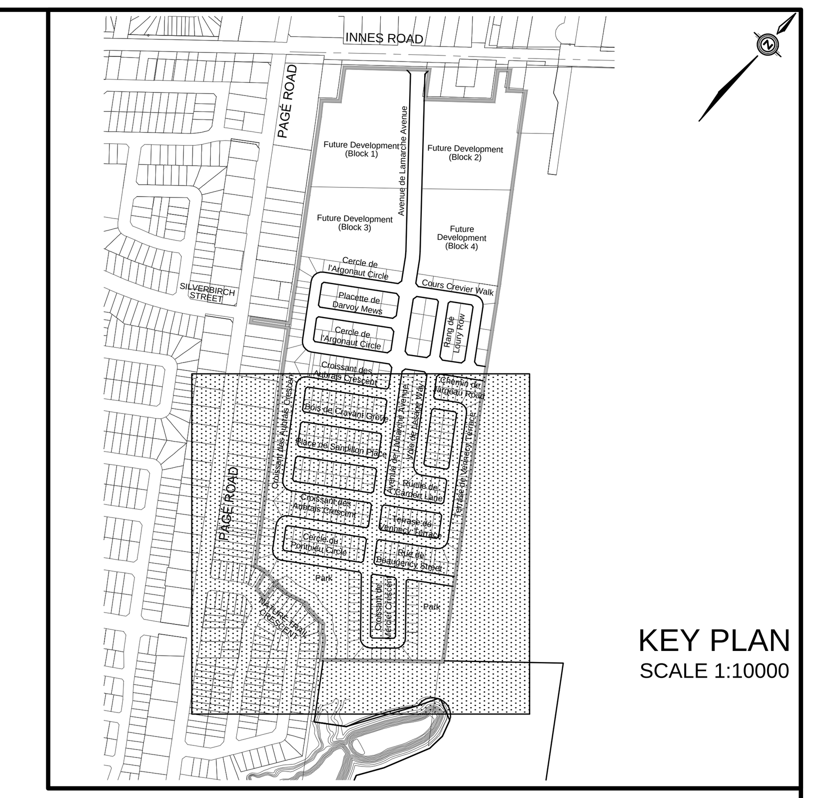
www.DSEL.ca

DRAWN BY: M.Z.	CHECKED BY: P.P.	DRAWING NO.	SHEET NO.
DESIGNED BY: P.P.	CHECKED BY: M.Z.		67
SCALE: 1:1000	DATE: JANUARY 2018		

CITY FILE No. D07-16-16-0022 CITY PLAN No. XXXXX



KEY PLAN
SCALE 1:10000

LEGEND

STORM DRAINAGE BOUNDARY
STORM DRAINAGE BOUNDARY (OTHER PHASES)
UPSTREAM MH TO DOWNSTREAM MH — 43 - 44
AREA IN HECTARES — 0.37
RUNOFF COEFFICIENT — 0.51
EXTERNAL 2.78AC = — 2.78AC=14.40
EXTERNAL TIME OF CONCENTRATION — TC=14.5 MIN
EXTERNAL BLENDED RUNOFF COEFFICIENT — C= 0.70
STREET CATCHBASIN & LEAD
STREET CATCHBASIN WITH CLOSED LID & LEAD
MAINTENANCE HOLE — MH202
CURB INLET CATCHBASIN & LEAD
CATCHBASIN/ MAINTENANCE HOLE — CBMH201
INTERCONNECTED CATCH BASIN & LEADS
CAP
OVERLAND FLOW DIRECTION
EXTERNAL OVERLAND FLOW DIRECTION
EMERGENCY OVERLAND FLOW DIRECTION

TOPOGRAPHIC INFORMATION

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LEGAL INFORMATION

CALCULATED M–PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 16–10–116–00 (PHASE 1 & 2) DATED MARCH 08, 2018.

ISSUED FOR MOE APPROVAL 18–05–09

NOT FOR CONSTRUCTION

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No.	DATE	BY	DESCRIPTION
2.	18–05–09	M.Z.	ISSUED FOR MOE APPROVAL
1.	18–01–24	M.Z.	1st SUBMISSION

Ottawa CITY OF OTTAWA

PROJECT No. 16–881

LICENSED PROFESSIONAL ENGINEER M.ZDRAVEVSKI 100130902 18-05-09 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

© DSEL

CAIVAN (ORLEANS VILLAGE) LIMITED

ORLEANS VILLAGE

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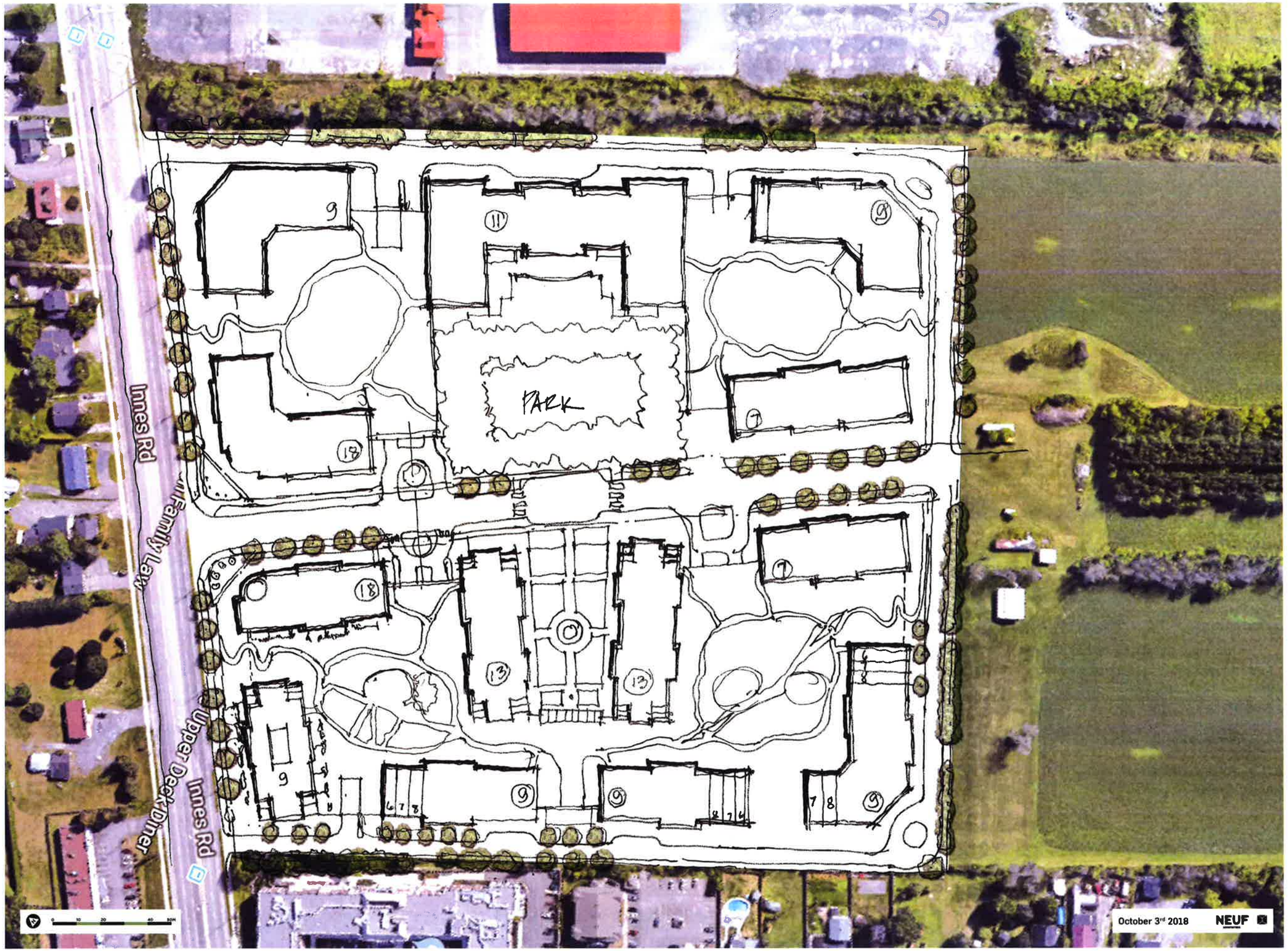
DRAWN BY: M.Z.	CHECKED BY: P.P.	DRAWING NO.	SHEET NO.
DESIGNED BY: P.P.	CHECKED BY: M.Z.		68
SCALE: 1:1000	DATE: JANUARY 2018		

CITY PLAN No. XXXXX

CITY FILE No. D07-16-16-0022

DRAWINGS / FIGURES


Innes Rd
Family Law
Upper Deck Diner
Innes Rd
PARK
October 3rd 2018
NEUF

SURVEYING
ANNIS
O'SULLIVAN
VOLLEBEKK

AREA CERTIFICATE

Re: 3534, 3544, 3554 AND 3564 Innes Road
Part of Lot 5
Concession 3 (Ottawa Front)
Geographic Township of Gloucester
City of Ottawa
Being PIN's 04404-0425, -0427, -0466 and -0468

To Whom It May Concern:

THIS IS TO CERTIFY THAT I have calculated the area of the parcels of land described above and find them to be as follows:

3534 Innes Road – PIN 04404-0468	1,468 square metres
3544 Innes Road – PIN 04404-0466	1,434 square metres
3554 Innes Road – PIN 04404-0427	994 square metres
3564 Innes Road – PIN 04404-0425	1,841 square metres

OTTAWA, Ontario
October 2, 2018
Our Reference E-8534-18

E. H. Herweyer
Ontario Land Surveyor

ONTARIO LAND SURVEYORS
A.J. Broxham
R.R. Gauthier
E.H. Herweyer
E.M. Lancaster
G.A. Ray
A.R. Roy
V.A. Shelp
D.R. Vollebekk

G.D. Annis (1939-2013)

DEVELOPMENT
R.F. Robinson

CONDOMINIUMS
A.Z. Pichette

OTTAWA ❑
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225 Industriel Street
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K0A 1W0
613 443-3364
613 443-3229 Fax
embrun@aovltd.com

TOPOGRAPHICAL PLAN OF

PART OF LOT 5
CONCESSION 3 (OTTAWA FRONT)
Geographic Township of Gloucester
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 500

20 15 10 5 0 10 20 Metres

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

July 20 2018
Date

E. H. Herweyer
Ontario Land Surveyor

Notes & Legend

	Denotes	
	"	Survey Monument Planted
	"	Survey Monument Found
SIB	"	Standard Iron Bar
SSIB	"	Short Standard Iron Bar
IB	"	Iron Bar
(WIT)	"	Witness
Meas.	"	Measured
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	"	Plan
(P2)	"	Plan
(P3)	"	Plan
MH-ST	"	Maintenance Hole (Storm Sewer)
MH-S	"	Maintenance Hole (Sanitary)
MH	"	Maintenance Hole (Unidentified)
FH	"	Fire Hydrant
WV	"	Water Valve
OHW	"	Overhead Wires
UP	"	Utility Pole
AN	"	Anchor
LS	"	Light Standard
T/G	"	Top of Grate
GV	"	Gas Valve
GM	"	Gas Meter
HH	"	Handhole
TB-B	"	Bell Terminal Box
PO-W	"	Wood Pole
E-O	"	Electrical Outlet
CLF	"	Chain Link Fence
BF	"	Board Fence
P&WF	"	Post and Wire Fence
MF	"	Metal Fence
BH	"	Proposed Borehole as marked on site
W	"	Well Cap
Ø	"	Diameter
+65.00	"	Location of Elevations
+65.00	"	Top of Curb/ Wall of Elevations
WRW	"	Wooden Retaining Wall
C/L	"	Centreline
	"	Property Line
	"	Deciduous Tree
	"	Coniferous Tree
CB	"	Catch Basin
CBI	"	Catch Basin Inlet
BOS	"	Bottom of Slope
TOS	"	Top of Slope
AC	"	Air Conditioner
MP	"	Metal Post

LIMITS OF LAMARCHE AVENUE, BLOCKS 147 TO 150 AND ADJACENT SOUTHERLY BLOCKS ARE CREATED FROM A CAD FILE FROM J.D. BARNES, OLS AND MAY BE SUBJECT TO CHANGE.

Bearings are grid bearings and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

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.

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Job No. E-8534-18 CRDS PIL1 5 C 3 OF GI T F

SURVEYING
ANNIS
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VOLLEBEKK

July 20, 2018

Canadian Rental Development Services Inc.
555 Legget Drive, Suite 206
Kanata, Ontario
K2K 2X3

Re: 3490 Innes Road
Part of Lot 5
Concession 3 (Ottawa Front)
Geographic Township of Gloucester
City of Ottawa
Being PIN's 04404-0446, -0462, and Part of -0464
Our Reference: E-8534-18

Copies of the topographical plan are enclosed; digital files have been forwarded by email. A few comments on the plan and information are in order:

- Although all existing /perimeter property lines are well known and represented, the Block and Road limits of the proposed subdivision plan are possibly subject to change as that plan moves to a final version as compared to the preliminary version provided to date
- The proposed Innes Road widening is illustrated on our plan; this widening is not illustrated on the proposed subdivision plan which is surprising
- The road widening issue may impact the Lamarche Avenue daylighting corners at Innes Road; the effect, if any, is not known
- Proposed borehole locations as marked on site are shown; final borehole locations are per as-built information from Paterson Group
- Areas:
  - Block 147: 21,651 sq. metres
  - Block 148: 25,374 sq. metres
  - Block 149: 28,606 sq. metres
  - Block 150: 21,729 sq. metres
  - PIN 04404-0446
    3592 Innes Road: 1,070 sq. metres
  - PIN 04404-0462
    3484 Innes Road: 1,715 sq. metres
  - Widenings
    - Total west of Lamarche Avenue: 220 sq. metres
    - Total east of Lamarche Avenue: 87 sq. metres

Please call should you require further information.

Yours truly,

EHH:jm
Encl.

E. H. Herweyer
Ontario Land Surveyor
Direct Line: 613-727-0934

www.aovltd.com

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Lépine Apartments — Canadian Rental Development Services Inc.

3490 Innes Road
Official Plan Amendment & Zoning By-law Amendment

DEVELOPMENT ASSUMPTIONS

UPDATED NOVEMBER 7, 2018

Total Mixed-Use Blocks & Innes Road Frontage Lots

Total Gross Land Area	28.17 acres or 11.4 hectares
Total Net Land Area (excluding Street 1)	26.14 acres or 10.6 hectares
Overall Residential Density	100 units/net acre or 247 units/net hectare
Total Residential Units	2,615 apartments
2-bedroom / 1-bedroom ratio	60% 2-bedroom, 40% 1-bedroom
Total 2-bedroom units	1,570 2-bedroom apartments
Total 1-bedroom units	1,045 1-bedroom apartments
Total Commercial GFA	57,000 ft^2 or 5,300 m^2

West of Street 1 (Lamarche Avenue)

Net Land Area	12.85 acres or 5.2 hectares
Residential Units	1,285 apartments
2-bedroom units	770 2-bedroom apartments
1-bedroom units	515 1-bedroom apartments
Commercial GFA	28,000 ft^2 or 2,600 m^2

East of Street 1 (Lamarche Avenue)

Net Land Area	13.29 acres or 5.4 hectares
Residential Units	1,330 apartments
2-bedroom units	800 2-bedroom apartments
1-bedroom units	530 1-bedroom apartments
Commercial GFA	29,000 ft^2 or 2,700 m^2

Notes on Development Assumptions

- Total gross land area includes all lots with frontage onto Innes Road (i.e., 3484 through 3592 Innes Road inclusive).
- Net land areas have net out the area for Street 1 (Lamarche Avenue), but not the lands to be dedicated for public open space (i.e., future parkland dedication is included in net area for density calculations).
- Residential unit counts and commercial floor areas are considered maximums for the purposes of the ZBLA and OPA applications and may be reduced through the Site Plan Control approval process.
- Preliminary estimated area of parkland dedication (mostly to the east of Street 1) is approximately 1.4 acres or 0.57 hectares (+/- 5% total gross land area).