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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

FOR

FORMASIAN DEVELOPMENT CORP. 1919 MAPLE GROVE ROAD

CITY OF OTTAWA

PROJECT NO.: 16-861

AUGUST 2019 – REV 2

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT
FOR
1919 MAPLE GROVE ROAD

FORMASIAN DEVELOPMENT CORP.

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FOR
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AUGUST 2019 – REV 2

CITY OF OTTAWA
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1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained by Formasian Development Corp. to prepare a Functional Servicing and Stormwater Management report in support of the application Plan of Subdivision at 1919 Maple Grove Road.

The subject property is located within the City of Ottawa urban boundary, in the Stittsville ward. As illustrated in ***Figure 1***, the subject property is located north of the Maple Grove Road and Johnwoods Street intersection. Comprised of a single parcel of land, the subject property measures approximately ***6.73 ha*** and is zoned Development Reserve (DR). The subject site is within the Kanata West Master Servicing Study (***KWMSS***) and was contemplated as residential lands, as shown by ***FIG. 2.1*** located in ***Drawings/Figures***.

Figure 1: Site Location

The proposed Plan of Subdivision would allow for the development of seven 4-storey residential buildings in two blocks, seventy-two home lots and six municipal right-of-ways. Scenario one contemplates ***36*** back-to-back townhome lots; ***36*** semi-detached lots; ***3*** townhome lots and ***460*** apartment units. Scenario two contemplates ***36*** back-to-back townhome lots; ***36*** semi-detached lots; ***3*** townhome lots; ***320*** apartment units and ***300*** retirement residence units. The development contemplates above ground parking and underground parking with access from Maple Grove Road and to the adjacent developments. A copy of the conceptual site plan and associated site statistics prepared by 110 Architects is included in ***Drawings/Figures***.

The objective of this report is to provide sufficient detail to demonstrate that the proposed Sub-division is supported by existing municipal services as outlined by the ***KWMSS***. In an effort to demonstrate that both scenarios are supported by the existing services, scenario two will be utilized as it yields the highest demands.

1.1 Existing Conditions

The existing site is predominantly vacant and vegetated parcel of land. There is a single detached residence on the South side of the parcel. The elevations range between 106.49 m and 107.31 m with a grade change of 0.82 m from the Northeast to the Southwest corner of the property.

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

Maple Grove Road:

- 305 mm diameter PVC watermain;
- 375 mm diameter PVC sanitary sewer tributary to the Kanata West Pump Station;
- 375 mm diameter PVC storm sewer tributary to the Kanata West Stormwater Pond 4;
- 2100 mm diameter concrete storm sewer tributary to the Kanata West Stormwater Pond 4.

1.2 Required Permits / Approvals

The contemplated development is subject to the Plan of Subdivision process for creation of the lots, road opening approval process for the municipal streets and site plan control approval process for the multi-unit buildings.

The contemplated development proposes new right-of-ways complete with sanitary and storm sewers and as a result the Ministry of the Environment, Conservation and Parks

(MOECP) requires an Environment Compliance Application (ECA) to be submitted under the Transfer of Review process.

As indicated by the Geotechnical Investigation (***Geotechnical Report***) prepared by Paterson Group, a temporary MOECP permit to take water (PTTW) may be required if more than 400,000 L/day of ground and/or surface water is required to be pumped during construction. A minimum of 4-5 months should be allotted to complete the PTTW process under the MOECC's jurisdiction. Further inspection is to be completed at the detailed design stage.

As indicated by the ***Geotechnical Report***, if 50,000 L/day to 400,000 L/day of ground and/or surface water is required to be pumped during construction, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of 2-4 weeks should be allotted to complete the EASR process. Further inspection is to be completed at the detailed design stage.

It is noted that an existing drainage feature crosses the subject site. Based on a previous development along Maple Grove, existing drainage that was previously tributary to the drainage feature has been redirected towards the municipal sewers. The Mississippi Valley Conservation Authority (***MVCA***) has been contacted to confirm whether approvals will be required to decommission the drainage feature, however no response was received at the time of publication.

1.3 Pre-consultation

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

2.0 GUIDELINES, PREVIOUS STUDIES AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

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

- **Kanata West Master Servicing Study,**
  Stantec Consulting Ltd., June 16, 2006.
  (KWMSS)

- **Kanata West Pump Station Flow Development Background,**
  Stantec Consulting Ltd., June 12, 2012.
  (KWPS Memo)

- **Geotechnical Investigation,**
  Paterson Group, July 20, 2018.
  (Geotechnical Report)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies within the City of Ottawa 3W pressure zone, as shown by the Pressure Zone map included in ***Appendix B***. Based on available City mapping, a 305 mm watermain exists within the Maple Grove Road right-of-way.

The ***KWMSS*** contemplated the site to be serviced via the 305 mm diameter watermain within the Maple Grove Road right-of-way, as shown by the *Watermain Final Concept* drawing (***WM-1***) included in ***Appendix B***.

3.2 Water Supply Servicing Design

It is anticipated that the contemplated development would be serviced from an internal watermain network with a connection to the existing 305 mm watermain within the Maple Grove Road right-of-way. A conceptual Site Servicing Plan (***SSP-1***) is included in ***Drawings/Figures***.

In accordance with City of Ottawa technical bulletin ISDTB-2014-02, redundant service connections will be required due to an estimated design flow of greater than ***50 m^3/day***. To provide a looped connection, it is anticipated connections to the adjacent development will be made. In the scenario where adjacent development is unavailable, a second connection to the existing watermain within Maple Grove Road will be made.

Based on the ***Water Supply Guidelines***, 49 single dwelling units on a permanent basis and 75 single dwelling units on a temporary basis are permitted on a dead-end watermain should the Sub-division be constructed in phases, noting that the above conditions rely on the available water pressure supplied to the development. In addition, the looped connection must be provided within two years.

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 Townhomes/Semi-Detached	2.7 P/unit
Residential 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 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 *
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*
*** Residential Max. Daily and Max. Hourly peaking factors per MOE Guidelines for Drinking-Water Systems Table 3-3 for 0 to 500 persons.*
-Table updated to reflect ISD-2010-2

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

Table 2
Summary of Anticipated Water Demand and Boundary Conditions

Design Parameter	Anticipated Demand[1] (L/min)	Boundary Condition[2] (m H_2O / kPa)
Average Daily Demand	230.2	53.5 / 524.8
Max Day + Fire Flow	575.6 + 16,000 = 16,575.6	43.8 / 429.7
Peak Hour	1266.2	49.9 / 489.5

1) Water demand calculation per ***Water Supply Guidelines***. See ***Appendix B*** for detailed calculations.
2) Boundary conditions supplied by the City of Ottawa for the demands indicated in the correspondence; assumed ground elevation 107.3m. See ***Appendix B.***

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

Fire flow requirements were estimated per City of Ottawa Technical Bulletin ***ISTB-2018-02***. The following parameters were assumed:

- Type of construction - Ordinary Construction;
- Occupancy type – Limited Combustibility;
- Sprinkler Protection – Supervised Sprinklered System (Apartment and Retirement Residence) and Non-Sprinklered System (Townhomes).

The above assumptions result in an estimated fire flow of approximately ***16,000 L/min***, noting that actual building materials selected will affect the estimated flow. A certified fire protection system specialist shall be employed to design the building fire suppression system(s) and confirm the actual fire flow demand.

Section 6.5.1 of the ***KWMSS*** summarizes the estimated fire flow requirements used in sizing the trunk infrastructure. Residential and Mixed Use/Commercial development assumed a fire flow requirement of ***6,000 L/min*** and ***13,000 L/min*** respectively, in the design of the future watermain network. Based on the ***KWMSS***, the residual pressure of the Stittsville Tank under a fire flow of ***13,000 L/min*** remains above 45 psi (310 kPa).

The City of Ottawa was contacted to obtain boundary conditions associated with the estimated water demand as indicated in the boundary request correspondence included in ***Appendix B***.

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

Detailed design of the site watermain infrastructure will ensure that pressures are respected within the City ranges.

3.3 Water Supply Conclusion

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

It is anticipated that the contemplated development would be serviced from an internal watermain network with a looped connection to the existing 305 mm watermain within the Maple Grove Road right-of-way and to the adjacent development. Detailed design of the site watermain infrastructure will ensure that pressures are respected within the City's required ranges.

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

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The subject site lies within the Kanata West Pump Station catchment area, as shown by the *Preferred Waste-Water Option* drawing (***S-1***) included in ***Appendix C***. Based on available City mapping, a 375 mm diameter sanitary sewer exists within the Maple Grove Road right-of-way. A 600 mm diameter sanitary sewer is located downstream of the subject site near the Maple Grove Road and Montserrat Street intersection.

Sanitary capacity for the site is outlined by the ***KWMSS***. *Section 4.3* of the ***KWMSS*** discusses overall sanitary services for the Kanata West lands, which includes the site. The site falls within the ***20.03 ha*** area 26, as shown by the *Preferred Waste-Water Option* drawing (***S-1***) and was contemplated to outlet to a 600 mm diameter sanitary sewer within Maple Grove Road. The ***KWMSS*** sanitary drainage plan and the corresponding Sanitary Sewer Calculation Sheet for the ultimate sanitary sewers are included in ***Appendix C***.

Based on the land use plan from the ***KWMSS***, the site has been identified as a residential area. *Section 4.4* of the ***KWMSS*** outlines the design criteria used to size the ultimate sanitary infrastructure servicing the site; residential areas assumed a flow rate of ***350 L/Person/Day***.

Stantec has prepared a report outlining the design criteria and associated catchment areas to be supported by the Kanata West Pump Station. As shown by the *KWMSS Drainage Allocations* prepared by Stantec included in ***Appendix C***, the subject site is to be serviced via the Kanata West Pump Station. Refer to the Kanata West Pump Station Flow Development Background Memorandum (***KWPS Memo***) for further details.

Table 3 demonstrates the existing peak flow from the existing residence. See ***Appendix C*** for associated calculations.

Table 3
Summary of Existing Peak Wastewater Flow

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	0.01
Estimated Peak Dry Weather Flow	0.05
Estimated Peak Wet Weather Flow	1.93

Based on the site area of ***20.03ha***, specified by drawing ***S-1*** included in ***Appendix C***, ***12.74 L/s*** of flow has been allotted to the development lands.

4.2 Wastewater Design

It is anticipated that the contemplated development will connect to the existing 375 mm sanitary sewer within the Maple Grove Road right-of-way in the vicinity of the Johnwoods Street and Maple Grove Road intersection. A conceptual Site Servicing Plan (***SSP-1***) is included in ***Drawings/Figures***.

Table 4 summarizes the ***City Standards*** employed in the design of the preliminary wastewater sewer system.

Table 4
Wastewater Design Criteria

Design Parameter	Value
Single Family Home (Existing)	3.4 P/unit
Residential Townhomes	2.7 P/unit
Residential 1 Bedroom Apartment	1.4 P/unit
Residential 2 Bedroom Apartment	2.1 P/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0 Harmon Correction Factor 0.8
Infiltration and Inflow Allowance	0.28L/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	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012.	

Table 5 demonstrates the anticipated peak flow from the Scenario Two proposed development. See ***Appendix C*** for associated calculations.

Table 5
Summary of Anticipated Peak Wastewater Flow

Design Parameter	Total Flow (L/s)
Estimated Average Dry Weather Flow	3.85
Estimated Peak Dry Weather Flow	12.32
Estimated Peak Wet Weather Flow	14.21

The estimated peak wet weather sanitary flow, based on the concept plan provided in ***Drawings/Figures,*** is ***14.21 L/s***. As a result, there is a proposed ***1.47 L/s*** increase in peak wet weather sanitary flow from the contemplated development. See ***Appendix C*** for associated calculations.

As part of the Maple Grove Reconstruction, a sanitary analysis was conducted and is outlined by the *Sanitary Drainage Plan* prepared by David Schaeffer Engineering Ltd. (Project No. 10-451) dated July 2011.

Based on the sanitary analysis, the controlling section of the local sewer system is located at the intersection of Maple Grove Road and Santolina Street (section 105A-106A) with an available residual capacity of ***32.0 L/s***. The Sanitary Drainage Plan and associated calculation sheet are included in ***Appendix C***.

The analysis above indicates that sufficient capacity is available in the local sewers to accommodate the estimated ***1.47 L/s*** increase in peak wet weather sanitary flow from the contemplated development.

4.3 Wastewater Servicing Conclusions

Contemplated by the ***KWPS Memo*** prepared by Stantec Consulting Ltd., the site lies within the Kanata West Pump Station collection area.

Based on the sanitary analysis prepared by David Schaeffer Engineering Ltd. in support of the Maple Grove road reconstruction, sufficient capacity is available in the local sewers to accommodate the anticipated ***14.21 L/s*** peak wet weather flow from the contemplated development.

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

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

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

Flows that influence the watershed in which the subject property is located are further reviewed by the principal authority. The subject property is located within the Carp River watershed, and is therefore subject to review by the MVCA.

The ***KWMSS*** contemplated the site to be services via a 1950 mm diameter storm sewer running within the Maple Grove Road right-of-way, as shown by the *Model Schematic Storm Drainage Major System* (***ST-MJ***) drawing located in ***Appendix D.*** The ultimate outlet of the storm sewers servicing the site is the ***KWMSS*** stormwater management facility Pond 4, constructed in 2015.

Minor system storm sewer criteria for the site is outlined by *Storm Drainage Plan* prepared by David Schaeffer Engineering Ltd. (Project No. 12-644) in support of the Pond 4 construction, where the site is located within the 17.39ha of Area A6 (A-1).

Major system flow is discussed in *Section 5.10* of the ***KWMSS***. As shown by ***ST-MJ*** included in ***Drawings/Figures***, the site is included in drainage area A-1. This drainage area is surrounded by arterial roads on two sides; per City standards, no overland flow is permitted to cross arterial roads during a 100-year event. Therefore, A-1 is required to contain the 100-year storm onsite. Storage methods anticipated are discussed in section ***5.3***.

As indicated by the ***KWMSS***, the subject site is to meet a target infiltration rate of 104 mm/yr and 73 mm/yr for areas with moderate and low recharge, respectively. To meet these infiltration rates, the following best management practices (BMP's) are recommended:

- Subsurface Infiltration;
- Biofilters;
- Wet ponds; and
- Dry ponds.

5.2 Post-development Stormwater Management Target

Stormwater management requirements for the proposed development were contemplated within the ***KWMSS*** and within the ***KWMSS*** Pond 4 design prepared by David Schaeffer Engineering Ltd., where the proposed development is required to:

- Meet an allowable release rate based on a Rational Method Coefficient of 0.60, employing the City of Ottawa IDF parameters for a 5-year storm with a time of concentration equal to 15 minutes;
- Attenuate all storms up to and including the City of Ottawa 100-year design event on site. Sufficient volume to contain 100-year event onsite is required;
- Quality controls are not anticipated as the outlet to the site is the ***KWMSS*** Pond 4.

Based on the above, the allowable release rate for the proposed development is ***937.1 L/s***.

5.3 Proposed Stormwater Management System

It is contemplated that the stormwater outlet from the proposed development will be to the 2100 mm diameter storm sewer within Maple Grove Road, as shown by ***ST-MJ*** located in ***Appendix D***. A conceptual Site Servicing Plan (***SSP-1***) is included in ***Drawings/Figures***.

To meet the stormwater objectives the proposed development may contain a combination of roof top flow attenuation along with surface and subsurface storage.

Table 6 summarizes post-development flow rates. The following storage requirement estimate assumes that approximately 10% of the development area will be directed to the outlet without flow attenuation. These areas will be compensated for in areas with flow attenuation controls.

Table 6
Stormwater Flow Rate Summary

Control Area	5-Year Release Rate	5-Year Storage	100-Year Release Rate	100-Year Storage
	(L/s)	(m^3)	(L/s)	(m^3)
Unattenuated Areas	117	0	250	0
Attenuated Areas	321	470	687	1005
Total	**438**	**470**	**937**	**1005**

It is anticipated that approximately ***1,005 m^3*** of storage will be required on site to attenuate flow to the established release rate of ***937.1 L/s***; storage calculations are contained within ***Appendix D***.

Actual storage volumes will need to be confirmed at the detailed design stage based on a number of factors, including grading constraints.

5.4 Stormwater Servicing Conclusions

Post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm in accordance with the *Storm Drainage Plan* prepared by David Schaeffer Engineering Ltd. (Project No. 12-644) in support of the Pond 4 construction. The post-development allowable release rate was calculated as ***937.1 L/s***, it is estimated that ***1,005 m³*** of storage will be required to meet this release rate.

Quality controls are not anticipated as the outlet to the site is the ***KWMSS*** Pond 4.

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

6.0 CONCLUSION AND RECOMMENDATIONS

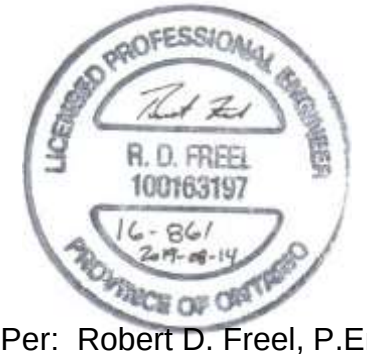
David Schaeffer Engineering Ltd. (DSEL) has been retained by Formasian Development Corp. to prepare a Functional Servicing and Stormwater Management report in support of the application for Sub-division at 1919 Maple Grove Road. The preceding report outlines the following:

- Based on boundary conditions provided by the City, the existing municipal water infrastructure is capable of providing the contemplated development with water within the City's required pressure range;
- The FUS method for estimating fire flow indicated ***16,000 L/min*** is required for the contemplated development;
- The contemplated Scenario Two development is anticipated to have a peak wet weather flow of ***14.21 L/s***. Based on the sanitary analysis conducted, the existing municipal sewer infrastructure has sufficient capacity to support the development;
- Post development stormwater runoff will be required to be restricted to the allowable target release rate for storm events up to and including the 100-year storm, in accordance with the *Storm Drainage Plan* prepared by David Schaeffer Engineering Ltd. (Project No. 12-644) in support of the Pond 4 construction. As a result, the post-development allowable release rate was calculated as ***937.1 L/s***;
- It is contemplated that stormwater objectives may be met through storm water retention via roof top, surface and subsurface storage. It is anticipated that ***1,005 m^3*** of onsite storage will be required to attenuate flow to the established release rate above;
- Quality controls are not anticipated as the outlet to the site is to the ***KWMSS*** Pond 4;
- The Ministry of the Environment, Conservation and Parks (MOECP) requires an Environmental Compliance Application (ECA) for new storm and sanitary sewers within the future municipal right-of-ways.

Prepared by,
David Schaeffer Engineering Ltd.

Per: Alison J. Gosling, EIT.

Reviewed by,
David Schaeffer Engineering Ltd.



Per: Robert D. Freel, P.Eng.

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APPENDIX A

Pre-Consultation

DEVELOPMENT SERVICING STUDY CHECKLIST

16-861 09/08/2019

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	Report Cover Sheet
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Drawings/Figures
☒	Plan showing the site and location of all existing services.	Figure 1
☒	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 1.1, 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.	Section 2.1
☒	All preliminary and formal site plan submissions should have the following information: -Metric scale -North arrow (including construction North) -Key plan -Name and contact information of applicant and property owner -Property limits including bearings and dimensions -Existing and proposed structures and parking areas -Easements, road widening and rights-of-way -Adjacent street names	Drawings/Figures

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 3.2
☒	Confirmation of adequate domestic supply and pressure	Section 3.2, 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 5.2
☐	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.	N/A
☐	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 5.1
☐	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 7.0
☐	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

Formasian Development Corp.
1919 Maple Grove Road
Proposed Site Conditions - Scenario One

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	36	98
Townhouse	2.7	39	106
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4	230	322
2 Bedroom	2.1	230	483
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	1009	282.5	196.2	706.3	490.5	1553.9	1079.1

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	2.5 $L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	0.0	0.0	0.0	0.0	0.0	0.0
		Total Demand	**282.5**	**196.2**	**706.3**	**490.5**	**1553.9**	**1079.1**

Formasian Development Corp.
1919 Maple Grove Road
Proposed Site Conditions - Scenario Two

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	36	98
Townhouse	2.7	39	106
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4	460	644
2 Bedroom	2.1	160	336
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	1184	331.5	230.2	828.8	575.6	1823.4	1266.2

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	2.5 $L/m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Office	75 $L/9.3m^2/d$		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Light	35,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
Industrial - Heavy	55,000 L/gross ha/d		0.00	0.0	0.0	0.0	0.0	0.0
		Total I/CI Demand	0.0	0.0	0.0	0.0	0.0	0.0
		Total Demand	**331.5**	**230.2**	**828.8**	**575.6**	**1823.4**	**1266.2**

Fire Flow Estimation per Fire Underwriters Survey

Water Supply For Public Fire Protection - 1999

Fire Flow Required

SOUTH WEST CENTRAL APARTMENT BUILDING

1. Base Requirement

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

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

Type of Construction: Ordinary Construction

C	1		*Type of Construction Coefficient per FUS Part II, Section 1*
A	8064.0	m^2	*Total floor area based on FUS Part II section 1*

Fire Flow	19756.0	L/min	
	20000.0	**L/min**	*rounded to the nearest 1,000 L/min*

2. Reduction for Occupancy Type

Limited Combustible	-15%	
Fire Flow	**17000.0**	**L/min**

3. Reduction for Sprinkler Protection

Sprinklered - Supervised	-50%	
Reduction	**-8500**	**L/min**

4. Increase for Separation Distance

	Cons. of Exposed Wall	S.D	Lw	Ha	LH	EC
N	Ordinary - Unprotected Openings	10.1m-20m	31	4	124	15%
S	Ordinary - Unprotected Openings	20.1m-30m	14	3	42	7%
E	Ordinary - Unprotected Openings	10.1m-20m	60	4	240	15%
W	Ordinary - Unprotected Openings	20.1m-30m	21	4	84	8%
		% Increase				**45%** *value not to exceed 75%*

Increase	**7650.0**	**L/min**

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

Total Fire Flow

Fire Flow	16150.0	L/min	*fire flow not to exceed 45,000 L/min nor be less than 2,000 L/min per FUS Section 4*
	16000.0	**L/min**	*rounded to the nearest 1,000 L/min*

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

Boundary Conditions Unit Conversion

	Height (m)	Elevation (m	m H_2O	PSI	kPa
Avg. DD	160.8	107.3	53.5	76.1	524.8
Fire Flow	151.1	107.3	43.8	62.3	429.7
Peak Hour	157.2	107.3	49.9	71.0	489.5

BOUNDARY CONDITIONS

Boundary Conditions For: 1919 Maple Grove

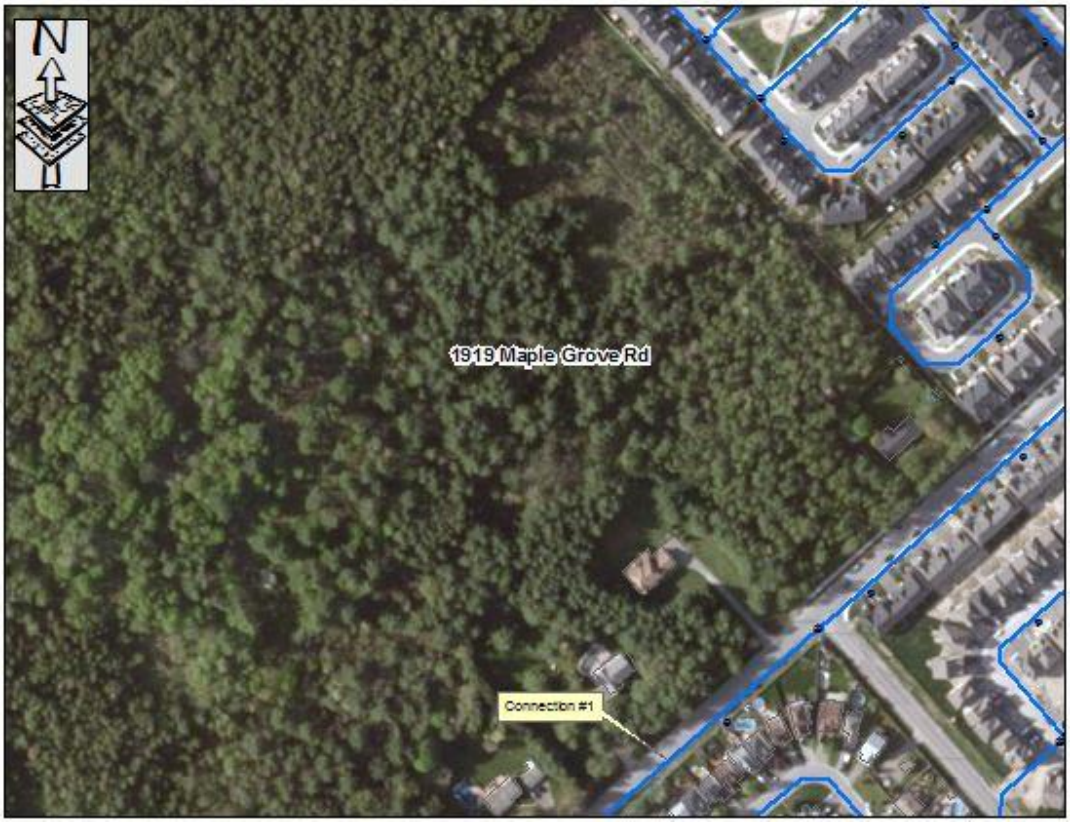
Date of Boundary Conditions: 2018-Jun-27

Provided Information:

Scenario	Demand	
	L/min	L/s
Average Daily Demand	288.6	3.8
Maximum Daily Demand	571.2	9.5
Peak Hour	1256.4	20.9
Fire Flow #1 Demand	16000	266.7

Number Of Connections: 1

Location:



BOUNDARY CONDITIONS

Results:

Connection #: 1

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.8	73.2
Peak Hour	157.2	68.2
Max Day Plus Fire (16,000) L/min	151.1	59.5

[1]Elevation: **109.27**

Notes:

1) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:

a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.

2) Two connections on two different Watermains are expected to be installed for 50 units or more. Alternatively two connections on the same main with a separation valve in between connections to be installed.

Disclaimer

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

Watermain Final Concept

Kanata West Master Servicing Study

Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
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www.stantec.com

Stantec

Legend

- KANATA–WEST CONCEPT PLAN BOUNDARY
- EXISTING WATERMAIN
- EXISTING 610mm WATERMAIN TO BE UPGRADED TO 914mm
- EXISTING 610mm WATERMAIN TO BE UPGRADED TO 762mm
- PROPOSED 610mm DIA. WATERMAIN
- PROPOSED 406mm DIA. WATERMAIN
- PROPOSED 305mm DIA. WATERMAIN
- PROPOSED 203mm DIA. WATERMAIN

Notes

INTERNAL WATERMAIN SIZE ARE EXPECTED TO VARY FROM 152mm TO 305mm.

CCL/IBI

5	REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
4	REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05
3	REVISED WATER DISTRIBUTION NETWORK	GBU	S.J.P.	AUG 09/05
2	REVISED POND 1 AREA	NB	MAF	JUNE 09/05
1	REVISED LOTTING FOR TARTAN AND MATTAMY	BCB	SJP	JAN.18/05
Revision		By	Appd.	Date

File Name:

Dsn. Chkd. Dsgn. Date

Seals

Client/Project

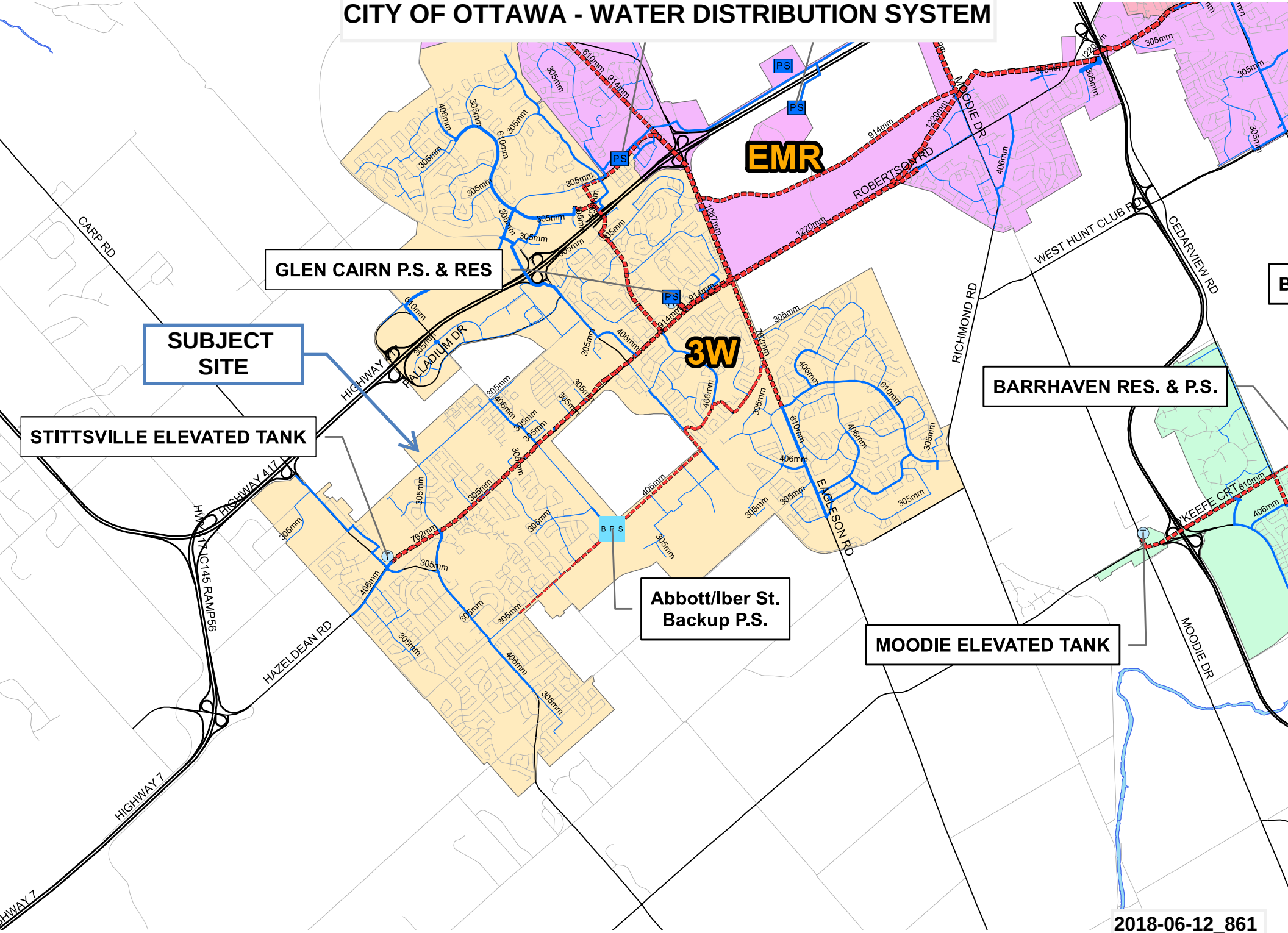
Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Watermain
Final Concept

Project No.	Scale	Sheet	Revision
60400406	1:7500 (0, 75, 225, 375m)		
Drawing No.			
WM-1		2 of 7	5


CITY OF OTTAWA - WATER DISTRICT SYSTEM
EMR
3W
GLEN CAIRN P.S. & RES
SUBJECT SITE
STITTSVILLE ELEVATED TANK
BARRHAVEN RES. & P.S.
Abbott/Iber St. Backup P.S.
MOODIE ELEVATED TANK
CARP RD
HIGHWAY 417
HWY 417 IC145 RAMP56
HAZELDEAN RD
HIGHWAY 7
PALLADIUM DR
ROBERTSON RD
MOODIE DR
WEST HUNT CLUB RD
CEDARVIEW RD
RICHMOND RD
EAGLESON RD
O'KEEFE CRT
PS
B P S
2018-06-12_861

APPENDIX C

Wastewater Collection

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

Site Area 6.730 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **1.88 L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	1	4
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		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

Total Pop **4**

Average Domestic Flow **0.01 L/s**

Peaking Factor **3.76**

Peak Domestic Flow **0.05 L/s**

Institutional / Commercial / Industrial Contributions

Property Type	**Unit Rate**		**No. of Units**	**Avg Wastewater (L/s)**
Commercial floor space	5	$L/m^2/d$		0.00
Ex. Industrial - Light	35,000	L/gross ha/d		0.00
Industrial - Light	35,000	L/gross ha/d		0.00
Industrial - Heavy	55,000	L/gross ha/d		0.00

Average I/C/I Flow **0.00**

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

peak factor flow per City of Ottawa Sewer Design Guidelines Tehnical Bulletin ISTB-2018-01

Total Estimated Average Dry Weather Flow Rate	**0.01 L/s**
Total Estimated Peak Dry Weather Flow Rate	**0.05 L/s**
Total Estimated Peak Wet Weather Flow Rate	**1.93 L/s**

Formasian Development Corp.
1919 Maple Grove Road
Proposed Development - Scenario One

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

Site Area 6.73 **ha**

Extraneous Flow Allowances

Infiltration / Inflow **1.88 L/s**

Domestic Contributions

Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	1	4
Semi-detached and duplex	2.7	36	98
Townhouse	2.7	39	106
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	230	322
2 Bedroom	2.1	230	483
3 Bedroom	3.1		0

Total Pop **1013**

Average Domestic Flow **3.28 L/s**

Peaking Factor **3.24**

Peak Domestic Flow **10.63 L/s**

Total Estimated Average Dry Weather Flow Rate	**3.28 L/s**
Total Estimated Peak Dry Weather Flow Rate	**10.63 L/s**
Total Estimated Peak Wet Weather Flow Rate	**12.51 L/s**

Formasian Development Corp.
1919 Maple Grove Road
Proposed Development - Scenario Two

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

Site Area 6.73 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**1.88**	**L/s**

Domestic Contributions

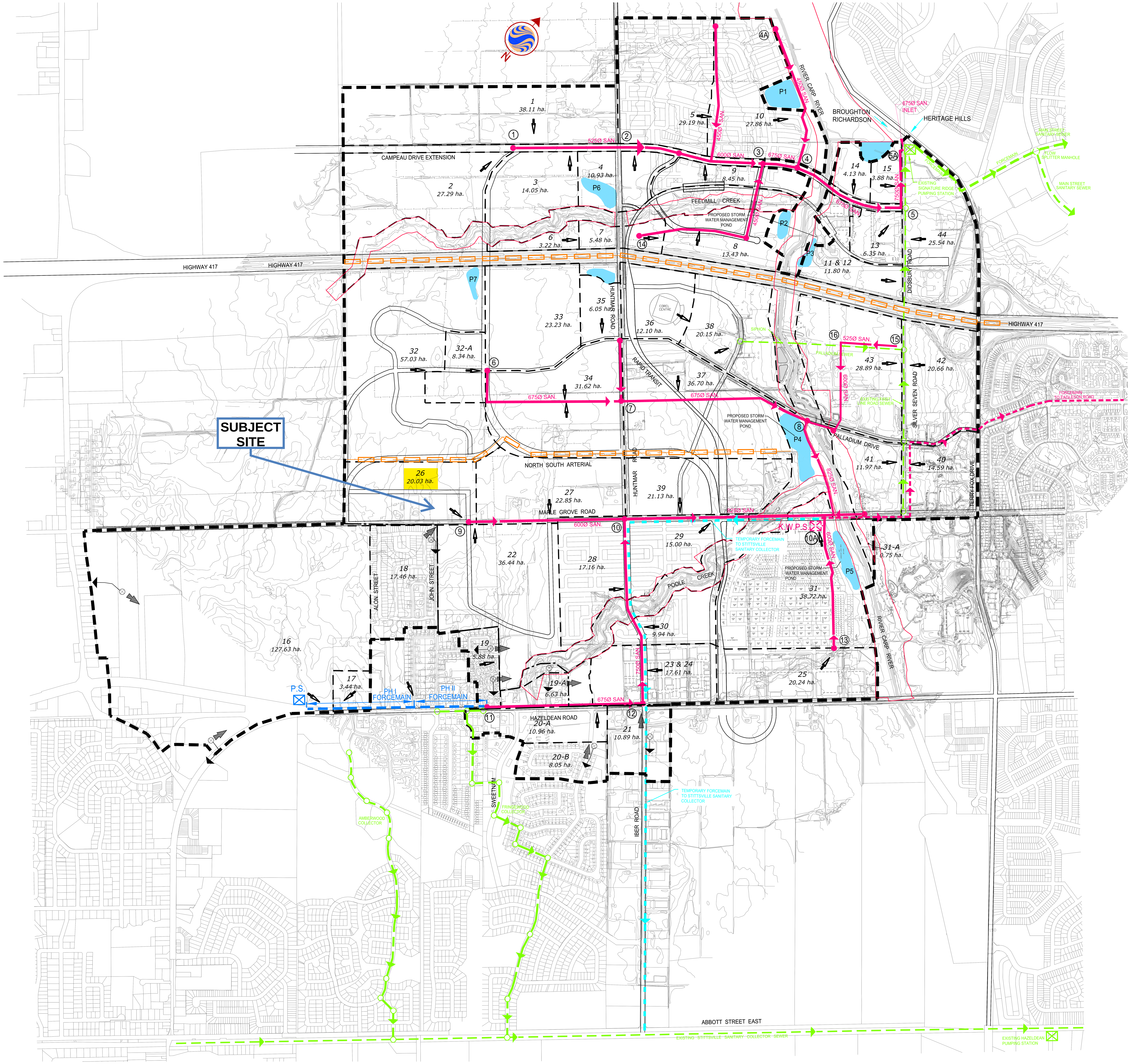
Unit Type	**Unit Rate**	**Units**	**Pop**
Single Family	3.4	1	4
Semi-detached and duplex	2.7	36	98
Townhouse	2.7	39	106
Stacked Townhouse	2.3		0
Apartment			
Bachelor	1.4		0
1 Bedroom	1.4	460	644
2 Bedroom	2.1	160	336
3 Bedroom	3.1		0
Average	1.8		0

Total Pop	**1188**	
Average Domestic Flow	**3.85**	**L/s**
Peaking Factor	**3.20**	
Peak Domestic Flow	**12.32**	**L/s**

Total Estimated Average Dry Weather Flow Rate	**3.85**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**12.32**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**14.21**	**L/s**

Preferred Waste-Water Master Servicing Study

Kanata West Master Servicing Study



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www.stantec.com

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

Legend

- ULTIMATE MAJOR DRAINAGE LIMIT
- SUBCATCHMENT AREAS
- PROPOSED TRUNK SEWER
- PROPOSED FORCEMAIN
- TEMPORARY FORCEMAIN
- PROPOSED STITTSVILLE PUMPING STATION AND FORCEMAIN
- EXISTING TRUNK SEWER
- MAJOR DRAINAGE SPLIT
- NODES
- EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
- 44 25.54 ha. INPUT POINT AND AREA IN HECTARES
- EXISTING PUMPING STATION GRAVITY OUTLET

Revision		By	Appd.	Date
5	REVISED FOR DEC.21/05 SUBMISSION	G.B.U.	S.J.P.	05:12:21
4	REVISED TRUNK SEWER FROM 16 TO KWPS	R.W.W.	R.W.W.	05:10:05
3	ARROWS FOR EXIST. PUMP STATIONS ADDED	R.W.W.	R.W.W.	05:08:09
2	REPORT JUNE 2005	R.W.W.	R.W.W.	05:06:07
1	REPORT APR. 2005	R.W.W.	R.W.W.	05:04:20

File Name:

Dwn. Chkd. Dsgn. Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Preferred Waste-Water Option

Project No. 60400406

Scale 1:7500 (0 75 225 375m)

Drawing No. S-I

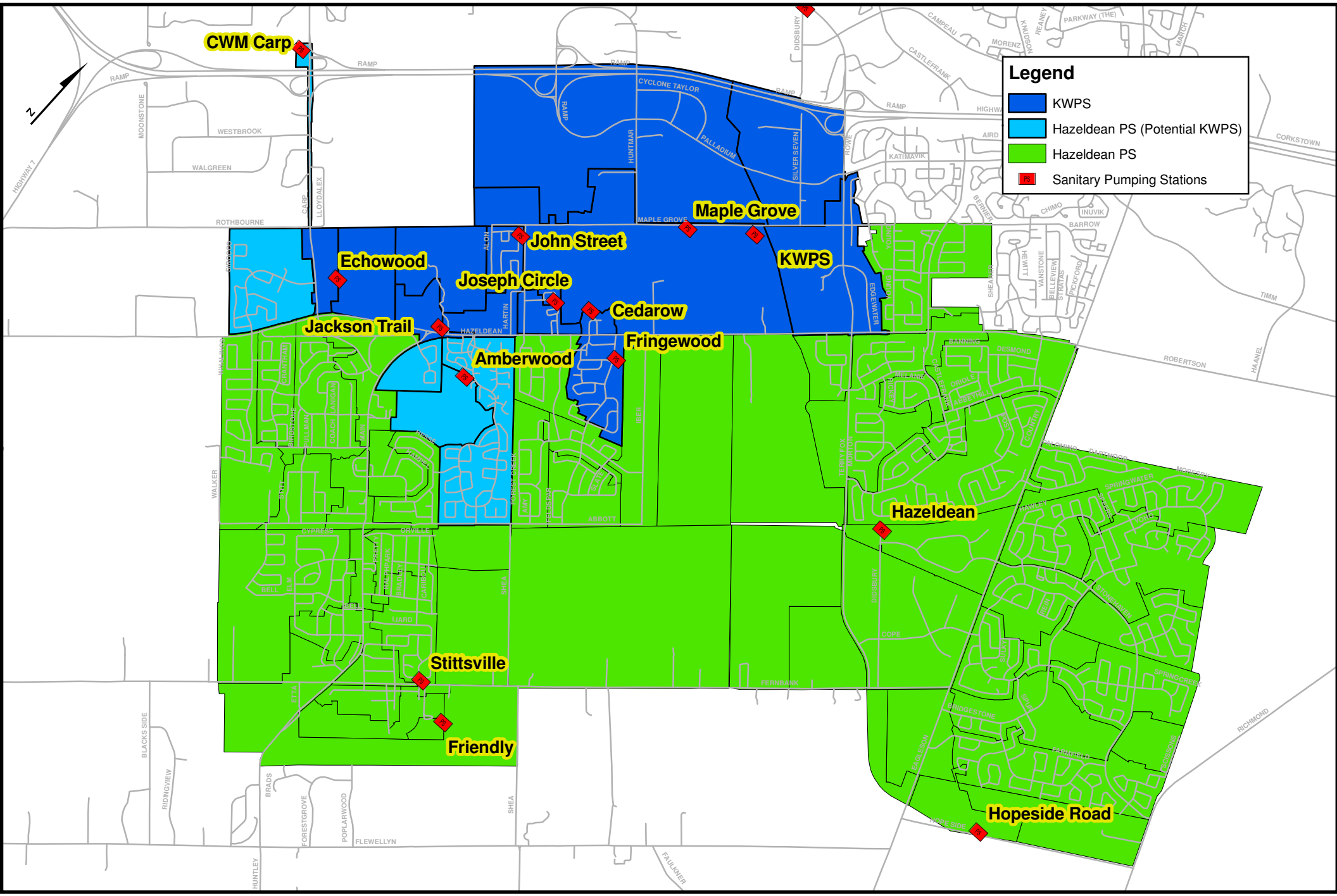
Sheet 7 of 7

Revision 5

KWMSS Drainage Allocations

Stantec Consulting Ltd.

August 2012
1634-01026



1:40,000

0 500 1,000 2,000 Meters

Stantec

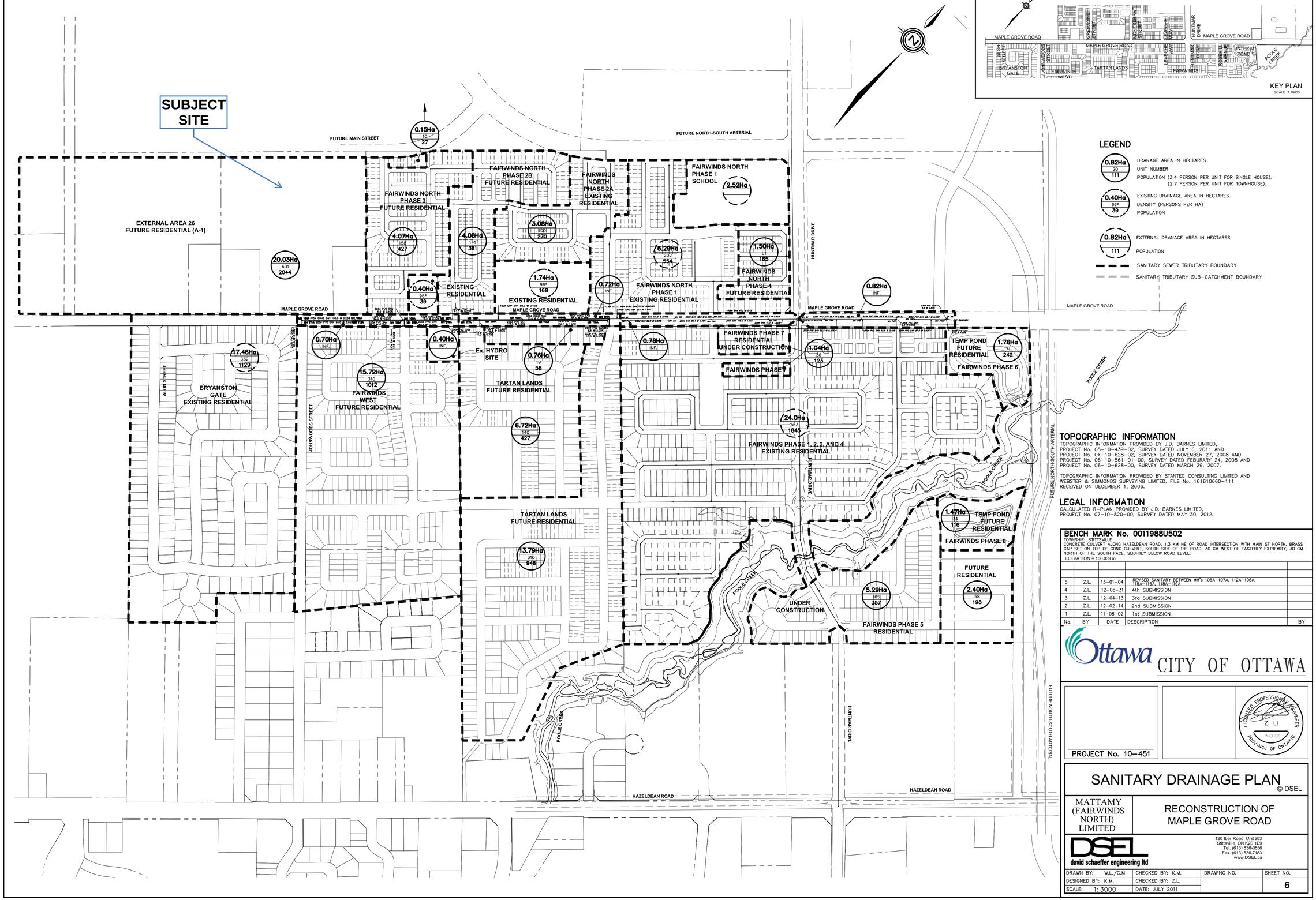
Client/Project City of Ottawa
WUCWC (1634-01026)

Figure No. 2

Title KWMSS Drainage Allocations

Sanitary Drainage Plan (Project No. 10-451)
Reconstruction of Maple Grove Road

David Schaeffer Engineering



LEGEND

- 0.82Ha / 20 / 111 — DRANAGE AREA IN HECTARES; UNIT NUMBER; POPULATION (3.4 PERSON PER UNIT FOR SINGLE HOUSE). (2.7 PERSON PER UNIT FOR TOWNHOUSE).
- 0.40Ha / 96* / 39 — EXISTING DRAINAGE AREA IN HECTARES; DENSITY (PERSONS PER HA); POPULATION
- 0.82Ha / 111 — EXTERNAL DRANAGE AREA IN HECTARES; POPULATION
- SANITARY SEWER TRIBUTARY BOUNDARY
- SANITARY TRIBUTARY SUB-CATCHMENT BOUNDARY

TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 05-10-439-02, SURVEY DATED JULY 6, 2011 AND
PROJECT No. 04-10-628-02, SURVEY DATED NOVEMBER 27, 2008 AND
PROJECT No. 06-10-561-01-00, SURVEY DATED FEBURARY 24, 2008 AND
PROJECT No. 06-10-628-00, SURVEY DATED MARCH 29, 2007.

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC CONSULTING LIMITED AND WEBSTER & SIMMONDS SURVEYING LIMITED, FILE No. 161610660-111 RECEIVED ON DECEMBER 1, 2006.

LEGAL INFORMATION

CALCULATED R-PLAN PROVIDED BY J.D. BARNES LIMITED,
PROJECT No. 07-10-820-00, SURVEY DATED MAY 30, 2012.

BENCH MARK No. 0011988U502

TOWNSHIP: STITTSVILLE
CONCRETE CULVERT ALONG HAZELDEAN ROAD, 1.3 KM NE OF ROAD INTERSECTION WITH MAIN ST NORTH. BRASS CAP SET ON TOP OF CONC CULVERT, SOUTH SIDE OF THE ROAD, 30 CM WEST OF EASTERLY EXTREMITY, 30 CM NORTH OF THE SOUTH FACE, SLIGHTLY BELOW ROAD LEVEL.
ELEVATION = 106.039 m

No.	BY	DATE	DESCRIPTION	BY
5	Z.L.	13-01-04	REVISED SANITARY BETWEEN MH's 105A-107A, 112A-106A, 115A-116A, 118A-119A	
4	Z.L.	12-05-31	4th SUBMISSION	
3	Z.L.	12-04-13	3rd SUBMISSION	
2	Z.L.	12-02-14	2nd SUBMISSION	
1	Z.L.	11-08-02	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 10-451

LICENSED PROFESSIONAL ENGINEER
Z. LI
PROVINCE OF ONTARIO

SANITARY DRAINAGE PLAN

MATTAMY (FAIRWINDS NORTH) LIMITED

RECONSTRUCTION OF MAPLE GROVE ROAD

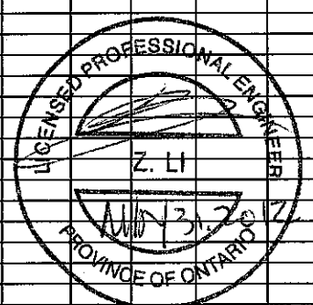
DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: W.L./C.M.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		6
SCALE: 1:3000	DATE: JULY 2011		

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INDUST		INSTIT		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)
MAPLE GROVE ROAD																											
			20.03	601	2044	20.03	2044										20.03	20.03									
	104A	105A	17.46	332	1129	37.49	3173	3.42	43.96								17.46	37.49	10.497	54.46	100.0	375	0.25	87.67	0.62	0.79	0.83
	105A	106A	0.70	0	0	38.19	3173	3.42	43.96								0.70	38.19	10.693	54.65	101.0	375	0.25	87.67	0.62	0.79	0.83
			0.40		39	38.59	3212										0.40	38.59									
			0.40	0	0	38.99	3212										0.40	38.99									
	106A	107A	15.72	310	1012	54.71	4224	3.31	56.64								15.72	54.71	15.319	71.96	70.0	450	0.20	127.50	0.56	0.80	0.82
	107A	108A	0.72	0	0	55.43	4224	3.31	56.64								0.72	55.43	15.520	72.16	63.0	450	0.20	127.50	0.57	0.80	0.82
	108A	109A	6.72	140	427	62.15	4651	3.27	61.61								6.72	62.15	17.402	79.01	80.0	450	0.40	180.32	0.44	1.13	1.09
	109A	1090A	1.74		168	63.89	4819	3.26	63.64								1.74	63.89	17.889	81.53	80.0	450	0.40	180.32	0.45	1.13	1.10
	1090A	110A				63.89	4819	3.26	63.64								0.00	63.89	17.889	81.53	83.0	450	0.40	180.32	0.45	1.13	1.10
			0.76	19	58	64.65	4877										0.76	64.65									
	110A	Ex. 88	13.79	310	946	78.44	5823	3.18	75.01								13.79	77.68	21.750	96.76	22.0	600	0.40	388.33	0.25	1.37	1.14
	Ex. 88	Ex. 89	0.78	0	0	79.22	5823	3.18	75.01								0.78	78.46	21.969	96.98	101.3	600	0.40	388.33	0.25	1.37	1.14
			4.07	158	427	83.29	6250										4.07	82.53									
			4.08	141	381	87.37	6631										4.08	86.61									
			3.08	100	270	90.45	6901										3.08	89.69									
			2.52			92.97	6901																				
			6.29	202	554	99.26	7455										6.29	95.98									
	Ex. 89	Ex. 89A	1.50	61	165	100.76	7620	3.07	94.76								1.50	97.48	27.294	122.05	72.8	600	0.40	388.33	0.31	1.37	1.21
	Ex. 89A	Ex. 90				100.76	7620	3.07	94.76								0.00	97.48	27.294	122.05	47.2	600	0.40	388.33	0.31	1.37	1.21
	Ex. 90	Ex. 91				100.76	7620	3.07	94.76								0.00	97.48	27.294	122.05	112.7	600	0.62	483.47	0.25	1.71	1.42
			0.82	0	0	101.58	7620										0.82	98.30									
			1.04	36	123	102.62	7743										1.04	98.52									
			1.76	71	242	104.38	7985										1.76	100.28									
			24.00	563	1845	128.38	9830										24.00	124.28									
			2.40	58	198	130.78	10028										2.40	126.68									
			5.29	105	357	136.07	10385										5.29	131.97									
	Ex. 91	Ex. 92	1.47	34	116	137.54	10501	2.93	124.64								1.47	133.44	37.363	162.00	96.1	825	0.28	759.56	0.21	1.42	1.12
	Ex. 92	Ex. 93				137.54	10501	2.93	124.64								0.00	133.44	37.363	162.00	88.9	825	0.51	1025.11	0.16	1.92	1.39
	Ex. 93	Ex. 94				137.54	10501	2.93	124.64								0.00	133.44	37.363	162.00	96.4	825	0.50	1015.01	0.16	1.90	1.39



DESIGN PARAMETERS

Average Daily Flow =	350	l/p/day	Industrial Peak Factor =	as per MOE Graph	
Commercial/Institution Flow =	50000	L/ha/da	Extraneous Flow =	0.280	L/s/ha
Industrial Flow =	35000	L/ha/da	Minimum Velocity =	0.760	m/s
Max Res. Peak Factor =	4.00		Manning's n =	0.013	
Commercial/Institution peak Factor =	1.50		Townhouse coeff=	2.7	
			Single house coeff=	3.4	

Designed: K.M.	PROJECT: RECONSTRUCTION OF MAPLE GROVE ROAD		
Checked: Z.L.	LOCATION: City of Ottawa		
Dwg. Reference: Sanitary Drainage Plan, Dwg. No. 6	File Ref: 10-451	Date: May, 2012	Sheet No. 1 of 1

APPENDIX D

Stormwater Management

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

Target Flow Rate

Area	6.73	ha
C	0.60	Rational Method runoff coefficient
t_c	15.0	min
	5-year	
i	83.6	mm/hr
Q	937.2	L/s

Estimated Post Development Peak Flow from Unattenuated Areas

Total Area	0.67	ha
C	0.60	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10.0	104.2	116.9	116.9	0.0	0.0	178.6	250.4	250.4	0.0	0.0

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

Estimated Post Development Peak Flow from Attenuated Areas

Total Area	6.06	ha
C	0.60	Rational Method runoff coefficient

	5-year					100-year				
t_c (min)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)	i (mm/hr)	Q_{actual} (L/s)	$Q_{release}$ (L/s)	Q_{stored} (L/s)	V_{stored} (m^3)
10	104.2	1051.8	320.6	731.2	438.7	178.6	2253.2	686.9	1566.3	939.8
15	83.6	843.5	321.3	522.2	470.0	142.9	1803.1	686.9	1116.3	1004.6
20	70.3	709.2	321.8	387.4	464.8	120.0	1513.6	686.9	826.7	992.1
25	60.9	614.7	322.2	292.5	438.8	103.8	1310.4	686.9	623.5	935.3
30	53.9	544.4	322.6	221.8	399.3	91.9	1159.3	686.9	472.4	850.3
35	48.5	489.8	322.9	166.9	350.6	82.6	1042.0	686.9	355.2	745.8
40	44.2	446.0	323.1	122.9	295.1	75.1	948.2	686.9	261.4	627.3
45	40.6	410.1	323.3	86.8	234.4	69.1	871.3	686.9	184.5	498.0
50	37.7	380.1	323.5	56.6	169.8	64.0	807.0	686.9	120.1	360.4
55	35.1	354.6	323.7	30.9	101.9	59.6	752.4	686.9	65.5	216.1
60	32.9	332.6	323.9	8.7	31.3	55.9	705.3	686.9	18.4	66.4
65	31.0	313.4	324.0	0.0	0.0	52.6	664.3	686.9	0.0	0.0
70	29.4	296.5	324.2	0.0	0.0	49.8	628.3	686.9	0.0	0.0
75	27.9	281.5	324.3	0.0	0.0	47.3	596.3	686.9	0.0	0.0
80	26.6	268.1	324.4	0.0	0.0	45.0	567.7	686.9	0.0	0.0
85	25.4	256.1	324.5	0.0	0.0	43.0	542.0	686.9	0.0	0.0
90	24.3	245.2	324.6	0.0	0.0	41.1	518.8	686.9	0.0	0.0
95	23.3	235.3	324.8	0.0	0.0	39.4	497.6	686.9	0.0	0.0
100	22.4	226.2	324.8	0.0	0.0	37.9	478.3	686.9	0.0	0.0
105	21.6	217.9	324.9	0.0	0.0	36.5	460.6	686.9	0.0	0.0
110	20.8	210.2	325.0	0.0	0.0	35.2	444.2	686.9	0.0	0.0

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

5-year $Q_{attenuated}$	**321.32 L/s**	**100-year $Q_{attenuated}$**	**686.88 L/s**
5-year Max. Storage Required	**470.0 m^3**	**100-year Max. Storage Required**	**1004.6 m^3**

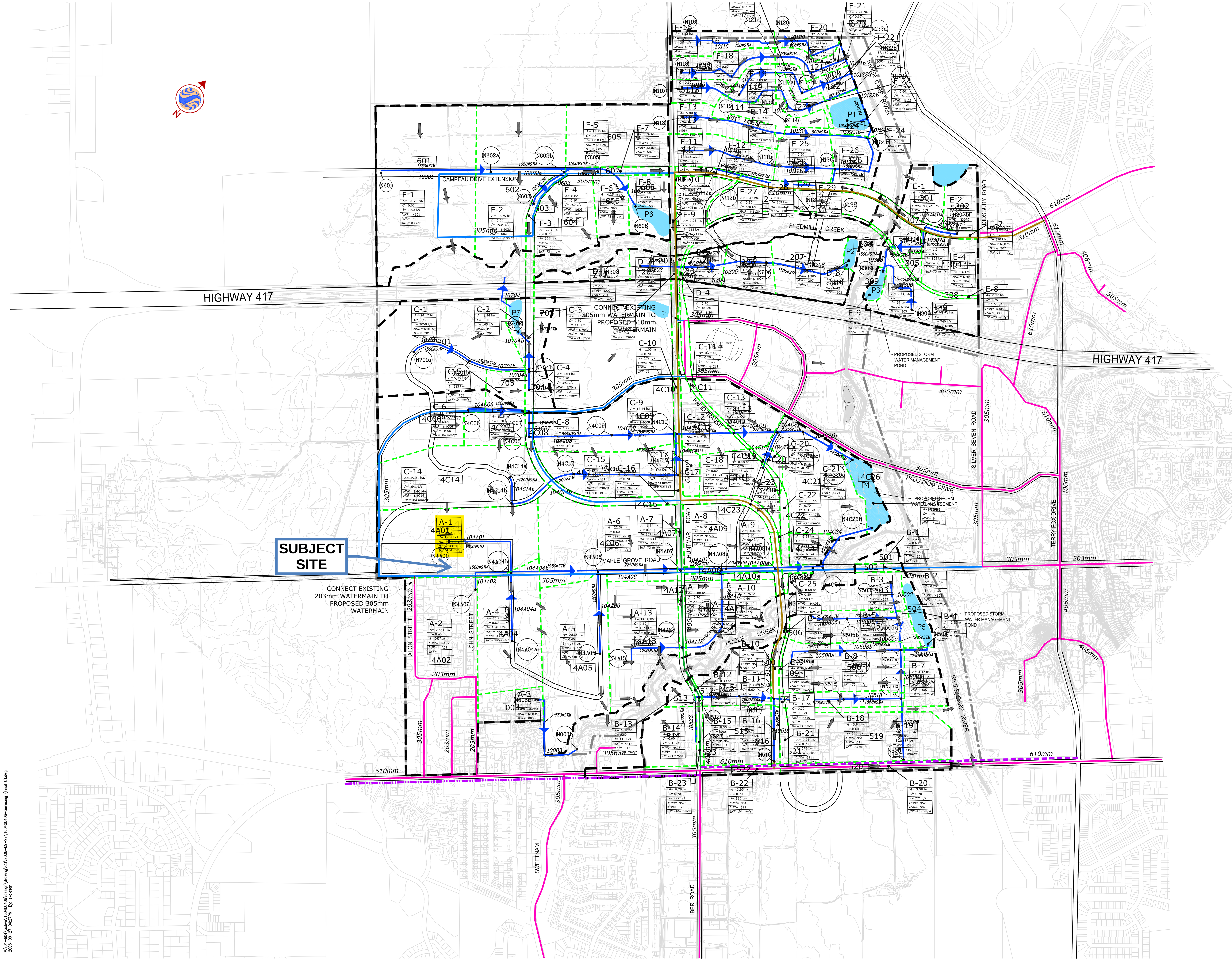
Summary of Release Rates and Storage Volumes

Control Area	5-Year Release Rate (L/s)	5-Year Storage (m^3)	100-Year Release Rate (L/s)	100-Year Storage (m^3)
Unattenuated Areas	117	0	250	0
Attenutated Areas	321	470	687	1005
Total	**438**	**470**	**937**	**1005**

								Sewer Data								
Area ID	**Area**	**C**	**Indiv AxC**	**Acc AxC**	**T_C**	**I**	**Q**	**DIA**	**Slope**	**Length**	**$A_{hydraulic}$**	**R**	**Velocity**	**Qcap**	**Time Flow**	**Q / Q full**
	(ha)	**(-)**			**(min)**	**(mm/hr)**	**(L/s)**	**(mm)**	**(%)**	**(m)**	**(m^2)**	**(m)**	**(m/s)**	**(L/s)**	**(min)**	**(-)**
A1	2.020	0.60	1.21	1.21	10.0	104.2	350.8	675	0.25	146	0.358	0.169	1.17	420.3	2.1	0.83
A2	0.178	0.60	0.11	1.32	12.1	94.4	345.8	675	0.25	56	0.358	0.169	1.17	420.3	0.8	0.82
					12.9											
A3	2.405	0.60	1.44	1.44	10.0	104.2	417.6	750	0.20	138	0.442	0.188	1.13	497.9	2.0	0.84
A4	0.128	0.60	0.08	1.52	12.0	94.5	399.0	750	0.20	11	0.442	0.188	1.13	497.9	0.2	0.80
A5	0.071	0.60	0.04	1.56	12.2	93.8	407.1	750	0.20	22.5	0.442	0.188	1.13	497.9	0.3	0.82
A6	0.112	0.60	0.07	1.63	12.5	92.5	418.4	750	0.20	40	0.442	0.188	1.13	497.9	0.6	0.84
					13.1											
A7	0.860	0.60	0.52	3.46	13.1	90.1	867.3	900	0.30	101	0.636	0.225	1.56	991.5	1.1	0.87
					14.2											
A8	0.444	0.60	0.27	0.27	10.0	104.2	77.1	375	0.25	101	0.110	0.094	0.79	87.7	2.1	0.88
			0.00	0.27	12.1	94.2	69.7	375	0.25	40	0.110	0.094	0.79	87.7	0.8	0.79
					13.0											
A9	0.460	0.60	0.28	4.01	14.2	86.2	959.4	900	0.40	36	0.636	0.225	1.80	1144.9	0.3	0.84
					14.5											

Storage Drainage Major System (ST-MJ)

Kanata West Master Servicing Study



Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

Legend

- KANATA-WEST CONCEPT PLAN BOUNDARY
- POND DRAINAGE BOUNDARY
- STORM SEWER DRAINAGE LIMIT
- OVERLAND FLOW DIRECTION
- 207 OVERLAND FLOW SEGMENT NUMBER

CCL/IBI
1770 WOODWARD DR., OTTAWA (613)225-1311

		By	Appd.	Date
2	REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
1	REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05

Revision

File Name: 160400406	LTM	MAF	MAF	AUG./05
	Dwn.	Chkd.	Dsgn.	Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

MODEL SCHEMATIC
STORM DRAINAGE MAJOR SYSTEM

Project No. 60400406

Scale 1:7500 (0 75 225 375m)

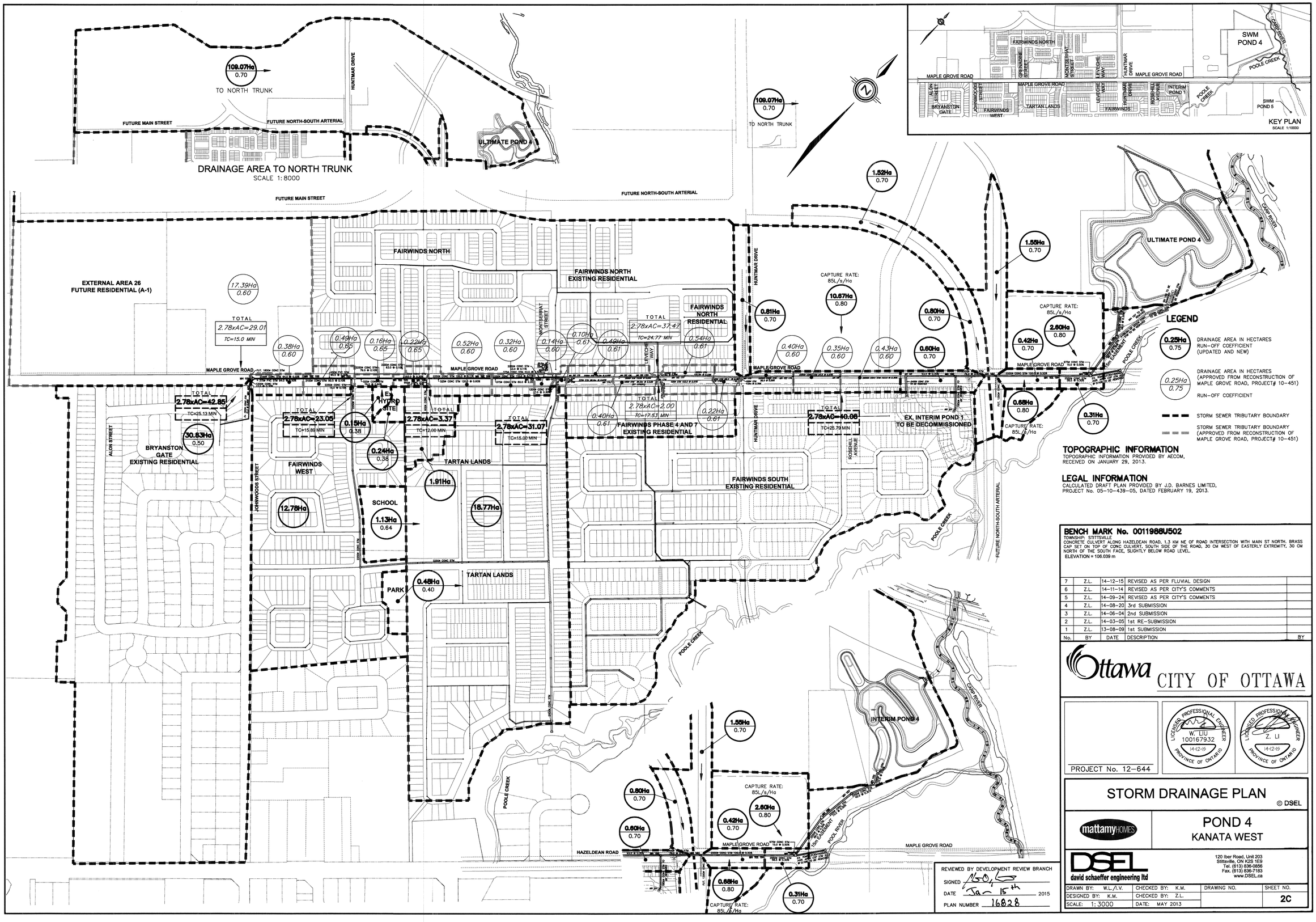
Drawing No. ST-MJ

Sheet 5 of 7

Revision 2

Storm Drainage Plan
Kanata West Pond 4

David Schaeffer Engineering Ltd.



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY AECOM, RECEIVED ON JANUARY 29, 2013.

LEGAL INFORMATION

CALCULATED DRAFT PLAN PROVIDED BY J.D. BARNES LIMITED, PROJECT No. 05-10-439-05, DATED FEBRUARY 19, 2013.

BENCH MARK No. 0011988U502

TOWNSHIP: STITTSVILLE
CONCRETE CULVERT ALONG HAZELDEAN ROAD, 1.3 KM NE OF ROAD INTERSECTION WITH MAIN ST NORTH. BRASS CAP SET ON TOP OF CONC CULVERT, SOUTH SIDE OF THE ROAD, 30 CM WEST OF EASTERLY EXTREMITY, 30 CM NORTH OF THE SOUTH FACE, SLIGHTLY BELOW ROAD LEVEL.
ELEVATION = 106.039 m

No.	BY	DATE	DESCRIPTION	BY
7	Z.L.	14-12-15	REVISED AS PER FLUVIAL DESIGN	
6	Z.L.	14-11-14	REVISED AS PER CITY'S COMMENTS	
5	Z.L.	14-09-24	REVISED AS PER CITY'S COMMENTS	
4	Z.L.	14-08-20	3rd SUBMISSION	
3	Z.L.	14-06-04	2nd SUBMISSION	
2	Z.L.	14-03-05	1st RE-SUBMISSION	
1	Z.L.	13-08-09	1st SUBMISSION	

CITY OF OTTAWA

PROJECT No. 12-644

W. LIU 100167932 14-12-15 PROVINCE OF ONTARIO

Z. LI 14-12-15 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

mattamyHOMES

POND 4
KANATA WEST

DSEL
david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

REVIEWED BY DEVELOPMENT REVIEW BRANCH
SIGNED
DATE Jan 15th 2015
PLAN NUMBER 16828

DRAWN BY: W.L./I.V.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		2C
SCALE: 1:3000	DATE: MAY 2013		

M:\12644\Subm_3\Drawings\02C_644_Strm_Drainage.dwg, 02C, 15/01/2015 11:59:01 AM, VY

DRAWINGS / FIGURES

NOT FOR CONSTRUCTION

TO BE DEVELOPED BY ADJOINING DEVELOPER

Line Between The North And South Halves Lot 1

Remains of Post & Wire Fence ± to Line

Street Widening

PARK
Area=6834 sqm

BLOCK 67

PARK (1594 m²)

4R-20914

BLOCK 66

BLOCK 58

BLOCK 64

BLOCK 65

BLOCK 63

BLOCK 69
Street Widening

4 STOREY RESIDENTIAL (987 m²)

4 STOREY RESIDENTIAL (1692 m²)

4 STOREY RESIDENTIAL (2016 m²)

STREET NO. 6

STREET NO. 5

STREET NO. 4

STREET NO. 3

STREET NO. 2

FRONT & BACK TOWNHOUSE

FRONT & BACK TOWNHOUSES

EASEMENT

2 Storey Dwelling (Concrete Foundation Noted)

Dwelling (Townhouse)

PART 1 PLAN 5R-7173

PART 1 PLAN 5R-11374

PART 1 PLAN 5R-6898

(HUNTLEY)

CENTERLINE OF ROAD

MAPLE GROVE ROAD

LOT 26 LOT 27 LOT 28 LOT 29 LOT 30 LOT 31 LOT 32 LOT 33 LOT 34 LOT 35 LOT 36 LOT 37

BLOCK 170
0.30 Reserve

REGISTERED PLAN 4M-864

REGISTERED PLAN 4M-756

MIKA STREET

JOHNWOODS STREET

1919 MAPLE GROVE ROAD

DEVELOPMENT CONCEPT PLAN

0 10 20 30 40 50 100 metres

SCALE : 1 : 750

DATE : 2016-02-20

NOT FOR CONSTRUCTION

TRUE NORTH

PROJECT NORTH

KEY PLAN:

110 ARCHITECTS
ARCHITECTURE + URBAN DESIGN INC.
110 ARTHUR STREET, OTTAWA, ONTARIO, CANADA, K1R 7C2
TEL 613-799-9117 E-mail: info@110architects.com

SEAL AND SIGNATURE:

CLIENT:
FORMATION DEVELOPMENT CORP.
1919 MAPLE GROVE ROAD
STITTSVILLE, ONTARIO K2S 1B9
TEL. (613) 836-[illegible]53
E-MAIL: vincel@formation.ca

PROJECT:
1919 MAPLE GROVE MASTER PLAN
1919 Maple Grove Road

DATE ISSUED	REV.	FOR SUBMISSION	BY
2018-05-11	13	MINOR REVISIONS	
2018-03-15	12	MINOR REVISIONS	
2018-03-06	11	MINOR REVISIONS	
2018-02-21	10	DRAFT FOR STUDIES	
2017-10-24	9	OPT- 3 (CITY COMMENTS)	
2017-09-25	8	OPT- 3 (CITY COMMENTS)	
2017-07-03	7	STREETSCAPE	
2017-06-27	6	EDITS & REDRAW	
2017-06-05	5	CHANGES - SURVEY	
2016-10-28	4	ADJUSTMENTS	
2016-10-23	3	DESIGN CHANGES	
2016-09-24	2	DESIGN CHANGES	
2016-09-19	1		
2016-09-18	0		

TITLE:
Site Plan

SCALE: AS NOTED
PROJECT No.: 010
DATE: SEPT 18, 2016
APPROVED BY: JG
DRAWN BY: TW / EL/ JG

NOT FOR CONSTRUCTION

A-004

NOT FOR CONSTRUCTION

Site Population Estimate

Phase	Building Types	Gross Building Area	Gross Floor Area	Storeys	bedrooms	p/unit	number of units	number of occupants
1	Front and Back Town Houses			3	2	2.7	12	33
2	Front and Back Town Houses			3	2	2.7	24	65
3	Semidetached and town homes			3	3	3.4	16	55
4	Semidetached and town homes			3	3	3.4	20	68
5	Apartment Buildings	8064	32256	4	1	1.4	160	224
					2	2.1	160	336
6	Apartment Buildings	3660	14640	4	1	1.4	70	98
					2	2.1	70	147
Total								**1026**

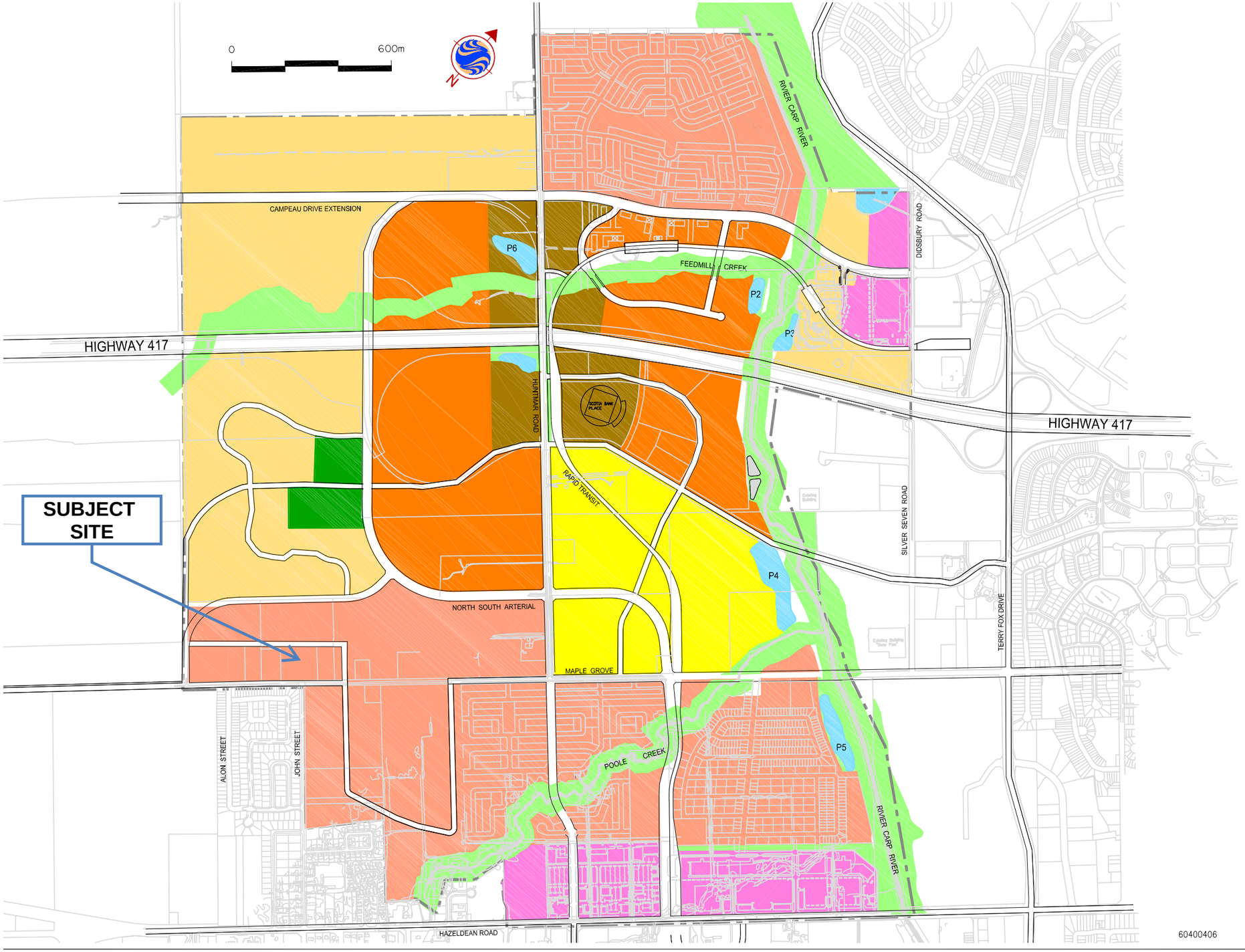
Site Population Estimate

Phase	Building Types	Gross Building Area	Gross Floor Area	Storeys	bedrooms	p/unit	number of units	number of occupants
1	Front and Back Town Houses			3	2	2.7	12	33
2	Front and Back Town Houses			3	2	2.7	24	65
3	Semidetached and town homes			3	3	3.4	16	55
4	Semidetached and town homes			3	3	3.4	20	68
5	Apartment Buildings	8064	32256	4	1	1.4	160	224
					2	2.1	160	336
6	Retirement Home	3660	14640	4	1	1.4	300	420
Total								**1201**

Kanata West Land Use (FIG. 2.1)

Kanata West Master Servicing Study

LAND USE PLAN



Kanata-West Concept Plan Boundary

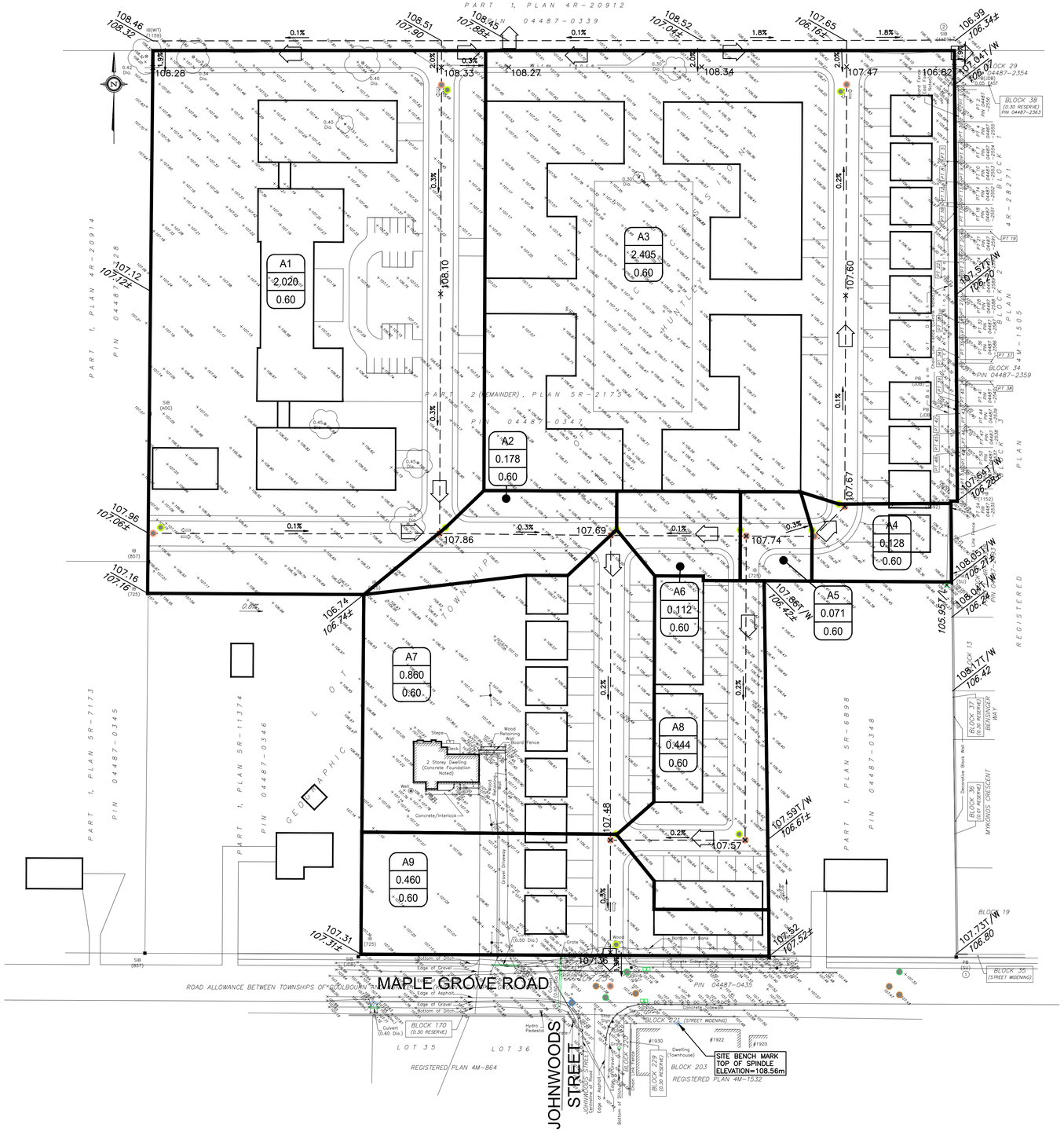
- PRESTIGE BUSINESS PARK
- OPEN SPACE
- COMMUNITY RETAIL
- DISTRICT PARK
- RESIDENTIAL
- MIXED USE
- HIGH PROFILE EMPLOYMENT
- EXTENSIVE EMPLOYMENT

Stantec

CCL/IBI
Cumming Cockburn Limited

MAY 2006

FIG. 2.1



LEGEND:

×100.00	EXISTING SPOT ELEVATION
+100.00	PROPOSED SPOT ELEVATION
1.0%	EXISTING GRADE AND DIRECTION
1.0%	PROPOSED GRADE AND DIRECTION
100.00 / 100.00	PROPOSED/EXISTING SPOT ELEVATION
	MAJOR SYSTEM FLOW ROUTE
	EXISTING STORM SEWER
	FUTURE STORM SEWER
	DRAINAGE DIVIDE
EX6 / 4.010 / 0.19	STORM DRAINAGE AREA

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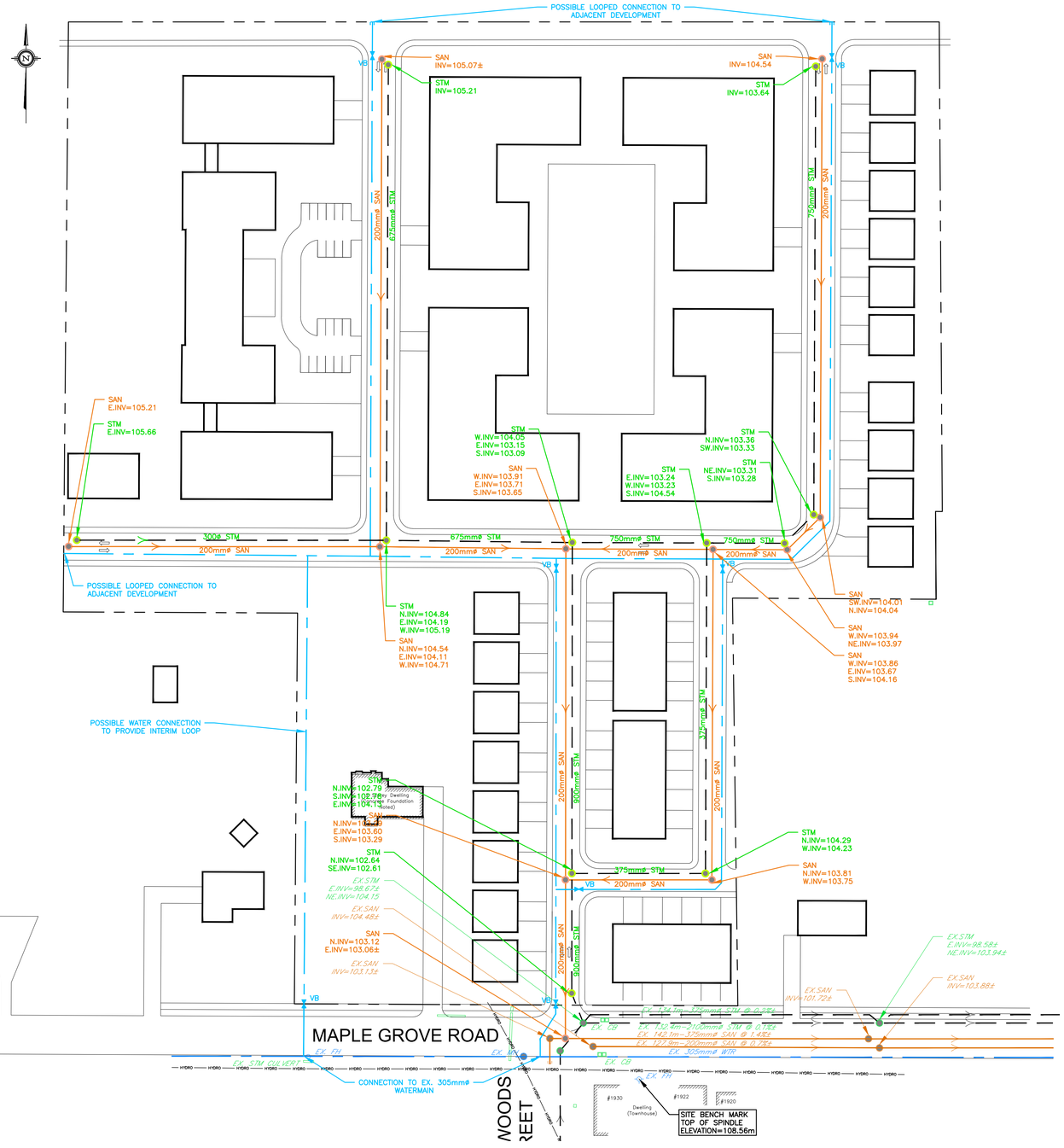
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

CONCEPTUAL GRADING & DRAINAGE PLAN
1919 MAPLE GROVE ROAD

PROJ NO.:	16-861
DRAWN BY:	AJG
DATE:	2019-08-14
SCALE:	1:750
FIGURE NO.:	GDP-1

z:\projects\16-861_formasiam-1919_maple_grove\b_design\b2_drawings\b2-2_main (dsel)\aes_sub1\cad\2019-08-14_861_ajg.dwg



LEGEND:

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- FUTURE WATERMAIN
- FUTURE SANITARY SEWER
- FUTURE STORM SEWER

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CONCEPTUAL SITE SERVICING PLAN
1919 MAPLE GROVE ROAD

PROJ NO.:	16-861
DRAWN BY:	AJG
DATE:	2019-08-14
SCALE:	1:750
FIGURE NO.:	SSP-1

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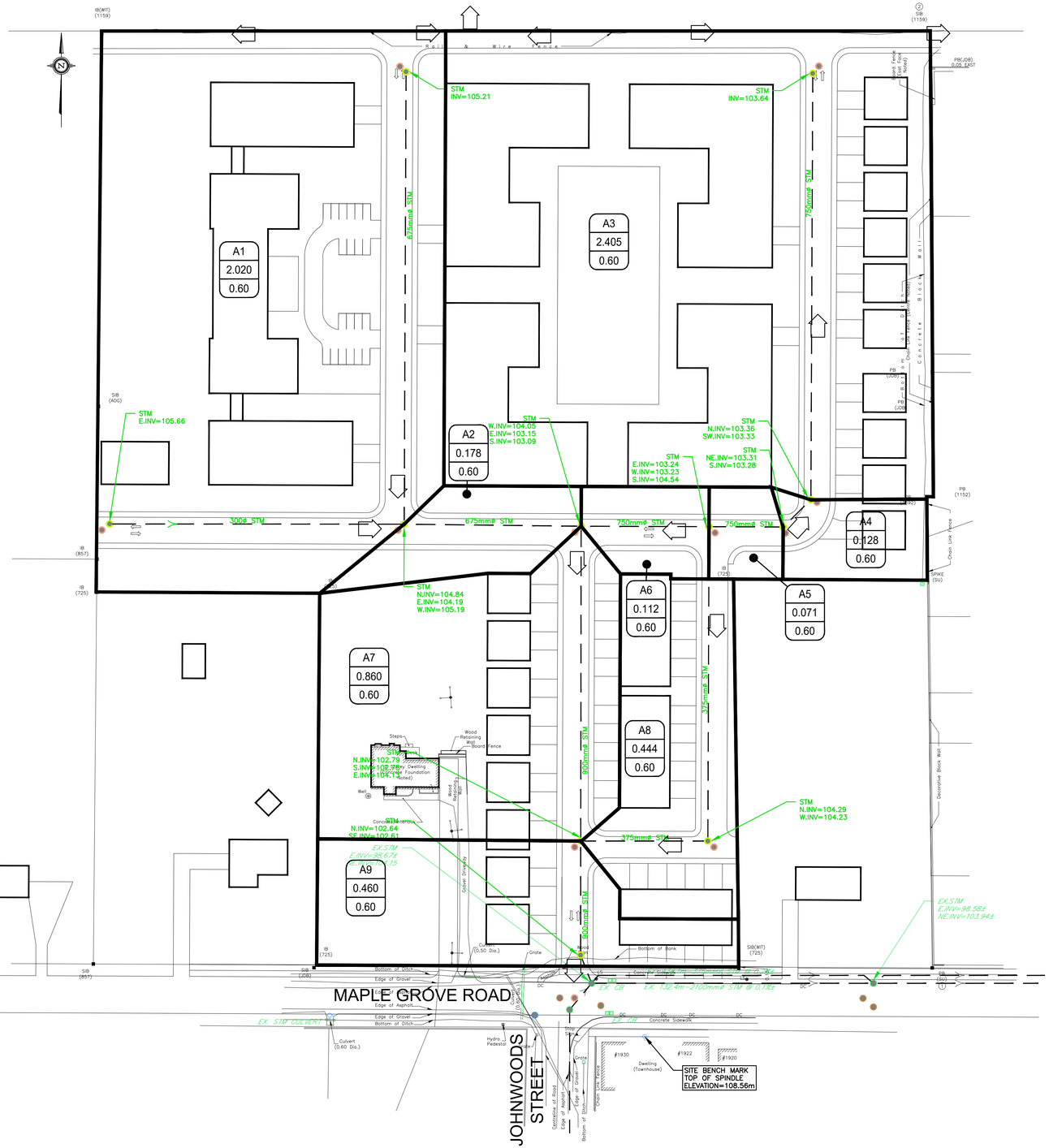

LEGEND:

- EXISTING STORM SEWER
- FUTURE STORM SEWER

EX6 / 4.010 / 0.19 — STORM DRAINAGE AREA

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CONCEPTUAL STORMWATER DRAINAGE PLAN
1919 MAPLE GROVE ROAD

PROJ NO.:	16-861
DRAWN BY:	AJG
DATE:	2019-08-14
SCALE:	1:750
FIGURE NO.:	SWM-1

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