david schaeffer engineering ltd

120 Iber Road, Suite 103
Ottawa, Ontario K2S 1E9
Tel. (613)836-0856
Fax (613) 836-7183
www.DSEL.ca

FUNCTIONAL SERVICING REPORT

FOR

GLENVIEW HOMES (CEDARVIEW) LTD.
3387 BORRISOKANE ROAD

CITY OF OTTAWA

PROJECT NO.: 15-809

MAY 2017 – REV 1

FUNCTIONAL SERVICING REPORT
FOR
GLENVIEW HOMES (CEDARVIEW) LTD.
3387 BORRISOKANE ROAD

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

Appendix A	• Servicing Guidelines Checklist (DSEL, May 2017) • Pre-Consultation Notes with City of Ottawa Staff (various) • City of Ottawa First Review Comments (City of Ottawa, December 2016) • Revised Concept Plan for 3387 Borrisokane (Stantec, April 7, 2017) • Responses to City of Ottawa First Review Comments (DSEL, May 2017)
Appendix B	• Excerpts from Barrhaven South Master Servicing Study (Stantec, November 2014) • Excerpts from Half Moon Bay West Functional Servicing Report (DSEL, December 2016)
Appendix C	• Water Demand Calculations (DSEL, April 2017)
Appendix D	• Sanitary Sewer Design Sheet (DSEL, April 2017)
Appendix E	• Sanitary Sewer Alternative Routing (DSEL, April 2017)
Appendix F	• Option 1, Stormwater Management Pond - Storm Sewer Design Sheet (DSEL, April 2016) • Stormwater Management Pond Design Sheet (DSEL, April 2017)
Appendix G	• Option 2, Oil Grit Separator Units - Storm Sewer Design Sheet (DSEL, April 2016) • Preliminary Sizing Information for Oil/Grit Separator Units (Various, September 2016)
Appendix H	• Proposed Sump Pump Detail (DSEL, September 2016) • Overview of Proposed Private Sump Pump Use (DSEL et al., March 2017)
Appendix I	• Excerpt from Mississippi-Rideau Source Water Protection Plan, Schedule M (MVCA & RVCA, August 2014)
Appendix J	• Original Cut/Fill Proposal (DSEL, July/August 2016)
Appendix K	• Natural Channel Corridor, per City of Ottawa and RVCA Recommendations (DSEL, April 2017)
Appendix L	• Update to Cut/Fill Analysis (DSEL, April 2017)

FUNCTIONAL SERVICING REPORT
FOR
GLENVIEW HOMES (CEDARVIEW) LTD.
3387 BORRISOKANE ROAD

MAY 2017 – REV 1

CITY OF OTTAWA
PROJECT NO.: 15-809

1.0 INTRODUCTION

David Schaeffer Engineering Limited (DSEL) has been retained to prepare a Functional Servicing Report in support of the Plan of Subdivision application for 3387 Borrisokane Road, which is owned by Glenview Homes (Cedarview) Ltd. (Glenview).

The subject property is located within the City of Ottawa urban boundary in the Barrhaven ward. As illustrated in ***Figure 1***, the subject property is located east of Borrisokane Road, south of the Jock River, and north of Cambrian Road. The subject property is one unique parcel (PIN 045951751) that measures approximately 20.13 ha.

The subject property is currently zoned Development Reserve (DR) Zone. The proposed concept plan would allow for the development of a commercial block, a school block, a park block, a stormwater management pond, a mix of low and medium density residential development, and a network of roads with a mix of 14.75m, 16.5m, 18m, and 24m right-of-way widths.

The subject property is within the study area of the *Barrhaven South Community Design Plan* (City of Ottawa, September 2006) and the associated *Barrhaven South Master Servicing Study* (MSS) (Stantec, June 2007) and *Draft Barrhaven South Master Servicing Study Addendum* (MSSA) (Stantec, November 2014). The MSS and MSSA were completed in order to provide a conceptual servicing strategy and cohesive development approach for the overall Barrhaven South development area. The MSS and MSSA identify existing infrastructure and environmental constraints, describe the neighbourhood-level trunk services that will service all properties within the study area, establish targets for future site-specific stormwater management plans, and identify required infrastructure upgrades to support the proposed development of the MSS area. Since completion of the MSS and MSSA, many of the identified neighbourhood-level infrastructure projects have been completed or are underway, including stormwater management ponds and trunk sewers. For the purpose of this Functional Servicing Report, the November 2014 *Draft Barrhaven South Master Servicing Study Addendum* (MSSA) is considered to best represent the current servicing plans for the subject property and adjacent areas.

The objectives of this report are to:

- Provide sufficient detail to demonstrate that development of the subject property will be adequately supported by municipal services, as set out in the *Draft Barrhaven South Master Servicing Study Addendum* (MSSA) and as refined during the planning, detailed design, and buildout of the various municipal infrastructure projects within the MSSA area;
- Define the course of subsequent detailed design, review, and acceptance of the proposed municipal services;
- Demonstrate how the proposed municipal services will conform with current Ministry of the Environment servicing design criteria and other applicable agency guidelines; and,
- Demonstrate good engineering practice for the protection of public safety, the environment, and sustainable operation.

1.1 Existing Conditions

Under existing conditions, the subject property is cultivated for agricultural use.

The existing elevations within the proposed development area generally range between 91.5 m – 92 m. Two existing ditches cross the subject property, as detailed in the *Headwater Drainage Feature Assessment* (Kilgour & Associates Ltd., July 2016). Existing roadside ditches run along the eastern and western sides of Borrisokane Road, adjacent to the subject property.

The subject property is within the Jock River watershed, and is under the jurisdiction of the Rideau Valley Conservation Authority (RVCA). Part of the subject property is within the RVCA's identified 100-year regulatory floodplain, as demonstrated in ***Figures 1-10*** and in ***Appendix J*** & ***Appendix L.*** The City of Ottawa owns the lands north of the subject property, which are considered to be within the RVCA's identified 100-year regulatory floodplain.

Paterson Group's *Geotechnical Investigations* (May 2017) for the subject lands explain that the long-term groundwater table is estimated to be between 89.9 m (northwest) and 90.7 m (southeast). The geotechnical investigations suggest that the subject property has a sensitive silty clay layer, and therefore the proposed development will be subject to grade raise restrictions ranging from 0.6 m to 1.2 m.

South and east of the subject property, there are planned residential and employment development projects by Mattamy Homes Ltd, known as the Half Moon Bay West development project. A preliminary road network is shown in ***Figures 1-10*** to provide context for the servicing strategies. The road network is preliminary and subject to refinements through future planning applications for these neighbouring lands. Glenview is proceeding with development applications for 3387 Borrisokane Road with the understanding that development applications for these neighbouring lands are to also proceed in the short term. Mattamy Homes has submitted a Functional Servicing Report

for Half Moon Bay West (DSEL, December 2016) and, at the time of publication of this report, is currently addressing comments as part of the development application process.

1.2 Development Concept

The proposed development concept is shown in ***Figure 1.***

In addition to the land use concept shown in ***Figure 1,*** an alternative development scenario is considered in this FSR: residential development is considered in the identified stormwater management pond block for water, sanitary, and stormwater servicing designs, so as to provide capacity for and not preclude residential development should a stormwater management option be pursued that does not require a large dedicated parcel of land (e.g. Option 2 – Oil/Grit Separator, as described in ***Section 5.0***).

Table 1 summarizes the land use breakdown for each of the development scenarios.

Table 1: Development Statistics (Glenview, April 2017)

	Option 1 Development with Pond Block, per April 7, 2017 Concept Plan (Appendix A)	**Option 2 Development without Pond Block**
Total Area	**20.13 ha**	**20.13 ha**
Streets	3.625 ha	3.625 ha
Road Widening Borrisokane	0.34 ha	0.34 ha
Land Exchange	0.005 ha	0.005 ha
Open Space	6.30 ha	6.30 ha
Park	0.65 ha	0.65 ha
SWM Pond	0.82 ha	0.00 ha
School	2.40 ha	2.40 ha
Commercial	0.43 ha	0.43 ha
Residential	5.43 ha	6.25 ha
Natural Channel Corridor	0.13 ha	0.13 ha
Total Units	**208 units**	**218 units**
Singles	116 units	126 units
Town Homes	92 units	92 units

The subject lands are expected to be developed in distinct phases according to the landowner's preferred timing. Temporary construction access roads may be required, and may require City and RVCA approval prior to construction.

Although similar to the development concept in the CDP, MSS, and MSSA, the road network, land uses, and arrangement of land uses for the subject property have been

refined as part of the Plan of Subdivision application and take into consideration the preliminary road layout of the neighbouring properties.

As part of the development concept, the existing ditches are to be closed and a new natural corridor is to be provided to link an existing woodlot south of the subject property to the Jock River north of the property. The connection is anticipated to be located within the residential block north of Street 1 and east of the commercial block. The closure and design of the new natural corridor are to be subject to RVCA and City review as part of a separate Headwater Assessment process associated with the Plan of Subdivision application. The proposed natural channel corridor per City and RVCA input to date is enclosed in ***Appendix K*** and shown on ***Figures 1-10*** for reference. Please note that the natural corridor channel within Street No. 1 and south of Street No. 1 (Mattamy lands) remains to be finalized, as at the time of publication of this report, Mattamy is addressing comments on their first draft plan submission.

It is expected that the commercial block included in the development concept will be subject to a future site plan application process. While the *general* servicing concept for the commercial block is described in this FSR, *detailed* servicing for the commercial block is expected to be developed, reviewed, and approved separate from this FSR, through the site plan application process.

1.3 Required Permits / Approvals

The City of Ottawa must approve detailed engineering design drawings and reports prior to construction of the municipal infrastructure identified in this report. This is expected to occur as part of the Plan of Subdivision application process.

Based on pre-consultation with City staff, the additional approvals and permits listed in ***Table 2*** are expected to be required prior to construction of the municipal infrastructure detailed herein. Please note that other permits and approvals may be required, as detailed in the other studies submitted as part of the Plan of Subdivision application (e.g. *Tree Conservation Report, Environmental Impact Statement, Phase 1 Environmental Site Assessment, Headwater Drainage Feature Assessment, etc.)*

1.4 Pre-consultation

Pre-application consultation was conducted with City of Ottawa and RVCA staff on March 21, 2016. Grade raise restrictions and stormwater drainage constraints were discussed. A subsequent coordination meeting with City of Ottawa staff occurred on August 23, 2016. Pre-consultation correspondence, along with the City of Ottawa servicing guidelines checklist, is provided in ***Appendix A***.

In addition, as part of the Headwater Assessment (published under separate cover), consultation has been undertaken with City of Ottawa and RVCA staff for the proposed natural channel corridor design. The proposed natural channel corridor per City and RVCA input to date is enclosed in ***Appendix K*** for reference.

City staff have provided comments on the first submission of this Functional Servicing Report (September 2016) for 3387 Borrisokane Road. All comments have been addressed in this revision of the Functional Servicing Report (May 2017). A summary of comments and responses is provided in ***Appendix A.***

Table 2: Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
RVCA	Permit under Ontario Regulation 174/06, RVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Ditches requiring closure due to development/grading, and potential changes to existing ditches outletting to Jock River.	Proposed land uses & municipal infrastructure require grading within the subject lands and result in the closure of existing ditches. May also require modifications to downstream drainage features.
RVCA	Permit under Ontario Regulation 174/06, RVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Grading (proposed development & potential temporary access roads) within the subject lands & new definition of regulatory floodplain.	Existing grades in the subject lands are below the 100-year floodplain elevation as reported by the Rideau Valley Conservation Authority (RVCA), based on their Jock River Flood Risk Map 2. For more information, refer to ***Appendix J & L.***
MOECC	Environmental Compliance Approval	Construction of new stormwater management pond or oil/grit separator unit and construction of sanitary & storm sewers.	The MOECC is expected to review the stormwater collection system, wastewater collection system, and stormwater management pond or oil/grit separator by transfer of review submission.
MOECC	Permit to Take Water	Construction of proposed land uses (e.g. basements for residential homes) and services.	Pumping of groundwater may be required during construction, given groundwater conditions and proposed land uses and on-site/off-site municipal infrastructure.
City of Ottawa	MOECC Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains.	The City of Ottawa is expected to review the watermains on behalf of the MOECC through the Form 1 – Record of Watermains Authorized as a Future Alteration.

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 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)

- **Ottawa Design Guidelines – Water Distribution**
  City of Ottawa, July 2010.
  (Water Supply Guidelines)

  - **Technical Bulletin ISD-2010-2**
    City of Ottawa, December 15, 2010.
    (*ISDTB-2010-2*)

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

- **Design Guidelines for Sewage Works,**
  Ministry of the Environment, 2008.
  (MOECC* 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, 2012, as updated from time to time.
  (OBC)

- **Jock River Flood Risk Mapping Project**
  RVCA, June 2005.

- **Mississippi-Rideau Source Water Protection Plan**
  MVCA & RVCA, August 2014.

- **Barrhaven South Master Servicing Study (MSS)**
  Stantec, June 2007.

- **Draft Barrhaven South Master Servicing Study Addendum (MSSA)**
  Stantec, November 2014.

- **Half Moon Bay West Funtional Servicing Report**
  DSEL, December 2016.

- **Geotechnical Investigations for 3387 Borrisokane Road**
  Paterson Group, May 2017.

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The subject property lies beyond the existing City of Ottawa BARR pressure zone. Existing BARR watermains serve the existing Mattamy Half Moon Bay development east of the subject property.

3.2 Water Supply Servicing Design

The proposed alignment of the trunk watermain network is depicted in ***Figure 2.***

Adequacy of sizing and configuration of trunk watermain infrastructure is provided in the MSSA. Per the MSSA (as shown in excerpts in ***Appendix B***), in support of full buildout of the MSSA area:

- a 300 mm diameter watermain will be required on Street 1;
- a 300 mm diameter watermain will be required along the N-S collector road adjacent to the site;
- a 300 mm diameter watermain will be required on Borrisokane Road south of the site;
- a 406 mm diameter watermain extension will be required on Cambrian; and
- a 406 mm diameter watermain will be required on the future Greenbank Road from Cambrian to Pearl Dace Crescent.

Depending on phasing and timing of development of the Glenview property and the Mattamy Half Moon Bay West property, not all of the watermains listed above are anticipated to be required to be in place prior to development of the Glenview property. At the time of detailed design, detailed hydraulic modelling will be undertaken to verify that the proposed on-site and off-site watermains are in conformance with the City's Water Supply Guidelines (2010, as amended from time to time).

At a minimum, a 300 mm diameter trunk watermain on Street 1 and a 300 mm trunk N-S watermain are expected to be required to service the site (***Figure 2***). These MSSA-identified watermains will extend through the neighbouring properties to connect to the existing watermain network that is in operation within the Mattamy Half Moon Bay development to the east. Should the development of the Glenview lands precede the development of Mattamy Half Moon Bay West, Glenview would look to front-end the necessary off-site works and would seek City approval at detailed design for any opportunities to minimize the amount of off-site infrastructure to be constructed to support the proposed development (e.g. Glenview may propose minor infrastructure sizing changes and minor alignment changes at detailed design, ensuring the changes have no adverse environmental impacts and no adverse capacity implications on affected landowners).

Potential alignments of local watermains are also depicted in ***Figure 2***, to illustrate that a redundant looped network is achievable to support the development of the site, extending from the planned MSSA infrastructure. At this time, proposed watermains are shown in road right-of-ways. Servicing easements may be required as detailed designs progress, which may trigger minor amendments to the proposed lot fabric in the concept plan.

The MSSA contemplated the development of the subject property by employing a 13000 L/min fire flow for the design of the trunk watermain network and an average water demand allowance based on the following consumption rates: single family home 180 L/cap/d; towns 198 L/cap/d; and employment 137 L/cap/d. As detailed designs progress, timing, alignment, and sizing of local watermains will be confirmed. The subdivision's local watermain network will be sized to meet maximum hour and maximum day plus fire flow demands. ***Table 3*** summarizes the Water Supply Guidelines employed in the preparation of the preliminary water demand estimate (***Appendix C*** and ***Table 4***) and that will be applied in future watermain network hydraulic modelling and design.

Table 3: Water Supply Design Criteria

Design Parameter	Value
Residential - Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – Apartment	1.8 p/unit
Residential Average Daily Demand	350 L/d/p
Residential - Maximum Daily Demand	2.5 x Average Daily Demand
Residential - Maximum Hourly Demand	2.2 x Maximum Daily Demand
Residential – Minimum Hourly Demand	0.5 x Average Daily Demand
Commercial/Institutional Average Daily Demand	50,000 L/gross ha/day
Park Average Daily Demand	28,000 L/gross ha/day
Commercial/Institutional Maximum Daily Demand	1.5 x Average Daily Demand
Commercial/Institutional Maximum Hour Demand	1.8 x Maximum Daily Demand
Commercial/Institutional Minimum Hourly Demand	0.5 x Average Daily Demand
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

Notes:

- *Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010), Table 4.1 - Per Unit Populations and Table 4.2 - Consumption Rates for Subdivisions of 501 to 3,000 Persons.*
- *No Outdoor Water Demand considered for residential uses.*
- *Park water demand assumed as Commercial/Institutional Use, since potential for community facilities, etc. Apply 'other commercial' rate of 28,000 L/gross ha/day per Table 4.2 & per MOECC Design Guidelines: for other Institutional and Commercial flows and tourist-commercial areas, an allowance of 28 m3/(ha·d) average flow should be used in the absence of reliable flow data.*

Fire flow requirements are to be confirmed in accordance with Local Guidelines (Fire Underwriters Survey), City of Ottawa Water Supply Guidelines, and the Ontario Building Code, upon development of detailed concepts for the single family homes, townhouses, school block, commercial block, and the park. For planning purposes, fire flow estimates are provided in the preliminary water demand estimate (***Appendix C*** and ***Table 4***) based on the information available in the preliminary concept plan and comparable recent developments in the City of Ottawa.

To support the future development of a hydraulic analysis for the subdivision, boundary conditions are expected to be provided by the City of Ottawa for the preliminary water demand estimate presented in ***Table 4***.

Table 4: Water Demand Estimate

	Avg. Daily		Max Day		Peak Hour		Fire Flow Requirement
	m^3/d	L/min	m^3/d	L/min	m^3/d	L/min	L/min
Residential Demand	237.3	164.8	593.3	412.0	1305.2	906.4	10000 L/min *(per ISDTB-2014-02)*
Park	18.20	12.6	27.3	19.0	49.1	34.1	15000 L/min *(considered adequate for most types of structures and occupancies, but is to be confirmed at the detailed design level)*
School	140.0	97.2	210.0	145.8	378.0	262.5	15000 L/min *(considered adequate for most types of structures and occupancies, but is to be confirmed at the detailed design level)*
Commercial Demand	21.50	14.9	32.3	22.4	58.1	40.3	15000 L/min *(considered adequate for most types of structures and occupancies, but is to be confirmed at the detailed design level)*
Total Demands	**417.0**	**289.6**	**862.8**	**599.2**	**1790.3**	**1243.3**	

3.3 Water Supply Conclusion

The City's BARR pressurized water supply network will be expanded through neighbouring properties to meet the water demands of the proposed concept plan, via the trunk watermain infrastructure identified in the MSSA and a network of local watermains. Detailed modelling will confirm phasing of the extensions of trunk watermains per the MSSA and sizing of the local watermain network. The proposed water supply design will conform to all relevant City and MOECC Guidelines and Policies.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

Existing sanitary sewers provide service to the existing Mattamy Half Moon Bay development east of the subject property.

4.2 Wastewater Design

The subject property is expected to be serviced by an internal gravity sanitary sewer system that is to follow the local road network, as shown in ***Figure 3.***

The MSSA contemplated that the subject property would be serviced by a 450 mm dia. trunk sanitary sewer along Street 1, which drains to a 450 mm dia. N-S trunk sanitary sewer east of the subject property (following a N-S collector road). This MSSA-identified sanitary sewer is planned to extend through the neighbouring properties to connect to the existing sanitary sewer network that is in operation within the Mattamy Half Moon Bay development to the east.

This Functional Servicing Report proposes that:

- Residential lots and the commercial block fronting onto Street 1 are to be serviced by the trunk sanitary sewer, as planned in the MSSA; and,
- All other sanitary outflows be directly connected to the downstream maintenance hole in the N-S trunk sanitary sewer (MH 306A), to better suit the proposed stormwater and grading plans outlined in ***Section 5.***

The timing of the 450 mm diameter trunk sanitary sewer on Street 1 and the adjacent N-S collector road is expected to be determined based on phased development demands for the site and for the surrounding properties. Should the development of the Glenview lands precede the development of Mattamy Half Moon Bay West, Glenview would look to front-end the necessary off-site works and would seek City approval at detailed design for any opportunities to minimize the amount of off-site infrastructure to be constructed to support the proposed development (e.g. Glenview may propose minor infrastructure sizing changes and minor alignment changes at detailed design, ensuring the changes have no adverse environmental impacts and no adverse capacity implications on affected landowners).

For example, at detailed design - dependent on approval from the City and affected landowners - consideration may be given to upsizing the easternmost N-S local sanitary sewer (on Street 2) to serve as the trunk 450 mm sanitary sewer, instead of the off-site location in Half Moon Bay West that is shown in ***Figure 3*** per the MSSA. The example alternative trunk sanitary sewer routing is depicted in ***Appendix E***, which minimizes the amount of off-site infrastructure required to support the proposed Glenview development. Although drainage catchment boundaries would vary slightly from ***Figure 3*** and the boundaries shown in the Half Moon Bay West Functional Servicing Report (DSEL,

December 2016), the alternative routing will not otherwise impact the planned upstream or downstream sanitary sewer network (e.g. sanitary sewer size, depth, and upstream/downstream connection points are unchanged), so is expected to achieve approval from City staff and affected landowners.

Applying the wastewater parameters in ***Table 5*** to the development concept, the estimated peak sanitary flow from the subject property is expected to be 16.90 L/s. See ***Appendix D*** for detailed calculations, making reference to the Half Moon Bay Functional Design Report (DSEL, December 2016) as required.

The proposed peak outflow from the proposed Glenview development to the downstream maintenance hole in the off-site N-S collector sewer (MH 306A) is 16.21L/s. The residual capacity in the trunk sanitary sewer segment downstream of the N-S trunk sanitary sewer (from segment 306A – 307A) is expected to be 52%, which is greater than the 44% residual capacity value reported in the Half Moon Bay West Functional Servicing Report (from segment 306A – 307A) (DSEL, December 2016), and greater than the 19% residual capacity reported in the MSSA (from segment MA7 – MA6).

Table 5 summarizes the City standards applied in the preliminary sanitary design information above and detailed in ***Appendix D***. The same ***Table 5*** parameters are to be employed in the detailed design of the proposed wastewater sewer system.

Table 5: Wastewater Design Criteria

Design Parameter	Value
Residential - Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – Apartment	1.8 p/unit
Average Daily Demand	350 L/d/per
Peaking Factor	Harmon's Peaking Factor. Max 4.0, Min 2.0
Commercial / Institutional Flows	50,000 L/ha/day
Commercial / Institutional Peak Factor	1.5
Infiltration and Inflow Allowance	0.28 L/s/ha
Park Flows	28,000 L/ha/d
Park Peaking Factor	1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Minimum Sewer Size	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, and recent residential subdivisions in City of Ottawa.	

4.3 Wastewater Servicing Conclusions

The proposed wastewater system for the subject lands is to be designed to conform to all relevant City Standards and MOECC Guidelines.

The subject property will be serviced by local sanitary sewers and an off-site trunk sanitary sewer network extending through neighbouring properties, as defined in the MSSA. The preferred alignment of sanitary sewers through the subject property deviates from the MSSA in that it connects to the trunk sanitary sewer system further downstream than planned. The same residual capacity exists downstream of the proposed connection point, therefore the deviation does not have a negative impact on neighbouring landowners.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Drainage

The subject lands are within the Jock River watershed. The existing drainage features and patterns are illustrated on ***Figure 4.*** Per the existing topography characterized in available City of Ottawa basemapping, all flows west of Borrisokane Road are conveyed to the Jock River via the Borrisokane Road west roadside ditch. In addition, much of the existing woodlot south of the proposed Street No. 1 and existing flows south of Cambrian Road are conveyed to the Jock River via the Borrisokane Road east roadside ditch.

5.2 Post-Development Stormwater Management Targets

Stormwater management requirements for the proposed development have been adopted from the MSSA. The MSSA proposes that stormwater runoff from the subject lands be treated for enhanced quality control. Quantity control is not required for the Jock River.

The following City standards will be required for stormwater management within the subject property:

- Storm sewers on local roads are to be designed to provide a 2-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- Storm sewers on collector roads are to be designed to provide a 5-year level of service without any ponding per the City's latest Technical Bulletin PIEDTB-2016-01.
- For less frequent storms (i.e. larger than 1:2 or 1:5 year), the minor system sewer capture will be restricted with the use of inlet control devices to prevent excessive hydraulic surcharges.
- Under full flow conditions, the allowable velocity in storm sewers is to be no less than 0.80 m/s and no greater than 6.0 m/s.
- For the 100-year storm and for all roads, the maximum depth of water (static and/or dynamic) on streets, rearyards, public space and parking areas shall not exceed 0.35 m at the gutter.
- The major system shall be designed with sufficient capacity to allow the excess runoff of a 100-year storm to be conveyed within the public ROW or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope, must remain below all building openings during the stress test event (100-year + 20%), and must maintain 15 cm vertical clearance between spill elevation on the street and the ground elevation at the nearest building envelope.
- Flow across road intersections shall not be permitted for minor storms (generally 5-year or less).

- When catchbasins are installed in rear yards, safe overland flow routes are to be provided to allow the release of excess flows from such areas. A minimum of 30 cm of vertical clearance is required between the rear yard spill elevation and the ground elevation at the adjacent building envelope.
- The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.

5.3 Proposed Stormwater Management Options

The subject property can be serviced by two alternative and feasible stormwater management schemes.

Under both proposals:

- The development blocks fronting onto Street 1 are to be picked up by the planned MSSA storm sewer within the Street 1 ROW, which conveys flows to the Clarke Pond (per the design shown in the Half Moon Bay West Functional Servicing Report (DSEL, December 2016); and,
- The proposed commercial block at the intersection of Street No. 1 and Borrisokane Road is proposed to have its own enhanced protection quality control measures on site (e.g. a separate oil grit separator unit), and discharge to the eastern Borrisokane Road roadside ditch. This is a deviation from the MSSA, but is consistent with the Half Moon Bay West Functional Servicing Report (DSEL, December 2016) that details the design of the Clarke Pond and the trunk storm sewer on Street No. 1. At the time of detailed design of the commercial block, a separate site plan application will be required, where detailed stormwater system and analysis would be presented, with consideration given to the capacity of the existing roadside ditch.

5.3.1 Option 1 – Cedarview Pond

Consistent with the MSSA, stormwater runoff can be treated by a wet pond designed to provide enhanced quality treatment (long-term average removal of 80% of suspended solids). The MSSA contemplates the wet pond being connected to the Jock River by an outlet channel through the Jock River floodplain. The MSSA recommended that the Cedarview Pond have a permanent pool of 2,432 m^3 and required extended detention volume of 521 m^3. The values were based on a 13.03 ha drainage area and total imperviousness of 71%.

Per the *MOECC Stormwater Management Planning and Design Manual* (MOECC, 2008), requirements and MSSA requirements for the current development concept, enhanced treatment translates to a required permanent pool volume of 1986 m^3 (based on a required storage volume of 166 m^3/ha) and an extended detention volume of 478 m^3 (based on a required volume of 40 m^3/ha). A proposed pond footprint is provided in ***Figure 5***, meeting the quality control requirements. Calculations are provided in ***Appendix F***.

The pond is to be located near the Jock River, in approximately the same location as contemplated in the MSSA.

Per the Jock River Flood Risk Map & associated study, Section 5538, the estimated 2 year water level in the Jock River in the vicinity of the pond is 90.67m, while the 100 year water level is 91.75m.

City of Ottawa staff have indicated that standing water is not desirable in the storm sewer system (***Appendix A***). If the MSSA operating levels in the pond were adopted, there would be standing water in storm sewers; as such, different water levels are being proposed in this Functional Servicing Report based on the City-approved Greenbank Pond design which outlets to the Jock River downstream of the subject property.

The permanent pool has been set below the 2 year water level - at the normal water level in the Jock River of 89.62m (as reported in the MSSA) - while meeting MOECC guidelines for quality treatment and depth of permanent pool. The pond will drain to the permanent pool level when the water level in the Jock is below the normal water level, with no standing water in the storm sewer network.

As water levels rise in the Jock River, the pond will function at a higher 'operational' permanent pool level. The higher operational permanent pool level will be used in the detailed design of the quality, quantity, and emergency overflow outlets of the pond.

Per the MSSA, the pond weir may be required to be set at the 100-year waterlevel in the Jock River, which will therefore incidentally offer an element of quantity control to the pond, although not required. Per the MOECC *Stormwater Management Planning and Design Manual* (2003), the overflow elevation must be at least above the 25 year floodline. As detailed designs progress, the recommended weir elevation (between 25 year and 100 year Jock River waterlevels) and pond operation characteristics will be further assessed. Notwithstanding final determination of the weir elevation, the proposed pond block is sufficiently sized to meet stormwater management criteria outlined in the MSSA and in this FSR.

The pond is proposed to outlet to the Jock River via a new ditch (adjacent to the existing ditch) within the Jock River floodplain and within lands owned by the City of Ottawa. The new ditch requires deeper inverts and an associated wider footprint than the existing ditch in this location, in order to connect the proposed pond to the existing Jock River bank at 89.47m (which is considered to be representative of a low water level on the Jock River, based on surveyed information). As such, grading activities are proposed on City of Ottawa floodplain lands north of the Glenview site.

5.3.2 Option 2 – Oil/Grit Separator

Because quantity control is not required per the MSSA, the subject property can be treated by oil and grit separator units designed to:

- Treat 90% of the runoff volume that occurs for the site on a long-term average basis; and
- Provide long-term average removal of 80% of suspended solids, based on 100% of the runoff volume that occurs for the site on a long-term average basis.

Because of the size of the site, two separate oil and grit separator (OGS) units can provide the required level of treatment. The OGS system would be placed near the existing headwater feature north of Street 6 and discharge to the Jock River via an outlet channel, approximately 120m upstream of the outlet channel contemplated for the Cedarview Pond in the MSSA. This outflow channel could tie into the existing drainage feature within the floodplain – note that work will be required within the floodplain lands owned by the City of Ottawa north of the Glenview site. Refer to ***Figure 7*** for details. Additional details and sizing information for the proposed OGS units are provided in ***Appendix G***.

5.4 Minor System

The subject lands are expected to be serviced by an internal gravity storm sewer system that is to follow the local road network. As detailed designs progress, alignment and sizing of local storm sewers will be confirmed and servicing easements may be required, which may trigger minor amendments to the proposed lot fabric in the concept plan.

Table 6 summarizes the standards that will be employed in the detailed design of the storm sewer network, meeting the requirements in ***Section 5.2*****.**

The preliminary design of the minor system captures drainage for storm events up to and including the 2-year event, assuming the use of inlet control devices (ICD) for all catchbasins within the subject property. The drainage will be conveyed within an underground piped sewer system that will discharge to the proposed receiving treatment facility in Option 1 or 2. Storm sewer design sheets for Options 1 and 2 are provided in ***Appendix F*** and ***Appendix G***, respectively, making reference to the Half Moon Bay West Functional Design Report (DSEL, December 2016) as required.

In all cases, rear yard catchbasins will capture drainage from backyards. Perforated catch basin leads will be provided, except the last segment where it connects to the right-of-way which will be solid pipe, per current City standards.

5.5 Hydraulic Grade Line

A detailed hydraulic gradeline (HGL) analysis will be completed for the proposed system at the detailed design level, based on the 100-year 3-hour Chicago, 12-hour SCS, and 24-hour SCS design storms. Other design storms and/or historical events may be

considered at detailed design, as required. Note that different combinations of design storms and downstream restrictive water level conditions in the Jock River are to be assessed as part of the 100-year HGL analysis to be completed at detailed design. Detailed grading design and storm sewer design will be modified as required to achieve the freeboard requirements set out in ***Section 5.2*** (per PIEDTB-2016-0).

Table 6: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding 1:5 year (PIEDTB-2016-01) for collector roads, without ponding
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A=732.951 | B=6.199 | C=0.810 5-year storm event: A = 998.071 | B = 6.053 | C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n' for pipe flow	0.013
Minimum Depth of Cover	1.7 m from crown of sewer to grade (*based on recent residential subdivisions in City of Ottawa)*
Minimum Full Flowing Velocity	0.8 m/s
Maximum Full Flowing Velocity	6.0 m/s
Clearance from 100-Year Hydraulic Grade Line to Building Opening	0.30 m
Max. Allowable Flow Depth on Municipal Roads	35 cm above gutter (PIEDTB-2016-01)
Extent of Major System	To be contained within the municipal right-of-way or adjacent to the right-of-way provided that the water level must not touch any part of the building envelope and must remain below the lowest building opening during the stress test event (100-year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016-01)
Stormwater Management Model	DDSWMM (release 2.1), SWMHYMO (v. 5.02) and XPSWMM (v. 10)
Model Parameters	Fo = 76.2 mm/hr, Fc = 13.2 mm/hr, DCAY = 4.14/hr, D.Stor.Imp. = 1.57 mm, D.Stor.Per. = 4.67 mm
Imperviousness	Based on runoff coefficient (C) where Percent Imperviousness = (C - 0.2) / 0.7 x 100%.
Design Storms	Chicago 3-hour Design Storms and 24-hour SCS Type II Design Storms. Maximum intensity averaged over 10 minutes.
Historical Events	July 1st, 1979, August 4th, 1988 and August 8th, 1996
Climate Change Street Test	20% increase in the 100-year, 3-hour Chicago storm

Extracted from City of Ottawa Sewer Design Guidelines, October 2012, and MSSA, and based on recent residential subdivisions in City of Ottawa.

5.6 Major System

Major system conveyance, or overland flow (OLF), will be provided to accommodate flows in excess of the minor system capacity. OLF is accommodated by generally routing surface flow along the road network and service easements to the Jock River, as shown in ***Figures 5-8*** for Options 1 and 2.

If the detailed design results in total (e.g. static + dynamic) depths greater than 35 cm or violations of the flow spread parameters in ***Section 5.2***, excess flows may be redirected to a different overland flow route, attenuated in surface storage, or captured within the minor system in order to reduce flow depths/spread, if necessary.

Therefore, the proposed drainage systems are expected to safely capture and convey all storms up to and including the 100-year event in accordance with the requirements of the MSSA and City standards.

5.7 Grading and Foundation Drainage

To achieve the planned stormwater drainage schemes and meet City of Ottawa guidelines pertaining to road and lot grading, both stormwater management options require fill from existing ground. The proposed grades are summarized in ***Table 7*** below. All grading scenarios exceed the allowable grade raise restrictions (Paterson Group, May 2017).

Table 7: Proposed Grading

	Existing	Option 1 Cedarview Pond	Option 2 OGS
Lowest Finished Road Grade within Subject Property	91.5 m	92.95 m	93.21 m
Highest Finished Road Grade within Subject Property	92.0 m	94.25m	94.24 m

Note that the *Geotechnical Investigations* (Paterson Group, May 2017) state that if higher than permissible grade raises are required (up to 2 or 2.5m), preloading with or without a surcharge, lightweight fill and/or other measures can be employed to reduce the risks of unacceptable long-term post construction total and differential settlements. As such, a preloading strategy has been developed by Paterson Group and is currently underway on site.

Even with the proposed preloading strategy and the proposed stormwater drainage schemes, the proposed road centrelines do not allow for standard basements with a gravity connection to the storm sewer system. As such, **because of the significant constraints on the subject property, sump pumps are proposed to be installed for all residential blocks and residential lots**. The sump pumps are to be connected to the

storm sewer system and protected from storm sewer surcharge by providing a gooseneck at least 0.3 m above the modelled 100-year HGL to be determined through detailed design (Section 5.5). The proposed detail is provided in ***Appendix H*** along with additional supporting information regarding the proposed private sump pump use (previously submitted to City of Ottawa under separate cover).

Where existing grades in the subject property are below the 100-year floodplain elevation and are proposed to be raised, a permit under Ontario Regulation 174/06 will be required. Based on preliminary consultation with the RVCA, it is understood that the proposed fill is not expected to have a negative impact on the function of the Jock River and that the cut/fill floodplain proposal is approved in principal. Please refer to ***Appendix J*** for details. Given the grading details related to the latest concept plan for the Glenview site (***Section 1.2***) and the proposed natural channel corridor (***Section 1.2*** and ***Appendix L***) that have been completed subsequent to the RVCA's original approval in principle, the cut/fill proposal & analysis have been updated. See ***Figures 9 – 10*** and ***Appendix K & Appendix L*** for further information. The updated cut/fill proposal continues to meet RVCA's policies, so it is expected that a permit will be granted for the work, as identified in the permitting requirements discussed in ***Section 1.3.***

The following additional grading criteria and guidelines will be applied to detailed design, per ***City of Ottawa Guidelines***:

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

5.8 Infiltration

Approximately 14% of the subject property is considered part of a significant groundwater recharge area per the MVCA/RVCA Source Water Protection Plan (August 2014) (***Appendix I***). As such, the following Low Impact Development techniques should be considered for implementation as part of detailed design:

- Rear-yard swales should be designed with minimum grades where possible, to promote infiltration;
- Rear-yard catchbasin leads should be perforated (except for the last segment connecting to the storm sewer within the right-of-way), to promote infiltration; and,
- Where eavestroughs are provided on residential units, they are to be directed to landscaped surfaces, to promote infiltration.

Furthermore, the following techniques can be examined as part of detailed landscaping design of the stormwater pond block and the park block:

- Amended topsoil (minimum 300mm thick) can be considered for use; and,
- Micro-grading can be considered to promote infiltration.

5.9 Stormwater Servicing Conclusions

Two options are presented in support of development of the subject property, which deviate from the MSSA but can meet City of Ottawa and MOECC stormwater management requirements as set out in background studies and current standards.

Under both proposals:

- The residential blocks fronting onto Street 1 are to be picked up by the planned MSSA storm sewer within the Street 1 ROW, which conveys flows to the Clarke Pond (per the design shown in the Half Moon Bay West Functional Servicing Report (DSEL, December 2016); and,
- The proposed commercial block at the intersection of Street No. 1 and Borrisokane Road is proposed to have its own enhanced protection quality control measures on site (e.g. a separate oil grit separator unit) and discharge to the eastern Borrisokane Road roadside ditch. This is a deviation from the MSSA, but is consistent with the Half Moon Bay Functional Servicing Report (DSEL, December 2016).

The stormwater management options proposed are:

- Quality treatment provided by a new Cedarview stormwater management wet pond (modified from MSSA concept); or
- Quality treatment provided by oil and grit separator units.

Each scenario is associated with a unique storm sewer network that will capture and convey minor flows to the treatment facility. Each scenario is associated with unique overland flow routes to convey all flows above those captured by the storm sewer system for unattenuated release to the Jock River, per the MSSA.

Grading options for both scenarios require surcharging and filling the site, as well as sump pumps for all residential blocks and lots. Although the use of sump pumps is not presented as the preferred servicing solution in the MSSA, given the constraints for the subject property, this *Functional Servicing Report* proposes sump pumps be connected to the storm sewer system, with flood protection provided by a gooseneck internal to the residences and located at least 0.3m above the 100-year HGL in the storm sewer system.

The storm sewers will be sized by the Rational Method and inlet control devices (ICDs) will be used to restrict the capture rates to 2-year (PIEDTB-2016-01). Storm sewers sizing

will be confirmed at the detailed design level, in conformance with MOECC and City standards.

Low Impact Development techniques will be implemented, to promote infiltration of stormwater.

6.0 UTILITIES

Utility services extending to the site may require connections to multiple existing infrastructure points: consultation with Enbridge gas, Hydro Ottawa, Rogers, and Bell is required as part of the development process to confirm the servicing plan for the subject lands.

7.0 EROSION AND SEDIMENT CONTROL

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

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

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

Catchbasins will have catchbasin inserts installed during construction to protect from silt entering the storm sewer system.

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

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from leaving the site and entering existing ditches.
- Install mud mat in order to prevent mud tracking onto adjacent roads.
- No refueling or cleaning of equipment near existing watercourses.
- No material stockpiles within the Jock River floodplain.
- Provide sediment traps and basins during dewatering.
- Install catchbasin inserts.
- Plan construction at proper time to avoid flooding.

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

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

8.0 CONCLUSION AND RECOMMENDATIONS

The overall municipal servicing strategy for the subject property was contemplated as part of the *Draft Barrhaven South Master Servicing Study Addendum* (MSSA) (Stantec, November 2014) and previously in the *Barrhaven South Community Design Plan* (City of Ottawa, September 2006) and the associated *Barrhaven South Master Servicing Study* (MSS) (Stantec, June 2007).

This *Functional Servicing Study* (FSR) (DSEL, May 2017) provides details on the planned on-site and off-site municipal services for the subject property, highlights proposed deviations from the MSSA, and demonstrates that adequate municipal infrastructure capacity is expected to be available for the planned development of the subject property.

- Given the sensitive clays within the site, grade raise restrictions are in effect for the subject property. A surcharge program has been prepared and is underway under the direction of Paterson Group.
- Water service is to be provided to the subject property via extensions of the existing BARR pressure zone watermains through neighbouring properties, per the MSSA.
- Sanitary service is to be provided to the subject property via extensions of the existing sanitary sewer network through neighbouring properties. Minor changes to sanitary drainage boundaries are proposed from the MSSA, but do not negatively affect other landowners.
- For residential lots fronting onto Street No. 1, stormwater drainage will be captured by the proposed storm sewer on Street No. 1 (shared by Mattamy Homes and Glenview) and will be conveyed to the Clarke Pond.
- For the commercial block at Street No. 1 and Borrisokane Road, stormwater drainage is to be captured and treated on-site for enhanced quality control, then discharged to the Borrisokane Road east roadside ditch.
- For the remainder of the site, two stormwater management options are presented in support of development of the subject property, which deviate from the MSSA but can meet City of Ottawa and MOECC stormwater management requirements as set out in background studies and current standards. The options proposed are:
    - A new Cedarview stormwater management wet pond (modified from MSSA concept); or
    - Oil and grit separator units.

  Both scenarios would provide enhanced quality control, as required per the MSSA. All overland flows above those captured by the storm sewer system can be released unattenuated to the Jock River, per the MSSA. Each stormwater management scenario is associated with a unique storm sewer network.
- Grading options for both stormwater management scenarios require surcharging and filling the site, and sump pumps for all residential blocks and lots. Although the

use of sump pumps is not presented as the preferred servicing solution in the MSSA, given the constraints for the subject property, sump pumps are proposed to be connected to the storm sewer system, with flood protection provided by a gooseneck internal to the residences located at least 0.3m above the 100-year HGL in the storm sewer system.

- Low Impact Development techniques will be implemented, to promote infiltration of stormwater.

Prior to detailed design of the infrastructure presented in this report, this FSR will require approval under the Planning Act as supporting information for the Plan of Subdivision application. Project-specific approvals are also expected to be required for the infrastructure presented in this report from the City of Ottawa, Ministry of Environment and Climate Change, and Rideau Valley Conservation Authority.

Prepared by,
David Schaeffer Engineering Ltd.

Laura Maxwell

Per: Laura Maxwell, B.Sc.(Civil Eng)

Reviewed by,
David Schaeffer Engineering Ltd.

Per: Matt Wingate, P.Eng

z:\projects\15-809_glenview_leiken-property\b_design\b3_reports\b3-2_servicing (dsel)\2017-04-26_809_fsr_rev1\2017-05-08_809_fsr_rev1.docx

Appendix A

- Servicing Guidelines Checklist (DSEL, September 2016)
- Pre-Consultation Notes with City of Ottawa Staff (various)
- City of Ottawa First Review Comments (City of Ottawa, December 2016)
- Revised Concept Plan for 3387 Borrisokane (Stantec, April 7, 2017)
- Responses to City of Ottawa First Review Comments (DSEL, May 2017)

DEVELOPMENT SERVICING STUDY CHECKLIST

4.1 General Content		
☐	Executive Summary (for larger reports only).	N/A
☐	Date and revision number of the report.	Title Page
☐	Location map and plan showing municipal address, boundary, and layout of proposed development.	Figure 1
☐	Plan showing the site and location of all existing services.	Appendix B
☐	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 & Section 2.0
☐	Summary of Pre-consultation Meetings with City and other approval agencies.	Section 1.4 & Appendix A
☐	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 3.0, Section 4.0, Section 5.0 & summarized in Section 6.0
☐	Statement of objectives and servicing criteria.	Section 1.0 & Section 3.2, Section 4.2, and Section 5.2
☐	Identification of existing and proposed infrastructure available in the immediate area.	Section 3.1, Section 4.1, and Section 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).	Section 1.1 & Section 1.2
☐	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.	Figure 6, Figure 8, and Figure 10
☐	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.	Addressed in Paterson Group, May 2017
☐	Proposed phasing of the development, if applicable.	Section 1.2 – Depends on landowner preferred timing
☐	Reference to geotechnical studies and recommendations concerning servicing.	Section 1.2 & Section 5.7
☐	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	Legal information contained on Draft Plan of Subdivision (Stantec, April 2017) which forms the base of Figures 1- 10

4.2 Development Servicing Report: Water		
☐	Confirm consistency with Master Servicing Study, if available	Section 3.2
☐	Availability of public infrastructure to service proposed development	MSSA & Section 3.2
☐	Identification of system constraints	MSSA & Section 3.2

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

☐	Identify boundary conditions	Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	Confirmation of adequate domestic supply and pressure	MSSA. Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	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.	MSSA. Sample FUS calculations in Appendix C. Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	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.	Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	Definition of phasing constraints. Hydraulic modeling is required to confirm servicing for all defined phases of the project including the ultimate design	Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	Address reliability requirements such as appropriate location of shut-off valves	Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	Check on the necessity of a pressure zone boundary modification	MSSA.
☐	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	MSSA & Section 3.2
☐	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.	MSSA, Section 3.2 & Figure 2. Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)
☐	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.	MSSA.
☐	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	Section 3.2

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

☐	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	Figure 2. Detailed hydraulic assessment N/A for FSR, per correspondence with Mr. Jeff Shillington (September 26, 2016)

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.	Section 4.2
☐	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.	MSSA
☐	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	MSSA & Section 4.2
☐	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)	MSSA & 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.	Appendix D
☐	Description of proposed sewer network including sewers, pumping stations, and forcemains.	MSSA, Section 4.2 & Figure 3
☐	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).	MSSA
☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	MSSA
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	MSSA
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	MSSA
☐	Special considerations such as contamination, corrosive environment etc.	MSSA

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 1.1 & Section 5.2
☐	Analysis of available capacity in existing public infrastructure.	Section 5.3
☐	A drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Figure 4, Figure 5, Figure 7 & Figure 9

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

☐	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.	None. MSSA & 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.	Enhanced. MSSA & Section 5.2
☐	Description of the stormwater management concept with facility locations and descriptions with references and supporting information	Section 5.3, Appendix F & Appendix G
☐	Set-back from private sewage disposal systems.	Addressed in Paterson Group, May 2017
☐	Watercourse and hazard lands setbacks.	N/A - addressed in Drainage Feature Headwater Assessment, Kilgour July 2016
☐	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	RVCA consultation records in Appendix A & Appendix J. Consultation with MOE forthcoming.
☐	Confirm consistency with sub-watershed and Master Servicing Study, if applicable study exists.	Section 5.3, Section 5.6, Section 5.7, Section 5.8
☐	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, Appendix F & Appendix G
☐	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 - addressed in Drainage Feature Headwater Assessment, Kilgour July 2016
☐	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.	MSSA, Figure 4, Figure 5, Figure 7 & Figure 9
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	MSSA
☐	Proposed minor and major systems including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	Section 5.4, Section 5.5, Section 5.6, Figure 5, Figure 7, Figure 9, Appendix F & Appendix G
☐	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.	MSSA
☐	Identification of potential impacts to receiving watercourses	MSSA
☐	Identification of municipal drains and related approval requirements.	N/A
☐	Descriptions of how the conveyance and storage capacity will be achieved for the development.	Section 5.3, Section 5.4, Section 5.5 & Section 5.6
☐	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	Section 5.5, 5.6 & Section 5.7
☐	Inclusion of hydraulic analysis including hydraulic grade line elevations.	N/A at FSR level, future work described in Section 5.5 & Section 5.6
☐	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0

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

☐	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.	Section 1.1, Figures 1-10, Appendix J
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	Section 5.7, Appendix J

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 1.3
☐	Application for Certificate of Approval (CofA) under the Ontario Water Resources Act.	Section 1.3
☐	Changes to Municipal Drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation etc.)	Section 1.3

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.	Appendix A
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	Section 8.0

Laura Maxwell

From: Fairouz Wahab <fwahab@glenview.ca>
Sent: Friday, April 8, 2016 4:13 PM
To: Laura Maxwell; mwingate@dsel.ca; afrancis@kilgourassociates.com; Robert.Vastag@stantec.com; Marc Rivet (mrivet@jlrichards.ca)
Cc: Jake Shabinsky; jdstirling@outlook.com
Subject: FW: 3387 Cedarview - pre-con follow up - DRAFT
Attachments: 3387 Cedarview (Glenview) - Applicant's_Study_and_Plan_Identification_List.doc; DC1A04F07MFD20160331150635.pdf

Afternoon,

Attached are the City's draft meeting notes from our March 21, 2016 pre-consult on 3387 Cedarview Road. Please have a read through the notes that relate to your respective disciplines and let me know by Tuesday next week if you have any comments/revisions.

Thank you,
Fairouz

From: Xu, Lily [mailto:Lily.Xu@ottawa.ca]
Sent: April 7, 2016 11:00 AM
To: Fairouz Wahab <fwahab@glenview.ca>; Marc Rivet <mrivet@jlrichards.ca>; Jack Stirling <jdstirling@outlook.com>
Cc: Tang, Tracy <tracy.tang@ottawa.ca>; Xu, Lily <Lily.Xu@ottawa.ca>; Shillington, Jeffrey <jeff.shillington@ottawa.ca>; Young, Mark <Mark.Young@ottawa.ca>; Sweet-Lindsay, Louise <Louise.Sweet-Lindsay@ottawa.ca>; Rehman, Sami <Sami.Rehman@ottawa.ca>; Richardson, Mark <Mark.Richardson@ottawa.ca>; Carter, Riley <Riley.Carter@ottawa.ca>; 'Jocelyn Chandler' <jocelyn.chandler@rvca.ca>; Emmerson, Diane <Diane.Emmerson@ottawa.ca>; Washnuk, Derek <Derek.Washnuk@ottawa.ca>
Subject: 3387 Cedarview - pre-con follow up - DRAFT

Fairouz,

This is to follow up on the pre-application consultation meeting on March 21, 2016 regarding a residential subdivision at 3387 Cedarview. The attached "Applicant's Study and Plan Identification List" identifies the number of copies required for each report and plan in order to deem the application(s) complete. PDF files are needed for all required reports and plans. Guidance on preparing the studies and plans can be found online.

Further, please note Staff's preliminary comments on the proposal:

TWF

- The site is within 1000 metres from the Trail Road Waste Facility. Developments near a landfill site are subject to the Official Plan policies as contained within section 3.8. As discussed with Waste Management and Policy Development, the influence area is 500 metres from the site boundary (Highway 416, Cambrain, and Trail Road), as defined by MoE. Further the CDP contains policies regarding the required warning clauses for residential uses located between 500 and 1000 m. As requested, we will ask TWF staff for the ECA and EA documents for the landfill site.

RVCA

- Storm water Servicing:

    - The CDP does not show the Cedarview Pond as envisioned in the Barrhaven South Master Servicing Plan. It is our understand that this development would rely on a stormwater pond to be constructed adjacent the floodplain on the north section of the site.
    - No quantity control is required
    - Enhanced quality control is necessary for the Jock River.
- The stormwater pond outlet :
    - The pond outlet channel will require review and approval by the RVCA under O.Reg 174/06.
    - The location of the future outlet must be reviewed with RVCA staff.
    - The outlet may require a self-assessment under the Fisheries Act.
- Watercourses
    - There are at least two small tributaries that run across these lands into the Jock River. Neither appears to have been considered as part of the Barrhaven South evaluation of watercourses undertaken at the time of the CDP and MSS. Both will require headwaters assessments and a determination on whether permission can be granted to close them will be based on that work.
    - Any alterations to these watercourses will require will and approval by the RVCA under O.Reg 174/06.
- Floodplain
    - The 1:100 year floodplain of the Jock River at this location is elevation 91.85 to 91.72 metres geodetic. The floodplain needs to be plotted with site specific elevation on the property by an OLS to determine the accurate limit of the 1:100 year floodplain and associated constraints.
    - The subdivision layout as shown on the drawing dated March 3, 2016 prepared by Korsiak Urban Planning is not supportable. Roads and development blocks are shown in the floodplain. No new development or lot creation is permitted in the floodplain under the 2014 PPS, OP, ZBL, CDP or RVCA local regulatory policies. there doesn't appear to be any opportunities to undertake a balanced cut on this site for the purpose of adjusting the floodplain to fit the proposed layout in any case.
- A portion of the property is within the jurisdiction of Ontario Regulation 174/06. Any works, including grading, filling, construction or site alteration requires a permit from the RVCA.

Environment

- The subject property is within 120m of potential significant habitat for threatened or endangered species and requires a detailed EIS. Further requirements of the EIS can be found in OP Section 4.7.8 or the EIS guidelines. Given the subject properties proximity to the Jock River, the EIS should also discuss the appropriate setbacks as per OP Section 4.7.3. The EIS should also discuss the findings and implications of the Headwater Drainage Features Assessment on the proposal.
- The applicant should contact the local Kemptville office of the MNRF to determine their obligations under the Endangered Species Act and to indentify which species should be included in their field investigations.
- A tree conservation report will also be required for this property and can be combined with the EIS to help avoid duplications. Details of the TCR requirements can be found in the TCR guidelines. Please contact Mark Richardson on Issues with urban tree by-law.
- The proposal will also require an Integrated Environmental Review (OP Section 4.7.1). We are requesting that the applicant include a draft version of the IER as part of their planning rationale. The intent of this request is to better integrate environmental issues into each of the supporting studies and the proposal's design. As the OP states, "[environmental] design components will be considered basic inputs...and must be assessed and considered prior to establishing an initial design or lot pattern." This will help inform the proposal's design and expedite the registration process. While we understand each study will not be complete at the time of drafting the IER, we request the draft IER to demonstrate that each supporting study has considered the subject property and surrounding environment, and identified potential environmental concerns and constraints, all recommendations and analyses of relevant policies, watershed and subwatershed studies and federal or provincial assessment documents, and the potential implications of these constraints on each aspect of the proposal and the associated supporting studies and the interactions between these studies and their potential recommendations and how the principles of design with nature have been applied. Full details of the IER requirements are available in OP Section 4.7.1.

Park

- Parkland dedication for residential units is calculated at the rate of 1.0 ha per 300 units. The estimated parkland dedication for the proposed 200 units is approximately 0.66 ha. In addition, institutional use (school) and commercial/employment uses are required to contribute at a rate of 2% of the land area.
- A parkette of approximately 0.66-0.7 ha is recommended for the subdivision. The suggested location of the parkette is to the north of the subdivision adjacent to the proposed stormwater management pond and outside the floodplain. The CDP also shows a park to the northwest of the site just outside the floodplain.
- As per the new park planning and development direction, park concept plans will be required prior to draft approval, and detailed design will be required at the time of registration. Please contact Park Planner, Diane Emmerson, for further information on facility requirements for the park.

Servicing

- It is understood that due to the sensitive soils with grade raise restrictions that there will be a requirement for submerged sewers. Please note the City's current policy does not allow sump pumps in new development. Alternatives are to be explored to reduce the length of submerged sewers (smaller diameter twin storm sewers) and alternative developments should also be considered (slab on grade). Should the length of submerged sewers be of significant length there may be a requirement for powered gates at the outlet to the pond to facilitate isolation and /or reduced spacing on maintenance holes to allow easier access to the pipe.
- The proposed SWM pond doesn't appear to have sufficient road frontage (we are currently seeking input from operations and will provide more information once available).
- Sediment drying area needs to be outside the floodplain.

Transportation & Noise

- OC Transpo:
    - OC Transpo's route network, as it is currently structured, would not foster transit usage as the development is located beyond a 400m convenient walking distance. The development of the site will trigger a revision of the route network for the area and we would likely require the developer to enter into an agreement with the Transit Services, prior to the registration of the subdivision, to outline the provision of interim bus service.
    - Streets which would be identified for potential transit service would have to be built to Transportation Association of Canada standards.
    - Paved passenger standing areas and/or concrete shelter pads at the locations identified as bus stops would have to be built to the specification of Transit Services.
- A Community Transportation Study is required for subdivision submission. It is recommended that the CTS be combined with the CTS for Mattamy's subdivision. Prior to registration a Transportation Impact Study (TIS) will be required.
- ROW:
    - On street 1 the ROW is changing from 14.75m in Mattamy to 18m where houses are on both side, then changing back to 14.75 m, this could potentially cause problems for the utilities. Please ensure to look to get early buy-in from the utility companies.
    - From our perspective, it would be much easier to have a consistent ROW either 18m all the way or 14.75m (some of our preliminary comments were to have road frontage for the storm pond so perhaps a 14.75m would work if there were no houses on the north side). If the changing ROW, at a minimum the 14.75m ROW should not be centred on the 18m ROW, rather the northern property line should match up between the two ROWs.
    - Further we'd like to see a sidewalk along the north side of the single-loaded road as it is abutting a district park, and we will be asking for street trees on both sides of the road. Please ensure to take them into account when designing the ROW.
- A noise feasibility study is required for subdivision submission. A detailed study will be required prior to registration.
- Please contact Transportation Project Manager, Riley Carter, for questions related to transportation and noise.

Design

- Please avoid noise wall as much as possible when designing the subdivision layout.
- Suggest moving the school block adjacent to the floodplain, and avoid locating townhouses in front of the proposed school frontage.
- Please refer to the attached sketch for staff's suggestions on the site layout, pedestrian connection and sidewalk locations.

Other Planning Matters

- Density targets: The CDP calls for a density target of 34 units/net hectare. The net density is calculated based on the total number of units divided by the total area of all residential lots and blocks. The lands provided for the school, park and floodplain are not counted for net density. It is further recognized that the CDP identifies locations for high-density residential areas; for subdivisions that are designated mostly low and medium density the overall net density may be below the target.
- CDP section 7.1 states that ... substantive changes to the CDP ... such as to the pattern of major road network ... and to the number and location of ... employment area ... the relocation of school and park ... major change in stormwater management ponds ... will be subject to approval by Planning Committee. Therefore any major changes to the CDP as a result of the proposed subdivision can be addressed through a (zoning) report to the Planning Committee.

Hope this is helpful. Please feel free to let us know if there are any questions.

Best regards,

Lily Xu, MPL, MCIP, RPP, LEED Green Assoc.
Planner II, Suburban Services | Urbaniste II, Serives suburbains
Planning and Growth Management | Urbanisme et Estion de la Crossance
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West. Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
tel/tél:613.580.2424 ext./poste **27505**, fax/téléc:613-580-2576, email/courriel:Lily.Xu@ottawa.ca
ottawa.ca/planning / ottawa.ca/urbanisme

Laura Maxwell

From: Fairouz Wahab <fwahab@glenview.ca>
Sent: Monday, August 29, 2016 9:25 AM
To: Young, Mark
Cc: Sweet-Lindsay, Louise; Jake Shabinsky
Subject: RE: Meeting Notes August 23, 2016 - 3387 Borrisokane Road Concept Plan Review

Morning Mark,

Thanks for letting me know that Diane's supportive of the park location. We'll wait to hear back as to what facilities she'd like to see in the park.

Fairouz

From: Young, Mark [mailto:Mark.Young@ottawa.ca]
Sent: August 26, 2016 2:13 PM
To: Fairouz Wahab <fwahab@glenview.ca>
Cc: Sweet-Lindsay, Louise <Louise.Sweet-Lindsay@ottawa.ca>
Subject: RE: Meeting Notes August 23, 2016 - 3387 Borrisokane Road Concept Plan Review

Hi Fairouz,

I can confirm that Diane has looked at the size and location of the park block and does not have any concerns provided it is all outside of the floodplain.

In terms of a facility fit, I am waiting to hear back, but it may be difficult as there is no area parks master plan for Barrhaven South.

Regards,
Mark

Mark Young, MCIP|MICU, RPP|PPC
Planner II, Urban Design, Development Review (Suburban Services)
Planning, Infrastructure and Economic Development Department
Urbaniste II, design urbain, Examen des demandes d'aménagement (Services suburbains)
Services de la planification, de l'infrastructure et du développement économique
City of Ottawa | Ville d'Ottawa
613.580.2424 ext./poste 41396
ottawa.ca/planning / ottawa.ca/urbanisme

From: Fairouz Wahab [mailto:fwahab@glenview.ca]
Sent: August 25, 2016 3:27 PM
To: Sweet-Lindsay, Louise; Young, Mark; Rehman, Sami; Shillington, Jeffrey; Yousfani, Asad; Emmerson, Diane; Marc Rivet (mrivet@jlrichards.ca)

Cc: Jake Shabinsky; jdstirling@outlook.com
Subject: Meeting Notes August 23, 2016 - 3387 Borrisokane Road Concept Plan Review

Afternoon,

Below are meeting notes highlighting the key points discussed at Tuesday's meeting with the City staff concerning Glenview's Draft Concept Plan for 3387 Borrisokane Road that was circulated on August 15, 2016. Please let me know if there are any errors or omissions.

Meeting Notes

Project - 3387 Borrisokane Road Concept Plan Review

Date – August 23, 2016 at 10:00pm at City Hall Room 4106E

Attendees:

- City of Ottawa – Louise Sweet Lyndsay (LSL), Mark Young (MY), Sami Rehman (SR), Jeff Shillington (JS), Asad Yousfani (AY)
- Stirling Group– Jack Stirling (JSt)
- Glenview – Jake Shabinsky (JS), Fairouz Wahab (FW)

Regrets:

- City of Ottawa – Diane Emmerson (DE)
- JLR – Marc Rivet (MR)

Attachments: N/A

1. Concept Plan -
    a. FW provided a summary of the works completed to date with respect to the development of the draft concept plan:
    b. Glenview has completed the cut/fill analysis, which has been approved in principle by the RVCA, to support the new 100yr flood line and western development boundary.
    c. Glenview has submitted the HWDA to the RVCA, which has been approved in principle, and are working with the RVCA and City on the alignment and cross-section of the realigned channel.
    d. The revised concept plan proposes:
        i. A 2.4ha school block, a 0.63ha park, a 0.43ha commercial block, a 077ha SWMP block and a mix of singles and towns equating to a density of 34 units/net ha all in keeping with the BS CDP.
        ii. ROW connections to Mattamy's property to the East and South are as per their latest draft plan.
        iii. Residential underlays have been shown in the School Block (62 units) should the Board opt not to purchase the land and in the SWMP (10 units) as Glenview's exploring opportunities to cost share on the Clark Pond or provide an O&GS in lieu of a quality pond.

2. Transportation –

a. AY had no transportation issues as it relates to the concept plan.

b. Glenview to prepare a Noise Study and CTS in support of DPA.

c. Depending on development timelines, the CTS may only address Glenview's development or may encompass Mattamy's draft plan as well. The CTS will identify any works at the intersection of Street 6 and Borrisokane, which would then be dealt with through the RMA process as part of the detailed subdivision design/registration.

3. Environment –

a. SR had no environmental issues as it relates to the concept plan.

b. Glenview to prepare an EIS and draft IER in support of DPA.

c. SR to email wording for IER to Kilgour and cc Glenview. *– ACTION City of Ottawa (SR)*

d. Glenview to provide landfill setback in CAD format. *– ACTION Glenview (FW) - Completed*

4. Engineering –

a. Glenview's application will be going in assuming the use of sump pumps. JS will defer to the management on whether sump pumps will be permitted. LSL confirmed that regardless, provided the DPA submission is complete, it will be deemed complete and put on circulation to identify/resolve other issues.

b. JSt indicated that sump pumps are supported by the Building Better Suburbs (BBS) working group as a servicing tool. Approval of their use in expected in September 2016 because without it development of the remaining lands in the City would come to a halt as it's too cost prohibitive otherwise.

c. JS explained that an O&GS was considered in HMB North, but due to catchment size and treatment performance was not possible. However, it's still a possible solution for Glenview's development. JS to provide details to Glenview on how the decision to permit O&GS was made. *– ACTION City of Ottawa (JS)*

d. JS indicated that if Glenview decides to redirect its' storm drainage to the Clark Pond, Glenview would be required to have Stantec prepare an update to the MSS at their cost. Stantec's update is not required at DPA, but would be required as part of the detailed engineering approval. This is consistent with the approach taken with Mattamy in HMB North and Minto's in OPA 76.

5. Urban Design –

a. MY had no urban design issues as it relates to concept plan. He liked that we'd paired the SWMP with the Park and asked that we consider two small changes:

i. A walkway block from the School Block to the ROW. JSt indicated that the Separate Board is not supportive of walkway connections and so it will not be provided. MY was in agreement.

ii. Moving the school block so it abuts the Future Open Space to provide better vistas' into the community, access to open space for the school and potential reduction in noise fencing *– ACTION Glenview (FW) - After the meeting Glenview looked at the impact of*

shifting the school adjacent to the floodplain but will not be for economic and marketing reasons.

6. Park Design –

   a. MY did not get a chance to connect with DE on the park, but thinks she will be supportive given the size (0.63ha which is consistent with the BS CDP) and the location (abutting the SWMP and Open Space). DE to provide confirmation on the park. *– ACTION City of Ottawa (DE)*

   b. DE to provide a list of facilities that are to be included in the facility fit plan required for draft approval.- *ACTION: City of Ottawa (DE)*

7. Miscellaneous -
   a. Mattamy had a pre-consult with City staff on HMBW and expect to submit an application in 2017.
   b. JST/LSL indicated that the Separate Board is currently taking between 2-3 years to option on lands.
   c. LX provided the list of studies required to support DPA following our pre-consult in March 2016
   d. Moving forward FW to copy SR & LSL on correspondence with RVCA pertaining to channel realignment and floodplain *– ACTION Glenview (FW)*
   e. Stage 1 & 2 Archaeological studies were submitted, approved and filed with the Ministry. FW to provide copies of studies and Ministry approval with DPA. *– ACTION Glenview (FW)*

8. Next steps

   - Glenview to submit DPA and Rezoning Applications end of September 2016

Fairouz Wahab, P. Eng.
Land Development Project Manager
T 613-748-3700 ext 241
C 613-914-0719
F 613-748-3289
Email FWahab@glenview.ca
www.glenview.ca

190 O'Connor Street, 11th Floor
Ottawa, Ontario K2P 2R3

File Nos. D07-16-16-0018
D02-02-16-0082

December 21, 2016

Fairouz Wahab
Glenview Homes
190 O'Connor Street, 11th Floor
Ottawa, ON
K2P 2R3

Dear Ms. Wahab

Re: 3387 Borrisokane Road

The circulation period ended on December 5, 2016 as such City Staff have completed their review of the Plan of Subdivision & Zoning By-law Amendment applications, including the plans and reports listed below and have the following comments:

Functional Servicing Report for Glenview Homes 3387 Borrisokane Road, prepared by DSEL, dated September 2016.

Geotechnical Investigation proposed Residential Development 3387 Borrisokane Road, prepared by patersongroup, dated September 29, 2016.

Plan of Subdivision, prepared by Brian Webster, dated September 29, 2016

Planning Rational, prepared by J.L. Richards, dated September 2016

3387 Borrisokane Road Community Transportation Study / Transportation Impact Study, prepared by Stantec, dated September 27, 2016.

Environmental Impact Statement & Tree Conservation Report, prepared by Kilgour & Associates Ltd., dated September 23, 2016.

Integrated Environmental Review, prepared by Kilgour & Associates Ltd., dated September 30th, 2016.

Phase 1 Noise Control Feasibility Study Requirements, prepared by Stantec, dated September 27, 2016

Phase I Environmental Site Assessment, prepared by PatersonGroup, dated September 21, 2015
A Stage 1 & 2 Archaeological Assessment of a development property at 3387 Cedarview Road, Part lot 12, Concession 3 Geographic Township of Nepean, prepared by Adams Heritage, dated May 11, 2016

Headwater Drainage Feature Assessment , prepared by Kilgour & Associates Ltd., dated June 27, 2016.

Engineering Comments

Functional Servicing Report

Wastewater Servicing

1. Please ensure the minimum full flow velocity is being met as the Sanitary Sewer Calculation Sheet shows the velocity slightly under the minimum for all pipe lengths.

Stormwater Management

1. Section 5.2 – 1st bullet, Table 6, please revise the wording to indicate that the minimum sewer size for local streets is to capture the 2-year event without any ponding.
2. It is understood that there have been ongoing discussions with Management at the City of Ottawa in regards to the use of sump pumps in suburban development, however at this time, we are unable to comment as no direction has been given by Management. Until Management provides further direction in regards to sump pumps, this application cannot be approved. In advance of further discussions on sump pumps please provide a rationale for their use, including the following topics: policy framework, engineering rationale, and financial rationale. We wish to have a document that we can provide to the reviews of the engineering standards to ensure they are aware of the broader scope of why sump pumps are proposed.
3. In regards to the preferred stormwater management option, the Barrhaven South Master Servicing Study currently identifies Option 1. Should Glenview wish to investigate an alternate stormwater manangement solution (Option 2 or 3), an analysis will be required to be completed by Stantec at Glenview's cost as an addendum to the Barrhaven South Master Servicing Study. In addition to the Stantec Addendum, City of Ottawa (Development Review, Infrastructure Policy and Stormwater Facility Ops) and RVCA staff are to be involved in the decision making process.
4. All 3 Storm Sewer Calculation Sheets contain several errors, please review and revise the following:
    a. STM Option #1 MH's and Areas do not correspond to Figure 5.
    b. Please ensure all Tc's start at 10 mins at the high end of each pipe run.
    c. Please ensure that all sewers have the capacity to accommodate the calculated peak flows as there are some instances where the capacity is exceeded.
5. Please provide more detailed calculations in regards to the sizing of the Cedarview Pond (Calculations showing how the permanent pool, extended detention, and 100 year volumes were calculated). Also, the sediment management area is shown on the neighbouring property. The sediment management area should be located within Glenview's pond block.

Geotechnical Investigation

6. Drawing No. PG3621-2-Settlement Plate Relocation Plan is missing from the report. Please resubmit the report and ensure that this drawing is included.

Comments from Infrastructure Policy:
Functional Servicing Report

Water

7. A number of future watermains are required to service this area (see below).
    a. Extension of the 406 mm watermain on Cambrian.
    b. 406 mm watermain on the future Greenbank Road from Cambrian to Pearl Dace Crescent.
    c. Three 305 mm watermains located outside of the site boundary.

Wastewater

8. Downstream trunk sanitary sewers within the adjacent development to the east of this site and along the future Greenbank Road are needed to accommodate this development.

Stormwater Management

9. Development of lands within the floodplain should be discussed with the RVCA
10. ESD staff should provide input on the proposed SWM options and preferred strategy presented in this study..
11. I would consider reducing the weir elevation to the 25 yr level (refer to page 4-6 of the MOE SWM Planning and Design manual). Retention of stormwater beyond the 25 mm event/24 hour duration is not required.
12. A review of the hydraulic conditions used to establish the 100 yr HGL in the pond and storm sewer system should be undertaken. The HGL during the 100 yr Chicago storm (which occurs during the summer) coupled with the 100 yr water level in the Jock River (which occurs during the spring freshet) is very conservative.
13. The 100 year Chicago storm should be used to assess the storm system. This storm event was not mentioned in Section 5.5
14. The use of sumps pumps will be deferred to the ISR-BBSS Working Group.

Conservation Authority

1. A conceptual cut and fill proposal was submitted and reviewed by our engineering staff. The conceptual plan appears to be feasible and meets the cut and fill policies of the RVCA. The onus in now on the applicant to demonstrate through detailed design that the cut and fill can be achieved. The applicant must submit a formal application to the RVCA under Ontario Regulation 174/06 which must be approved by the RVCA before draft plan approval. Implementation of the cut and fill can be achieved through conditions of draft approval.
2. The RVCA was provided with a copy of a servicing options study for stormwater management. Although we have undertaken a preliminary review of the study to identify preferred options, we have not undertaken a detailed engineering review without knowing what the preferred option will be (consensus of City, RVCA and applicant). However, we can clearly state at this time that we do not support Option 3, which would see the flows from this site diverted from the existing Jock River tributaries to the future Clarke Pond.

3. The headwaters drainage feature assessment has been reviewed by our Aquatic and Fish Habitat Biologist and we are in agreement with the management recommendations for reaches 1 and 4 (maintain recharge) and for reaches 2 and 3 (mitigation). The proposed realigned sections of reaches 2 and 3 will cross lands outside the floodplain where the existing buffer conditions do not meet the recommended target (minimum 30 m wide vegetated buffer along at least 75% of length on both sides of the feature). It is our expectation that the targeted buffer requirements will be met. Additional mitigation measures may be required to ensure the continued movement of amphibians between the woodlot and the Jock River.
4. Since the current plan is dependent on watercourse relocation, written confirmation will have to be provided by Mattamy that the relocation is acceptable to them since they ultimately have to tie into it.
5. It would be useful to have a composite plan showing the preferred servicing option for SWM, the cut and fill, the watercourse relocations and related corridors (including the buffer).

Zoning Discussion

1. Zoning will be a condition of the plan of subdivision, and the application will be put on hold until such time as draft approval is granted.

Plan of Subdivision - Design

1. Proceed with the subdivision design which illustrates the school block as per the letter from the Ottawa Catholic School Board attached
2. Given the CA's comments on stormwater I recommend we move forward with the draft plan illustrating a pond on the subject lands (adjacent to the park). If subsequent engineering details recommend oil/grit separators we can visit that at that time.
3. Please front Blocks 181 and 192 to face Street No. 1 to avoid the need for noise walls.
4. Please consider re-locating the towns located across from the school block (Blocks 182 – 185) with singles family lots. This allows for more on-street parking opportunities and fewer conflicts.
5. Front end of block detached lots on Street No. 7 to face the open space lands (see attached).
6. Consider placing town blocks facing the Park and SWM block. The single loaded road is a good location for towns due to increased on-street parking on the north side of Street No. 5.
7. Consider swapping Blocks 198-201 with Lots 135 to 148. This would produce streets with a greater mix of units and lot widths to allow for more on-street parking and tree planting opportunities due to a reduction in utility/driveway conflicts.
8. Please provide a 6 m walkway block between block 181 and Lot 5 to allow for access to the open space lands from Street No. 1.
9. Please consider a walkway block from the rear of the school block to Street No. 4.

10. Please consider fronting singles onto Street No. 1 and brining Block 9 townhouse products onto Street No. 4 (this will allow a mix of units while not having townhouses facing singles)
11. The Facility Fit Sketch will be influenced slightly by the design option for either a stormwater management pond or residential units on Street No. 9.

Transportation Comments:

12. Please note that City's OP identifies 37.5 m ROW protection along Borrisokane Road between Strandherd Drive and Cambrian Road which translates into 18.75 m (37.5/2 = 18.75) on either side from the roadway centreline. Block 20 accomplishes this – thank you.
13. Section 1.2.1- Site Plan Concepts (p-2): The first and second concepts include a school block. The third concept has 77 and 66 more residential units comparing it with the first and second concepts respectively. Without knowing the size and type of school considered for the first and second concepts, how an assumption can be established that more residential units would necessarily generate more vehicular trips in a development. The catchment area for school sites generally go beyond the adjacent community. Please provide clarification along with the concept plan drawings showing the size/type of school facility envisaged for first and second concept plans and the associated vehicular trip generations.
14. Section 2.1 - Roads and Traffic Control (p-5):
    - Borrisokane Road between Strandherd Drive and Cambrian Road is an Urban Arterial as identified in the City's 2013 TMP (Map 6). Please correct the report text where it states Borrisokane Road as a rural arterial road.
    - Same is true for Strandherd Drive and Cambrian Road which are identified in the City's TMP as Urban Arterials. Please correct the report text accordingly.
    - Also Map 5 of the City's 2013 TMP reflect the Rapid Transit and Transit Priority Network 0 2031 Affordable Network. However, the report notes it otherwise
15. Section 2.3 Walking and Cycling (p-7): As shown on the geoOttawa, Borrisokane Road and Cambrian Road both are identified as part of the Ultimate Bicycle Network. It seems appropriate to make note of it in the report.
16. Section 3.1.1 Road Network Improvements (Table 1, p-10): Regarding Chapman Mills Drive, please note that the City has recently completed the EA Study for westerly extension of Chapman Mills Drive and BRT corridor. The EA Study is out for 30-day public review period until 20 December, 2016. The recommended plan established for the corridor includes two lanes (one in each direction) along Chapman Mills Drive for general traffic as opposed to four lanes as noted in the report. Also, Chapman Mills Drive is identified in the TMP as a major collector roadway. Further, as per the TMP, implementation of BRT facility along this section of Chapman Mills Drive is a post 2031 project. Please correct the text in the report accordingly.
17. Section 3.2 – 2022 Future Background Conditions (p-11) : The report states that by 2022 the BRT part of Realigned Greenbank Road will be built and operational. What is the source of this information? It will affect the ensuing

assumptions and analysis related to future background and total traffic volumes.

- 2nd last paragraph (p-12): The 2011 OD Survey results may be a good indicator to understand travel pattern for a larger area, its application to individual sites require careful consideration. The future rapid transit facility as mentioned in the report, is fairly away from the proposed site and is unlikely to be accessible by walking. Its implementation is also post 2031. Therefore, for an area similar to the subject site, where the transit service is not very frequent, 30% transit modal share appears fairly high. Please provide a rationale for how a 30% transit modal share is justified for the subject development. It has the potential to affect the ensuing assumptions regarding background and future traffic volumes, traffic analysis undertaken and the Findings and Conclusion section of the report.

18. Section 3.3 – Site Traffic Generation (p-14):
    - What is the source of factors (0.75, 0.99 for Land Use Type 210 and 0.51 and 0.59 Land Use Type 230) used for AM and PM peak hours as reflected in Table 3 (Step 1)?
    - The Trip Generation volumes as reflected in Table 3 (Step 2) seem higher when comparing to the volumes using ITE equations. Please provide clarification.
    - Step 3: As commented earlier, the 30% transit modal share appears fairly high in the vicinity where the subject development is proposed to occur.
19. Table 3 – Step 3: The table shows 137 and 174 two-way vehicular trips during the AM and PM peak hours. However, 50% of the trips are assigned to enter/exit the site from Borrisokane Road. The remaining 50% would use the three proposed internal connections to Mattamy's Half Moon Bay West development as stated in the report. What would be the impact of 50% traffic from the subject site on the adjacent neighbourhood?
20. GeoOttawa shows a future cycling link between Jock River and Cambrian Road as part of the Ultimate Network. It runs north-south just east of the subject site. What measures are proposed to provide connection to this future cycle facility?
21. The modal split proposed (30% transit) once subdivision is occupied seems optimistic. The report states that existing Barrhaven South auto modal share is 90%. A 20-30% reduction in 5-10 years seems doubtful – please comment.
22. Section 3.3, Table 3. Conversion of Auto Trips to person trips - transit modal share = 10%. How does this then go to 30% for Person Trips to Modal Share?
23. If traffic from the Half Moon Bay Road development is taken into account in this report, then what are the impacts of the Glenview Homes traffic travelling through Half Moon Bay Road and north on Greenbank Road?
24. The intersection of Strandherd Drive and Borrisokane Road is currently failing as mentioned in report. Volumes have likely increased since the traffic counts were provided to Stantec, especially with recent opening of Costco on Strandherd Drive. A new count was to be conducted around the end of November 2016.
25. Traffic Services has concerns about queuing on Strandherd Drive, especially in the PM peak period backing up past Maravista Drive. This site, as well as neighbouring sites is shown to add significant traffic demand on Strandherd Drive.

26. Synchro Modelling Notes:

- Timing plans have been changed at Strandherd Drive and Borrisokane Road as a result of Costco opening. Updated plans can be provided to Stantec upon request.
- Models show max recalls for north-south, and no recalls for east-west, with no detection provided for PM. This results in no east-west movement. Models should be revised to show max recalls for east-west. This affects the v/c calculations of the program.
- Side-street through movements should have a minimum of 10s in accordance with TIA guidelines.
- For future Strandherd Drive conditions, if one left-turn direction is fully protected, the opposite must be as well.
- Double westbound left turn lanes provided, but only one southbound receiving lane.
- Future intersection width will require a much higher flashing-don't-walk value for both directions, calculated at 1.0 m/s (new standard). FDW numbers should be increased.

27. The report should map the locations of the background developments indicated in Table 2. An RMA is required for the proposed southbound left-turn lane

Tree Conservation Report:

1. A tree permit is needed prior to the removal of trees 10cm in diameter or larger; one will be made available for the commencement of site works
2. The removal of trees on a property line, or on an adjacent property, will require the permission of the adjacent property owner – the removal of the East Drain may require this
3. The EIS/TCR has appropriately rationalized the need for tree removal on the site

EIS

1. We wish to understand why the OP policy for the 30 metre NHWM setback is not applied the full distance to the woodlot, including Block 22 on the applicant's lands.
2. Given City Staff have concerns with the policy approach to the realigned Centre Drain we would like to meet with the applicant and their consultants to discuss:
   a. Discuss the OP Policy framework for the drain relocation
   b. Discuss the technical aspects of how the greenway and realigned drain will function
   c. Long term maintenance and function of the greenway.

Integrated Environmental Review

3. Please have page 19 signed by the 4 reviewers representing the 4 disciplines.

4. Page 12 (Section 4.3.1) references conceptual cross sections of the new channel and green corridor Appendix 4, but none are provided. Please provide a longitudinal section from the Jock River to Cambrian Woods.
5. Appendix 1, page 6 discusses Policy compliance with 4.7.3 but does not consider the full length of the realigned drain. We wish to understand why the OP policy for the 30 metre NHWM setback is not applied the full distance to the woodlot, including Block 22 on the applicant's lands.
6. Given City Staff have concerns with the policy approach to the realigned Centre Drain we would like to meet with the applicant and their consultants to discuss:
    d. Discuss the OP Policy framework for the drain relocation
    e. Discuss the technical aspects of how the greenway and realigned drain will function
    f. Long term maintenance and function of the greenway.

Phase 1 Noise Control Feasibility Study Requirements

1. Please update the study such that the City of Ottawa Environmental Noise Control Guidelines dated January 2016 [ENCG] is the primary reference point. The MOECC NPC-300 document should also be specifically named, when referenced. Please note that this will require updates to substantial portions of the report, and may impact the recommendations and conclusions of the report. Some of these required updates are identified in the below comments, and it is the responsibility of the noise consultant to review and ensure subsequent revisions of this report are prepared in accordance with the new guidelines. Please also note that the ENCG may at times have criteria or requirements greater than those identified in MOECC documents; in all cases the consultant must follow the guideline that will result in the best protection for the future occupants. If additional information is required, we would be happy to schedule a meeting to discuss.
2. Street 6 is referenced through the report; during this review it was assumed that Street 1 was intended; please confirm and update accordingly.
3. Please include the southbound lanes of Highway 416 in the analysis.
4. Noise contour lines must be combined; combined effect of all noise sources must be analyzed.
5. Please include noise contours down to 40 dBA, or calculate the extent of effect and include justification within the report.
6. Please note that noise mitigation requirements in the ENCG have changed. Please follow the requirements of the City of Ottawa Official Plan and ENCG when determining noise mitigation. Use of the former "5 dBA tolerance" is not automatic, nor part of the City of Ottawa or MOECC criteria. Outdoor spaces should be mitigated to 55 dBA or below, and all mitigation options should be reviewed prior to applying noise barriers.
7. Please note that the City of Ottawa has established alternative warning clauses that must be implemented in all noise studies and legal agreements. At this time, however, as part of a Feasibility Study specific warning clauses

should not be assigned, but could be discussed. Additional details and site-specific warning clauses will need to be established during the Detail Noise Study.

Phase 1 Environmental Site Assessment

1. No comments

Stage 1 & 2 Archaeological Assessment

1. No Comments

Attached Agency Comments

1. Enbridge - dated November 15, 2016
2. Soloway Wright – dated November 21, 2016
3. Conservation Authority – dated April 15, 2016
4. Rogers Communication Partnership – dated November 14, 2016
5. Group Telecom – dated November 17th, 2016
6. Ottawa Catholic School Board – dated November 22, 2016
7. Canada Post – dated March 29, 2016
8. Hydro Ottawa comments dated April 15, 2016

Please review the above comments and advise if you have any questions or concerns. Please submit 3 hard copies of all revised plans/reports for my review, including pdf's of all revisions on a cd.

Finally, regarding the statutory public meeting I recommend holding off on scheduling the meeting until such time as we have reconciled the sump pump issue.

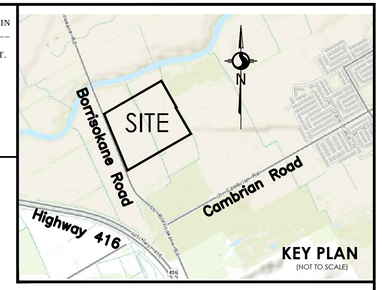
Regards,

Sean Moore, Planner III (Acting)
City of Ottawa
Planning and Growth Management Department
South Services Unit
Ph: 613.580.2424 ext.16481
Fax: 613.560.6006

cc: **Don Herweyer**, Manager, Development Review, South Services Unit
Jeff Shillington, Engineer, Development Review, South Services Unit
Mark Young, Urban Designer, Development Review
Asad Yousfani, Transportation Project Manager, Development Review

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____20____
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT. THIS____DAY OF_____,2017.

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW, SUBURBAN SERVICES
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



DRAFT PLAN OF SUBDIVISION OF

PART OF LOT 12
CONCESSION 3 (RIDEAU FRONT)
(GEOGRAPHIC TOWNSHIP OF NEPEAN)
CITY OF OTTAWA

Scale 1:1000
20 0 20 40 60 METRES

METRIC CONVERSION

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

SCHEDULE OF LAND USE			
BLOCK	USE	UNITS	AREA (Ha/ac)
1 TO 116	SINGLES	116	3.54/8.75
117 TO 135	TOWNS	92	1.89/4.67
136	COMMERCIAL		0.43/1.06
137	SCHOOL		2.40/5.93
138	STORM POND		0.82/2.03
139	PARK		0.65/1.61
140	OPEN SPACE		6.30/15.56
141	LAND EXCHANGE		0.005/0.01
142	ROAD WIDENING		0.34/0.84
143	DITCH CORRIDOR		0.13/0.31
STREETS	STREETS		3.625/8.97
TOTAL		208	20.13/49.74

INFORMATION: REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT R.S.O. 1990

a. SEE PLAN
b. SEE PLAN
c. SEE PLAN
d. SEE PROPOSED LAND USE SCHEDULE (ABOVE)
e. SEE PLAN
f. SEE PLAN
g. SEE PLAN
h. CITY WATER AVAILABLE
i. SEE SOIL REPORT
j. SEE TOPOGRAPHICAL INFORMATION
k. ALL CITY SERVICES AVAILABLE
l. NO EASEMENTS REGISTERED ON TITLE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE

JACOB SHABINSKY
AUTHORIZED SIGNING OFFICER
GLENVIEW HOMES (CEDARVIEW) LTD.

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE

XXXXXXXXXX
VICE PRESIDENT, LAND DEVELOPMENT
1564989 ONTARIO INC.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

Stantec Geomatics Ltd.
CANADA LANDS SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL. (613)722-4420 FAX. (613)722-2799
stantec.com

DRAWN: CEC | CHECKED: FP | PM: FP | FIELD: N/A | PROJECT No.: 161613485-131

david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

MEMORANDUM

DATE: May 4, 2017 *By Email*

TO: **City of Ottawa**
Development Review (South Services)
Planning, Infrastructure and Economic Development
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Attention: Sean Moore
MCIP, RPP, LEED Green Associate
[613.580.2424 ext.16481]

SUBJECT: **Functional Servicing Report for 3387 Borrisokane Road**
Summary of Planned Responses to City Comments
Glenview Homes (Cedarview) Ltd

OUR FILE: 11-809

ATTACHMENTS: N/A

Mr. Moore,

Glenview Homes (Cedarview) Ltd. received engineering comments from the City of Ottawa (letter dated December 21, 2016) about the first submission of the Functional Servicing Report for the proposed development of 3387 Borrisokane Road. A summary of comments relevant to the Functional Servicing Report and a description of how each matter is addressed is provided in the table that follows.

In the same letter, the City of Ottawa also provided comments on the associated planning, engineering, and environmental documents that were submitted as part of the overall development application for 3387 Borrisokane Road. The draft plan of subdivision has been revised since the original submission to address City comments.

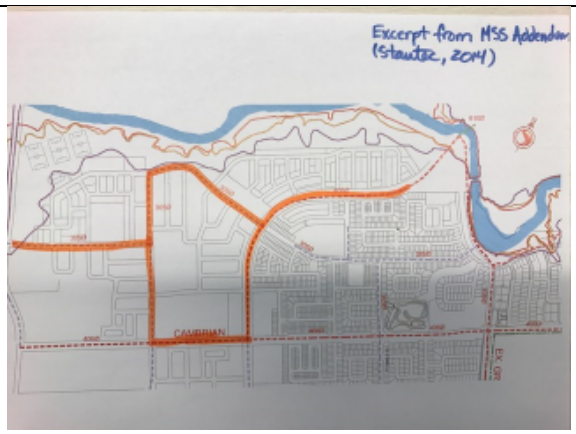
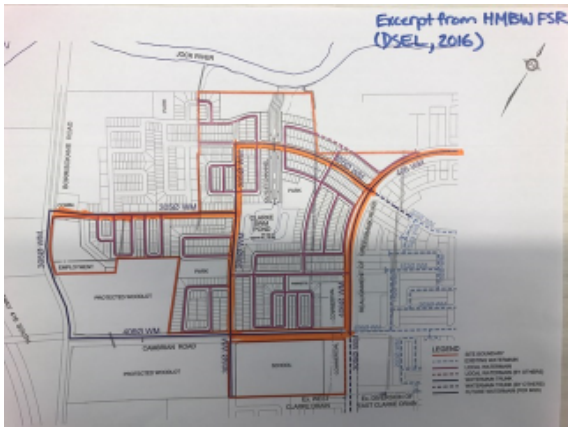
In addition to the updates described below, DSEL has updated the FSR for the latest concept plan (e.g. development statistics, servicing demands, etc.) and to have regard for the Half Moon Bay West Functional Servicing Report (DSEL, December 2016) (e.g. commercial block storm

outflows to be directed to the Borrisokane roadside ditch, trunk sanitary sewer inverts and demands, trunk storm sewer on Street No. 1 inverts and demands, etc.), where applicable.

Please do not hesitate to contact our office should you wish to discuss any of the information that follows.

Item	Comment	Response
Wastewater Servicing Appendix D	Please ensure the minimum full flow velocity is being met as the Sanitary Sewer Calculation Sheet shows the velocity slightly under the minimum for all pipe lengths.	The 0.59 m/s reported value is a rounding error associated with the minimum pipe slopes that were used. The velocity can be considered to meet the 0.6 m/s minimum value required by the Ottawa Sewer Design Guidelines (2012, and as amended from time to time), as shown in the revised Appendix D .
Section 5.2	1st bullet, Table 6, please revise the wording to indicate that the minimum sewer size for local streets is to capture the 2-year event without any ponding.	The suggested wording has been provided in the revised FSR to clarify the requirements of PIEDTB-2016-01.
Stormwater Management Section 5.0	It is understood that there have been ongoing discussions with Management at the City of Ottawa in regards to the use of sump pumps in suburban development, however at this time, we are unable to comment as no direction has been given by Management. Until Management provides further direction in regards to sump pumps, this application cannot be approved. In advance of further discussions on sump pumps please provide a rationale for their use, including the following topics: policy framework, engineering rationale, and financial rationale. We wish to have a document that we can provide to the reviews of the engineering standards to ensure they are aware of the broader scope of why sump pumps are proposed.	A draft memo summarizing the rationale for the proposed use of private sump pumps has been previously provided to the City and is included in Appendix H of the updated FSR.
Stormwater Management Appendix E, F, G	All 3 Storm Sewer Calculation Sheets contain several errors, please review and revise the following: a) STM Option #1 MH's and Areas do not correspond to Figure 5.	The calculation sheets have been updated. The starting Tc value for trunk sewers is calculated assuming local sewers flowing at minimum velocity of 0.8 m/s connecting to the high end of each trunk sewer. Per Table 6, detailed design will ensure local sewers

	b) Please ensure all Tc's start at 10 mins at the high end of each pipe run. c) Please ensure that all sewers have the capacity to accommodate the calculated peak flows as there are some instances where the capacity is exceeded.	are designed with minimum velocity, and applying the noted Tc 10 min start time as required by the Ottawa Sewer Design Guidelines (2012, as amended from time to time). Where Q/Q was reported over 100% in the first submission, the values were all very close to 100%. Rounding errors and pipe sizes have been adjusted in calculation sheets in the updated FSR, to ensure it is demonstrated that no proposed pipe would be flowing at or near capacity. At detailed design, pipes will be required to meet all requirements of the Ottawa Sewer Design Guidelines (2012, as amended from time to time).
Stormwater Management Section 5.0	Please provide more detailed calculations in regards to the sizing of the Cedarview Pond (Calculations showing how the permanent pool, extended detention, and 100 year volumes were calculated). Also, the sediment management area is shown on the neighbouring property. The sediment management area should be located within Glenview's pond block.	The Draft Barrhaven South MSS Addendum (Stantec, 2014) has the Cedarview Pond with required permanent pool of 2,432 m3 and required extended detention volume of 521 m3. These values are based on a 13.03 ha drainage area and total imperviousness of 71%. The requirements for the pond are described in Section 5.3.1 and calculations are provided in Appendix F, to reflect the current development concept and to be in conformance with the MOE Stormwater Management Planning and Design Manual (2003). 100 year storage is not required within the Jock River watershed, however an element of storage above the extended detention volume will be provided incidental to the construction of the pond. The sediment management area has been moved within the Glenview Homes (Cedarview) Ltd property, and the pond block and park property lines have been revised accordingly.
Water Section 3.0	A number of future watermains are required to service this area (see below). a) Extension of the 406 mm watermain on Cambrian. b) 406 mm watermain on the future Greenbank Road from Cambrian to Pearl Dace Crescent.	The extensions noted by the city are clarified in image below, which is an excerpt from the Draft Barrhaven South MSS Addendum (Stantec, 2014).

	c) Three 305 mm watermains located outside of the site boundary.	 The watermains are also shown in the Mattamy Half Moon Bay West Functional Servicing Report (DSEL, 2016), as shown in the image below.  Depending on phasing and timing of development of the Glenview Homes (Cedarview) Ltd property and the Mattamy Half Moon Bay West property, not all of the watermains listed are anticipated to be required to be in place prior to development of the Glenview Homes (Cedarview) Ltd property. Glenview will look to front-end the required off-site infrastructure, if required. At the time of detailed design, detailed hydraulic modelling would be undertaken to prove that the proposed on-site and off-site watermains are in conformance with the City's Water Supply Guidelines (2010, as amended from time to time). Any changes to proposed off-site infrastructure would need to ensure no adverse environmental issues and no negative impact to affected landowners. The FSR has been updated accordingly.

Wastewater Section 4.0	Downstream trunk sanitary sewers within the adjacent development to the east of this site and along the future Greenbank Road are needed to accommodate this development.	The extensions noted by the city are shown in image below, which is an excerpt from the Draft Barrhaven South MSS Addendum (Stantec, 2014).  The sewers are also shown in the Mattamy Half Moon Bay West Functional Servicing Report (DSEL, 2016), as shown in the image below.  Depending on phasing and timing of development of the Glenview Homes (Cedarview) Ltd property and the Mattamy Half Moon Bay West property, the sanitary sewers on the shared street between Mattamy and Glenview and select other downstream sewers are not all anticipated to be required to be in place prior to development of the Glenview Homes (Cedarview) Ltd property. At the time of detailed design, detailed sanitary capacity analysis would be undertaken to prove that the proposed on-site and off-site sanitary sewers are in conformance with the Ottawa Sewer Design Guidelines (2012, as amended from time to time). Glenview will look to front-end the required off-site infrastructure, if required. The FSR has been updated accordingly, including an alternative sanitary

		sewer routing of the trunk sewer to be considered at the time of detailed design, if Glenview Homes project precedes the Mattamy Homes development. Any changes to proposed off-site infrastructure would need to ensure no adverse environmental issues and no negative impact to affected landowners.
Stormwater Management Section 5.0	Development of lands within the floodplain should be discussed with the RVCA	Based on preliminary consultation with the RVCA (Appendix J), it is understood that the proposed fill is not expected to have a negative impact on the function of the Jock River and that the cut/till proposal has the RVCA's support in principal. The RVCA has advised that a previous OMB decision has established that the cut/fill work in the floodplain does not need to be completed before draft approval, however a permit needs to be issued prior to draft approval and implementation made part of the draft conditions. Timing should be worked out so the permit is received before draft approval is expected as per timelines in the Planning Act. The work must be completed prior to zoning and registration. Appendix L of the updated FSR contains an updated cut/fill analysis for the updated development concept.
Stormwater Management Section 5.0	ESD staff should provide input on the proposed SWM options and preferred strategy presented in this study.	This comment comes from the Infrastructure Policy group. Since not otherwise advised, DSEL proceeded with updating the FSR assuming that all ESD input has been provided within the City of Ottawa comment letter dated December 21, 2016.
Stormwater Management Section 5.0	I would consider reducing the weir elevation to the 25 yr level (refer to page 4-6 of the MOE SWM Planning and Design manual). Retention of stormwater beyond the 25 mm event/24 hour duration is not required.	Agreed, retention of stormwater is not required beyond the MOE's permanent pool and quality control targets. Agreed, per the MOE Stormwater Management Planning and Design Manual (2003), the minimum active storage detention time is 24 hrs as noted. The Draft Barrhaven South MSS Addendum (Stantec, 2014) and the approved detailed design of the Greenbank Pond (DSEL, 2016) both include weirs at the 100-year floodplain level, so DSEL considered it prudent to list in the FSR as a requirement for future design. The updated FSR says: *Per the MSSA, the pond weir may be required to be set at the 100-year water level in the Jock River, which will therefore incidentally offer an element of quantity*

		control to the pond, although not required. Per the MOE Stormwater Management Planning and Design Manual (2003), the overflow elevation must be at least above the 25 year floodline. As detailed designs progress, the recommended weir elevation (between 25 year and 100 year Jock River waterlevels) and pond operating characteristics will be further assessed. Notwithstanding final determination of the weir elevation, the proposed pond block is sufficiently sized to meet the stormwater management criteria outlined in this FSR.
Stormwater Management Section 5.0	A review of the hydraulic conditions used to establish the 100 yr HGL in the pond and storm sewer system should be undertaken. The HGL during the 100 yr Chicago storm (which occurs during the summer) coupled with the 100 yr water level in the Jock River (which occurs during the spring freshet) is very conservative	Noted. In the Draft Barrhaven South MSS Addendum (Stantec, 2014), the 100-year HGL in the storm sewer system was based on the 100-year 3-hour Chicago design storm, with the pond having an outlet weir set at the 100-year waterlevel in the Jock River, and a fixed downstream backwater level at the Jock River equal to the 100-year waterlevel. In the approved pond design brief for the Greenbank Pond (DSEL, 2016), the pond was modelled using 24-hr SCS Type II design storms and restrictive downstream conditions using the Jock River 100-year waterlevel. The resulting 100-year waterlevel in the pond was applied to the 100-year HGL analysis for the upstream storm sewer network, which was reported as a composite 100-year HGL taking the most conservative results from the 100-year 3-hour Chicago and 100-year 24-hour SCS Type II design storms. To ensure flexibility at the detailed design level, the updated FSR contains the following in Section 5.5 *Note that different combinations of design storms and downstream restrictive waterlevel conditions in the Jock River are to be assessed as part of the 100-year HGL analysis to be completed at detailed design.* Please note that because of the proposed use of private sump pumps across the site, the 100-year HGL has less of an impact on the overall grading scheme at 3387 Borrisokane Road as compared to subdivisions with typical servicing arrangements with freeboard requirements set from the 100-year HGL.

Stormwater Management Section 5.0	The 100 year Chicago storm should be used to assess the storm system. This storm event was not mentioned in Section 5.5	Per Section 5.5, Table 6, the Draft Barrhaven South MSS Addendum (Stantec, 2014) and the City of Ottawa Sewer Design Guidelines (2012, as amended from time to time), the Chicago 3-hr design storms and the 24-hr SCS Type II design storms will be used to assess the storm sewer system. Section 5.5 of the FSR has been revised to say "100-year **3-hour** Chicago" instead of "100-year **4-hour** Chicago".
Stormwater Management Section 5.0	The use of sumps pumps will be deferred to the ISR-BBSS Working Group.	Noted.
Conservation Authority Appendix J	A conceptual cut and fill proposal was submitted and reviewed by our engineering staff. The conceptual plan appears to be feasible and meets the cut and fill policies of the RVCA. The onus in now on the applicant to demonstrate through detailed design that the cut and fill can be achieved. The applicant must submit a formal application to the RVCA under Ontario Regulation 174/06 which must be approved by the RVCA before draft plan approval. Implementation of the cut and fill can be achieved through conditions of draft approval.	A formal application will be submitted to the RVCA prior to the draft plan approval, as requested. The cut/fill application will include details regarding the proposed natural channel corridor and the future proposed stormwater management outlet(s). Appendix L of the updated FSR contains an updated cut/fill analysis that is reflective of the current development concept for the Glenview Homes lands, including the proposed natural channel corridor design (Appendix K).
Conservation Authority Section 1.3	The RVCA was provided with a copy of a servicing options study for stormwater management. Although we have undertaken a preliminary review of the study to identify preferred options, we have not undertaken a detailed engineering review without knowing what the preferred option will be (consensus of City, RVCA and applicant). However, we can clearly state at this time that we do not support Option 3, which would see the flows from this site diverted from the existing Jock River tributaries to the future Clarke Pond.	Only Options 1 (Cedarview Pond) and 2 (Oil/Grit Separator Units) are presented in the updated FSR.

Conservation Authority Section 1.3	The headwaters drainage feature assessment has been reviewed by our Aquatic and Fish Habitat Biologist and we are in agreement with the management recommendations for reaches 1 and 4 (maintain recharge) and for reaches 2 and 3 (mitigation). The proposed realigned sections of reaches 2 and 3 will cross lands outside the floodplain where the existing buffer conditions do not meet the recommended target (minimum 30 m wide vegetated buffer along at least 75% of length on both sides of the feature). It is our expectation that the targeted buffer requirements will be met. Additional mitigation measures may be required to ensure the continued movement of amphibians between the woodlot and the Jock River.	As part of the development concept, the existing ditches are to be closed and a new natural corridor is to provide a drainage pathway and natural linkage for the north block of Cambrian Woods instead of reaches 2 & 3. The details of the natural corridor, including vegetated buffer widths, alignment, etc. are being determined by the environmental consultant (Kilgour & Associates) in a process separate from the FSR. For reference, the current natural channel corridor proposal (per RVCA and City recommendations) is included in Appendix K and is shown on Figures 1-10, but is understood to require approval from Mattamy Homes, RVCA, and City of Ottawa before considering the concept as final.
Conservation Authority Section 1.3	Since the current plan is dependent on watercourse relocation, written confirmation will have to be provided by Mattamy that the relocation is acceptable to them since they ultimately have to tie into it.	Per the Mattamy Half Moon Bay West Functional Servicing Report (DSEL, 2016) and the first and current submission of the Glenview Homes (Cedarview) Ltd Functional Servicing Report, the identified natural corridor lines up on either side of the shared street, and can be connected via culverts under the shared Street No.1. However, it is understood that Mattamy is revising their concept plan for their lands south of Street No.1, so the alignment within and south of Street No. 1 remains to be finalized. As part of the natural corridor approval process (separate from this FSR), Glenview will seek written approval from Mattamy on the watercourse relocation.
Conservation Authority Appendix J	It would be useful to have a composite plan showing the preferred servicing option for SWM, the cut and fill, the watercourse relocations and related corridors (including the buffer).	Composite plans showing the SWM servicing options, cut and fill, and watercourse relocations are provided as Figures 9 and 10 of the updated FSR.
Plan of Subdivision – Design Figure 1	Given the CA's comments on stormwater I recommend we move forward with the draft plan illustrating a pond on the subject lands (adjacent to the park). If subsequent engineering	The draft plan (Appenidx A) illustrates a pond on the subject lands. The FSR continues to put forward Options 1 (Cedarview Pond) and 2 (Oil/Grit Separator Units) for stormwater management. For water, sanitary, and Option 2 stormwater designs, the pond block is assumed to be developed as low-density residential

	details recommend oil/grit separators we can visit that at that time.	land use, to ensure capacity is provided in the servicing network.
EIS Appendix 1, Pg 6	Given City Staff have concerns with the policy approach to the realigned Centre Drain we would like to meet with the applicant and their consultants to discuss: a) Discuss the OP Policy framework for the drain relocation b) Discuss the technical aspects of how the greenway and realigned drain will function Long term maintenance and function of the greenway. c) Appendix 1, page 6 discusses Policy compliance with 4.7.3 but does not consider the full length of the realigned drain. We wish to understand why the OP policy for the 30 metre NHWM setback is not applied the full distance to the woodlot, including Block 22 on the applicant's lands.	The details of the natural corridor, including vegetated buffer widths, alignment, etc. are being determined by the environmental consultant (Kilgour & Associates) in a process separate from the FSR. For reference, the current natural channel corridor proposal (per RVCA and City recommendations) is included in Appendix K of the FSR and is shown on Figures 1-10, but is understood to require approval from Mattamy Homes, RVCA, and City of Ottawa before considering the concept as final.

Please do not hesitate to contact our office should we be able to offer assistance during your review.

Yours Truly,
David Schaeffer Engineering Ltd.

2017-04-26_Borrisokane_Engineering_Review_Comments_Responses

Per: Laura Maxwell, B.Sc. (Civil Eng), M.Pl.

Appendix B

- Excerpts from Barrhaven South Master Servicing Study (Stantec, November 2014)
- Excerpts from Half Moon Bay West Functional Servicing Report (DSEL, December 2016)

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- A501 / 3.25 / 71.4 — AREA ID; TOTAL IMPERVIOUSNESS (%); AREA (ha)
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER WITH STANDING WATER FROM POND
- 1050Ø — PIPE DIAMETER
- 501 — MANHOLE LOCATION WITH IDENTIFIER
- DRAINAGE BOUNDARY
- 10 YEAR FLOOD LINE
- 25 YEAR FLOOD LINE
- 100 YEAR FLOOD LINE
- LIMIT OF CDP BOUNDARY
- STORMWATER — PROPOSED STORMWATER FACILITY
- OVERLAND FLOW DIRECTION

Notes

1. ALL FOUNDATIONS TO BE 0.3m ABOVE THE 100 YEAR HGL
2. ALL BUILDING FOUNDATIONS TO DRAIN BY GRAVITY TO THE STORM SEWER SYSTEM

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
Revision		By	Appd.	YY.MM.DD
File Name: 163400999-FIG 4 1-3.DWG		ST	AP	AP	14.11.21
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

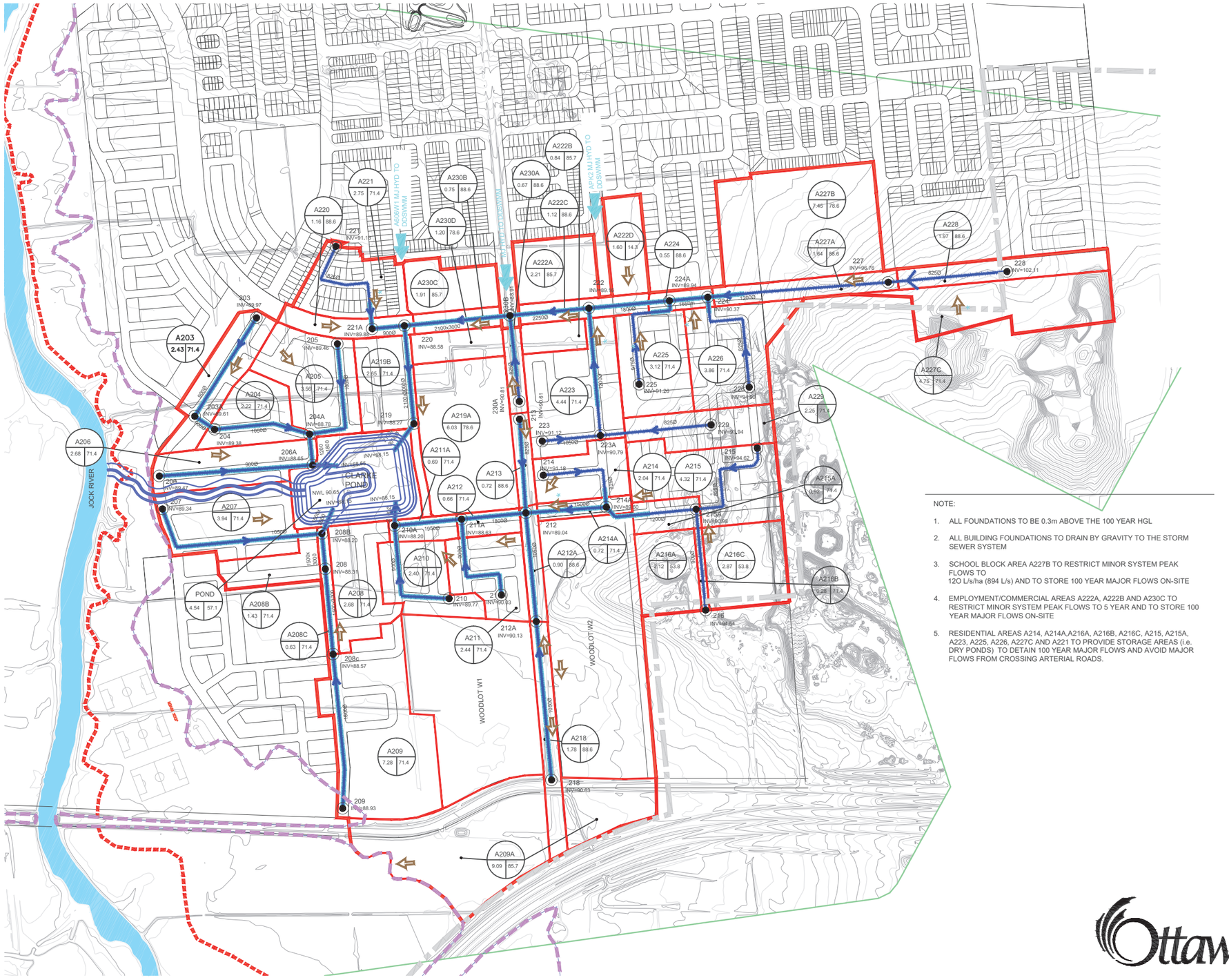
Client/Project
CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
CEDARVIEW POND DRAINAGE PLAN

Project No.	Scale	0 12.5 37.5 62.5m
163400999		
Drawing No.	Sheet	Revision
FIG 4-1	1 of 3	1

Ottawa



NOTE:

1. ALL FOUNDATIONS TO BE 0.3m ABOVE THE 100 YEAR HGL
2. ALL BUILDING FOUNDATIONS TO DRAIN BY GRAVITY TO THE STORM SEWER SYSTEM
3. SCHOOL BLOCK AREA A227B TO RESTRICT MINOR SYSTEM PEAK FLOWS TO 120 L/s/ha (894 L/s) AND TO STORE 100 YEAR MAJOR FLOWS ON-SITE
4. EMPLOYMENT/COMMERCIAL AREAS A222A, A222B AND A230C TO RESTRICT MINOR SYSTEM PEAK FLOWS TO 5 YEAR AND TO STORE 100 YEAR MAJOR FLOWS ON-SITE
5. RESIDENTIAL AREAS A214, A214A,A216A, A216B, A216C, A215, A215A, A223, A225, A226, A227C AND A221 TO PROVIDE STORAGE AREAS (i.e. DRY PONDS) TO DETAIN 100 YEAR MAJOR FLOWS AND AVOID MAJOR FLOWS FROM CROSSING ARTERIAL ROADS.

Ottawa

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- A214 / 1.45 / 88.6 — AREA ID; TOTAL IMPERVIOUSNESS (%); AREA (ha)
- PROPOSED STORM SEWER
- PROPOSED STORM SEWERWITH STANDING WATER FROM POND
- 1050ø — PIPE DIAMETER
- 217 — MANHOLE LOCATION WITH IDENTIFIER
- DRAINAGE BOUNDARY
- 10 YEAR FLOOD LINE
- 25 YEAR FLOOD LINE
- 100 YEAR FLOOD LINE
- LIMIT OF CDP BOUNDARY
- PROPOSED STORMWATER FACILITY
- MAJOR FLOW HYDROGRAPHS FROM EXTERNAL AREAS
- OVERLAND FLOW DIRECTION

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
	Revision	By	Appd.	YY.MM.DD

File Name: 163400999-FIG 4 1-3.DWG		ST	AP	AP	14.11.21
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

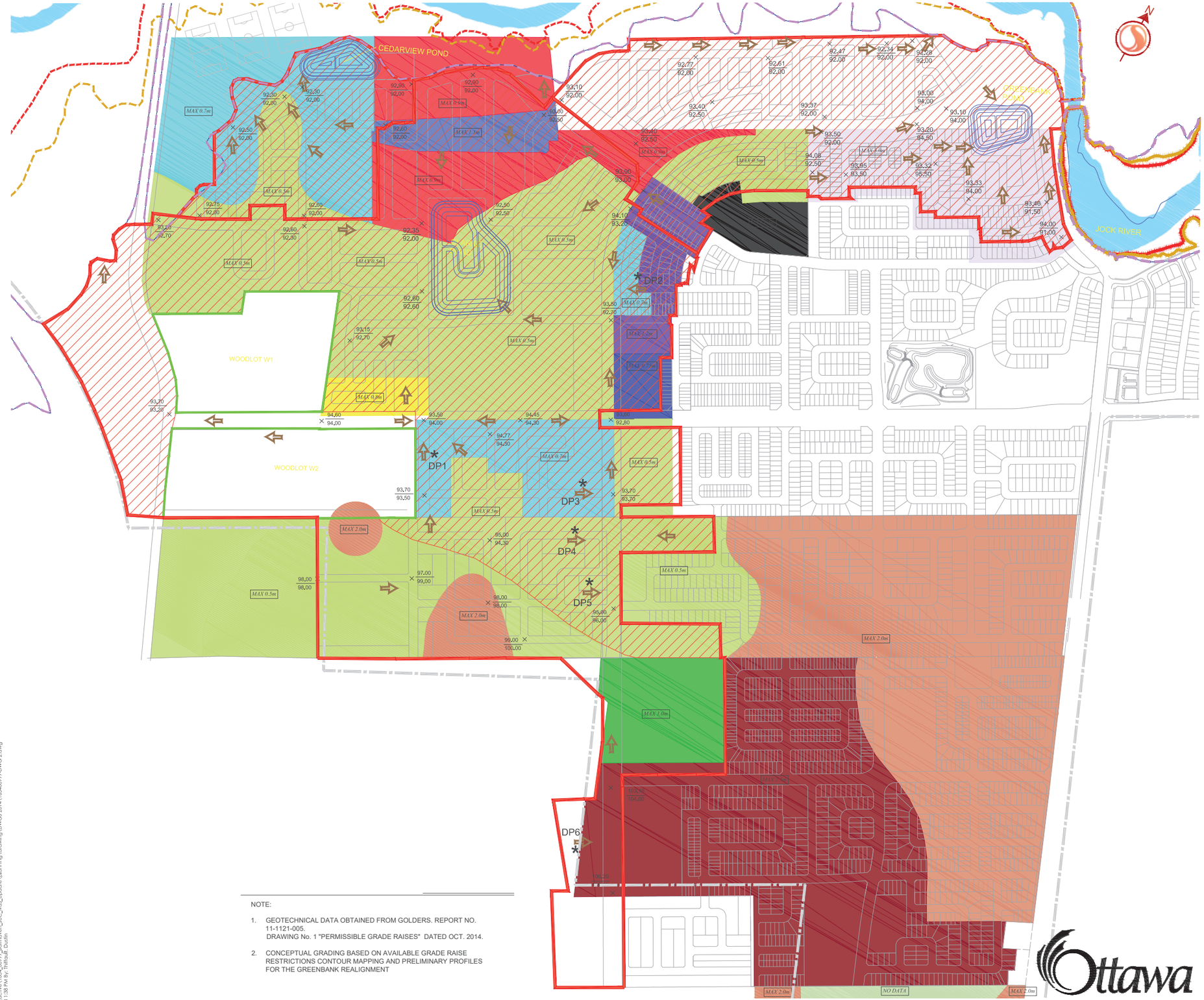
Permit-Seal

Client/Project
CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
CLARKE POND DRAINAGE PLAN

Project No. 163400999	Scale 0 40 120 200m
Drawing No. FIG 4-2	Sheet 2 of 3 — Revision 1



NOTE:

1. GEOTECHNICAL DATA OBTAINED FROM GOLDERS. REPORT NO. 11-1121-005. DRAWING No. 1 "PERMISSIBLE GRADE RAISES" DATED OCT. 2014.
2. CONCEPTUAL GRADING BASED ON AVAILABLE GRADE RAISE RESTRICTIONS CONTOUR MAPPING AND PRELIMINARY PROFILES FOR THE GREENBANK REALIGNMENT

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- OVERLAND FLOW DIRECTION
- ADDITIONAL STORAGE REQUIRED TO DETAIN 100YR MAJOR FLOWS
- SWM POND DRAINAGE BOUNDARY
- ALTERNATIVE HOUSE DESIGN REQUIRED SUBJECT TO FILL RESTRICTIONS AND/OR 100 YEAR HYDRAULIC GRADELINE. FURTHER GEOTECHNICAL INVESTIGATION REQUIRED DURING DETAILED DESIGN
- MAX FILL DEPTH OF 0.5m
- MAX FILL DEPTH OF 0.7m
- MAX FILL DEPTH OF 0.75m
- MAX FILL DEPTH OF 0.8m
- MAX FILL DEPTH OF 0.9m
- MAX FILL DEPTH OF 1.0m
- MAX FILL DEPTH OF 1.1m
- MAX FILL DEPTH OF 1.2m
- MAX FILL DEPTH OF 1.4m
- MAX FILL DEPTH OF 2.0m
- MAX FILL DEPTH OF 2.5m
- MAX FILL DEPTH OF 3.0m
- NO DATA - ADDITIONAL GEOTECHNICAL DATA REQUIRED
- 10 YEAR FLOOD LINE
- 25 YEAR FLOOD LINE
- 100 YEAR FLOOD LINE
- LIMIT OF CDP BOUNDARY
- WOOD LOT
- 106.20 / 106.00 PROPOSED ELEVATION / EXISTING ELEVATION

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
Revision		By	Appd.	YY.MM.DD
File Name: 163400999-WM.DWG		ST	AP	14.11.21
		Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
CITY OF OTTAWA

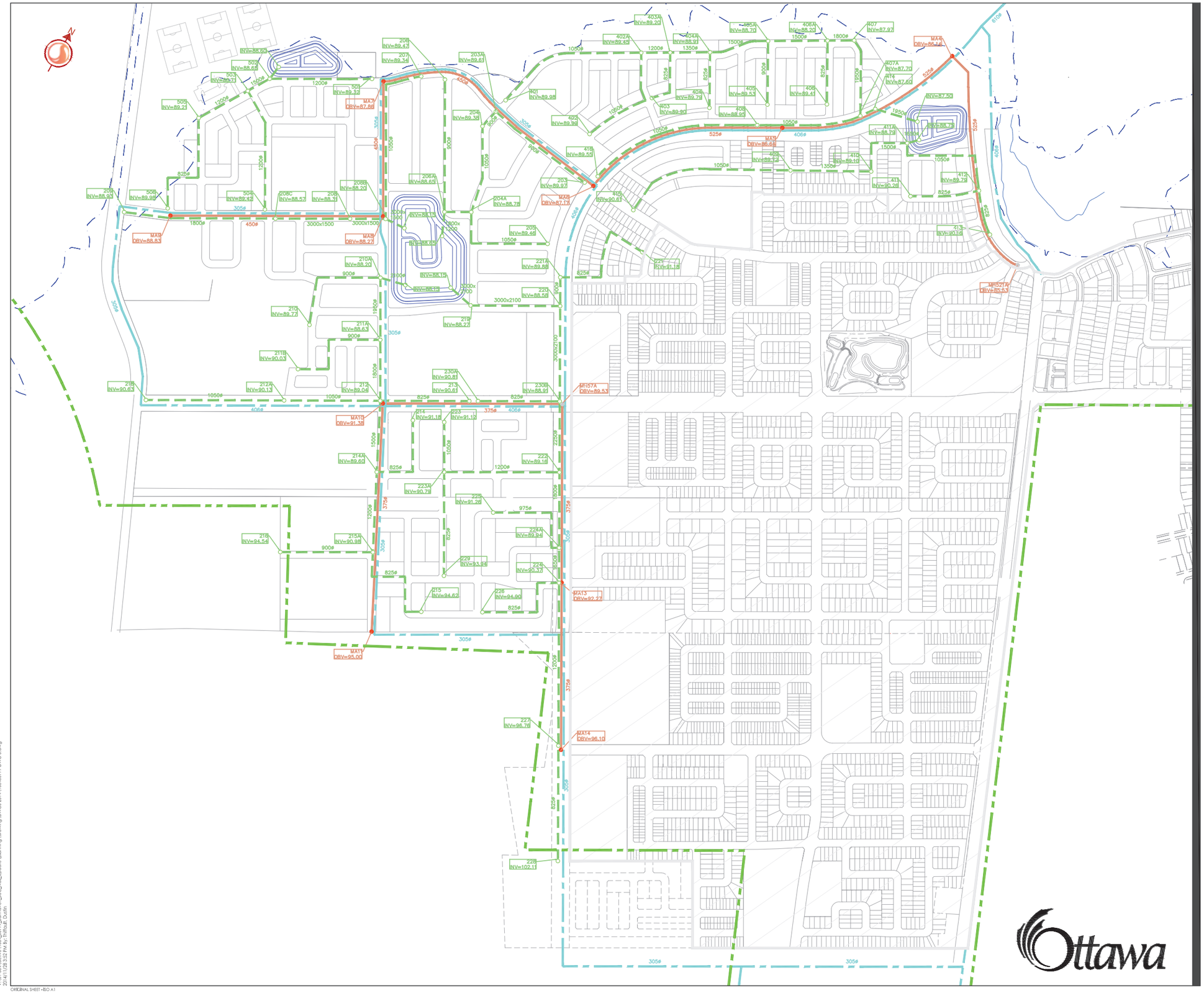
BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
BARRHAVEN SOUTH MASTER GRADING PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
163400999	1:4000 (0, 40, 120, 200m)	A-2	2 of 9	1

V:\01\434\active\163400999_Barrhaven_SUC_MSS_Update\planning\drawing\DWGS 2014\163400999-DWG 2.dwg
2014/11/28 1:38 PM By: Thiffault, Dustin

ORIGINAL SHEET - ISO A1



Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- PROPOSED WATERMAIN
- PROPOSED STORM SEWER
- PROPOSED SANITARY SEWER
- STORM SEWER NODE
- SANITARY SEWER NODE
- EXISTING AREA / FORTHCOMING DRAFT APPROVAL AREA
- CDP BOUNDARY

Notes

1. THE LOCATION OF UTILITIES IS APPROXIMATE ONLY. THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL PROVE THE LOCATION OF UTILITIES AND SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.
2. CONCEPTUAL GRADING BASED ON AVAILABLE GRADE RAISE RESTRICTIONS, CONTOUR MAPPING, AND PRELIMINARY PROFILES FOR THE GREENBANK ROAD REALIGNMENT.

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
Revision		By	Appd.	YY.MM.DD
File Name: 163400999-DWG 3.DWG		ST	LP	AP	14.11.28
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM

Ottawa, ON

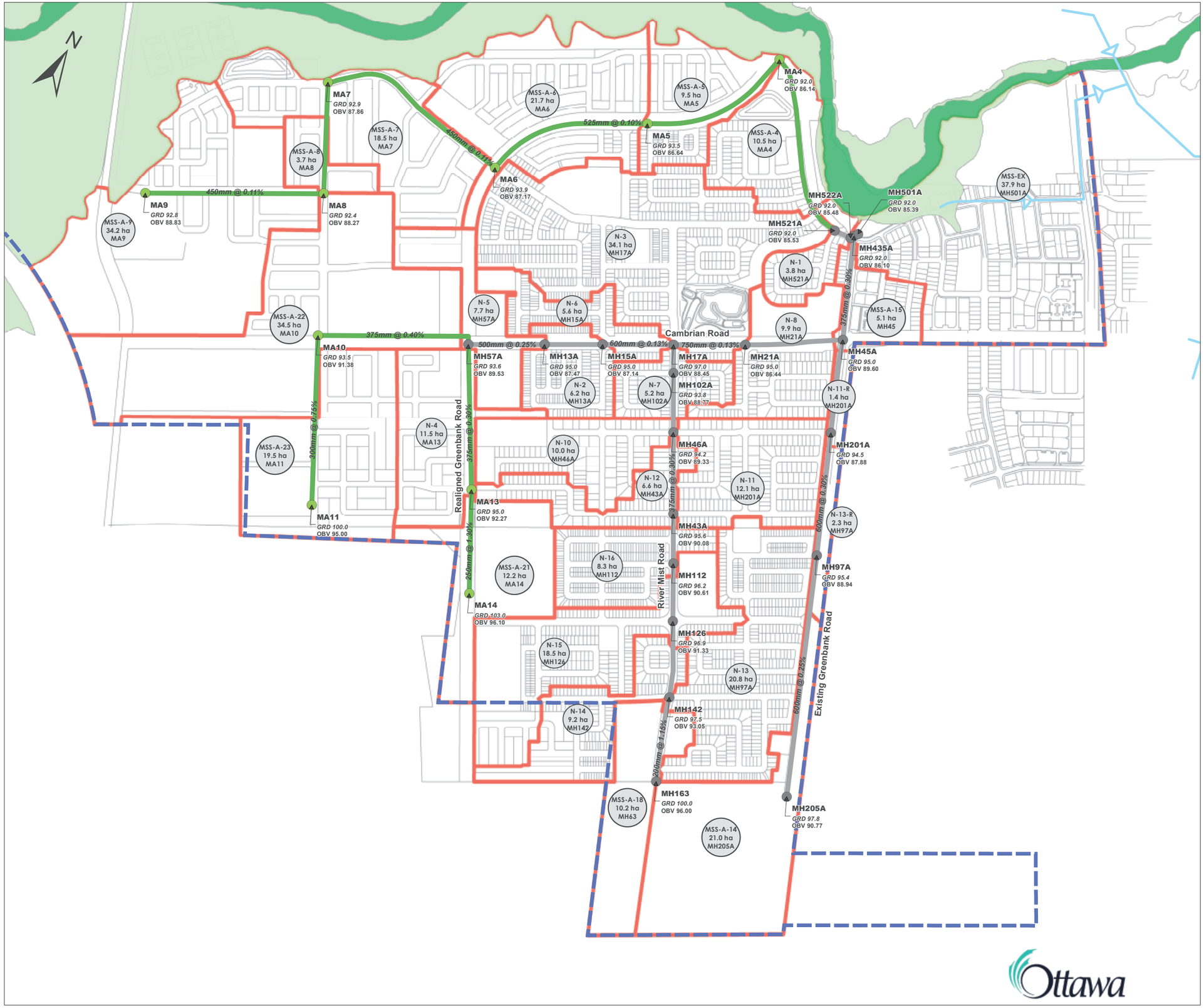
Title

SERVICING KEY PLAN

Project No.	Scale				
163400999	1:4000	0	40	120	200m
Drawing No.	Sheet		Revision		
A-3	3 of 9		1		

Ottawa

ORIGINAL SHEET - ISO A1



W:\active\1634_00999_Barrhaven_SUC_MSS_Update\planning\drawing\Sanitary\163400999-SAN-DRAWING4.mxd

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- BARRHAVEN SOUTH COMMUNITY BOUNDARY
- EXISTING NODES
- FUTURE NODES
- EXISTING SEWER
- FUTURE SEWER
- EXISTING SEWER (FROM 2007 MSS)
- RIVER
- 100 YEAR FLOOD PLAIN
- SANITARY DRAINAGE CATCHMENTS
- Area Name / Area (ha) / Manhole — SANITARY CATCHMENT INFORMATION

Node Name
Ground Elevation
Top Obvert Elevation

Notes

1	ISSUED FOR MSS ADDENDUM	LP	AP	14.11.28
	Revision	By	Appd.	YY.MM.DD

File Name: 163400999-SAN-DRAWING4.MXD		LP	AP	LP	14.11.28
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project

CITY OF OTTAWA

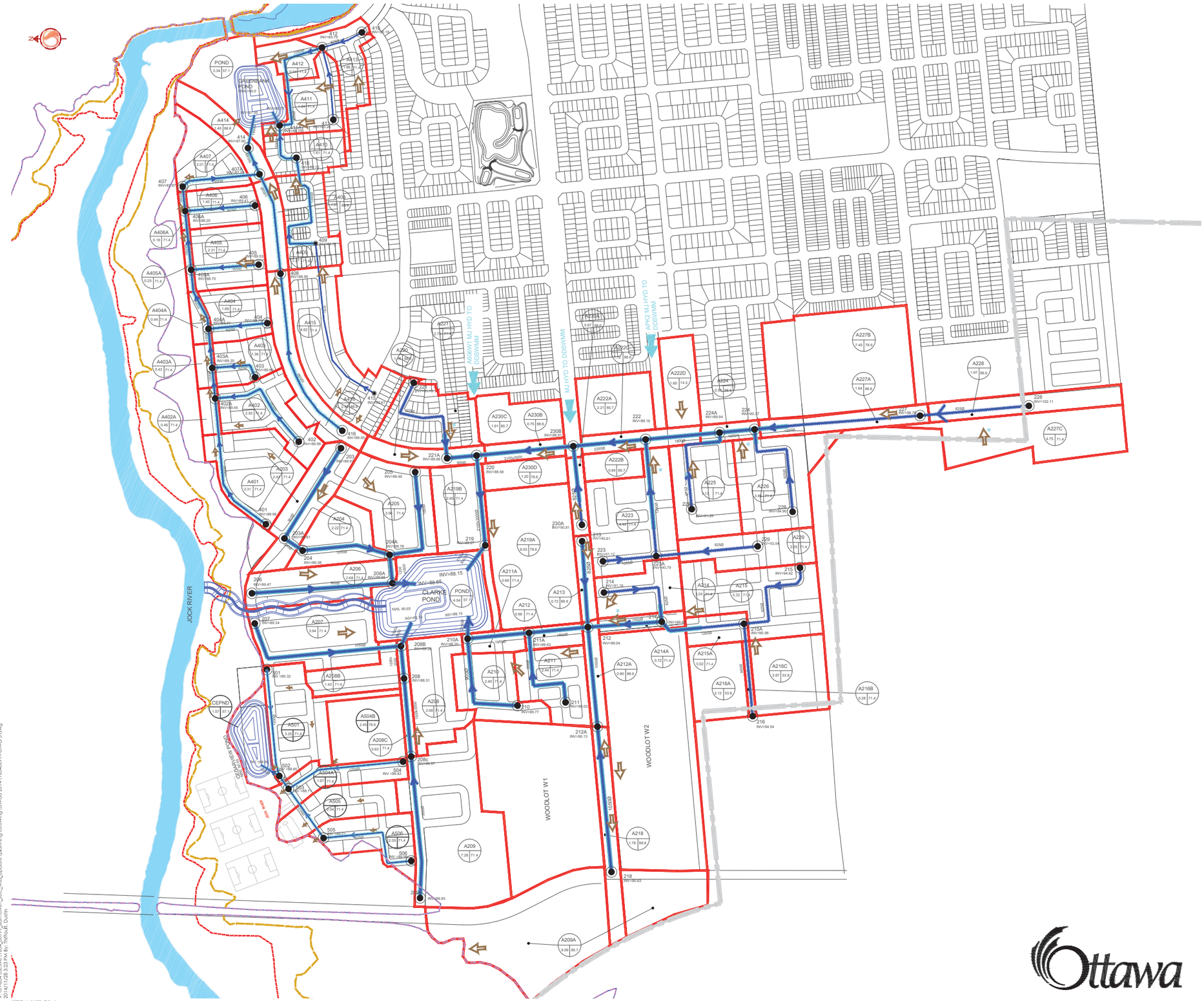
BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM

Ottawa, ON

Title

SANITARY SERVICING PLAN

Project No.	Scale	Drawing No.	Sheet	Revision
163400999	1:5,000 (0 75 150 300 Meters)	A-4	4 of 9	1



V:\01-ldsa\active\163400999_Barrhaven_SUC_MSS_Update\planning\drawing\DWGS 2014\163400999-DWG S.dwg
2017-11-28 3:23 PM By: Thiffault, Dustin

ORIGINAL SHEET - ISO A1

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

- AREA ID (e.g. A414)
- TOTAL IMPERVIOUSNESS (%) (e.g. 88.6)
- AREA (ha) (e.g. 1.45)
- PROPOSED STORM SEWER
- PROPOSED STORM SEWERWITH STANDING WATER FROM POND
- 1050Ø PIPE DIAMETER
- 417 MANHOLE LOCATION WITH IDENTIFIER
- DRAINAGE BOUNDARY
- 10 YEAR FLOOD LINE
- 25 YEAR FLOOD LINE
- 100 YEAR FLOOD LINE
- LIMIT OF CDP BOUNDARY
- PROPOSED STORMWATER FACILITY (GREENBANK POND)
- OVERLAND FLOW DIRECTION

Notes

1. ALL FOUNDATIONS TO BE 0.3m ABOVE THE 100 YEAR HGL
2. ALL BUILDING FOUNDATIONS TO DRAIN BY GRAVITY TO THE STORM SEWER SYSTEM

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
Revision		By	Appd.	YY.MM.DD

File Name: 163400999-DWG S.DWG	ST	AP	AP	14.11.21
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

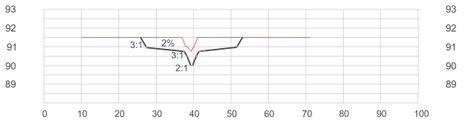
Client/Project
CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
STORM WATER SERVICING PLAN

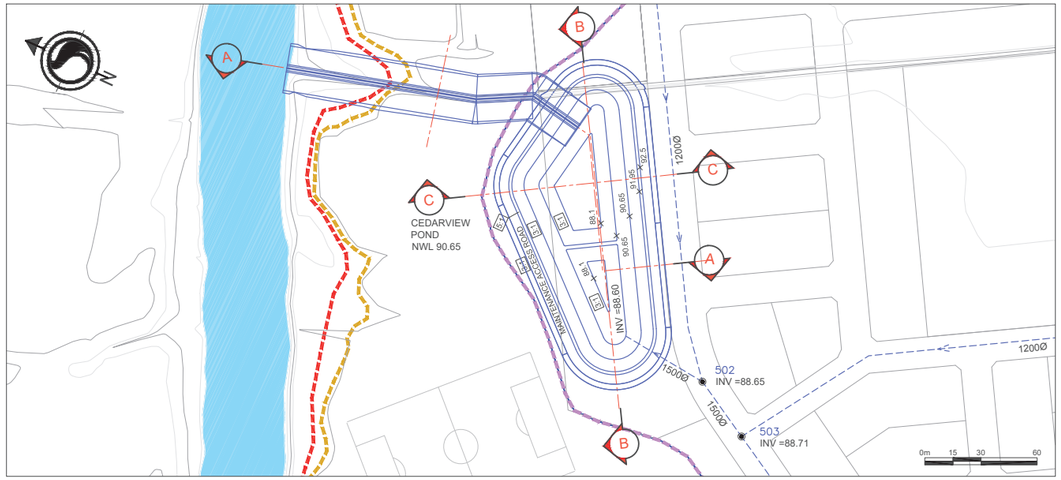
Project No.	Scale
163400999	1:4000 (0, 40, 120, 200m)
Drawing No.	Sheet / Revision
A-5	5 of 9 / 1

Ottawa

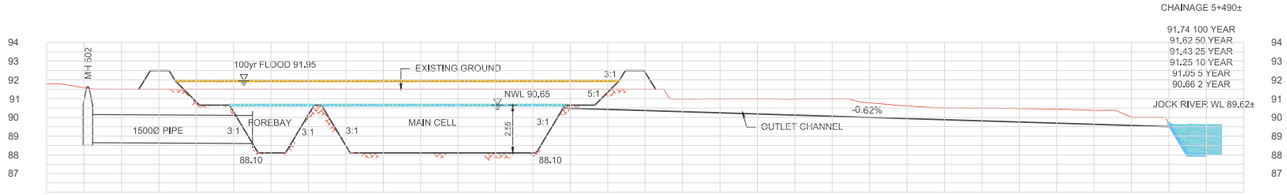


SECTION D -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)

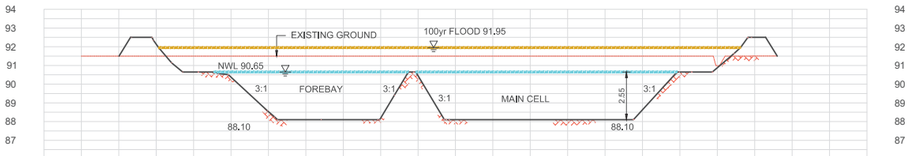


CEDARVIEW POND - PLAN

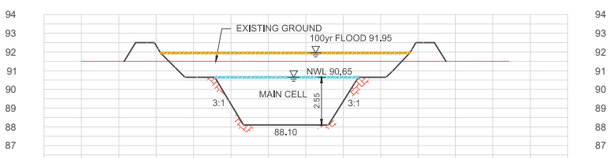


SECTION A -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)



SECTION B -



SECTION C -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)

NOT FOR CONSTRUCTION.
CONCEPTUAL DESIGN ONLY.
SUBJECT TO REVISION
DURING DETAILED DESIGN.

Ottawa

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

PROPOSED STORM SEWER
1050Ø PIPE DIAMETER
501 MANHOLE LOCATION WITH IDENTIFIER
10 YEAR FLOOD LINE
25 YEAR FLOOD LINE
100 YEAR FLOOD LINE

Notes

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
	Revision	By	Appd.	YY.MM.DD
File Name: 163400999-DWG 6-8.DWG		ST Dwn.	AP Chkd.	AP Dsgn. 14.11.21 YY.MM.DD

Permit-Seal

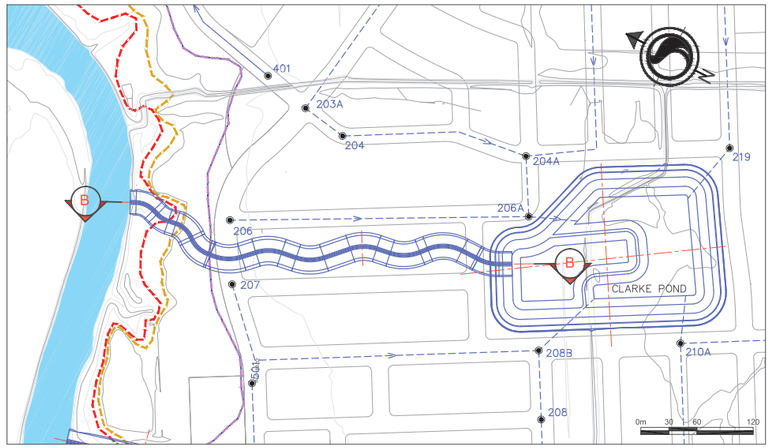
Client/Project
CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

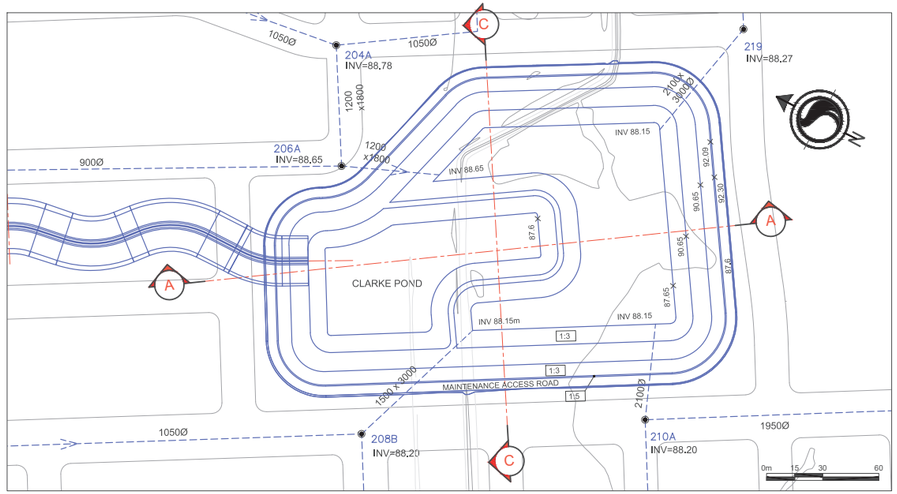
Title
CEDARVIEW POND - CONCEPTUAL POND CONFIGURATION AND PROFILES

Project No.	Scale	
163400999	AS SHOWN	
Drawing No.	Sheet	Revision
A-6	6 of 9	1

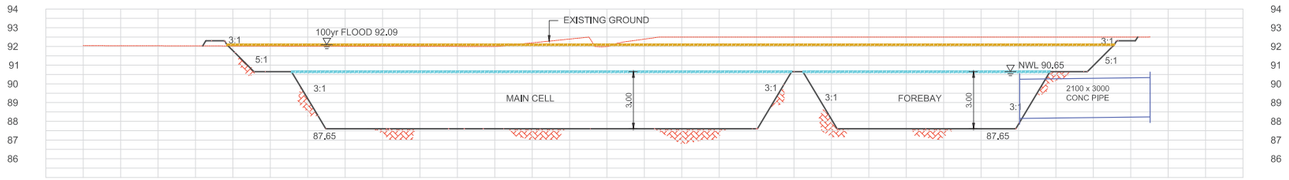
ORIGINAL SHEET - ISO A1



CLARKE POND / DRAINAGE DITCH - PLAN

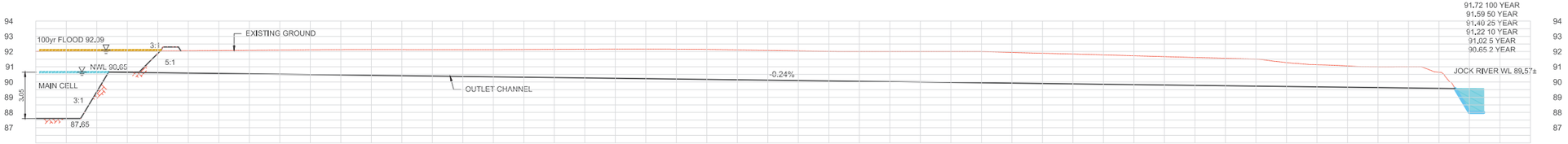


CLARKE POND - PLAN



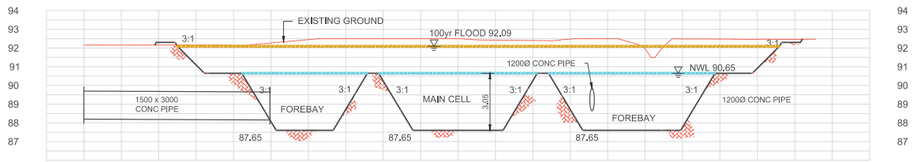
SECTION A -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)



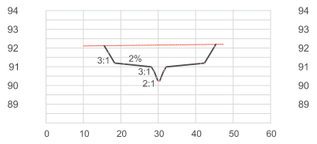
SECTION B -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)



SECTION C -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)



SECTION D -

1:750 (HORIZ.)
0m 7.5 15 30
0 3 6
1:150 (VERT.)

NOT FOR CONSTRUCTION.
CONCEPTUAL DESIGN ONLY.
SUBJECT TO REVISION
DURING DETAILED DESIGN.

Ottawa

Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

Legend

PROPOSED STORM SEWER
1050Ø PIPE DIAMETER
217 MANHOLE LOCATION WITH IDENTIFIER
10 YEAR FLOOD LINE
25 YEAR FLOOD LINE
100 YEAR FLOOD LINE

Notes

1	ISSUED FOR MSS ADDENDUM	ST	AP	14.11.28
Revision		By	Appd.	YY.MM.DD
File Name: 163400999-DWG 6-8.DWG		ST	AP	AP	14.11.21
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
CLARKE POND

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
CLARKE POND - CONCEPTUAL POND CONFIGURATION AND PROFILES

Project No.	Scale	
163400999	AS SHOWN	
Drawing No.	Sheet	Revision
A-7	7 of 9	1

Area:

BARRHAVEN SOUTH
MASTER SERVICING STUDY

DATE: 11/28/2014
REVISION: 1
DESIGNED BY: LP
CHECKED BY: DT

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

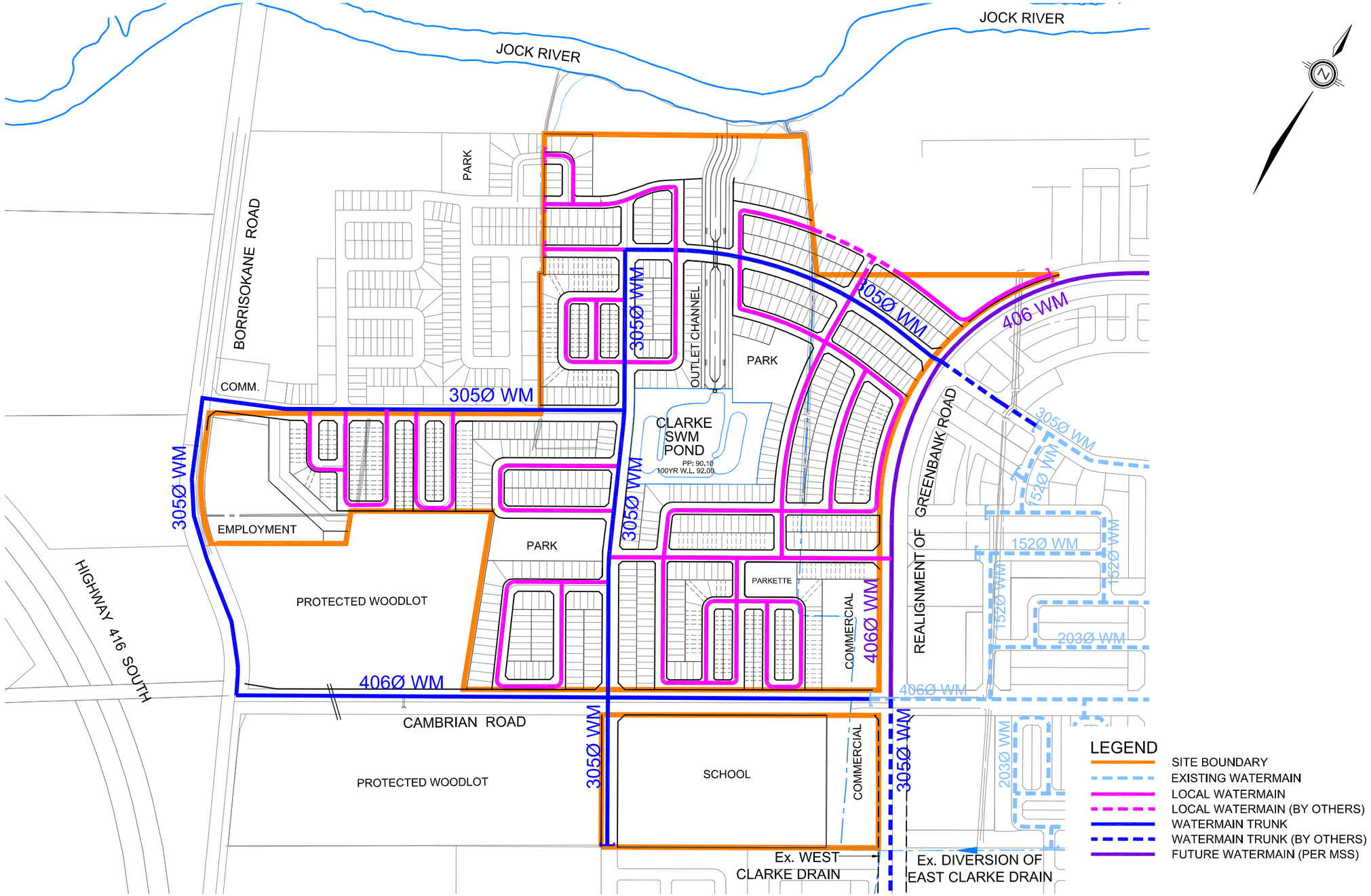
FILE NUMBER: 163400999

Colour code:
Hard coded values
Caculated value
Value from subdivision design
Most US MH
Estimated value
MH receiving flow from 2 or more sewers

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 L/p/day	MINIMUM VELOCITY	0.60 m/s	As per CDP (units/ha)	
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 L/ha/day	MAXIMUM VELOCITY	3.00 m/s	LOW DENSITY RESIDENTIAL	26
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 L/ha/day	MANNINGS n	0.013	SEMI-DETACHED	52
PEAKING FACTOR (COMM., INST.):	1.5	INDUSTRIAL (LIGHT)	35,000 L/ha/day	BEDDING CLASS	B	TOWN HOUSES	82
PERSONS / SINGLE UNIT	3.4	INSTITUTIONAL	50,000 L/ha/day	MINIMUM COVER	2.50 m	APARTMENTS	120
PERSONS / TOWNHOME	2.7	INFILTRATION	0.28 L/s/ha			COMMUNITY CORE	60
PERSONS / APARTMENT	1.8					AVERAGE PERSONS/ha	107

LOCATION				RESIDENTIAL AREA AND POPULATION										COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		GREEN / UNUSED		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER		FROM M.H.	TO M.H.	DEV AREA (ha)	DEV POP	ADD'N RES AREA (ha)	ADD'N POP	TOTAL AREA (ha)	TOTAL 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)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (L/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (L/s)	FLOW (L/s)	LENGTH (m)	DIA (mm)	MATERIAL	SLOPE (%)	CAP. (FULL) (L/s)	CAP. V PEAK FLOW (%)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
MSS-A-23		MA11	MA10	0.00	0	14.23	1,523	14.23	1,523	14.23	1,523	3.67	22.6	0.00	0.00	0.00	0.00	0.00	0.00	2.80	2.80	2.50	2.50	2	19.53	19.53	5.5	30.1	482.1	300	PVC	0.75	87.6	34%	1.20	1.08
MSS-A-22		**MA10**	MH57A	0.00	0	12.81	1371	12.81	1,371	27.04	2,894	3.46	40.6	0.00	0.00	0.00	0.00	0.00	0.00	7.22	10.02	14.49	16.99	8.7	34.52	54.05	15.1	64.4	449.7	375	PVC	0.40	115.1	56%	1.01	1.04
Realigned Greenbank Road																																			
MSS-A-21		MA14	MA13	0.00	0	4.79	513	4.79	513	4.79	513	3.97	8.3	0.00	0.00	0.00	0.00	0.00	0.00	7.45	7.45	0.00	0.00	6.5	12.24	12.24	3.4	18.2	295.0	250	PVC	1.30	71.4	25%	1.40	1.12
N-4		**MA13**	MH57A	0.00	0	10.99	1176	10.99	1,176	15.78	1,689	3.64	24.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.45	0.53	0.53	6.5	11.52	23.76	6.7	38.1	413.1	375	PVC	0.30	100.3	38%	0.88	0.81
Cambrian Road																																			
N-5		MH57A	MH13A	0.00	0	4.29	458	4.29	458	4.29	5,041	3.24	66.2	3.44	3.44	0.00	0.00	0.00	0.00	0.00	17.47	0.00	17.52	18.2	7.73	85.54	24.0	108.4	216.5	500	CPP	0.25	188.2	58%	0.96	1.00
N-2		**MH13A**	MH15A	6.18	631	0.03	3	6.21	634	10.50	5,675	3.19	73.3	0.00	3.44	0.00	0.00	0.00	0.00	0.00	17.47	0.00	17.52	18.2	6.21	91.75	25.7	117.2	165.2	500	CPP	0.20	168.6	70%	0.86	0.94
N-6		**MH15A**	MH17A	5.59	868	0.02	2	5.61	870	16.11	6,545	3.13	83.0	0.00	3.44	0.00	0.00	0.00	0.00	0.00	17.47	0.00	17.52	18.2	5.61	97.36	27.3	128.5	202.0	600	CPP	0.13	230.7	56%	0.79	0.81
River Mist Road																																			
MSS-A-18	Stantec	MH163	162	6.51	543	0.00	0	6.51	543	6.51	543	3.96	8.7	0.00	0.00	0.00	0.00	0.00	0.00	2.77	2.77	0.90	0.90	2.4	10.18	10.18	2.9	14.0	36.3	200	PVC	1.15	35.8	39%	1.12	1.04
	Stantec	162	161	0.00	0	0.00	0	0.00	0	6.51	543	3.96	8.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	0.00	10.18	2.9	14.0	87.2	250	PVC	1.15	67.3	21%	1.32	1.00
	Stantec	161	EX151	0.00	0	0.00	0	0.00	0	6.51	543	3.96	8.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	0.00	10.18	2.9	14.0	75.6	250	PVC	1.15	67.3	21%	1.32	1.00
	Stantec	EX151	MH142	0.00	0	0.00	0	0.00	0	6.51	543	3.96	8.7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	0.00	10.18	2.9	14.0	44.4	300	PVC	1.40	119.0	12%	1.63	1.08
N-14	Stantec	**MH142**	EX139	8.23	825	0.96	102	9.19	927	15.70	1,470	3.69	22.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	9.19	19.37	5.4	29.8	74.8	300	PVC	0.40	63.5	47%	0.87	0.85
	Stantec	EX139	EX136	0.00	0	0.00	0	0.00	0	15.70	1,470	3.69	22.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	0.00	19.37	5.4	29.8	64.7	300	PVC	0.40	63.5	47%	0.87	0.85
	Stantec	EX136	MH126	0.00	0	0.00	0	0.00	0	15.70	1,470	3.69	22.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.77	0.00	0.90	2.4	0.00	19.37	5.4	29.8	78.9	300	PVC	0.41	64.2	46%	0.88	0.86
N-15	Stantec	**MH126**	EX123	16.46	954	0.00	0	16.46	954	32.16	2,424	3.52	34.6	0.00	0.00	0.00	0.00	0.00	0.00	2.06	4.83	0.00	0.90	4.2	18.52	37.89	10.6	49.4	71.3	375	PVC	0.45	122.0	40%	1.07	1.01
	Stantec	EX123	MH112	0.00	0	0.00	0	0.00	0	32.16	2,424	3.52	34.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	0.00	37.89	10.6	49.4	90.3	375	PVC	0.42	118.6	42%	1.04	0.99
N-16	Stantec	**MH112**	EX102	8.33	689	0.00	0	8.33	689	40.49	3,113	3.43	43.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	8.33	46.22	12.9	60.4	68.0	375	PVC	0.31	101.5	60%	0.89	0.93
	Stantec	EX102	EX101	0.00	0	0.00	0	0.00	0	40.49	3,113	3.43	43.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	0.00	46.22	12.9	60.4	34.0	375	PVC	0.29	98.0	62%	0.86	0.91
	IBI	EX101	MH43A	0.00	0	0.00	0	0.00	0	40.49	3,113	3.43	43.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	0.00	46.22	12.9	60.4	38.0	375	PVC	0.30	100.3	60%	0.88	0.92
N-12	IBI	**MH43A**	MH44A	6.56	352	0.00	0	6.56	352	47.05	3,465	3.39	47.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	6.56	52.78	14.8	66.6	81.0	375	PVC	0.30	100.3	66%	0.88	0.95
	IBI	MH44A	MH45A	0.00	0	0.00	0	0.00	0	47.05	3,465	3.39	47.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	0.00	52.78	14.8	66.6	64.0	375	PVC	0.30	100.3	66%	0.88	0.95
	IBI	MH45A	MH46A	0.00	0	0.00	0	0.00	0	47.05	3,465	3.39	47.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	0.90	4.2	0.00	52.78	14.8	66.6	85.0	375	PVC	0.30	100.3	66%	0.88	0.95
N-10	IBI	**MH46A**	MH47A	8.40	562	0.00	0	8.40	562	55.45	4,027	3.33	54.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	1.60	2.50	4.2	10.00	62.78	17.6	76.1	41.0	375	PVC	0.30	100.3	76%	0.88	0.98
	DSEL	MH47A	MH101A	0.00	0	0.00	0	0.00	0	55.45	4,027	3.33	54.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	2.50	4.2	0.00	62.78	17.6	76.1	64.0	375	PVC	0.30	100.3	76%	0.88	0.98
	DSEL	MH101A	MH102A	0.00	0	0.00	0	0.00	0	55.45	4,027	3.33	54.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	2.50	4.2	0.00	62.78	17.6	76.1	64.0	375	PVC	0.30	100.3	76%	0.88	0.98
N-7	DSEL	**MH102A**	MH17A	4.03	291	1.21	129	5.24	420	60.69	4,447	3.29	59.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	0.00	2.50	4.2	5.24	68.02	19.0	82.5	81.0	375	PVC	0.30	100.3	82%	0.88	0.99
Cambrian Road																																			
N-3		MH17A	MH21A	26.01	1956	0.00	0	26.01	1,956	102.81	12,948	2.84	149.0	0.00	3.44	0.00	0.00	0.00	0.00	2.96	25.26	5.10	25.12	24.9	34.07	199.45	55.8	229.7	204.3	750	CPP	0.13	419.5	55%	0.92	0.94
N-8		**MH21A**	MH45	7.04	408	0.00	0	7.04	408	109.85	13,356	2.83	153.1	0.00	3.44	0.00	0.00	0.00	0.00	0.00	25.26	2.89	28.01	24.9	9.93	209.38	58.6	236.6	277.8	750	CPP	0.13	419.5	56%	0.92	0.95
Greenbank Road																																			
MSS-A-14	IBI	MH205A	MH98A	0.00	0	20.99	2246	20.99	2,246	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	20.99	20.99	5.9	38.2	126.0	600	CPP	0.25	321.2	12%	1.10	0.73
	IBI	MH98A	MH99A	0.00	0	0.00	0	0.00	0	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	20.99	5.9	38.2	125.0	600	CPP	0.25	321.2	12%	1.10	0.73
	IBI	MH99A	MH100A	0.00	0	0.00	0	0.00	0	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	20.99	5.9	38.2	108.0	600	CPP	0.25	321.2	12%	1.10	0.73
	IBI	MH100A	MH204A	0.00	0	0.00	0	0.00	0	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	20.99	5.9	38.2	105.0	600	CPP	0.25	321.2	12%	1.10	0.73
	IBI	MH204A	MH206A	0.00	0	0.00	0	0.00	0	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	20.99	5.9	38.2	103.0	600	CPP	0.25	321.2	12%	1.10	0.73
	IBI	MH206A	MH97A	0.00	0	0.00	0	0.00	0	20.99	2,246	3.55	32.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00	20.99	5.9	38.2	125.0	600	CPP	0.25	321.2	12%	1.10	0.73
N-13, N-13-R	IBI	**MH97A**	MH96A	19.89	1625	0.06	6	19.95	1,631	40.94	3,877	3.35	52.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.81	0.0	20.76	41.75	11.7	64.3	98.0	600	CPP	0.30	350.4	18%	1.20	0.89
	IBI	MH96A	MH95A	0.00	0	0.00	0	0.00	0	40.94	3,877	3.35	52.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	0.00	41.75	11.7	64.3	129.0	600	CPP	0.30	350.4	18%	1.20	0.89
	IBI	MH95A	MH201A	0.00	0	0.00	0	0.00	0	40.94	3,877	3.35	52.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	0.00	41.75	11.7	64.3	123.0	600	CPP	0.30	350.4	18%	1.20	0.89
N-11, N-11-R	IBI	**MH201A**	MH201B	12.13	787	0.00	0	12.13	787	53.07	4,664	3.27	61.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	12.13	53.88	15.1	76.9	124.0	600	CPP	0.30	350.4	22%	1.20	0.94
	IBI	MH201B	MH200A	0.00	0	0.00	0	0.00	0	53.07	4,664	3.27	61.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	0.00	53.88	15.1	76.9	68.0	600	CPP	0.30	350.4	22%	1.20	0.94
	IBI	MH200A	MH200C	0.00	0	0.00	0	0.00	0	53.07	4,664	3.27	61.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	0.00	53.88	15.1	76.9	48.0	600	CPP	0.50	452.6	17%	1.55	1.12
	IBI	MH200C	MH45	0.00	0	0.00	0	0.00	0	53.07	4,664	3.27	61.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.0	0.00	53.88	15.1	76.9	26.0	600	CPP	0.12	221.9	35%	0.76	0.68
MSS-A-15		MH45	MH435A	0.00	0	5.12	548	5.12	548	168.04	18,568	2.68	201.6	0.00	3.44	0.00	0.00	0.00	0.00	0.00	25.26	0.00	28.82	24.9	5.12	268.38	75.1	301.6	296.6	900	CPP	0.10	597.0	51%	0.91	0.91
North																																			
MSS-A-9		MA9	MA8	0.00	0	22.23	2378	22.23	2,378	22.23	2,378	3.53	34.0	0.00	0.00	0.00	0.00	0.00	0.00	2.45	2.45	9.54	9.54	2.1	34.22	34.22	9.6	45.7	507.5	450	CPP	0.11	98.4	46%	0.60	0.59
MSS-A-8		**MA8**	MA7	0.00	0	2.88	308	2.88	308	25.11	2,686	3.48	37.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.78	10.32	2.1	3.66	37.88	10.6	50.6	317.1	450	CPP	0.11	98.4	51%	0.60	0.60
MSS-A-7		**MA7**	MA6	0.00	0	18.50	1979	18.50	1,979	43.61	4,665	3.27	61.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.00	10.32	2.1	18.50	56.38	15.8	79.7	573.1	450	CPP	0.11	98.4	81%	0.60	0.67
MSS-A-6		**MA6**	MA5	0.00	0	21.68	2320	21.68	2,320	65.29	6,985	3.11	88.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.00	10.32	2.1	21.68	78.06	21.9	112.0	473.9	525	CPP	0.10	140.5	80%	0.63	0.71
MSS-A-5		**MA5**	MA4	0.00	0	9.53	1020	9.53	1,020	74.82	8,005	3.05	98.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.00	10.32	2.1	9.53	87.59	24.5	125.5	439.4	525	CPP	0.10	140.5	89%	0.63	0.72
MSS-A-4		**MA4**	MH521A	0.00	0	8.07	863	8.07	863	82.89	8,868	3.01	108.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	2.42	12.74	2.1	10.49	98.08	27.5	137.7	530.7	525	CPP	0.10	140.5	98%	0.63	0.73
N-1		**MH521A**	MH522A	3.29	177	0.51	54	3.80	231	86.69	9,099	3.00	110.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.02	12.76	2.1	3.82	101.90	28.5	141.2	49.9	600	CPP	0.10	201.5	70%	0.69	0.75
		MH522A	MH435A	0.00	0	0.00	0	0.00	0	86.69	9,099	3.00	110.6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45	0.00	12.76	2.1	0.00	101.90	28.5	141.2	11.1	600	CPP	0.10	201.5	70%	0.69	0.75
		MH435A	MH501A	0.00	0	0.00	0	0.00	0	254.73	27,667	2.51	281.3	0.00	3.44	0.00	0.00	0.00	0.00	0.00	27.71	0.00	41.58	27.0	0.00	370.28	103.7	412.0	13.3	900	CPP	0.10	597.0	69%	0.91	0.99

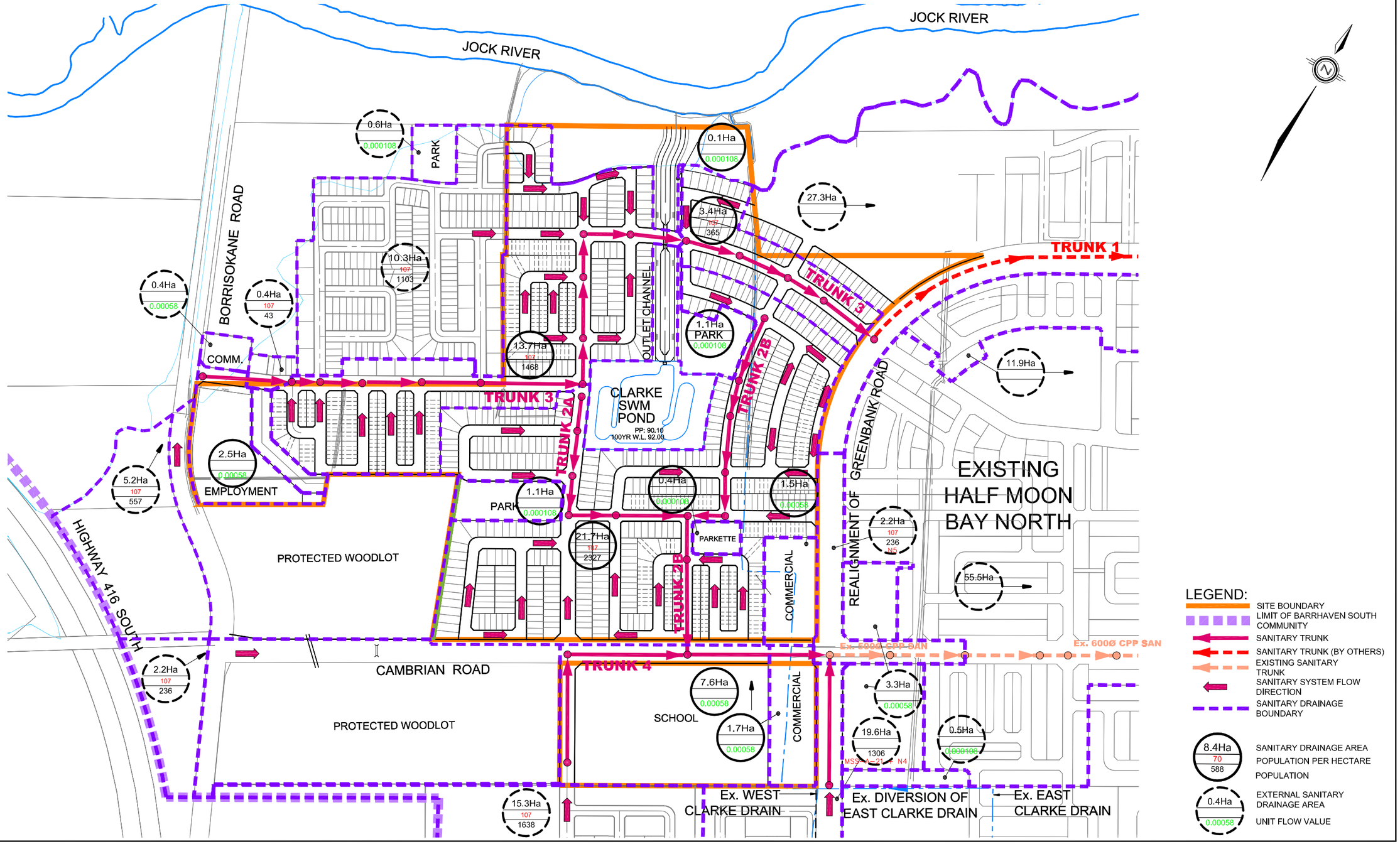


david schaeffer engineering ltd

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

HALF MOON BAY WEST
CONCEPTUAL WATER SUPPLY NETWORK
CITY OF OTTAWA

PROJECT No.:	16-888
SCALE:	1:6000
DATE:	NOVEMBER 2016
FIGURE:	4



david schaeffer engineering ltd

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

HALF MOON BAY WEST
CONCEPTUAL SANITARY SERVICING
CITY OF OTTAWA

PROJECT No.:	16-888
SCALE:	1:6000
DATE:	NOVEMBER 2016
FIGURE:	6

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		PARK		INSTIT		C+P+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)	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)	PERCENT
TRUNK 2A																											
	201A	202A	0.3		33	0.30	33	4.00	0.53		0.0		0.0		0.0	0.00	0.30	0.30	0.084	0.61	55.5	200	0.40	20.74	0.66	0.29	3
	202A	203A	1.8		193	2.10	226	4.00	3.66		0.0		0.0		0.0	0.00	1.80	2.10	0.588	4.25	72.5	200	0.40	20.74	0.66	0.52	20
Park											0.0	1.1	1.1		0.0	0.18	1.10	3.20									
	203A	204A	1.0		107	3.10	333	4.00	5.40		0.0		1.1		0.0	0.18	1.00	4.20	1.176	6.76	64.0	200	0.40	20.74	0.66	0.59	33
	204A	205A	4.9		525	8.00	858	3.84	13.35		0.0		1.1		0.0	0.18	4.90	9.10	2.548	16.08	75.5	250	0.25	29.73	0.61	0.62	54
	205A	210A	2.4		257	10.40	1115	3.77	17.03		0.0		1.1		0.0	0.18	2.40	11.50	3.220	20.43	115.0	250	0.25	29.73	0.61	0.66	69
To Trunk 2B, MH 210A -211A						10.400	1115						1.1					11.50		20.430							
TRUNK 2B																											
Park											0.0	1.1	1.1		0.0	0.18	1.10	1.10									
	206A	207A	2.9		311	2.90	311	4.00	5.04		0.0		1.1		0.0	0.18	2.90	4.00	1.120	6.34	104.0	200	0.40	20.74	0.66	0.58	31
	207A	208A	1.0		107	3.90	418	4.00	6.77		0.0		1.1		0.0	0.18	1.00	5.00	1.400	8.35	153.5	250	0.25	29.73	0.61	0.52	28
	208A	209A	2.9		311	6.80	729	3.88	11.46		0.0		1.1		0.0	0.18	2.90	7.90	2.212	13.85	69.5	250	0.25	29.73	0.61	0.60	47
Commercial, Parkette										1.5	1.5	0.4	1.5		0.0	1.54	1.90	9.80									
	209A	210A	1.3		140	8.10	869	3.84	13.52		1.5		1.5		0.0	1.54	1.30	11.10	3.108	18.17	60.0	250	0.25	29.73	0.61	0.64	61
Contribution from Trunk 2A						10.40	1115						1.10					11.50		20.43							
	210A	211A	0.0		0	18.50	1984	3.59	28.85		1.5		2.6		0.0	1.72	0.00	22.60	6.328	36.90	70.0	375	0.15	67.91	0.61	0.62	54
	211A	403A	3.2		343	21.70	2327	3.53	33.28		1.5		2.6		0.0	1.72	3.20	25.80	7.224	42.22	152.5	375	0.15	67.91	0.61	0.64	62
To Trunk4, MH403A - Ex. MH						21.700	2327				1.5		2.6					25.80		42.220							
TRUNK 4																											
WEST																											
	401A	402A	15.3		1638	15.30	1638	3.65	24.22		0.0		0.0		0.0	0.00	15.30	15.30	4.284	28.50	173.0	300	0.75	83.75	1.18	1.06	34
Extermal	402A	403A	2.2		236	17.50	1874	3.61	27.41		0.0		0.0		0.0	0.00	2.20	17.50	4.900	32.31	190.5	375	0.15	67.91	0.61	0.60	48
School											0.0		0.0	7.6	7.6	6.61	7.60	25.10									
Commercial										1.7	1.7		0.0		7.6	8.09	1.70	26.80									
Contribution from Trunk 2B						21.70	2327				1.50		2.60		7.6			25.80		42.22							
	403A	57A	0.0		0.0	39.20	4201	3.31	56.33		3.2		2.6		7.6	9.81	0.00	52.60	14.728	80.87	229.0	375	0.30	96.03	0.87	0.97	84
To 57A						39.20	4201				3.2		2.6		7.6			52.60		80.87							
MSS-A-21	14	13	4.8		514	4.80	514	3.97	8.27					7.5	7.5	0.00	12.30	12.30	3.444	11.71	295.0	250	1.30	67.80	1.38	1.03	17
N-4	13	57A	7.4		792	12.20	1306	3.72	19.68			0.5	0.5		7.5	0.00	7.90	20.20	5.656	25.34	413.1	375	0.30	96.03	0.87	0.73	26
Contribution from Trunk 4						39.20	4201				3.20		2.60		7.60			52.60		80.87							
N-5	57A	13A	2.20		236	54	5743	3.19	74.21	3.3	6.5		3.1		15.1	19.28	5.50	78.3	21.924	115.41	216.5	500	0.25	188.80	0.96	1.00	61
To MH57A - MH15A						54.00	5743				6.5		3.1		15.1			78.30		115.41							
TRUNK 3																											
Extermal			5.2		557	5.20	557	3.95	8.91	0.0	0.0					0.00	5.20	5.20									
Commercial										0.4	0.4					0.35	0.40	5.60									
Employment										2.5	2.9					2.52	2.50	8.10									
	301A	302A	0.4		43	5.60	600	3.93	9.55		2.9					2.52	0.40	8.50	2.380	14.45	135.0	450	0.111	94.99	0.60	0.43	15
	302A	303A	2.7		289	8.30	889	3.83	13.79		2.9					2.52	2.70	11.20	3.136	19.45	208.5	450	0.111	94.99	0.60	0.47	20
	303A	304A	2.2		236	10.50	1125	3.77	17.18		2.9					2.52	2.20	13.40	3.752	23.45	93.5	450	0.111	94.99	0.60	0.49	25
	304A	305A	1.0		107	11.50	1232	3.74	18.67		2.9					2.52	1.00	14.40	4.032	25.22	163.0	450	0.111	94.99	0.60	0.51	27
	305A	306A	3.2		343	14.70	1575	3.66	23.35		2.9					2.52	3.20	17.60	4.928	30.80	240.0	450	0.111	94.99	0.60	0.53	32
External			10.3		1103	25.00	2678	3.48	37.75		2.9	0.6	0.6			2.61	10.90	28.50									
	306A	307A	2.7		289	27.70	2967	3.45	41.47		2.9		0.6			2.61	2.70	31.20	8.736	52.82	75.0	450	0.111	94.99	0.60	0.61	56
	307A	308A	1.9		204	29.60	3171	3.42	43.93		2.9		0.6			2.61	1.90	33.10	9.268	55.81	89.5	450	0.111	94.99	0.60	0.62	59
Park											2.9	0.1	0.7			2.63	0.10	33.20									
	308A	309A	2.2		236	31.80	3407	3.40	46.93		2.9		0.7			2.63	2.20	35.40	9.912	59.47	174.0	450	0.111	94.99	0.60	0.63	63
	309A	2000A	1.2		129	33.00	3536	3.38	48.42		2.9		0.7			2.63	1.20	36.60	10.248	61.30	169.5	450	0.111	94.99	0.60	0.64	65
To Greenbank Rd, MH 2000A						33.00	3536				2.9		0.7					36.60		61.30							

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da			
Average Daily Flow =	350	l/p/day	Industrial Peak Factor =	as per MOE Graph	
Comm/Inst 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/Inst peak Factor =	1.50		Townhouse coeff=	2.7	
Institutional	0.58	l/s/Ha	Single house coeff=	3.4	

Designed: V.C.

Checked: K.M

Dwg. Reference: APP01

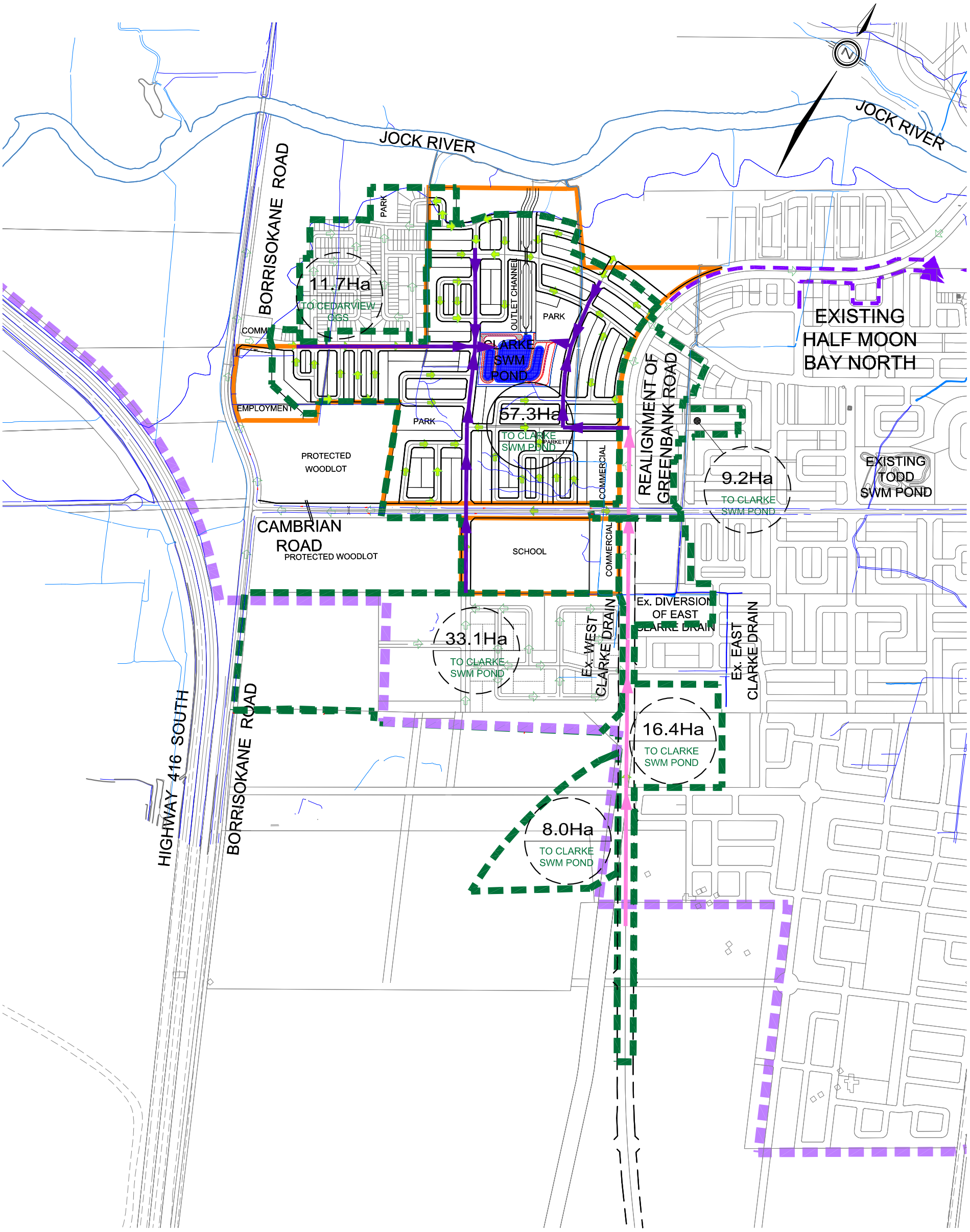
PROJECT: **HALF MOON BAY WEST**
FSR - SUBMISSION 2

LOCATION: **City of Ottawa**

File Ref: 16-888

Date: November, 2016

Sheet No. 1 of 1



LEGEND

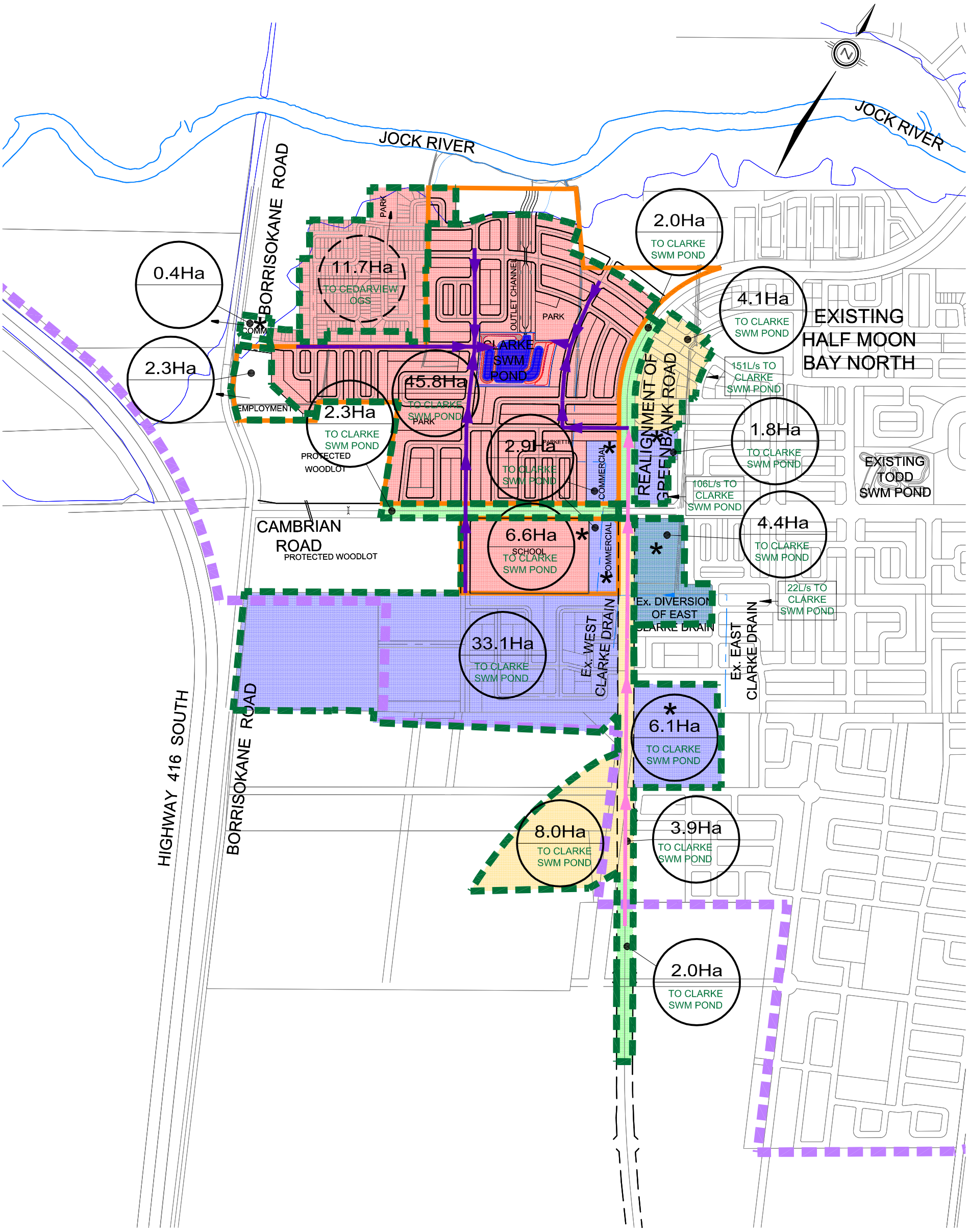
- SITE BOUNDARY
- LIMIT OF BARRHAVEN SOUTH COMMUNITY
- STORM TRUNK
- STORM TRUNK (BY OTHERS)
- DRAINAGE AREA BOUNDARY
- 100 YEAR FLOOD LINE
- EXTERNAL STORM OVERLAND FLOW ARROW
- STORM OVERLAND FLOW ARROW
- 5.0Ha / TO CLARKE SWM POND — DRAINAGE AREA / DRAINAGE AREA DESTINATION
- 7.0Ha / TO CLARKE SWM POND — EXTERNAL DRAINAGE AREA / EXTERNAL DRAINAGE AREA DESTINATION

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

HALF MOON BAY WEST
STORM DRAINAGE PLAN (MAJOR)

CITY OF OTTAWA

DATE: NOVEMBER 2016
SCALE: 1:10000
PROJECT No.: 16-888
FIGURE: 7



LEGEND

- SITE BOUNDARY
- LIMIT OF BARRHAVEN SOUTH COMMUNITY
- STORM TRUNK
- STORM TRUNK BY OTHERS
- 100 YEAR FLOOD LINE
- DRAINAGE AREA BOUNDARY

5.0Ha / TO CLARKE SWM POND — DRAINAGE AREA / DRAINAGE AREA DESTINATION

7.0Ha / TO CLARKE SWM POND — EXTERNAL DRAINAGE AREA / EXTERNAL DRAINAGE AREA DESTINATION

- 2 YEAR CAPTURE AREA
- 5 YEAR CAPTURE AREA
- 10 YEAR CAPTURE AREA
- 5 YEAR CAPTURE AREA, NO 100 YEAR STORAGE
- 100 YEAR CAPTURE AREA
- * ONSITE 100 YEAR CONTROL

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

HALF MOON BAY WEST
STORM DRAINAGE PLAN (MINOR)

CITY OF OTTAWA

DATE: NOVEMBER 2016
SCALE: 1:10000
PROJECT No.: 16-888
FIGURE: 8

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 2 years

	LOCATION		AREA (Ha)								FLOW					SEWER DATA								
			R=	R=	R=	R=	R=	R=	R=	R=	Indiv.	Accum.	Time of	Rainfall	Peak Flow		DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	0.25	0.30	0.40	0.60	0.65	0.75	0.80	0.85	2.78 AC	2.78 AC	Conc.	Intensity	Q (l/s)		(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
TRUNK (BY OTHERS)											Estimated Length =		350.00												
Greenbank Road (Slope @0.5%)										2.0	4.73	4.73	12.92												
														10 YR											
														106.55	504										
														2 YR											
														67.17	317										
														(10-2)YR	**186**	Flow_A									
											Estimated Length =		237.00												
Greenbank Road (Slope >1.0%)										3.9	9.22	9.22	11.98												
														100 YR											
														162.32	1496										
														2 YR											
														69.97	645										
														(100-2)YR	**851**	Flow_C									
											Estimated Length =		355.00												
School							6.1				11.02	11.02	12.96												
														5 YR											
														90.79	1001										
														2 YR											
														67.05	739										
														(5-2)YR	**262**	Flow_E									
											Estimated Length =		595.00												
Future Development (South)								33.1			69.01	69.01	14.96												
														5 YR											
														83.69	5776										
														2 YR											
														61.87	4270										
														(5-2)YR	**1506**	Flow_F									
											Estimated Length =		208.00												
Commercial 1									1.4		3.11	3.11	11.73												
														5 YR											
														95.85	298										
														2 YR											
														70.73	220										
														(5-2)YR	**78**	Flow_G									
											Estimated Length =		185.00												
Commercial 2									1.5		3.34	3.34	11.54												
														5 YR											
														96.70	323										
														2 YR											
														71.35	238										
														(5-2)YR	**85**	Flow_H									
											Estimated Length =		214.00												
Commercial 3									2.2		4.89	4.89	11.78												
														5 YR											
														95.63	468										
														2 YR											
														70.57	345										
														(5-2)YR	**123**	Flow_I									
											Estimated Length =		241.00												
Commercial 4									1.8		4.00	4.00	12.01												
														5 YR											
														94.66	379										
														2 YR											
														69.87	280										
														(5-2)YR	**99**	Flow_J									

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/sec

Designed: V.C.
Checked: K.M.
Dwg. Reference: Storm Drainage Plan

PROJECT: **Half Moon Bay West, Submission 2**
LOCATION: **City of Ottawa**
File Ref: 16-888 | Date: November, 2016 | Sheet No. 1 of 3

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 Return Frequency = 2 years

LOCATION			AREA (Ha)								FLOW					SEWER DATA									
			R=	R=	R=	R=	R=	R=	R=	R=	Indiv.	Accum.	Time of	Rainfall	Peak Flow		DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	CAPACITY	VELOCITY	TIME OF	RATIO
Location	From Node	To Node	0.25	0.30	0.40	0.60	0.65	0.75	0.80	0.85	2.78 AC	2.78 AC	Conc.	Intensity	Q (l/s)		(actual)	(nominal)		(%)	(m)	(l/s)	(m/s)	FLOW (min.)	Q/Q full
											Estimated Length =		514.00												
Greenbank Road North										2.0	4.73	4.73	14.28												
														100 YR											
														147.02	695										
														2 YR											
														63.51	300										
														(100-2)YR	**395**	Flow_K									
											Estimated Length =		320.00												
Cambrian Road										2.0	4.73	4.73	12.67												
														10 YR											
														107.72	509										
														2 YR											
														67.89	321										
														(10-2)YR	**188**	Flow_L									
											Estimated Length =		97.00												
Cambrian Road										0.3	0.71	0.71	10.81												
														10 YR											
														117.33	83										
														2 YR											
														73.83	52										
														(10-2)YR	**31**	Flow_M									
											Estimated Length =		310.00												
								0.9			1.88	1.88													
Residential East of Greenbank							1.6	1.6			6.23	8.10	12.58												
														100 YR											
														157.95	1280										
														2 YR											
														68.13	552										
														(100-2)YR	**728**	Flow_N									
											Estimated Length =		258.00												
Park					2.2						2.45	2.45	12.15												
														5 YR											
														94.06	230										
														2 YR											
														69.43	170										
														(5-2)YR	**60**	Flow_O									
											Estimated Length =		512.00												
Ex. Pre-Development			8.0								5.56	5.56	26.67												
														100 YR											
														99.48	553										
														2 YR											
														43.30	241										
														(100-2)YR	**312**	Flow_P									
											Estimated Length =		300.00												
Ex. Development								1.1			2.29	2.29	12.50												
														100 YR											
														158.53	364										
														5 YR											
														92.61	212										
														(100-5)YR	**151**	Flow_Q									
											Estimated Length =		225.50												
Ex. Development									0.7		1.56	1.56	11.88												
														100 YR											
														163.03	254										
														5 YR											
														95.21	148										
														(100-5)YR	**106**	Flow_R									
											Estimated Length =		265.50												
Ex. Development						0.2					0.33	0.33	12.21												
														100 YR											
														160.58	54										
														5 YR											
														93.80	31										
														(100-5)YR	**22**	Flow_S									

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/sec

Designed: V.C.
Checked: K.M.
Dwg. Reference: Storm Drainage Plan

PROJECT: **Half Moon Bay West, Submission 2**
LOCATION: **City of Ottawa**
File Ref: 16-888 Date: November, 2016 Sheet No. 2 of 3

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Manning 0.013 | Return Frequency = 2 years | * Refer to Sheet 1 & 2 for Calculations

Location	LOCATION From Node	LOCATION To Node	AREA (Ha) R= 0.25	R= 0.30	R= 0.40	R= 0.60	R= 0.65	R= 0.75	R= 0.80	R= 0.85	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	Concentrated Flows Added* Q (l/s)	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
TRUNK BY OTHERS										3.9	9.22	9.22								Estimated Length =		350	Estim.tc=	12.92	
	228	227								2.0	4.73	13.94	12.92	67.17	1974	A, C	900	900	CONC	1.70	361.0	2360	3.71	1.62	0.84
Ex. Pre-Development			8.0								5.56	19.50											Estim.tc=	26.67	
	227	224					6.1				11.02	30.52	26.67	43.30	2933	A, C, E, P	1050	1050	CONC	1.70	304.0	3560	4.11	1.23	0.82
	224	224A									0.00	30.52	27.90	42.03	2894	A, C, E, P	1350	1350	CONC	0.50	84.0	3774	2.64	0.53	0.77
	224A	222			2.2						2.45	32.97	28.43	41.51	3040	A, C, E, O, P	1800	1800	CONC	0.15	154.0	4452	1.75	1.47	0.68
									1.5		3.34	36.31													
	222	230B							2.2		4.89	41.20	29.90	40.14	3555	A, C, E, O, H, I, P, S	1800	1800	CONC	0.15	179.0	4452	1.75	1.71	0.80
									1.4	2.0	7.84	49.04													
	230B	220							1.8	0.3	9.48	58.52	31.60	38.66	4872	A, C, E, O, H, I, J, K, M, G, P, S, R	2100	2100	CONC	0.15	217.0	6715	1.94	1.87	0.73
												58.52	33.47												
TRUNK 4																									
Contribution from Trunk By Others												58.52	33.47												
								1.6			3.34	61.86													
							1.6	0.9			4.77	66.62													
	220	42					0.5	0.4			1.74	68.36	33.47	37.18	6030	A, C, E, O, H, I, J, N, K, M, G, P, S, R,	2250	2250	CONC	0.15	172.5	8072	2.03	1.42	0.75
							0.2	0.8			2.03	70.39													
	42	53			0.4		3.1	3.6			13.55	83.94	34.88	36.14	6522	A, C, E, O, H, I, J, N, K, M, G, P, S, R,	2250	2250	CONC	0.15	214.5	8072	2.03	1.76	0.81
To Trunk 5, MH 53-HW												83.94	36.64												
TRUNK 5																				Estimated Length =		163	tc=	11.36	
	51	52					2.6				4.70	4.70	11.36	71.96	338		750	750	CONC	0.15	74.0	431	0.98	1.26	0.78
																				Estimated Length =		378	tc=	13.15	
	52	53			1.0		3.7	0.40			8.63	13.33	13.15	66.51	887		1050	1050	CONC	0.15	112.5	1058	1.22	1.54	0.84
Contribution from Trunk 4, MH 42 to MH 53												83.94	36.64												
	53	HW					0				0.00	97.27	36.64	34.93	6887	A, C, E, O, H, I, J, N, K, M, G, P, S, R,	2400	2400	CONC	0.15	89.5	9588	2.12	0.70	0.72
To SWM POND												97.27	37.35												
TRUNK 1																				Estimated Length =		205	Estim.tc=	11.71	
	11	12					2.6	0.4			5.53	5.53	11.71	70.81	392		825	825	CONC	0.15	69.0	556	1.04	1.11	0.70
	12	13					0.3	0.6			1.79	7.33	12.81	67.46	494		900	900	CONC	0.15	108.0	701	1.10	1.63	0.70
	13	34					1.6	1.6			6.23	13.55	14.45	63.10	855		1050	1050	CONC	0.15	63.0	1058	1.22	0.86	0.81
To Trunk 3, MH 34 - HW												13.55	15.31												
TRUNK 2																				Estimated Length =		139	Estim.tc=	11.16	
	21	22			0.7		0.4	1.7			5.05	5.05	11.16	72.63	366		825	825	CONC	0.15	113.0	556	1.04	1.81	0.66
	22	23						3.0			6.26	11.30	12.97	67.02	757		1050	1050	CONC	0.15	190.0	1058	1.22	2.59	0.72
	23	34					1.3				2.35	13.65	15.56	60.47	825		1050	1050	CONC	0.15	162.5	1058	1.22	2.22	0.78
To Trunk 3, MH 34 - HW												13.65	17.78												
TRUNK 3																				Estimated Length =		594	Estim.tc=	14.95	
	31	32					6.6	33.1			80.94	80.94	14.95	61.89	6515	F	2250	2250	CONC	0.15	214.0	8072	2.03	1.76	0.81
	32	33					4.6			2.0	13.04	93.98	16.71	58.01	6958	F, L	2400	2400	CONC	0.15	218.0	9588	2.12	1.71	0.73
	33	34			1.1		5.0	0.2			10.68	104.65	18.42	54.72	7421	F, L	2400	2400	CONC	0.15	211.5	9588	2.12	1.66	0.77
Contribution from Trunk 1, MH 13-34												13.55	15.31												
Contribution from Trunk 2, MH 22-34												13.65	17.78												
	34	HW										131.86	20.08	51.90	8537	F, L	2550	2550	CONC	0.15	50.5	11270	2.21	0.38	0.76
To SWM POND												131.86	20.47												

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/sec

Designed: V.C.
Checked: K.M.
Dwg. Reference: Storm Drainage Plan

PROJECT: **Half Moon Bay West, Submission 2**
LOCATION: **City of Ottawa**
File Ref: 16-888 | Date: November, 2016 | Sheet No. 3 of 3

Appendix C

- Water Demand Calculations (DSEL, April 2017)

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	126	429
Semi-detached	2.7		0
Townhouse	2.7	92	249
Apartment			0
Bachelor	1.4		0
1 Bedroom	1.4		0
2 Bedroom	2.1		0
3 Bedroom	3.1		0
Average	1.8		0

	Pop	Avg. Daily		Max Day		Peak Hour	
		m^3/d	L/min	m^3/d	L/min	m^3/d	L/min
Total Domestic Demand	678	237.3	164.8	593.3	412.0	1305.2	906.4

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
Park	28,000.0 L/ha/d	0.65	18.20	12.6	27.3	19.0	49.1	34.1
Institutional Demand	50,000.0 L/ha/d	2.8	140.00	97.2	210.0	145.8	378.0	262.5
Commercial Demand	50,000 L/ha/d	0.43	21.50	14.9	32.3	22.4	58.1	40.3
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		179.7	124.8	269.6	187.2	485.2	336.9
	Total Demand		**417.0**	**289.6**	**862.8**	**599.2**	**1790.3**	**1243.3**

Appendix D

- Sanitary Sewer Design Sheet (DSEL, April 2017)

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

Site Area 12.190 **ha**

Extraneous Flow Allowances

Infiltration / Inflow	**3.41**	**L/s**

Domestic Contributions

Unit Type	Unit Rate	Units	Pop
Single Family	3.4	126	429
Semi-detached and duplex	2.7		0
Townhouse	2.7	92	249
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	**678**	
Average Domestic Flow	**2.75**	**L/s**
Peaking Factor	**3.90**	
Peak Domestic Flow	**10.72**	**L/s**

Institutional / Commercial / Industrial Contributions

Property Type	Unit Rate	No. of Units	Avg Wastewater (L/s)
Park	28,000.0 L/ha/d	0.65	0.21
Commercial Demand	50,000 L/ha/d	0.43	0.25
School	50,000 L/ha/d	2.4	1.39
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	**1.85**
Peak Institutional / Commercial Flow	2.77
Peak Industrial Flow**	0.00
Peak I/C/I Flow	**2.77**

** assuming a 12 hour commercial operation*
*** peak industrial flow per City of Ottawa Sewer Design Guidelines Appendix 4B*

Total Estimated Average Dry Weather Flow Rate	**4.59**	**L/s**
Total Estimated Peak Dry Weather Flow Rate	**13.49**	**L/s**
Total Estimated Peak Wet Weather Flow Rate	**16.90**	**L/s**

PROJECT: Glenview Borrisokane FSR
LOCATION: 3387 Borrisokane Road
FILE REF: 15-809
DATE: 25-Apr-17

DESIGN PARAMETERS

Avg. Daily Flow Res.	350 L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28 L/s/ha
Avg. Daily Flow Comm	50,000 L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60 m/s full flowing
Avg. Daily Flow Instit.	50,000 L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00 m/s full flowing
Avg. Daily Flow Park.	28,000 L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013

Location			Residential Area and Population										Commercial		Institutional		Park			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
Sanitary Option #1																															
Design Information from Half Moon Bay West FSR prepared by DSEL (December 2016)																															
Trunk 3																															
External Residential			5.2					557	5.20	557	3.95	8.91							0.00	5.20	5.2										
Commercial													0.4	0.4				0.00	0.35	0.40	5.6										
Employment													2.5	2.9				0.00	2.52	2.50	8.1										
	301A	302A	0.3	2		3		15	5.50	572	3.94	9.14	0.0	2.9					2.52	0.30	8.4	2.35	14.01	457.0	0.111	135.0	0.164	0.114	0.60	99.0	0.14
	302A	303A	2.4			17		260	7.90	832	3.85	12.98	0.0	2.9					2.52	2.40	10.8	3.02	18.52	457.0	0.111	208.5	0.164	0.114	0.60	99.0	0.19
	303A	304A	2.2					236	10.10	1068	3.78	16.36	0.0	2.9					2.52	2.20	13.0	3.64	22.52	457.0	0.111	93.5	0.164	0.114	0.60	99.0	0.23
	304A	305A	1.0					107	11.10	1175	3.75	17.87	0.0	2.9					2.52	1.00	14.0	3.92	24.30	457.0	0.111	163.0	0.164	0.114	0.60	99.0	0.25
	305A	306A	3.2					343	14.30	1518	3.68	22.60	0.0	2.9					2.52	3.20	17.2	4.82	29.94	457.0	0.111	240.0	0.164	0.114	0.60	99.0	0.30
w Property Sanitary Trunk																															
	SAN108	SAN107	0.860			25		68	0.860	68	4.00	1.10	0.00	0.00	2.40	2.40	0.00	0.00	2.1	3.260	3.260	0.91	4.10	203	0.320	144.0	0.032	0.051	0.60	19.3	0.21
	SAN107	SAN106	0.870	21				72	1.730	140	4.00	2.27	0.00	0.00	0.00	2.40	0.00	0.00	2.1	0.870	4.130	1.16	5.51	203	0.320	113.0	0.032	0.051	0.60	19.3	0.29
	SAN106	SAN105	1.250	25				85	2.980	225	4.00	3.65	0.00	0.00	0.00	2.40	0.00	0.00	2.1	1.250	5.380	1.51	7.24	256	0.240	106.0	0.051	0.064	0.60	31.0	0.23
	SAN105	SAN104	0.250	5				17	3.230	242	4.00	3.92	0.00	0.00	0.00	2.40	0.00	0.00	2.1	0.250	5.630	1.58	7.58	256	0.240	73.0	0.051	0.064	0.60	31.0	0.24
	SAN104	SAN103A	1.540	25				85	4.770	327	4.00	5.30	0.00	0.00	0.00	2.40	0.65	0.65	2.6	2.190	7.820	2.19	10.10	256	0.240	74.0	0.051	0.064	0.60	31.0	0.33
	SAN103B	SAN103A	1.190	31				105	1.190	105	4.00	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.190	1.190	0.33	2.03	203	0.320	165.0	0.032	0.051	0.60	19.3	0.11
	SAN103A	SAN102A	0.290	6				20	6.250	452	4.00	7.32	0.00	0.00	0.00	2.40	0.00	0.65	2.6	0.290	9.300	2.60	12.53	256	0.240	71.0	0.051	0.064	0.60	31.0	0.40
	SAN102B	SAN102A	1.640	7		47		151	1.640	151	4.00	2.45	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.640	1.640	0.46	2.91	203	0.320	165.0	0.032	0.051	0.60	19.3	0.15
	SAN102A	SAN101	0.190	4				14	8.080	617	3.93	9.81	0.00	0.00	0.00	2.40	0.00	0.65	2.6	0.190	11.130	3.12	15.54	381	0.140	41.3	0.114	0.095	0.60	68.4	0.23
	SAN101	MH306A	2.400					0	10.480	617	3.93	9.81	0.00	0.00	0.00	2.40	0.00	0.65	2.6	2.400	13.530	3.79	16.21	381	0.140	123.0	0.114	0.095	0.60	68.4	0.24
	306A	307A	2.7					289	27.48	2424	3.52	34.56	0.0	2.9	0.0	2.4	0.0	0.65	3.47	2.70	33.4	9.36	47.39	457.0	0.111	75.000	0.164	0.114	0.60	99.0	0.48
	307A	308A	1.9					204	29.38	2628	3.49	37.16	0.0	2.9	0.0	2.4	0.0	0.65	3.47	1.90	35.3	9.89	50.52	457.0	0.111	89.500	0.164	0.114	0.60	99.0	0.51
See Half Moon Bay West FSR prepared by DSEL (December 2016) for continuation																															

Information highlighted in green from Half Moon Bay West FSR prepared by DSEL (December 2016)
Information highlighted in red, updates to the Half Moon Bay West FSR based on revised drainage areas from 3387 Borrisokane Road FSR

Appendix E

- Sanitary Sewer Alternative Routing (DSEL, April 2017)

JOCK RIVER

BORRISOKANE ROAD

ASSUMED POTENTIAL RESIDENTIAL DEVELOPMENT UNDER SWM OPTION 2

0.25Ha | 5 | 17

0.65Ha PARK

1.54Ha | 25 | 85

1.25Ha | 25 | 85

0.87Ha | 21 | 72

0.29Ha | 6 | 20

0.19Ha | 4 | 14

1.64Ha | 54 | 151

1.19Ha | 31 | 105

2.40Ha SCHOOL

0.86Ha | 25 | 68

0.43 COMMERCIAL

0.24Ha | 5 | 15

0.39Ha | 17 | 46

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

SAN101

SAN102A

SAN102B

SAN103A

SAN103B

SAN104

SAN105

SAN106

SAN107

SAN108

SAN301A

SAN302A

SAN303A

SAN305A

SAN306A

SAN307A

250Ø SAN

200Ø SAN

450Ø SAN

93.30TG 89.490BV

93.41TG 89.250BV

93.63TG 89.080BV

93.97TG 88.970BV

88.83 OBV

93.63TG 89.490BV

93.46TG 90.070BV

93.90TG 88.730BV

94.06TG 90.050BV

94.13TG 89.260BV

99.65 OBV

84.10 OBV

NO FENCE

FENCE

500m LANDFILL SETBACK

LOCAL SANITARY SEWER

CLARKE POND (BY OTHERS)

LEGEND:

- SITE BOUNDARY
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- PROPOSED EXTERNAL SANITARY (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- PROPOSED SANITARY TRUNK, SIZING PER DSEL PROJ. No. 888 UPDATED ROUTING PER GLENVIEW - BORRISOKANE FSR
- EXTERNAL SANITARY SEWER ROUTING PER DSEL PROJ. No. 888, SIZING UPDATED PER GLENVIEW - BORRISOKANE FSR
- PROPOSED EXTERNAL SANITARY MANHOLE (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- SANITARY DRAINAGE BOUNDARY
- 0.17Ha | 6 | 21 — SANITARY DRAINAGE AREA IN HECTARES; NUMBER OF UNITS; POPULATION
- 93.56TG 88.780BV — PROPOSED SANITARY MH TOP OF GRATE (ELEVATIONS FROM GRADING OPTION 2); PROPOSED SANITARY OBVERT

GLENVIEW - BORRISOKANE
SANITARY SERVICES PLAN - OPTION 2

DSEL david schaeffer engineering ltd SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	APPENDIX-1

PROJECT: Glenview Borrisokane FSR
LOCATION: 3387 Borrisokane Road
FILE REF: 15-809
DATE: 5-May-17

DESIGN PARAMETERS

Avg. Daily Flow Res.	350	L/p/d	Peak Fact Res. Per Harmons: Min = 2.0, Max =4.0		Infiltration / Inflow	0.28	L/s/ha
Avg. Daily Flow Comm	50,000	L/ha/d	Peak Fact. Comm.	1.5	Min. Pipe Velocity	0.60	m/s full flowing
Avg. Daily Flow Instit.	50,000	L/ha/d	Peak Fact. Instit.	1.5	Max. Pipe Velocity	3.00	m/s full flowing
Avg. Daily Flow Park.	28,000	L/ha/d	Peak Fact. Indust. per MOE graph		Mannings N	0.013	

Location			Residential Area and Population										Commercial		Institutional		Park			Infiltration				Pipe Data							
Area ID	Up	Down	Area	Number of Units by type				Pop.	Cumulative Area	Cumulative Pop.	Peak. Fact.	Q_{res}	Area	Accu. Area	Area	Accu. Area	Area	Accu. Area	Q_{C+I+I}	Total Area	Accu. Area	Infiltration Flow	Total Flow	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
			(ha)	Singles	Semi's	Town's	Apt's		(ha)		(-)	(L/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(L/s)	(ha)	(ha)	(L/s)	(L/s)	(mm)	(%)	(m)	(m^2)	(m)	(m/s)	(L/s)	(-)
Sanitary Option #2																															
Design Information from Half Moon Bay West FSR prepared by DSEL (December 2016)																															
Trunk 3																															
External Residential			5.2					557	5.20	557	3.95	8.91							0.0	5.2	5.2										
Commercial													0.4	0.4				0.00	0.3	0.4	5.6										
Employment													2.5	2.9				0.00	2.5	2.5	8.1										
	301A	302A	0.3	2		3		15	5.50	572	3.94	9.14	0.0	2.9					2.5	0.3	8.4	2.4	14.0	457.0	0.111	135.0	0.164	0.114	0.60	99.0	0.14
	302A	303A	2.4			17		260	7.90	832	3.85	12.98	0.0	2.9					2.5	2.4	10.8	3.0	18.5	457.0	0.111	208.5	0.164	0.114	0.60	99.0	0.19
	303A	304A	2.2					236	10.10	1068	3.78	16.36	0.0	2.9					2.5	2.2	13.0	3.6	22.5	457.0	0.111	93.5	0.164	0.114	0.60	99.0	0.23
	304A	SAN102B	0.0					0	10.10	1068	3.78	16.36	0.0	2.9					2.5	0.0	13.0	3.6	22.5	457.0	0.111	75.0	0.164	0.114	0.60	99.0	0.23
	SAN102B	SAN102A	1.640	7		47		151	11.74	1219.0	3.74	18.48	0.00	2.90	0.00	0.00	0.00	0.00	2.5	1.6	14.6	4.1	25.1	457.0	0.111	165.0	0.164	0.114	0.60	99.0	0.25
	SAN108	SAN107	0.860			25		68	0.86	68.0	4.00	1.10	0.00	0.00	2.40	2.40	0.00	0.00	2.1	3.3	3.3	0.9	4.1	203.0	0.320	144.0	0.032	0.051	0.60	19.3	0.21
	SAN107	SAN106	0.870	21				72	1.73	140.0	4.00	2.27	0.00	0.00	0.00	2.40	0.00	0.00	2.1	0.9	4.1	1.2	5.5	203.0	0.320	113.0	0.032	0.051	0.60	19.3	0.29
	SAN106	SAN105	1.250	25				85	2.98	225.0	4.00	3.65	0.00	0.00	0.00	2.40	0.00	0.00	2.1	1.3	5.4	1.5	7.2	256.0	0.240	106.0	0.051	0.064	0.60	31.0	0.23
	SAN105	SAN104	0.250	5				17	3.23	242.0	4.00	3.92	0.00	0.00	0.00	2.40	0.00	0.00	2.1	0.3	5.6	1.6	7.6	256.0	0.240	73.0	0.051	0.064	0.60	31.0	0.24
	SAN104	SAN103A	1.540	25				85	4.77	327.0	4.00	5.30	0.00	0.00	0.00	2.40	0.65	0.65	2.6	2.2	7.8	2.2	10.1	256.0	0.240	74.0	0.051	0.064	0.60	31.0	0.33
	SAN103B	SAN103A	1.190	31				105	1.19	105.0	4.00	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.2	1.2	0.3	2.0	203.0	0.320	165.0	0.032	0.051	0.60	19.3	0.11
	SAN103A	SAN102A	0.290	6				20	6.25	452.0	4.00	7.32	0.00	0.00	0.00	2.40	0.00	0.65	2.6	0.3	9.3	2.6	12.5	256.0	0.240	71.0	0.051	0.064	0.60	31.0	0.40
	SAN102A	SAN101	0.190	4				14	18.18	1685.0	3.64	24.86	0.00	2.90	0.00	2.40	0.00	0.65	5.1	0.2	24.1	6.8	36.7	457.0	0.111	41.3	0.164	0.114	0.60	99.0	0.37
	SAN101	MH306A	0.000					0	18.18	1685.0	3.64	24.86	0.00	2.90	0.00	2.40	0.00	0.65	5.1	0.0	24.1	6.8	36.7	457.0	0.110	123.0	0.164	0.114	0.60	98.5	0.37
	304A	305A	1.0					107	1.00	107	4.00	1.73	0.0	0.0					0.0	1.0	1.0	0.3	2.0	203.0	0.320	163.0	0.032	0.051	0.60	19.3	0.10
	305A	306A	3.2					343	4.20	450	4.00	7.29	0.0	0.0					0.0	3.2	3.2	0.9	8.2	203.0	0.320	240.0	0.032	0.051	0.60	19.3	0.42
	306A	307A	2.7					289	25.08	2424	3.52	34.56	0.0	2.9	0.0	2.4	0.0	0.65	3.5	2.7	30.0	8.4	46.4	457.0	0.111	75.0	0.164	0.114	0.60	99.0	0.47
	307A	308A	1.9					204	26.98	2628	3.49	37.16	0.0	2.9	0.0	2.4	0.0	0.65	3.5	1.9	31.9	8.9	49.6	457.0	0.111	89.5	0.164	0.114	0.60	99.0	0.50
See Half Moon Bay West FSR prepared by DSEL (December 2016) for continuation																															

Information highlighted in green from Half Moon Bay West FSR prepared by DSEL (December 2016)
Information highlighted in red, updates to the Half Moon Bay West FSR based on revised drainage areas and routing from 3387 Borrisokane Road FSR

Appendix F

- Option 1, Stormwater Management Pond - Storm Sewer Design Sheet (DSEL, April 2016)
- Stormwater Management Pond Design Sheet (DSEL, April 2017)

										Sewer Data								
Area ID	Up	Down	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)	(-)
STM Option #1 - Cedarview Pond per MSS																		
110	STM110	STM109	3.26	0.76	2.48	2.48	11.8	70.5	485.3	750	0.30	148	0.442	0.188	1.38	609.8	1.8	0.80
109	STM109	STM108	0.87	0.65	0.57	3.04	13.6	65.3	552.1	750	0.30	115	0.442	0.188	1.38	609.8	1.4	0.91
108	STM108	STM107	1.24	0.65	0.81	3.85	15.0	61.8	661.0	825	0.30	105	0.535	0.206	1.47	786.2	1.2	0.84
107	STM107	STM103	0.26	0.65	0.17	4.02	16.2	59.1	660.2	825	0.30	77	0.535	0.206	1.47	786.2	0.9	0.84
106	STM106	STM105	1.28	0.65	0.83	0.83	11.3	72.1	166.7	525	0.30	163	0.216	0.131	1.09	235.6	2.5	0.71
105	STM105	STM104A	0.47	0.65	0.31	1.14	13.8	64.8	204.6	600	0.30	72	0.283	0.150	1.19	336.3	1.0	0.61
104B	STM104B	STM104A	1.56	0.65	1.01	1.01	11.2	72.5	204.2	600	0.30	147	0.283	0.150	1.19	336.3	2.1	0.61
104A	STM104A	STM103	0.23	0.65	0.15	2.30	14.8	62.2	397.8	825	0.15	96	0.535	0.206	1.04	555.9	1.5	0.72
103	STM103	STM102	1.13	0.5	0.57	6.88	17.0	57.3	1096.5	975	0.30	47	0.747	0.244	1.64	1227.5	0.5	0.89
102	STM102	STM101	0	0.65	0.00	6.88	17.5	56.4	1078.6	975	0.30	9	0.747	0.244	1.64	1227.5	0.1	0.88
	STM101	Pond	0	0.65	0.00	6.88	17.6	56.2	1075.3	975	0.30	19	0.747	0.244	1.64	1227.5	0.2	0.88
To Clarke Pond - Design Information From Half Moon Bay Subdivision FSR prepared by DSEL (December 2015)																		
	21	22	2.8	0.65	1.82	1.82	11.2	72.6	367.2	825	0.15	113.0	0.535	0.206	1.04	555.9	1.8	0.66
	22	23	2.7	0.75	2.03	3.85	13.0	67.0	715.8	1050	0.15	190.0	0.866	0.263	1.22	1057.6	2.6	0.68
	23	34	1.4	0.65	0.91	4.76	15.6	60.5	798.7	1050	0.15	162.5	0.866	0.263	1.22	1057.6	2.2	0.76

Notes

Information highlighted in green from Half Moon Bay West FSR prepared by DSEL (December 2016)

Information highlighted in red, updates to the Half Moon Bay West FSR based on revised drainage areas from 3387 Borrisokane Road FSR

Starting Tc for internal sewers calculated assuming local sewers flowing at minimum velocity of 0.80m/s to trunk sewer, detailed design to ensure local sewers are designed with minimum velocity

Preliminary Wet Pond Sizing Per MOE

Tributary Area	ha	11.94
Estimated Imperviousness	(%)	62
Volume Requirements	m^3/ha	166.3 <-- 40 m3/ha accounted for in ext. detention
Volume Required	**m^3**	**1986.0**
Volume Provided	**m^3**	**2720.0**

Table 3.2 Water Quality Storage Requirements based on Receiving Waters[1, 2]

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	25	30	35	40
	Wetlands	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	25	30
	Wetlands	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20
	Wetlands	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

Source: Stormwater Management Planning and Design Manual prepared by the MOE, 2003

Extended Detention Volume

Tributary Area	ha	11.94
Volume Requirements	m^3/ha	40
Volume Required	**m^3**	477.6
Volume Provided @ 91.43m 25-Year Jock River WL	**m^3**	7226

Appendix G

- Option 2, Oil Grit Separator Units - Storm Sewer Design Sheet (DSEL, April 2016)
- Preliminary Sizing Information for Oil/Grit Separator Units (Various, September 2016)

										Sewer Data								
Area ID	Up	Down	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)	(-)
STM Option #2 - OGS																		
205	STM205	STM204	1.28	0.65	0.83	0.83	11.3	72.1	166.7	525	0.30	163	0.216	0.131	1.09	235.6	2.5	0.71
204	STM204	STM203A	0.47	0.65	0.31	1.14	13.8	64.8	204.6	600	0.30	72	0.283	0.150	1.19	336.3	1.0	0.61
203B	STM203B	STM203A	1.56	0.65	1.01	1.01	11.2	72.5	204.2	600	0.30	147	0.283	0.150	1.19	336.3	2.1	0.61
203A	STM203A	STM202A	0.23	0.65	0.15	2.30	14.8	62.2	397.8	825	0.15	72	0.535	0.206	1.04	555.9	1.2	0.72
202B	STM202B	STM202A	1.95	0.55	1.07	1.07	10.4	75.3	224.3	600	0.30	96	0.283	0.150	1.19	336.3	1.3	0.67
202A	STM202A	STM201	0.18	0.65	0.12	3.49	16.0	59.6	577.8	900	0.15	52	0.636	0.225	1.10	701.1	0.8	0.82
	STM201	OGS	0	0.65	0.00	3.49	16.7	57.9	561.7	900	0.15	10	0.636	0.225	1.10	701.1	0.2	0.80
105	STM105	STM104	3.26	0.76	2.48	2.48	11.8	70.5	485.3	750	0.30	148	0.442	0.188	1.38	609.8	1.8	0.80
104	STM104	STM103	0.87	0.65	0.57	3.04	13.6	65.3	552.1	825	0.25	115	0.535	0.206	1.34	717.7	1.4	0.77
103	STM103	STM102	1.24	0.65	0.81	3.85	15.0	61.7	660.0	975	0.15	104	0.747	0.244	1.16	868.0	1.5	0.76
102	STM102	STM101	0.08	0.65	0.05	3.90	16.5	58.4	633.1	975	0.15	16	0.747	0.244	1.16	868.0	0.2	0.73
	STM101	OGS	0	0.65	0.00	3.90	16.7	58.0	628.0	975	0.15	10	0.747	0.244	1.16	868.0	0.1	0.72
To Clarke Pond - Design Information From Half Moon Bay Subdivision FSR prepared by DSEL (December 2015)																		
	21	22	2.8	0.65	1.82	1.82	11.2	72.6	367.2	825	0.15	113.0	0.535	0.206	1.04	555.9	1.8	0.66
	22	23	2.7	0.75	2.03	3.85	13.0	67.0	715.8	1050	0.15	190.0	0.866	0.263	1.22	1057.6	2.6	0.68
	23	34	1.4	0.65	0.91	4.76	15.6	60.5	798.7	1050	0.15	162.5	0.866	0.263	1.22	1057.6	2.2	0.76

Notes

Information highlighted in green from Half Moon Bay West FSR prepared by DSEL (December 2016)

Information highlighted in red, updates to the Half Moon Bay West FSR based on revised drainage areas from 3387 Borrisokane Road FSR

Starting Tc for internal sewers calculated assuming local sewers flowing at minimum velocity of 0.80m/s to trunk sewer, detailed design to ensure local sewers are designed with minimum velocity

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

TSS Removal Calculation

The TSS removal calculation can be found in Appendix I. As indicate, the CDS PMSU units have been selected to meet the MOE's Level I (TSS: 80%, Treated volume > 90%). Sizing is based upon rainfall fall data for Ottawa, ON. MOE requirements for level I is treating >90% of the average yearly rainfall for the most recent 40 year history. Appendix I also shows the validation against the Fine PSD. Appendix II shows the anticipated grit load/cleaning cycle

Reference Drawing

PMSU 40_40_8 reference drawing is in Appendix III

Structural Design

The proposed CDS PMSU unit has been is designed to Canadian Highway Bridge Design Code (CHBDC) loadings. All concrete components are manufactured at an OPS pre-qualified plant.

Approval of the CDS Technology for TSS Removal

NJDEP – CDS has met NJDEP's testing requirements and is a re-certified product as of January, 2015. It is also the only Oil/Grit Separator to have achieved Tier One and Tier Two testing with approved scour testing as of January, 2015.

Ministry of Environment - The Ministry of Environment (MOE) has reviewed the system and has provided Certificate of Approval/Environmental Compliance, (see Appendix IV). Approvals are for sites using CDS units to achieve Level 1 (80% TSS Removal, 90% Runoff Treated) treatment.

Ontario Provincial Standards – Ontario Provincial Standards' (OPS) Special Review Committee for the approval of oil/grit separators in municipal roadway applications, standardized a review process for all municipalities. CDS has been reviewed and approved by OPS. Certification is attached, Appendix IV.

System Features

Conventional oil-grit separators rely solely on gravity for grit separation. The CDS utilizes multiple hydraulic techniques to allow large flows to be processed in a compact footprint. These processes include gravity, swirl concentration and a patented inertial based screening process. In a CDS system, the energy in the storm flow is used to enhance separation, thereby allowing for a much more compact treatment chamber.

Floatables Containment

The CDS system removes 100% of the buoyant and neutrally buoyant material larger than 2.4mm up to the treatment flowrate. The system also incorporates a riser tube on top of the treatment chamber that extends beyond the high water condition to maintain the capture of buoyant material during peak events and temporary backwater conditions.

Hydrocarbon Capture

CDS units capture and retain hydrocarbons with their integral oil baffle design. CDS units were tested and demonstrated to be greater than 99% effective in controlling dry-weather oil spills.

Internal High Flow By-Pass Capability

CDS units have an internal by-pass weir and are capable of by-passing peak design storm events. CDS units are custom designed for each site based on the specific hydraulic requirements.

Sump is Separate from the Treatment Chamber

CDS units have a separate treatment chamber and grit storage sump chamber. With this design, the geometry of the treatment chamber is not impacted by accumulated grit. The sump chamber volume can be optimized to capture the estimated accumulated grit in between maintenance cycles.

ECHELON ENVIRONMENTAL

505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

Inspection and Maintenance

Echelon Environmental provides a full Operations and Maintenance Manual with as-built drawings included for all CDS units. Echelon Environmental also offers a comprehensive Inspection and Maintenance Program to assist owners in establishing long term maintenance for their separators.

We trust this submittal fully addresses all the tender requirements for the oil-grit separator.

Yours Truly,
Echelon Environmental Inc.
George Gebara, B.Eng - Project Manager

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX I
CDS TSS REMOVAL CALCULATIONS, Unit 1
PSD VALIDATION

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: Glenview Leiken
Location: Barrhaven, ON
OGS #: Area 1

Engineer: **David Shaeffer Engineering Ltd.**
Contact: Steve Merrick, EIT.
Report Date: 22-Sep-16

Area	5.72	ha	**Rainfall Station #**	215	
Weighted C	0.67		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	10.7	10.7	6.3	97.1	10.3
1.5	9.9%	29.7%	16.0	16.0	9.4	96.2	9.5
2.0	8.4%	38.1%	21.3	21.3	12.5	95.3	8.0
2.5	7.7%	45.8%	26.6	26.6	15.7	94.4	7.3
3.0	5.9%	51.7%	32.0	32.0	18.8	93.5	5.6
3.5	4.4%	56.1%	37.3	37.3	21.9	92.6	4.0
4.0	4.7%	60.7%	42.6	42.6	25.1	91.7	4.3
4.5	3.3%	64.0%	47.9	47.9	28.2	90.8	3.0
5.0	3.0%	67.1%	53.3	53.3	31.4	89.9	2.7
6.0	5.4%	72.4%	63.9	63.9	37.6	88.1	4.7
7.0	4.4%	76.8%	74.6	74.6	43.9	86.3	3.8
8.0	3.5%	80.3%	85.2	85.2	50.2	84.5	3.0
9.0	2.8%	83.2%	95.9	95.9	56.4	82.7	2.3
10.0	2.2%	85.3%	106.5	106.5	62.7	80.9	1.8
15.0	7.0%	92.3%	159.8	159.8	94.1	71.9	5.0
20.0	4.5%	96.9%	213.1	169.9	100.0	56.0	2.5
25.0	1.4%	98.3%	266.4	169.9	100.0	44.8	0.6
30.0	0.7%	99.0%	319.6	169.9	100.0	37.3	0.3
35.0	0.5%	99.5%	372.9	169.9	100.0	32.0	0.2
40.0	0.5%	100.0%	426.2	169.9	100.0	28.0	0.2
45.0	0.0%	100.0%	479.4	169.9	100.0	24.9	0.0
50.0	0.0%	100.0%	532.7	169.9	100.0	22.4	0.0
							88.0

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 81.5%
Predicted Annual Rainfall Treated = 97.2%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS Stormwater Treatment Unit Performance

Table 1. Fine Particle Size Distribution (PSD)

Particle Size (µm)	% of Particle Mass
< 20	20
20 – 40	10
40 – 60	10
60 – 130	20
130 – 400	20
400 – 2000	20

Removal Efficiencies – CDS Unit Testing Under Various Flow Rates

The following performance curves are based on controlled tests using a full scale CDS Model PMSU20_20 (2400 micron screen), 1.1-cfs (494-gpm) capacity treatment unit.

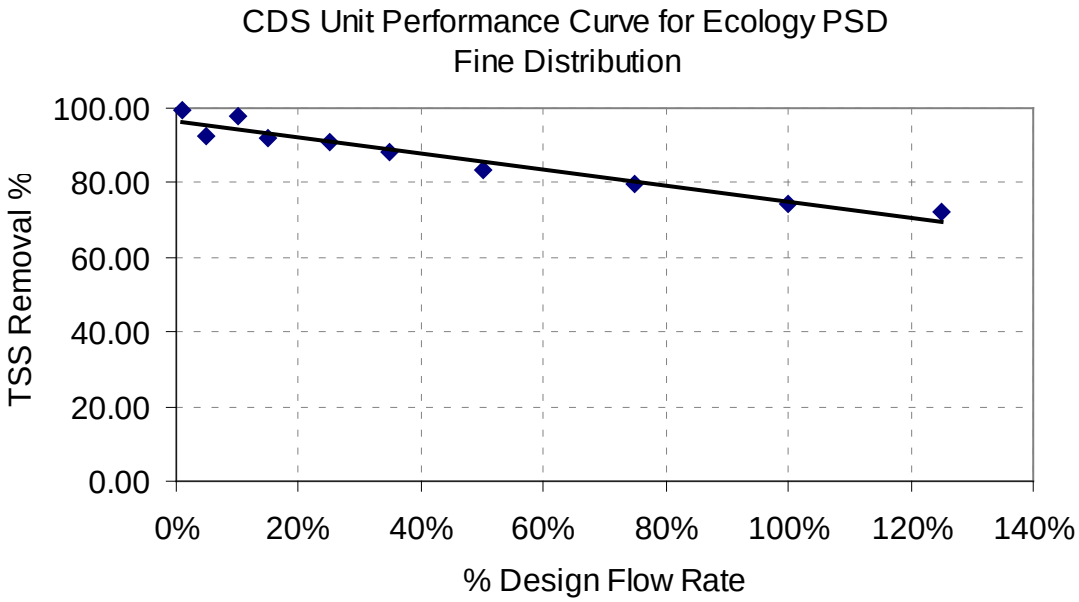


Figure 1. CDS Unit Performance for Fine PSD

Tests were conducted using two types of sand – U.S. Silica OK-110 and UF sediment (a mixture of U.S. Silica sands). Particle size gradations for the two types of sand are illustrated in Figure 2.

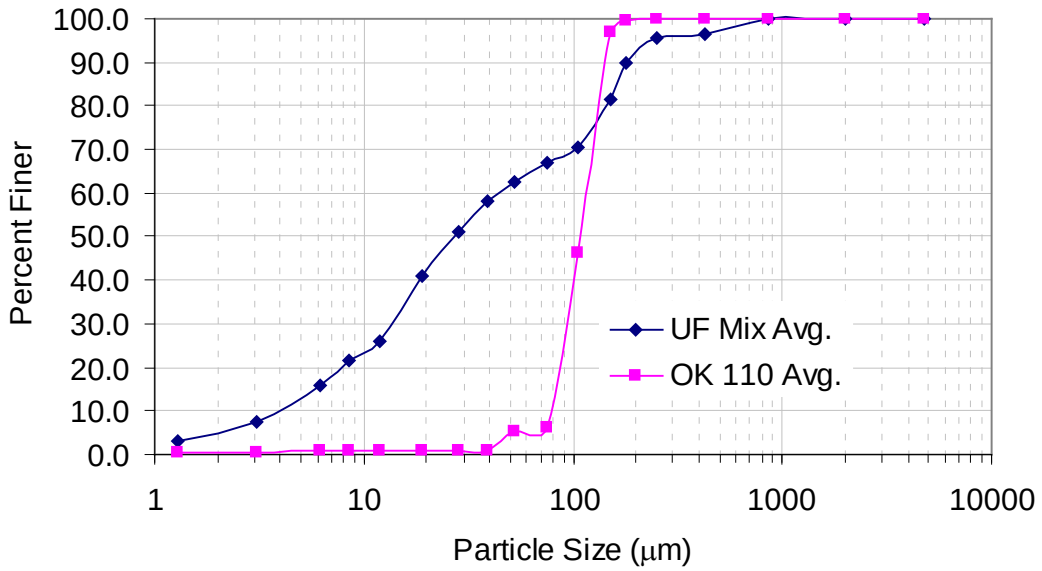


Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

The influent concentration (mg/L) for the test was set at 200-mg/L and verified from slurry feeding. Effluent samples were taken at fixed time intervals during each test run at various flow rates. The composite effluent samples were sent to Test American Analytical Testing Lab, OR for TSS analysis (ASTM D3977-97).

TSS removal rates for the specified PSD (d_{50} of 90 μm) under various flow rates were calculated from Figure 2 shows the removal efficiency as a function of operating flow rate. This removal efficiency curve as a function of percent flow rate can be applied to all CDS unit models.

ECHELON ENVIRONMENTAL

505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

Sept. 23, 2016

Mr. Steven Merrick EIT
David Schaeffer Engineering Ltd.
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9

Subject: CDS sizing, Glenview Leiken , Ottawa, ON
Unit 1: CDS PMSU 40_40_8
Unit 2: CDS PMSU 40_40_8

Ms. Merrick EIT,

Approval Background

CDS units are installed throughout Ontario. The CDS Stormwater Treatment System is an approved product in Ontario and is servicing various jurisdictions throughout the province. Introduction into Ontario was in 2002. Units installed in Ontario are approximately 2000 units as of 2016. Eastern Ontario volumes are approximately 25 units a year, approximately 300 units as of 2016.

- Installation references available upon demand

Design Parameters

The proposed CDS PMSU units were designed based on the following parameters:

Unit 1:

Drainage Area:	5.72 Ha
Runoff Coefficient:	0.67 based upon I=65%
Time of Concentration:	10 Min (calculated, does not impact efficiency calculation)
Target Particle Size Distribution:	Fine PSD
Treatment Level:	TSS: 80%, Treated Volume: >90% (MOE LEVEL I)
Hydraulic capacity:	30 CFS (~760 l/sec)
Flow Limit:	TBD

Unit 1:

Drainage Area:	5.24 Ha
Runoff Coefficient:	0.67 based upon I=65%
Time of Concentration:	10 Min (calculated, does not impact efficiency calculation)
Target Particle Size Distribution:	Fine PSD
Treatment Level:	TSS: 80%, Treated Volume: >90% (MOE LEVEL I)
Hydraulic capacity:	30-40 CFS (~760 – 1100 l/sec)
Flow Limit:	TBD

OGS data:

Unit	Sump Volume (L)	Treatment Chamber Volume (L)	Oil Capacity (L)
PMSU 40_40_8	10 910	10 910	1970

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

CDS TSS REMOVAL CALCULATIONS, Unit 2
PSD VALIDATION

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: Glenview Leiken
Location: Barrhaven, ON
OGS #: Area 2

Engineer: **David Shaeffer Engineering Ltd.**
Contact: Steve Merrick, EIT.
Report Date: 22-Sep-16

Area	5.24	ha	**Rainfall Station #**	215	
Weighted C	0.67		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	9.8	9.8	5.7	97.2	10.3
1.5	9.9%	29.7%	14.6	14.6	8.6	96.4	9.5
2.0	8.4%	38.1%	19.5	19.5	11.5	95.6	8.0
2.5	7.7%	45.8%	24.4	24.4	14.4	94.7	7.3
3.0	5.9%	51.7%	29.3	29.3	17.2	93.9	5.6
3.5	4.4%	56.1%	34.2	34.2	20.1	93.1	4.1
4.0	4.7%	60.7%	39.0	39.0	23.0	92.3	4.3
4.5	3.3%	64.0%	43.9	43.9	25.8	91.4	3.0
5.0	3.0%	67.1%	48.8	48.8	28.7	90.6	2.7
6.0	5.4%	72.4%	58.6	58.6	34.5	89.0	4.8
7.0	4.4%	76.8%	68.3	68.3	40.2	87.3	3.8
8.0	3.5%	80.3%	78.1	78.1	46.0	85.7	3.0
9.0	2.8%	83.2%	87.8	87.8	51.7	84.0	2.4
10.0	2.2%	85.3%	97.6	97.6	57.4	82.4	1.8
15.0	7.0%	92.3%	146.4	146.4	86.2	74.2	5.2
20.0	4.5%	96.9%	195.2	169.9	100.0	61.1	2.8
25.0	1.4%	98.3%	244.0	169.9	100.0	48.9	0.7
30.0	0.7%	99.0%	292.8	169.9	100.0	40.7	0.3
35.0	0.5%	99.5%	341.6	169.9	100.0	34.9	0.2
40.0	0.5%	100.0%	390.4	169.9	100.0	30.6	0.2
45.0	0.0%	100.0%	439.2	169.9	100.0	27.2	0.0
50.0	0.0%	100.0%	488.0	169.9	100.0	24.4	0.0
							88.9
						Removal Efficiency Adjustment[2] =	6.5%
						Predicted Net Annual Load Removal Efficiency =	**82.4%**
						Predicted Annual Rainfall Treated =	**97.7%**

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

CDS Stormwater Treatment Unit Performance

Table 1. Fine Particle Size Distribution (PSD)

Particle Size (µm)	% of Particle Mass
< 20	20
20 – 40	10
40 – 60	10
60 – 130	20
130 – 400	20
400 – 2000	20

Removal Efficiencies – CDS Unit Testing Under Various Flow Rates

The following performance curves are based on controlled tests using a full scale CDS Model PMSU20_20 (2400 micron screen), 1.1-cfs (494-gpm) capacity treatment unit.

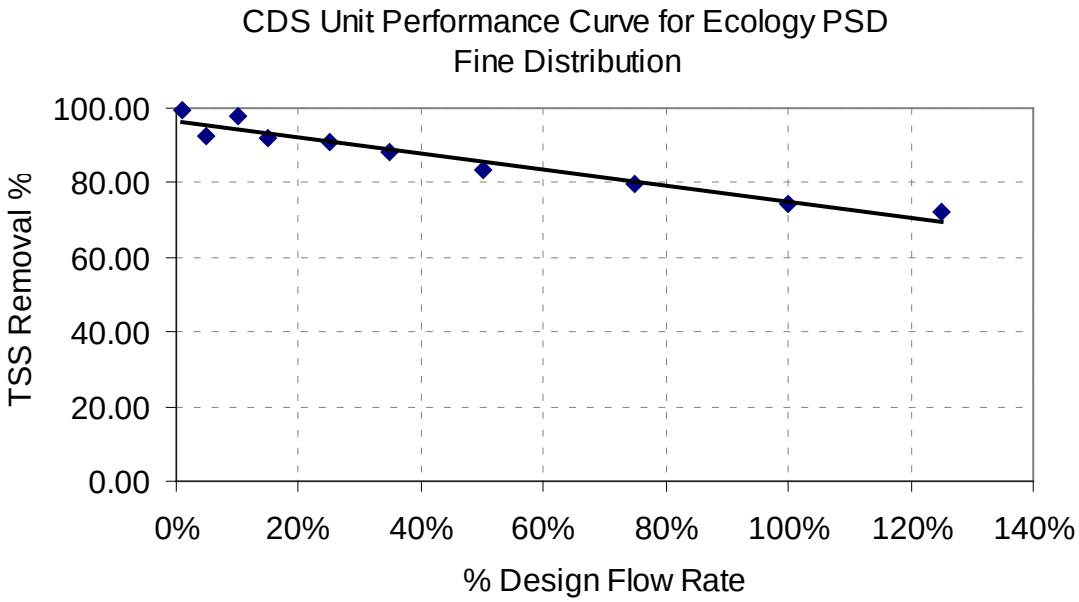


Figure 1. CDS Unit Performance for Fine PSD

Tests were conducted using two types of sand – U.S. Silica OK-110 and UF sediment (a mixture of U.S. Silica sands). Particle size gradations for the two types of sand are illustrated in Figure 2.

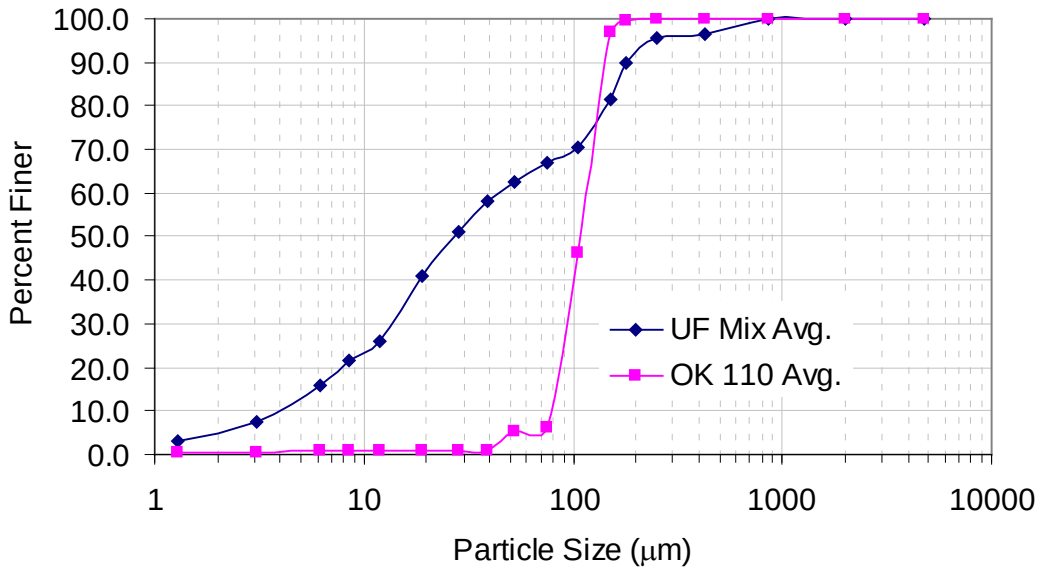


Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

The influent concentration (mg/L) for the test was set at 200-mg/L and verified from slurry feeding. Effluent samples were taken at fixed time intervals during each test run at various flow rates. The composite effluent samples were sent to Test American Analytical Testing Lab, OR for TSS analysis (ASTM D3977-97).

TSS removal rates for the specified PSD (d_{50} of 90 μm) under various flow rates were calculated from Figure 2 shows the removal efficiency as a function of operating flow rate. This removal efficiency curve as a function of percent flow rate can be applied to all CDS unit models.

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX II
ANTICIPATED GRIT LOAD/CLEANING CYCLE, unit 1

ECHELON ENVIRONMENTAL

Phone: 905-948-0000
Fax: 905-948-0577
info@echelonenvironmental.ca
www.echelonenvironmental.ca

Estimate of Annual Grit Collection

Engineer:	DSEL
Contact:	Mr. S. Merrick EIT
Report Date:	23-Sep-16

Project:	Glenview leikin, unit 1
CDS Model:	40_40_8
OGS Location:	Ottawa, ON

Area :	5.72	ha
Imperviousness :	65	%
Runoff Coefficient :	0.67	

Assumptions:

1. Annual Rainfall	750	mm	(Kingston estimated)
2. Typical Grit Concentration	250	mg/l	
3. Apparent Grit Density	1.4	kg/l	(estimated)
4. Grit Capture Efficiency	80%		

Runoff Volume = Area x Rainfall Depth x Runoff Coefficient = 28,743 cu.m

Grit Collected = Grit Concentration x Runoff Volume x Grit Capture Efficiency = 5,749 kg

Grit Volume = Mass / Apparent Density = 4,106 litres or 4.106 cu.m

Therefore it can be expected that this site will generate approximately 4.106cu.m of grit annually.

Sump Capacity of CDS unit = 4.270 cu.m

Therefore the design sump capacity will accommodate a cleaning frequency of one time per 12 to 14 months.

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

ANTICIPATED GRIT LOAD/CLEANING CYCLE, unit 1

ECHELON ENVIRONMENTAL

Phone: 905-948-0000
Fax: 905-948-0577
info@echelonenvironmental.ca
www.echelonenvironmental.ca

Estimate of Annual Grit Collection

Engineer:	DSEL
Contact:	Mr. S. Merrick EIT
Report Date:	23-Sep-16

Project:	Glenview leikin, unit 2
CDS Model:	40_40_8
OGS Location:	Ottawa, ON

Area :	5.24	ha
Imperviousness :	65	%
Runoff Coefficient :	0.67	

Assumptions:

1. Annual Rainfall	750	mm	(Kingston estimated)
2. Typical Grit Concentration	250	mg/l	
3. Apparent Grit Density	1.4	kg/l	(estimated)
4. Grit Capture Efficiency	80%		

Runoff Volume = Area x Rainfall Depth x Runoff Coefficient = 26,331 cu.m

Grit Collected = Grit Concentration x Runoff Volume x Grit Capture Efficiency = 5,266 kg

Grit Volume = Mass / Apparent Density = 3,762 litres or 3.762 cu.m

Therefore it can be expected that this site will generate approximately 3.762cu.m of grit annually.

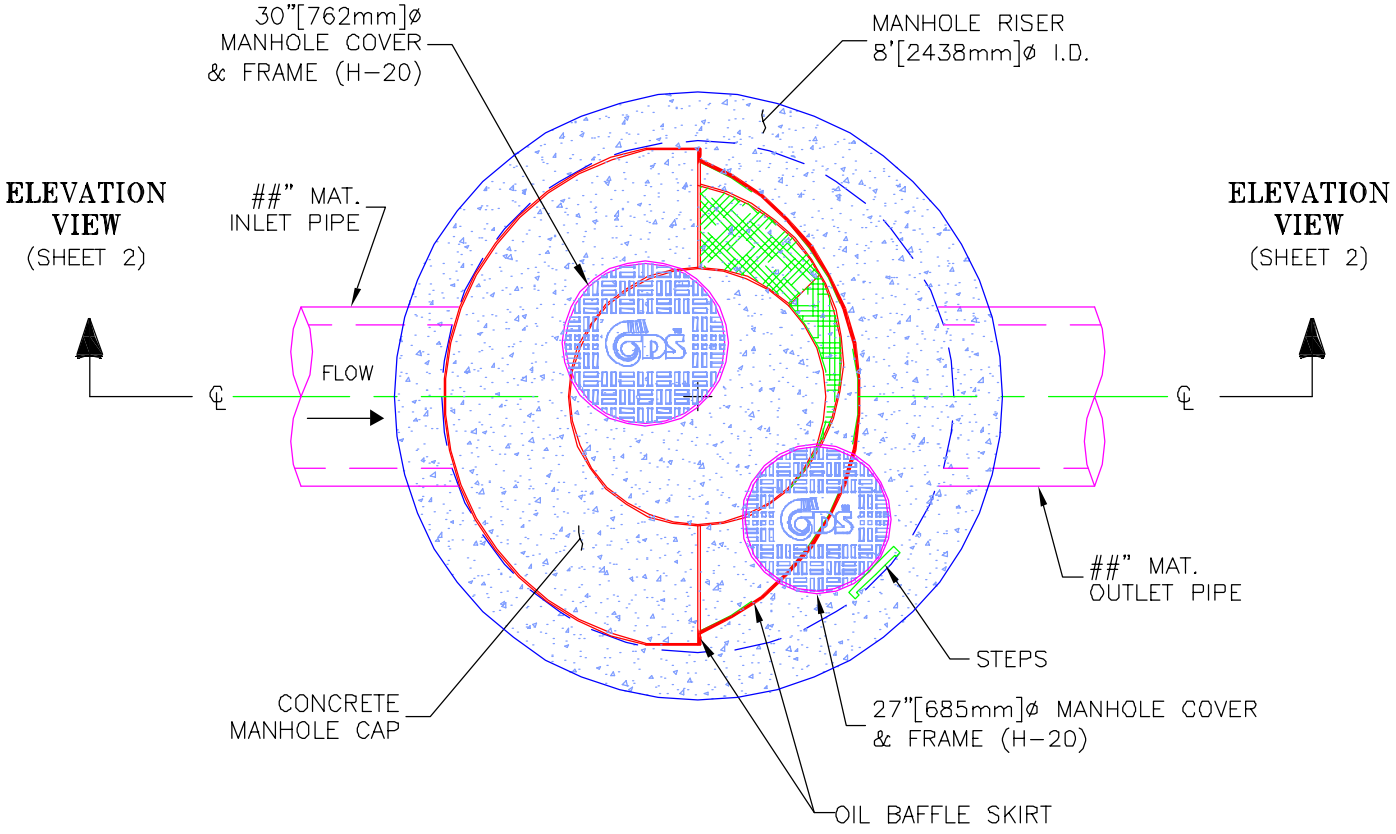
Sump Capacity of CDS unit = 4.270 cu.m

Therefore the design sump capacity will accommodate a cleaning frequency of one time per 12 to 14 months.

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX III
CDS PMSU 40_40_8 DRAWING

PLAN VIEW

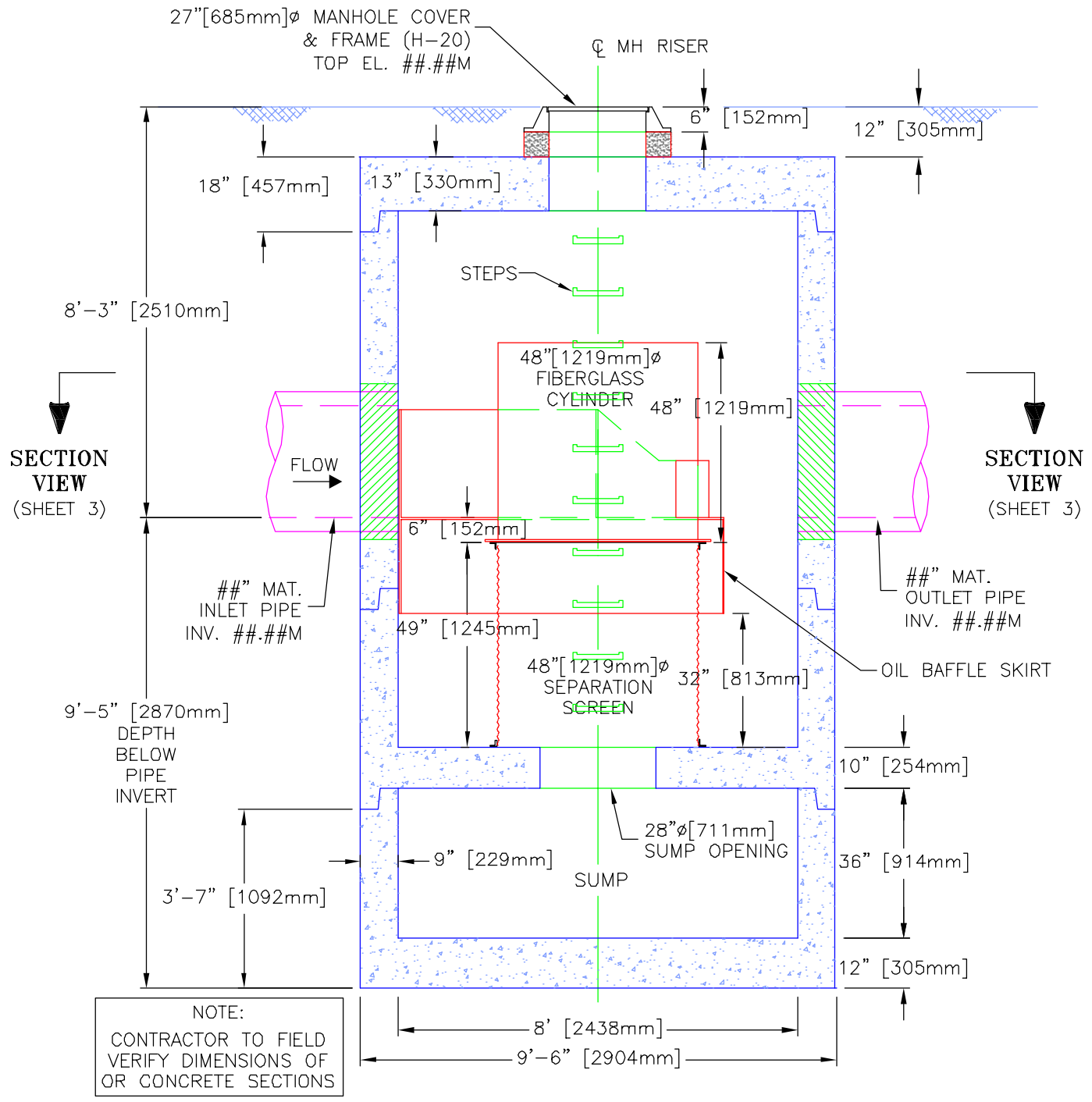


CDS MODEL PMSU40_40m, 6.0 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 3'
		DATE ##/##/##	SHEET 1
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

ELEVATION VIEW



NOTE:
CONTRACTOR TO FIELD VERIFY DIMENSIONS OF OR CONCRETE SECTIONS

CDS MODEL PMSU40_40m, 6.0 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

CONTECH STORMWATER SOLUTIONS	PROJECT NAME CITY, STATE	JOB# XX-##-###	SCALE 1" = 3'
		DATE ##/##/##	SHEET 2
		DRAWN INITIALS	
		APPROV.	

Echelon Environmental 505 Hood Road, Unit 26, Markham, Ontario L3R 5V6 Tel: (905) 948-0000 Fax: (905) 948-0577
CONTECH Stormwater Solutions Inc. 930 Woodcock Road, Suite 101, Orlando, Florida 32803 Tel: (800) 848-9955

ECHELON ENVIRONMENTAL
505 Hood Road Unit 26 Markham ON L3R 5V6
Tel: (905) 948-0000 Fax: (905) 948-0577
E-mail: info@echelonenvironmental.ca

APPENDIX IV
Ontario Provincial Standards Approval
MOE Certificate

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

CERTIFICATE

OF TECHNOLOGY ASSESSMENT

CDS™ Technologies

The Ontario Ministry of the Environment has reviewed the solid/liquid separation system developed by ***CDS™ Technologies****. Based on the review of the documentation submitted by the company (see the Notable Aspects section and Appendix), and data from pilot-scale testing and full-scale operations conducted by various agencies, the Ministry concludes that the continuous deflection separation (CDS™) system can provide useful removal of solids and floatables as part of a stormwater management system.*

The CDS™ Technologies may be able to provide "basic to enhanced" level of protection when used alone, maintained for effective operation, and when appropriately designed for the development area to be serviced. CDS™ units may also be used for pretreatment in combination with other non-proprietary technologies such as man-made wetlands, treatment ponds and infiltration basins.

John Mayes, (A) Director
Standards Development Branch
Ministry of the Environment
(September 2006)

New Environmental Technology Evaluation Program

Promoting the development and application of new environmental technologies

Ontario

TECHNOLOGY ASSESSMENT • TECHNOLOGY ASSESSMENT

150 - 07 - 2000

Echelon Environmental

Supplier of stormwater treatment systems
Category: **Distributor**

Contacts

Rob Rainford, P.Eng.
General Manager
Echelon Environmental
505 Hood Road, Unit #26
Markham, ON L3R 5V6
Phone: 905-948-0000 x225
Fax: 905-948-0577
Cellular: 416-899-0553
Email: **rob@echelonenvironmental.ca**
Web: **http://www.echelonenvironmental.ca**

Products

** For product details select the down arrow.*

Info **CDS Technologies Precast Manhole Stormwater Unit (PMSU)**

Info **ChamberMaxx**

Products Distributed

Contech Construction Products Inc.

CDS©

Using patented continuous deflective separation technology, the CDS® system, effectively screens, separates and traps debris, sediment, and oil from stormwater runoff. The indirect screening capability of the system allows for 100% removal of floatables and neutrally buoyant material, without blinding. It is available in offline, inline, and grate inlet configurations. The unique inlet design provides more ways to receive stormwater in a single treatment unit. Its unique forebay design allows it to receive single or multiple pipes on a 170° arc. If needed, the system can perform as a catch basin or drop inlet and receive flow from the rest of the drainage collection system ? eliminating the need for additional structures. An oil baffle skirt surrounding the non-blocking screening process traps oil and grease. It separates previously captured oil and grease from high bypass flows, preventing re-entrainment. The CDS® system is available in precast or cast-in-place. Offline units can treat flows from 1 to 300 cfs (30 to 8500 L/s). Inline units can treat up to 7.5 cfs (170 L/s), and internally bypass larger flows in excess of 50 cfs (1420 L/s). The pollutant removal capability of the CDS system has been proven in the lab and field.

Hydroguard Separator Design Summary

Glenview Leiken Residential Development
Ottawa, Ontario

Prepared for:
David Schaeffer Engineering Ltd.

September 22, 2016

Introduction

Hydroguard is a Canadian technology that has been independently tested to industry standards and has been certified through the MOE's New Environmental Technology Evaluation (NETE) program. It has also been approved by the Ontario Provincial Standard's Product Management Committee for use in Ontario.

Two Hydroguard separators are proposed to provide stormwater quality for the Glenview Leiken Residential Development in Ottawa. They were sized using Hydroguard's continuous simulation sizing program to meet the MOE's "Enhanced Protection" criteria capturing a minimum of 80% of the annual TSS load and treating a minimum of 90% of the annual run-off. The sizing program has been calibrated to independent lab testing conducted on a full scale Hydroguard unit. The sizing program is available at http://www.hydroworks.com/hydroguard.html#.

The particle size distribution (PSD) a separator is designed to capture is a critical design parameter. It determines the size of structure required and also the environmental benefit it will provide. The Hydroguard separator was designed to capture a PSD consistent with the MOE's 1994 Stormwater Management Guidelines. A detailed breakdown of the PSD is below.

Particle Size Distribution (PSD)

µm	%
20	20
60	20
150	20
400	20
2000	20

Drainage Data

Unit Area 1	Drainage Area Size (ha)	Imperviousness (%)	Hydroguard Unit Proposed	Annual TSS Removal	Net Annual Volume Treated
East Property	5.72	65	***HG 10***	83%	98%
West Property	5.24	65	***HG 10***	84%	98%

Hydroguard Dimensions and Capacities

Table 1. Hydroguard Separator Dimensions for this project

Model	Structure Inside Diam. (SID) (mm)	NJDEP Certified Flow Rate (l/s)	Sediment Depth Requiring Maintenance (litres)	Oil/Floating Trash Volume* [litres]	Permanent Pool Wet Volume* (litres)
HG 10	3000	142	650mm (4,595)	3,380	18,984

-Sediment and oil storage volumes can be easily modified for increased capacity

The values in Table 1 are a guideline. The internal baffles are customized for each project depending on pipe diameter, slope, and the depth of inlet pipe below grade. Accordingly, the values of sediment storage and oil storage can be expected to vary slightly from project to project.

Hydroguard Operation

The Hydroguard (HG) separator is unique since it treats both high and low flows in one device, but maintains separate flow paths for low and high flows. Accordingly, high flows do not scour out the fines that are settled in the low flow path since they are treated in a separate area of the device as shown in Figure 1.

The Hydroworks HG separator consists of three chambers:

1. An inner chamber that treats low or normal flows
2. A middle chamber that treats high flows
3. An outlet chamber where water is discharged to the downstream storm system

The water leaving the inner chamber continues into the middle chamber, again at a tangent to the wall of the structure. The water is then conveyed through an outlet baffle wall (high and low baffle). This enhances the collection of any floatables or suspended solids not removed by the inner chamber. Water flowing through the baffles then enters the outlet chamber and is discharged into the downstream storm drain.

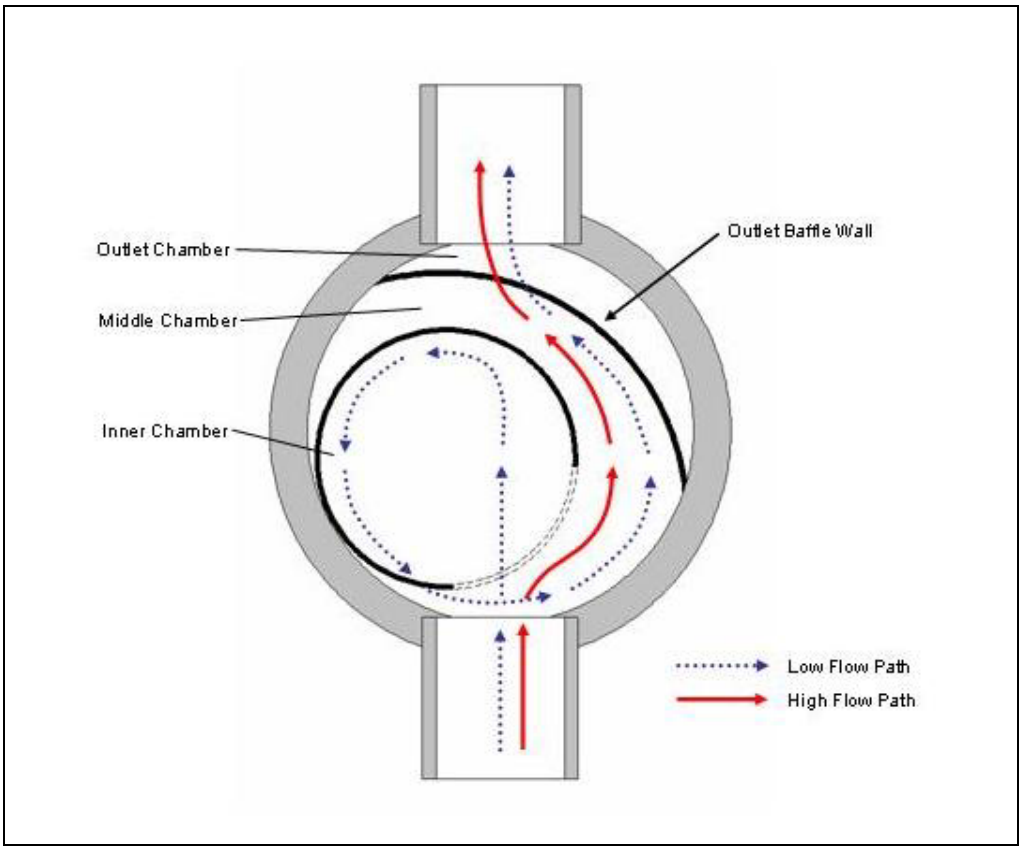


Figure 1. Hydroworks HG Operation – Plan View

During high flows, the flow rate entering the inner chamber is restricted by the size of the inlet opening to the inner chamber. This restriction of flow rate into the inner chamber prevents scour and re-suspension of solids from the inner chamber during periods of high flow. High flows are conveyed directly into the middle chamber where they receive treatment for floatables and solids via the baffle system. This treatment of the higher flow rates is important since trash and heavier solids are typically conveyed during periods of higher flow rates.

The Hydroworks HG separator is revolutionary since it incorporates low and high flow treatment in one device while maintaining separate low and high flow paths to prevent the scour and re-suspension of fines.

Figure 2 is a profile view of Hydroworks HG separator showing the flow patterns for low and high flows.

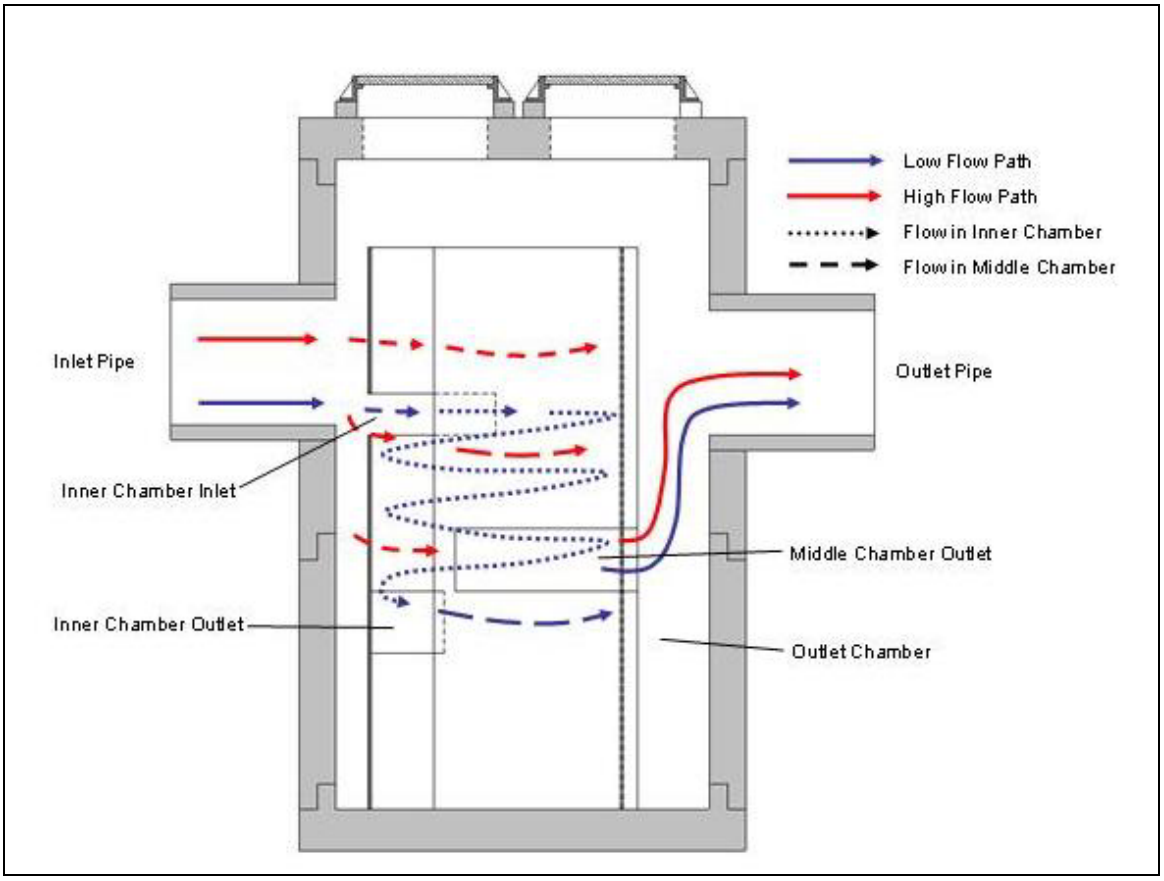


Figure 2. Hydroworks HG Operation – Profile View

Construction Materials

The inner chamber and outlet baffle are made out of a copolymer plastic. The shell of the structure is pre-cast concrete made to OPS specifications. All municipalities readily accept pre-cast concrete since it has the following advantages:

- Made from standard maintenance hole components
- Long service life
- Ease of installation (less dependent on backfill (contractor proficiency) for structural integrity)
- Concrete structures are designed for both anti-buoyancy and traffic loading without any field requirements (such as structural loading slabs in traffic areas and anti-buoyancy slabs to prevent groundwater uplift).
- Low maintenance requirements

Headloss

Any water quality system implemented in a storm drain network will create headloss in the system. In general, depending on the configuration of the by-pass, systems designed to treat high flows or all of the flow will have a higher headloss impact on the storm drain network than systems that by-pass high flows.

The headloss created by the HG separator was measured in an independent laboratory (Alden Research Laboratory) for a full scale HG6. The K value ($h = K\ v^2/(2g)$) for headloss calculations was determined to be 1.09 for full pipe flow. Hydroworks recommends using a K value of 1.6 for all flows (free flow, full pipe, pressure flow) to be conservative.

TSS Removal Calculations for the Specified System

Hydroworks sizes separators based on continuous modeling of rainfall, runoff, TSS buildup, TSS washoff, TSS settling and TSS transport through the system.

The continuous simulation model is based on SWMM 4.4. The model uses the buildup and washoff models directly from SWMM. Settling was calculated using the washoff load and flow rate from SWMM each timestep (5 minutes) and laboratory settling (Alden 2008) for dynamic (flowing water) and Cheng's equation for quiescent (inter-event) time periods with the specified particle size distribution.

TSS removal calculations in the sizing program are based on the Hydroguard being a completely mixed reactor vessel. The removal calculations solve a first order differential equation for the concentration of solids in the tank at any time. The first order differential equation is for continuity of mass.

$$C'V = QC_i - QC_t - r_cV$$

C' = the change in concentration of solids in the tank with time
Q = flow rate through the tank
C_i = solids concentration in the influent to the tank
C_t = solids concentration in the tank
V = tank volume
r_c = reduction in solids in the tank (theoretical (Stokes law) settling or laboratory performance curve

Continuous simulation provides the most accurate way of estimating performance possible since it takes into account:

- The effect of flow rate (detention time) on settling
- Back to back storms
- Pollutant buildup and washoff
- Inter-event settling.

The independent laboratory testing (Alden Research Laboratory, 2008) conducted on the Hydroguard using the NJDEP particle size distribution is provided in Figure 3.

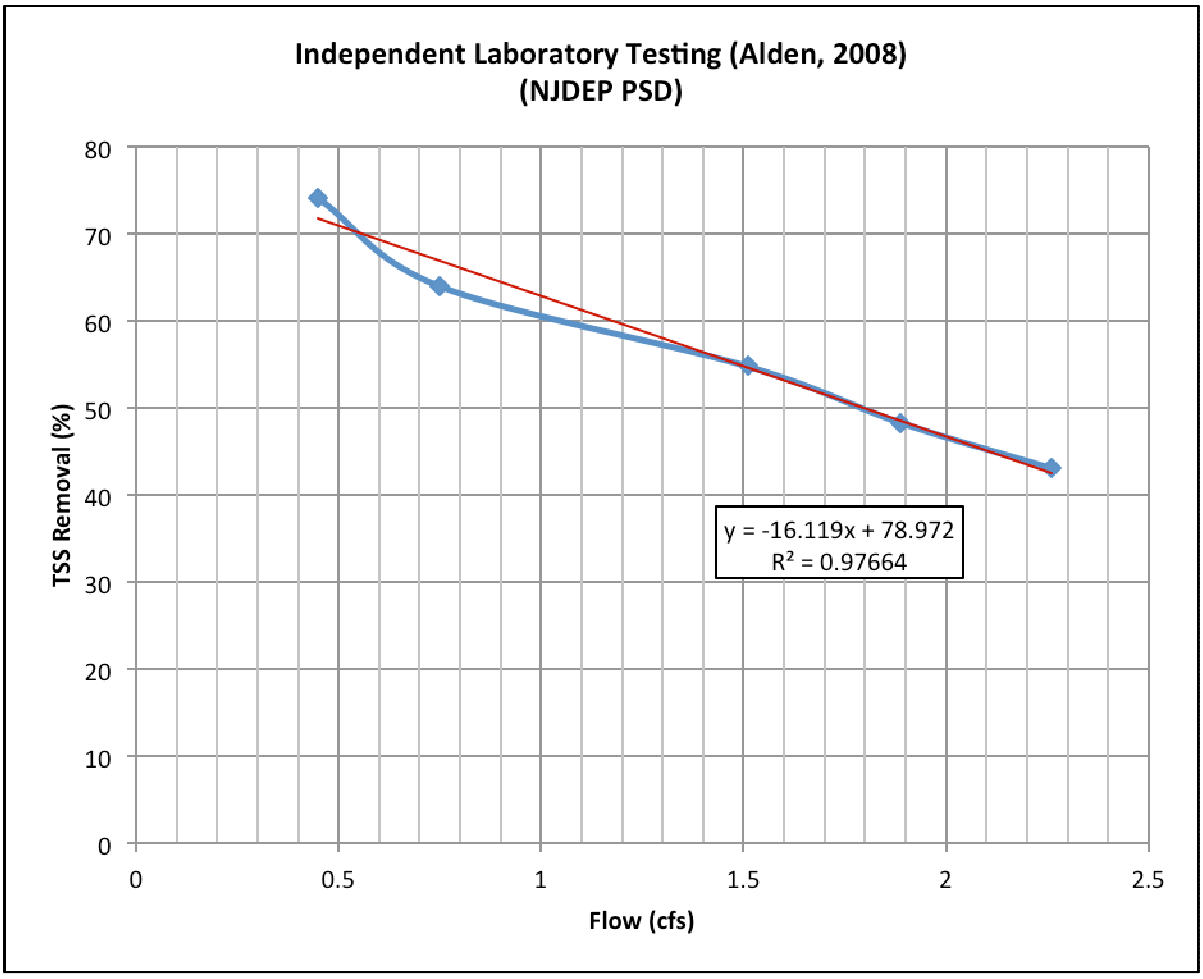


Figure 3. Independent Laboratory Results (Alden, 208)

Figure 4 shows the NJDEP particle size distribution tested by Alden on the HG6.

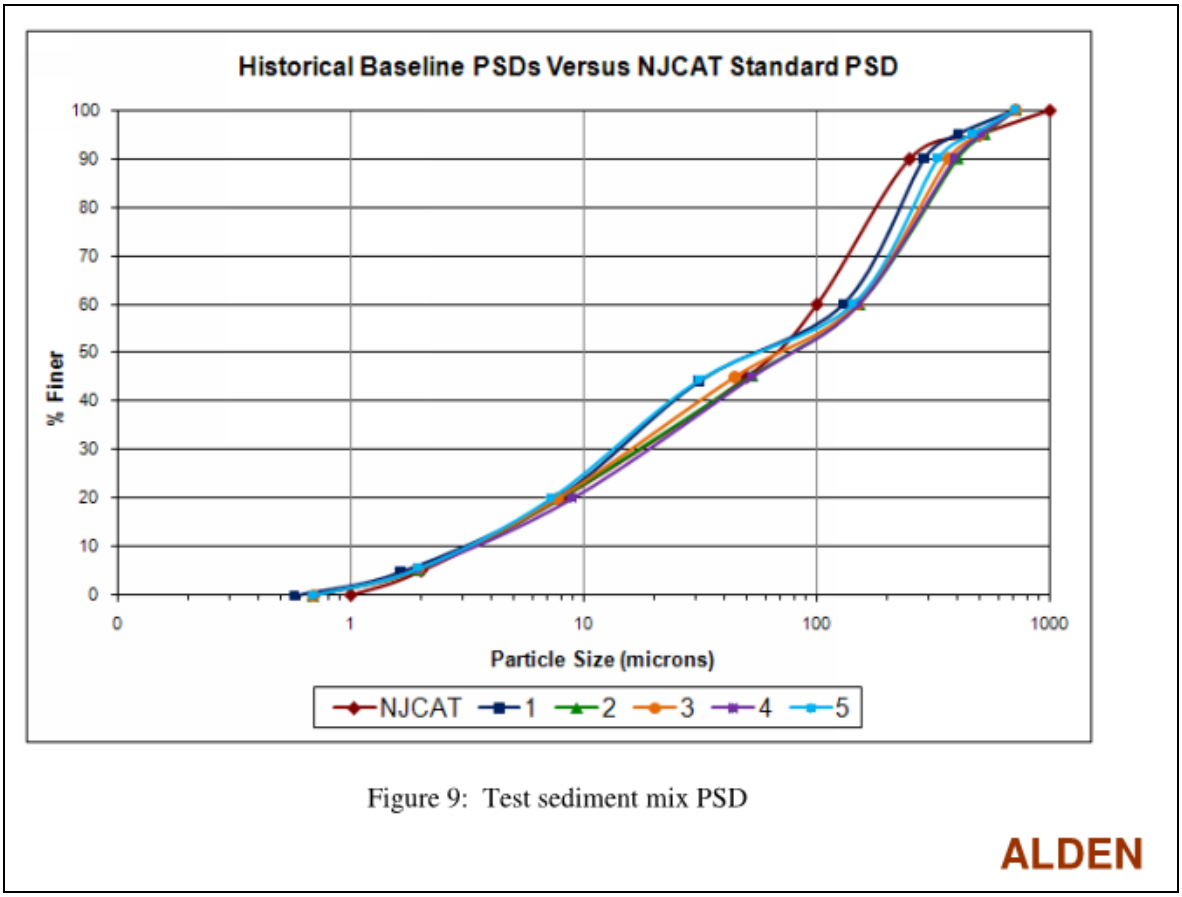


Figure 4. Independent Testing Particle Size Distribution

The model uses the Peclet Number to calculate TSS removal based on the independent laboratory testing. The Peclet number has been used as a dimensionless scaling number for sediment deposition in lakes (Dhamotharan, et. Al. 1981). Others have suggested its use for scaling of TSS removal results for hydrodynamic separators (Dhanak, 2008, Gulliver, Guo and Wu, 2008).

The Peclet number is the ratio of convection (convective settling) to diffusion (turbulence keeping particles in suspension). The Peclet number (Equation 1) varies with the size of separator, particle size of TSS, and flow rate.

$$Pe = Vs\ h\ d\ /Q \qquad \text{Equation 1}$$

Where Pe = Peclet number
Vs = settling velocity
h = depth of separator sump
d = separator diameter
Q = flow rate

A particle will be removed in the separator if the Peclet number is equal to, or greater than, the Peclet number calculated for removal of that particle based on the independent laboratory results. Based on the NJDEP PSD in Figure 4, the TSS removal in Figure 5, and the dimensions of the tested HG 6, critical Peclet Numbers can be calculated for each particle size in Figure 6 (critical Peclet number is the Peclet Number above which the particle is removed). A critical Peclet Number curve was then developed and input to the model (Figure 5).

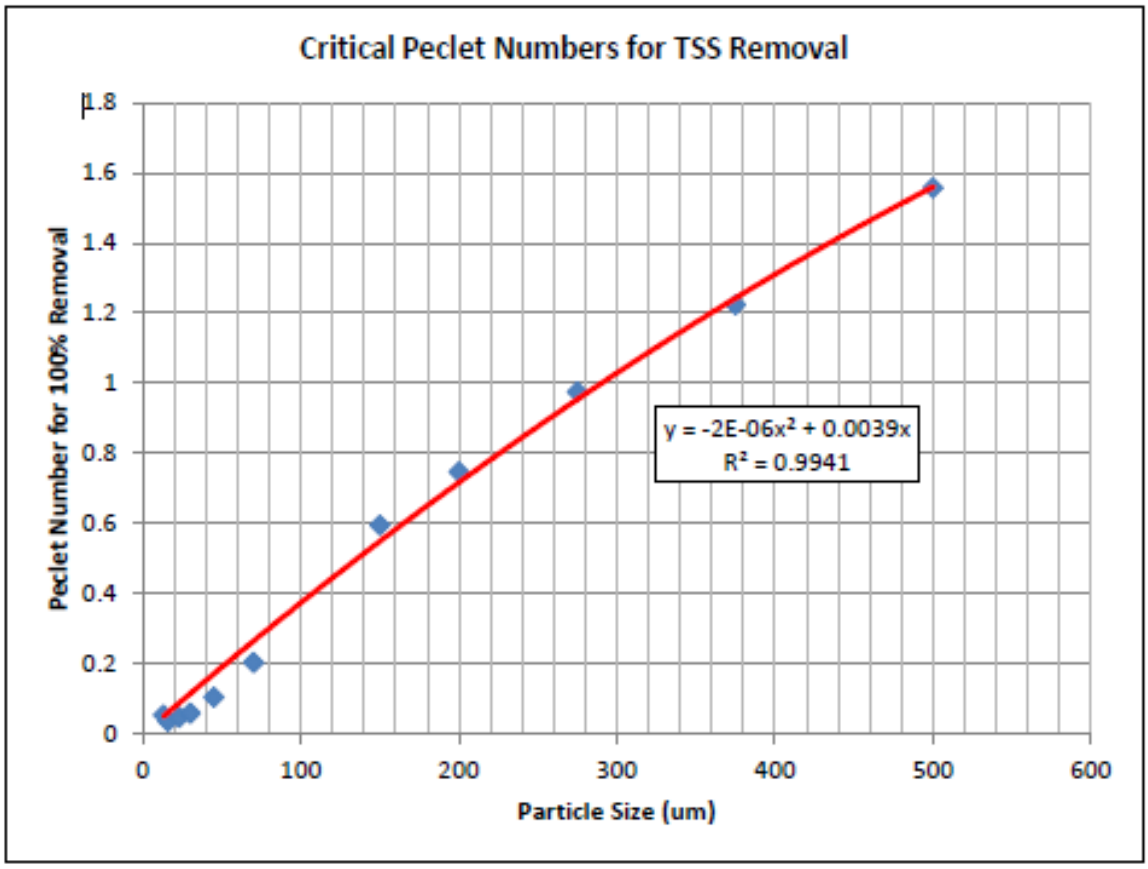


Figure 5. Critical Peclet Number Curve

At each timestep the Peclet Number is calculated for every flow and every Hydroworks separator for each particle size in the design particle size distribution. The calculated Peclet Number is then compared to the Critical Peclet Number to determine if the particle is removed at that timestep or not (removed if the calculated Peclet Number is greater than the Critical Peclet Number and not removed if less than the Critical Peclet Number). These calculations are done for the entire rainfall record to determine an overall TSS removal percentage.

Hydroworks added a Peclet routine to the USEPA SWMM model to determine TSS removal based on the Peclet number calibrated to the independent laboratory testing completed by Alden Research Laboratory in Holden, MA in 2008. A paper describing the Peclet sizing model is available as well as the independent laboratory testing completed by Alden Labs. Figure 6 shows the calibrated model results compared to the independent laboratory testing results from Alden Labs for a Hydroguard HG6 based on the NJDEP (NJCAT) particle size distribution used by Alden for testing purposes.

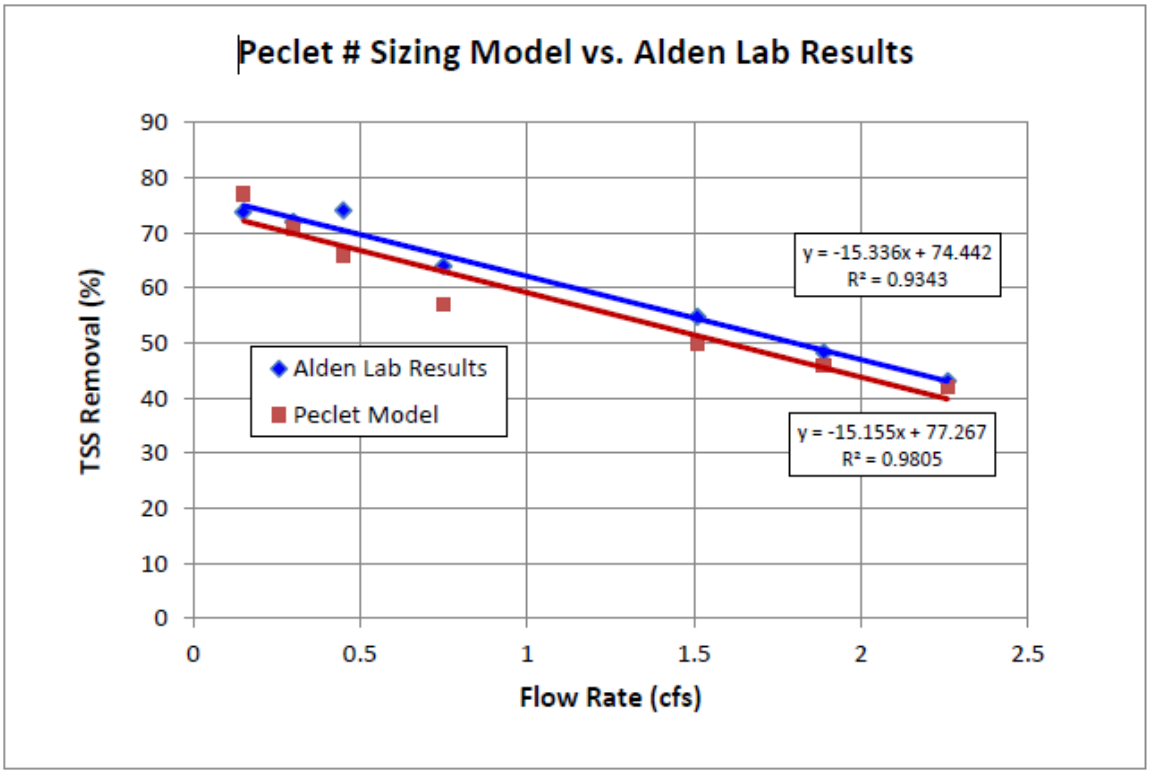


Figure 6. Independent Laboratory TSS Removal Performance versus Peclet Sizing Model

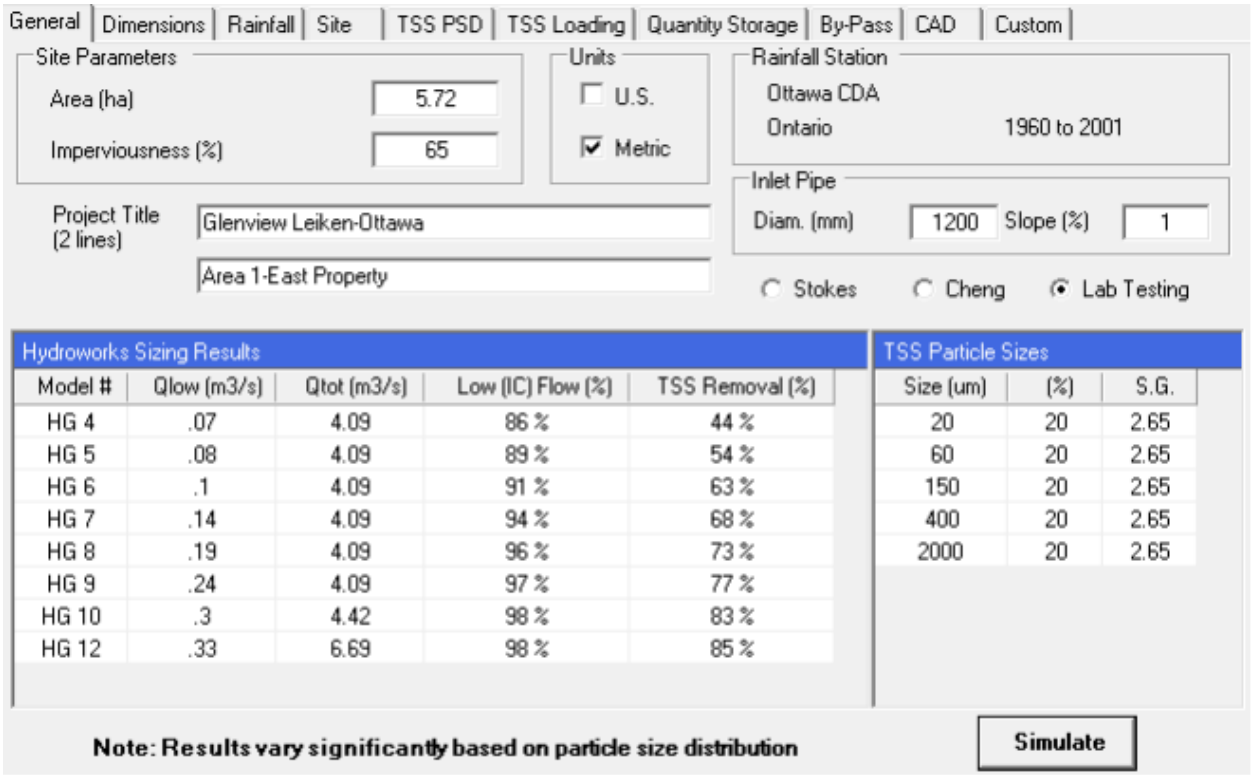
The use of the Peclet Number allows Hydroworks to size the Hydroguard based on any particle size and design storm or local hydrology.

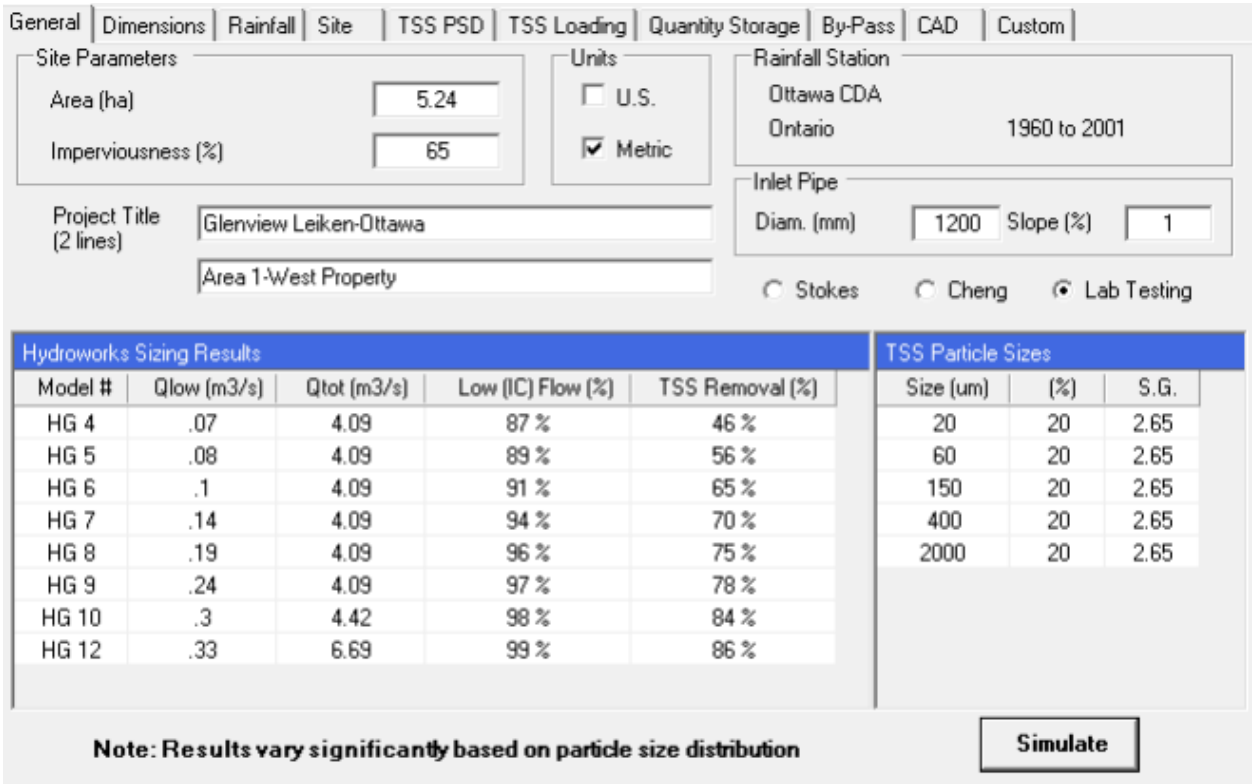
Sizing Results

A summary of the sizing simulation is provided below.

Unit	Hydroguard Model	TSS Removal (%)
East Property	HG 10	83%
West Property	HG 10	84%

Based on a particle size distribution (PSD) consistent with the MOE's 1994 Stormwater Management Guidelines. A breakdown of the PSD is in the sizing summary below.


General
Dimensions
Rainfall
Site
TSS PSD
TSS Loading
Quantity Storage
By-Pass
CAD
Custom
Site Parameters
Area (ha) 5.72
Imperviousness (%) 65
Units
U.S.
Metric
Rainfall Station
Ottawa CDA
Ontario 1960 to 2001
Inlet Pipe
Diam. (mm) 1200 Slope (%) 1
Project Title (2 lines)
Glenview Leiken-Ottawa
Area 1-East Property
Stokes Cheng Lab Testing
Hydroworks Sizing Results
Model # | Qlow (m3/s) | Qtot (m3/s) | Low (IC) Flow (%) | TSS Removal (%)
HG 4 | .07 | 4.09 | 86 % | 44 %
HG 5 | .08 | 4.09 | 89 % | 54 %
HG 6 | .1 | 4.09 | 91 % | 63 %
HG 7 | .14 | 4.09 | 94 % | 68 %
HG 8 | .19 | 4.09 | 96 % | 73 %
HG 9 | .24 | 4.09 | 97 % | 77 %
HG 10 | .3 | 4.42 | 98 % | 83 %
HG 12 | .33 | 6.69 | 98 % | 85 %
TSS Particle Sizes
Size (um) | (%) | S.G.
20 | 20 | 2.65
60 | 20 | 2.65
150 | 20 | 2.65
400 | 20 | 2.65
2000 | 20 | 2.65
Note: Results vary significantly based on particle size distribution
Simulate


General
Dimensions
Rainfall
Site
TSS PSD
TSS Loading
Quantity Storage
By-Pass
CAD
Custom
Site Parameters
Area (ha) 5.24
Imperviousness (%) 65
Units
U.S.
Metric
Rainfall Station
Ottawa CDA
Ontario 1960 to 2001
Inlet Pipe
Diam. (mm) 1200 Slope (%) 1
Project Title (2 lines)
Glenview Leiken-Ottawa
Area 1-West Property
Stokes Cheng Lab Testing
Hydroworks Sizing Results
Model # | Qlow (m3/s) | Qtot (m3/s) | Low (IC) Flow (%) | TSS Removal (%)
HG 4 | .07 | 4.09 | 87 % | 46 %
HG 5 | .08 | 4.09 | 89 % | 56 %
HG 6 | .1 | 4.09 | 91 % | 65 %
HG 7 | .14 | 4.09 | 94 % | 70 %
HG 8 | .19 | 4.09 | 96 % | 75 %
HG 9 | .24 | 4.09 | 97 % | 78 %
HG 10 | .3 | 4.42 | 98 % | 84 %
HG 12 | .33 | 6.69 | 99 % | 86 %
TSS Particle Sizes
Size (um) | (%) | S.G.
20 | 20 | 2.65
60 | 20 | 2.65
150 | 20 | 2.65
400 | 20 | 2.65
2000 | 20 | 2.65
Note: Results vary significantly based on particle size distribution
Simulate

Maintenance Requirements

Based on data from the National Stormwater Quality Database in the U.S.,
(http://rpitt.eng.ua.edu/Publications/Stormwater%20Characteristics/NSQD%20EPA.pdf)
the average concentration of TSS in stormwater run-off was 125 mg/litre, regardless of land use.
Therefore the estimated annual captured solids load will be:

Unit	Recommended Sediment Depth for Maintenance	Estimated Annual captured Solids
Area 1-East Property-HG 10	650mm ($4.60m^3$)	**$1.21m^3$**
Area 1-West Property-HG 10	650mm ($4.60m^3$)	**$1.13m^3$**

The maintenance manual is available at http://www.hydroworks.com/hgmaintenance.pdf
A post-installation inspection and 2 annual inspections are included with every Hydroguard unit.

Approvals

Hydroguard has received the MOE's NETE Certification and been approved for use in Ontario by the Ontario Provincial Standards-Product Management Committee. It is NJCAT verified and NJDEP certified.

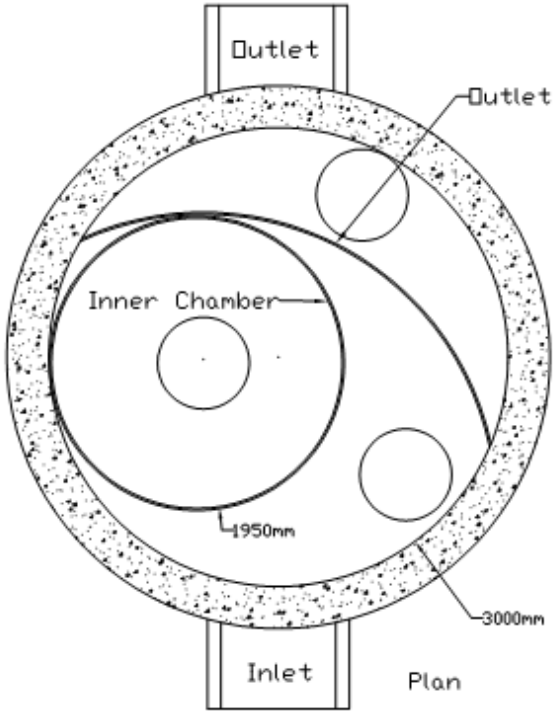
Contacts

Hydroguard units are 100% Canadian. They are manufactured by Con Cast Pipe (Guelph, Ontario) and DeCast Ltd (Utopia, Ontario). Please call CIP @ (519) 212-9161 with any questions or visit our website at www.c-i-p.ca.

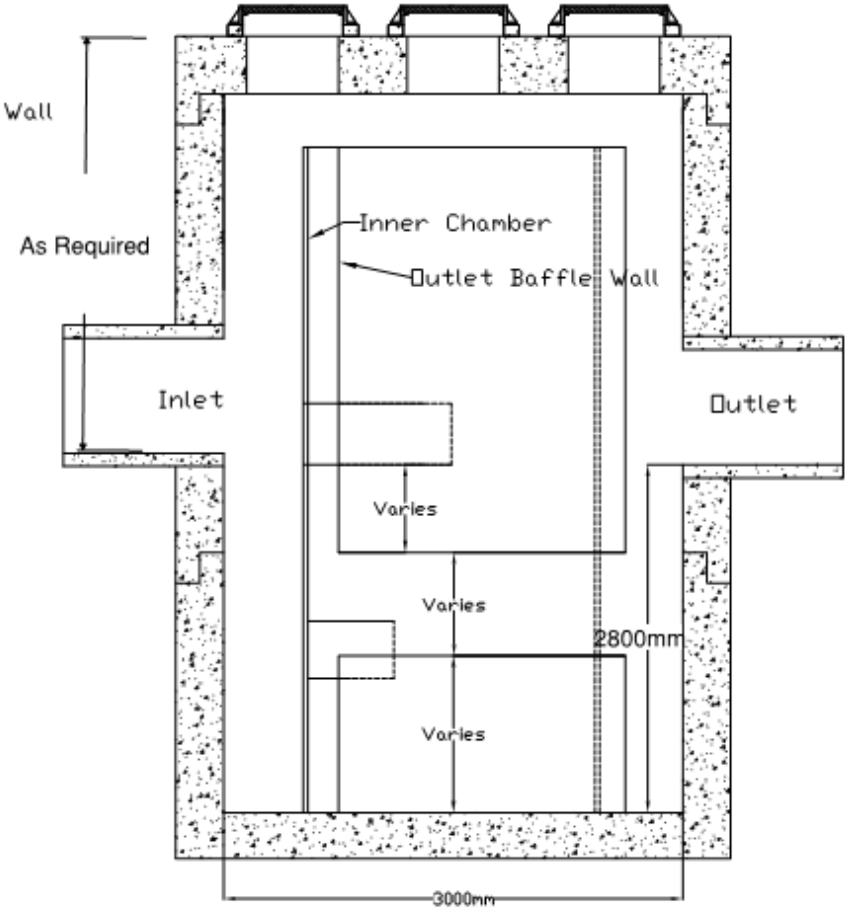
APPENDIX 1

CAD Drawings

Not for Construction



Plan



Profile

Permanent Pool Volume = 18,984 litres
The Hydroguard must be cleaned after the construction period if it is used as a sediment and erosion control measure
The Hydroguard should be inspected once per year for stabilized sites
Inspection will determine the maintenance frequency (annual maintenance or once every two years typical for stabilized sites)
Sites with unstable conditions (exposed soil or materials storage) will require more frequent inspection and maintenance

Canadian Infrastructure Products
44 Spooner Crescent, Cambridge, Ontario N1T 1X3
(519) 212-9161 www.c-i-p.ca

Hydroworks, LLC
50 S. 21st St., Kenilworth, NJ 07033
Phone: 888-290-7900 Fax: 888-783-7271
Web: www.hydroworks.com

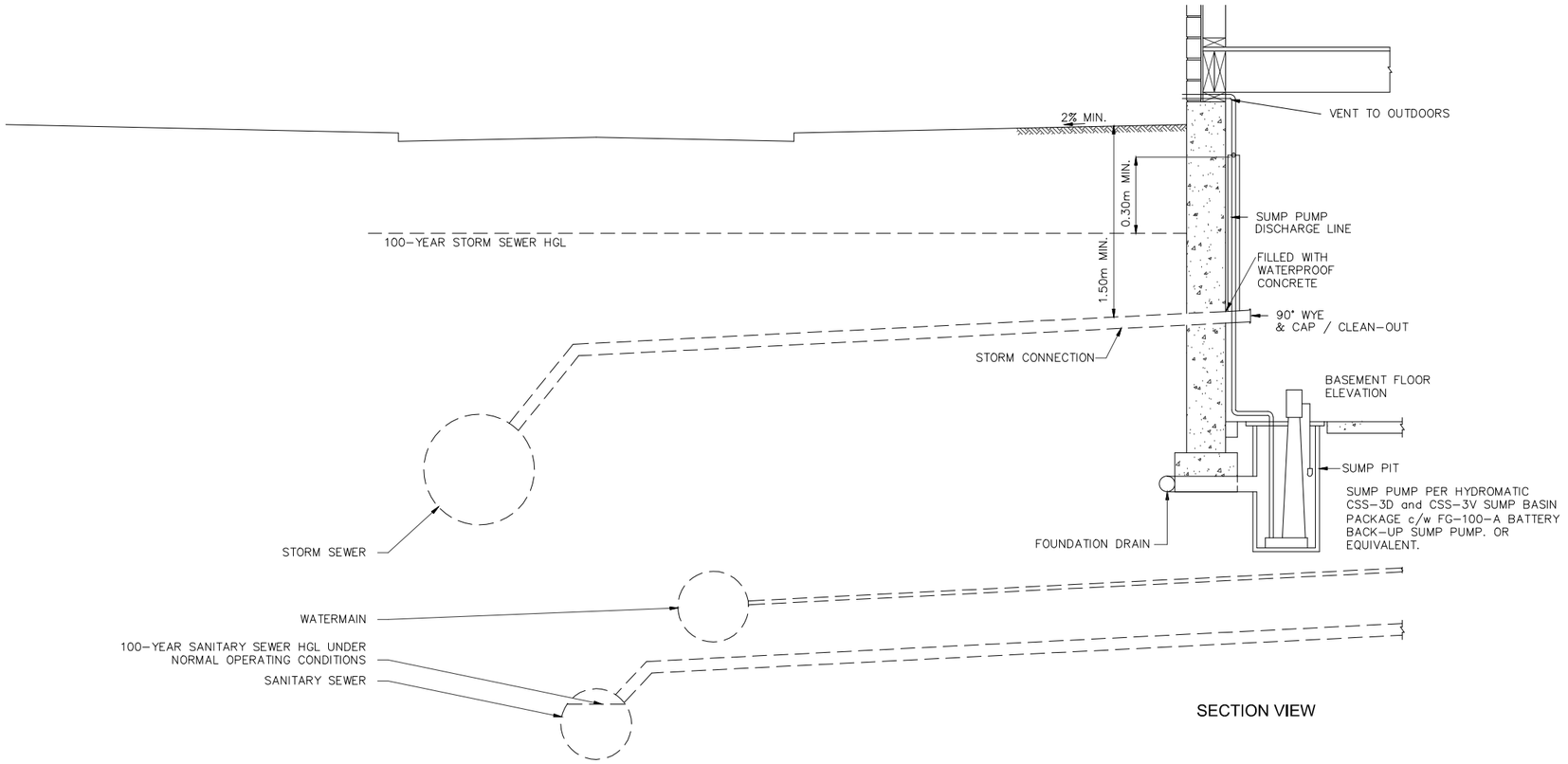
Can. Patent No. 2,536,300 U.S. Patent No. 6,951,619

Hydroworks HG 10 (3000mmØ)	
PROJECT:	Glenview Leiken Development
LOCATION:	Ottawa, Ontario
DATE:	September 22, 2016

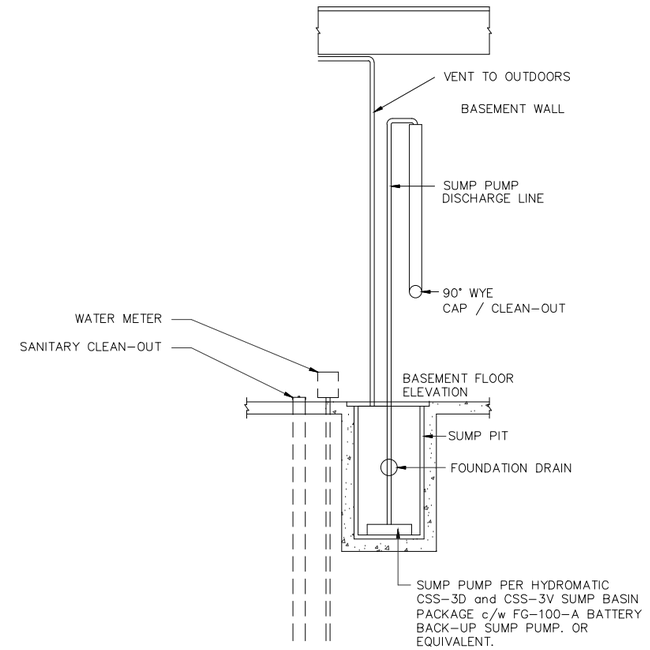
Hydroworks

Appendix H

- Proposed Sump Pump Detail (DSEL, September 2016)
- Overview of Proposed Private Sump Pump Use (DSEL et al., March 2017)



SECTION VIEW



FRONT VIEW

david schaeffer engineering ltd

120 Iber Road, Unit 203
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

SUMP PUMP - DETAIL

DATE: Sep 2016
SCALE: N.T.S.
PROJECT No.: 15-809
FIGURE APP H

March 24, 2017 DSEL File No.: 15-809

City of Ottawa
Development Review (South Services)
Planning, Infrastructure and Economic Development
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Attention: Mr. Sean Moore, MCIP, RPP, LEED Green Associate
613.580.2424 ext. 16481

Re: Overview of Proposed Private Sump Pump Use
3387 Borrisokane Road
Glenview Homes (Cedarview) Ltd.

This letter is intended to outline the rationale for proposing private sump pumps for the development of the 3387 Borrisokane property through policy, engineering, and financial lenses.

1.0 POLICY FRAMEWORK ALLOWING THE USE OF SUMP PUMPS

1.1 Planning Policies

Urban development of the 3387 Borrisokane property via municipal services is supported by the Provincial Policy Statement 2014 (PPS) and other governing policies laid out in the City of Ottawa Official Plan, Barrhaven South Community Design Plan 2006 (BSCDP), Barrhaven South Master Servicing Study Draft Addendum 2014 (BSMSS), and the Building Better and Smarter Suburbs: Strategic Directions and Action Plan 2015 (BBSS).

The PPS, through the *Planning Act*, requires that all decisions affecting planning matters be consistent with the policy statement. The PPS speaks to development servicing as it relates to: (PPS, 2014)

> *1.1.1 Healthy, liveable, and safe communities are sustained by:*
> *e) promotes cost-effective development patterns and standards to minimize land consumption and servicing costs.*

The PPS goes onto prioritize municipal sewage and water services as the preferred form of servicing in development areas, which is consistent with the recommendations of the BSMSS: (PPS, 2014)

> *1.6.6.2 Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas. Intensification and redevelopment within settlement areas on existing municipal sewage services and municipal water services should be promoted, wherever feasible.*

The PPS also outlines specific policies as it relates to 'Sewage, Water and Stormwater', specifically: (PPS, 2014)

> *1.6.6.1 Planning for sewage and water services shall:*
> *b) ensure that these systems are provided in a manner that:*
> *…..*
> *2. is feasible, financially viable and complies with all regulatory requirements; and*
> *3. protects human health and the natural environment;*
>
> *1.6.6.7 Planning for stormwater management shall:*

…….
c) not increase risks to human health and safety and property damage;
……

The engineering and financial rationales for the use of private sump pumps described herein (refer to sections 2.0 and 3.0) are considered to be aligned with the PPS policies.

The City of Ottawa Official Plan, the Barrhaven South Community Design Plan, and the associated Master Servicing Study all support development of the 3387 Borrisokane property via municipal water, wastewater, and drainage infrastructure. The BSMSS specifically considered the use of private sump pumps for the development of areas with grade raise restrictions (including the 3387 Borrisokane property), but did not carry forward this alternative solution based on City policy at the time of preparation of the study. Alternatively, to address the grade raise restriction areas, the BSMSS:

- calls for land uses typically developed as slab-on-grade (e.g. schools, commercial uses, etc.); and,
- for residential land uses typically developed with full basements, suggests 'alternative house design' and/or preloading of soils.

The engineering and financial evaluations described herein (refer to sections 2.0 and 3.0) take into account the recommendations of the BSMSS, but recommend the installation of private sump pumps in order to implement the Official Plan and BSCDP policy calling for the 3387 Borrisokane property to be developed primarily for residential uses.

Under the City of Ottawa's approved action plan for BBSS, City policies are being updated to promote better efficiency and functionality within new developments and to better consider the cost-effectiveness of development. **The engineering and financial rationales for the use of private sump pumps described herein (refer to sections 2.0 and 3.0) are considered to be aligned with the intent of the BBSS.**

1.2 Design Guidelines

The use of private sump pumps is permitted under the Ontario Building Code. The use of private sump pumps is also permitted under the City of Ottawa and Ministry of Environment and Climate Change (MOECC) sewer design guidelines.

The City of Ottawa recommends the use of sump pumps in specific conditions: (City of Ottawa Sewer Design Guidelines, 2012, as amended from time to time)

5.7.3 Connection to Storm Systems with Capacity Constraints

There are some circumstances in which connecting to the storm sewer is not possible or recommended due to downstream capacity constraints:

- *Infill housing where storm sewer is available, but footing elevations must be set low to conform to grades of adjacent developments, thus making gravity drainage impossible.*
- *Infill housing where a storm sewer is unavailable.*
- *Existing lots that experience storm sewer backup on a frequency greater than 1 in 5 years.*
- *Lots where the hydraulic grade line (HGL) is high and backwater valves would be closed for an extended period of time.*

In these situations, pumping water from a sump (i.e. sump pump) is recommended with discharge to the ground surface. Also, slab on grade construction would eliminate the need for a sump pump and most likely eliminate the risk of flooding due to sewer backups.

Furthermore, recognizing that not all developments meet the criteria outlined in Section 5.7.3, Section 1.3 of the City of Ottawa sewer design guidelines details a mechanism for approving non-standard servicing designs: (City of Ottawa Sewer Design Guidelines, 2012, as amended from time to time)

> *1.3 Deviations/Exceptions*
>
> *If the designer wishes to apply methods which differ from the guidelines provided in this document, or if these guidelines do not cover a subject of concern to a specific design, or if the designer proposes to use materials not approved in this document, then the onus shall be upon the designer to justify the proposal or resolve the concern to the satisfaction of the City. The proposal shall be the subject of a report that the designer shall have prepared by a professional engineer and signed, sealed, and submitted to the City for review.*
>
> *The report shall present the alternatives for resolution of the concern and shall make a recommendation on the proposed standard or material to be used, with justifications in terms of implementation feasibility and economics as well as engineering, environmental, operational, reliability, risk and maintenance issues.*
>
> *Notwithstanding the review of this report by the City and the acceptance by the City of the alternatives recommended in the report, the designer remains fully responsible for the design and construction of the municipal sewer systems according to good engineering practice and its ability to address the specific needs and site conditions for the given project.*

The MOECC recommends the use of sump pumps for specific conditions: (MOE Design Guidelines for Sewage Works, 2008)

> *5.4.7 Foundation Drainage*
>
> *It is recommended that foundation drainage be directed either to the surface of the ground or storm sewer system, if one exists. The designer should consider and advise the municipality of the following factors:*
>
> - *Possibility of storm sewer surcharging;*
> - *Difference in elevation between basement floor slabs and storm sewer obverts;*
> - *Possibility of foundation damage and flooding which could result due to back up into private storm drains;*
> - *Where concerns exist regarding the first two points, but where connection to a storm sewer is still desirable, this connection should be made via a sump pump system; and*
> - *The use of a "third" pipe or foundation drain collector.*

Furthermore, the MOECC Stormwater Management Planning and Design Manual – speaking to the use of sump pumps for lot level and conveyance controls – indicates: (MOE Stormwater Management Planning and Design Manual, 2003)

> *4.5.7 Sump Pumping of Foundation Drains*
>
> *Development standards allow foundation drains to be connected to the storm sewer. (…)*
>
> *In areas where the seasonally high water table is within 1 metre of the building foundation drains, sump pumps should not be utilized. This requirement is imposed to prevent excessive sump pump operation (…)*[1]

[1] The proposed sump pump configuration described in **Section 2.0** sets the sump pump within 0.3m of the long term groundwater level, which differs from the MOECC guideline. The deviation is justified because the low permeability of the silty clay subgrade will limit excessive sump pump use where placed within 1 m of the groundwater level. It should be noted that the seasonal fluctuations of the long-term groundwater level are very limited in a low permeability soil, such as the local silty clay deposit. This limited fluctuation allows a foundation to be placed at least 0.3 m above the long-term groundwater level without the perimeter drainage

In areas where the depth to bedrock is within 1 m of the foundation drain elevation, foundation drainage by sump pumps is not feasible. This requirement is imposed to prevent excessive sump pump operation (…)

Discharges to the surface should be directed to the rear yard to minimize the amount of surface drainage over sidewalks during the winter. Sump pumps discharging to the surface should discharge approximately 0.5 m above the ground surface to prevent blockages in the winter due to ice and snow.

In all cases, the installation of sump pumps will be governed by the Ontario Building Code. Requirements are expected to include, but are not limited to: (Ontario Building Code, 2016)

Section 9.14.2. Foundation Drainage

9.14.2.1(1) Unless it can be shown to be unnecessary, drainage shall be provided at the bottom of every foundation wall that contains the building interior.

Section 9.14.5. Drainage Disposal

9.14.5.1(1) Foundation drains shall drain to a sewer, drainage ditch or dry well.

9.14.5.2(1) Where gravity drainage is not practical, a covered sump with an automatic pump shall be installed to discharge the water into a sewer, drainage ditch or dry well.

2.0 ENGINEERING RATIONALE

The proposed elevations for the subject property, governed by geotechnical restrictions and the City of Ottawa's servicing requirements, are such that discharging of the foundation drains via gravity to a storm sewer system is onerous, not cost-effective, and consequently considered impractical for the reasons listed below:

- The 100-year water level in the Jock River is 91.74 m, which translates to a predicted 100-year hydraulic gradeline in the storm sewer system at approximately the same elevation as existing ground.

- The geotechnical analysis prepared to support the Draft Barrhaven South Master Servicing Study Addendum (Stantec, November 2014), indicated the silty sand and silty clay soils underlying the site will support a maximum permissible grade raise of 0.5 m – 0.7 m. Detailed geotechnical studies (Paterson Group, September 2016) for the site have refined the maximum permissible grade raise to 0.6 m – 1.2 m.

- **Traditional residential home construction** with basements and foundation drainage by gravity **would result in finished grades at the homes of as much as 2.7 m above existing ground** [i.e. 100-year hydraulic gradeline *plus* 0.3 m vertical clearance between the 100-year hydraulic gradeline and the underside of footing (required by the City of Ottawa's Sewer Design Guidelines 2012) *plus* 2.84 m standard height of residential basement (underside of footing to finished floor elevation) *less* 0.45 m (approximate difference between finished floor elevation and finished grade at house)].

- **The use of private sump pumps** would allow for the underside of footing to be lowered below the 100-year hydraulic gradeline within the storm sewer network, and would result in cover over top of the storm sewer becoming the governing constraint for finished grade elevations. The finished grade at the centerline of road

system at the building's footing level ever handling an excessive volume due to the seasonally high groundwater level. Peak use will be during the spring melt and after heavy precipitation events due to the low permeability of the silty clay deposit, which would be the case regardless of the footing elevation with respect to the groundwater level.

would range from 0.7 m – 1.5 m above existing ground[2] [i.e. using a surveyed Jock River summer water level of 89.40 m as the minimum invert elevation for the subdivision's stormwater conveyance network *plus* a trunk storm sewer size of 1200 mm diameter *plus* 1.7 m minimum cover over top of the storm sewer], which **would result in finished grades at the homes of approximately 1.2 m - 2.2 m above existing elevations.**

In summary, it is anticipated that private sump pumps would allow for a reduction to the anticipated development grade raise of approximately 0.5 m - 1.5 m in comparison to direct gravity basement foundation drainage connections to the storm sewer network. This grade raise reduction could be further improved if springline-to-springline storm sewer connections at manholes and/or additional standing water in storm sewers are permitted by the City of Ottawa.

Given the MOECC, City of Ottawa, and Ontario Building Code guidelines and the site constraints discussed above, private sump pumps located below the dwellings' basement floors are proposed for the collection and discharge of the foundation drain flows for the 3387 Borrisokane Road development. Subsurface soil conditions consist of silty clay - and as these are low permeability soils with little infiltration potential - discharging sump pumps to the storm sewer in lieu of discharging to the ground surface is proposed. The connection from the homes to the municipality's storm sewer is proposed to be via a 100 mm sewer pipe. A goose neck arrangement in the homes would enable the sump pump discharge pipe to rise a minimum of 0.3 m above the 100-year hydraulic grade line before turning down and connecting to the sewer system. Note that because of the standard depth of residential basements, the location of the gooseneck can be raised closer to the top of foundation wall, to provide greater than 0.3 m freeboard from the 100-year hydraulic gradeline and protection beyond the 100-year design storm event. Additional protection would be provided by backwater valves, as required by the City of Ottawa's Sewer Design Guidelines (2012).

Figure 1 illustrates a potential design for the private sump pumps. The design is based on the approved concept for sump pump discharge connection to the storm sewer network from the Richmond Village western expansion lands development application (**Figure 2**).

Paterson Group's geotechnical investigation of the subject property (February 2016) concludes that the use of sump pumps is suitable from a geotechnical perspective, provided that the underside of footing elevations are at least 0.3m above the long term groundwater level. The long term groundwater level has been defined as 0.5m above the interface of the weathered clay crust and saturated silty clay. A sample cross section is provided in **Figure 3**, to demonstrate the relationship between the groundwater levels and the proposed sump pumps for the 3387 Borrisokane property. The geotechnical investigation concludes that the proposed grades, considering traditional residential home construction with basements and sump pumps, can be accomplished with a settlement surcharge program and without the use of lightweight fill.

To support the use of sump pumps in the development:

- A battery backup system would be installed with each sump pump, to provide flood protection in the scenario of a power outage; and,
- The details of the recommended maintenance, repair, and replacement of the private sump pump and battery would be included within a Homeowners Handbook to be distributed to all home purchasers.

Taken together, the proposed sump pump arrangement is considered an effective method to provide 100-year protection against basement flooding and is considered consistent with the approved application of sump pumps in the Richmond Village western development lands [PL130778, June 2014].

[2] Note that since cover over the storm sewer would be the governing constraint under sump pump conditions, the proposed road centerline grades could be further lowered, provided that springline-to-springline storm sewer connections at manholes and/or additional standing water in storm sewers would be permitted by the City of Ottawa.

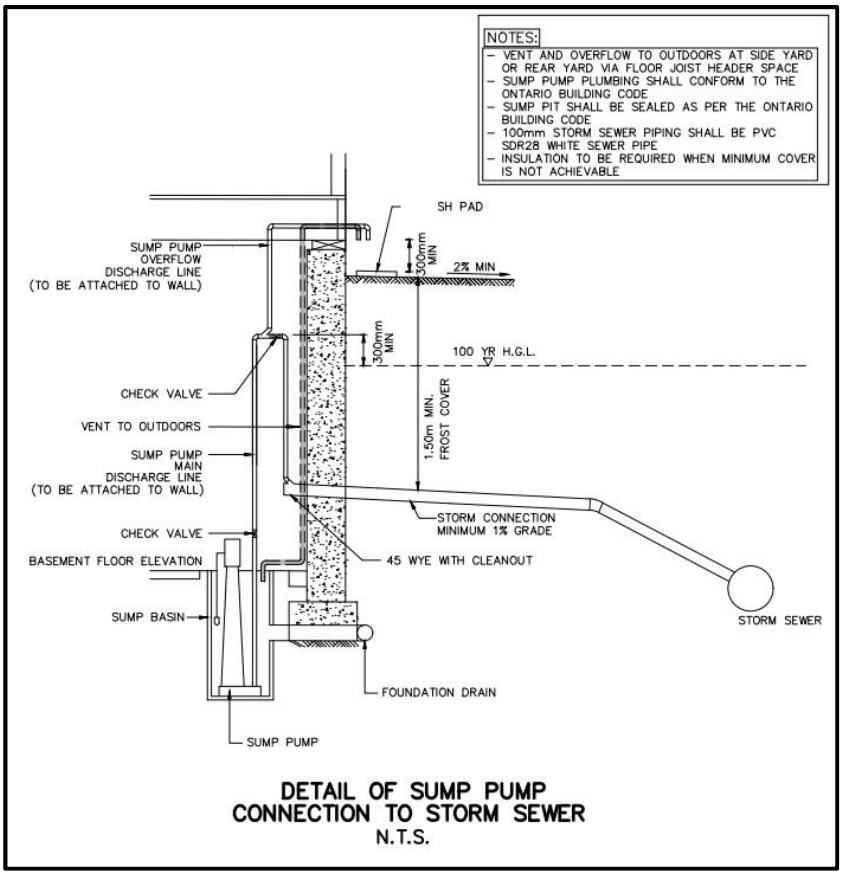


Figure 1: Potential Detail of Sump Pump Connection to Storm Sewer (DSEL, 2017)

3.0 FINANCIAL RATIONALE

Due to the site-specific constraints described above, the proposed grading for the site with the use of private sump pumps results in finished grades at the homes of approximately 1.2 m - 2.2 m above existing elevations. The proposed grades exceed the maximum allowable grade raise for the site, and as such, Paterson Group has recommended a settlement surcharge program. The surcharge program is underway and requires surcharge piles of 2m - 3m in height across the proposed developable lands, over and above the 1.2 - 2.2 m of imported material required to raise the site for servicing (**Figure 4**). Approximately 1.5 – 2 years after placement of the surcharge piles, the piles are expected to be removed and the resulting soils are expected to be able to withstand the proposed grades. Glenview and their consultants are currently budgeting $4.3M for site preparation, including a phased pre-grading and surcharge program (as described above), to ready the site for the proposed development with private sump pumps. The phased pre-grading and surcharge program is expected to include a total of 115,000 m^3 of imported material (which will remain on site) and 122,000 m^3 of excess surcharge material (which will be hauled off site at a cost to the developer).

Alternatives to private sump pumps were considered for the development of the 3387 Borrisokane property:

- Option 1, Conventional Residential Units with Basements with Gravity Foundation Drainage and Lightweight Fill Program - A significant thickness of lightweight fill would be required under the buildings and roadways, which would drastically increase cost of construction. For example, it is expected that lightweight fill costs would vary between $20,000 to $30,000/per unit for buildings with basements (Glenview would budget $4.2-$6.3M) and $30,000 to $60,000/per unit for slab-on-grade buildings (Glenview would budget $6.3M to

$12.6M). Furthermore, this option is not feasible, since Paterson Group has advised that lightweight fill within City ROWs would be required (which is not an accepted practice).

- Option 2, Conventional Residential Units with Basements with Gravity Foundation Drainage with Surcharge Program - A settlement surcharge program could be initiated similar to the one currently underway. However, the anticipated settlement time would be significantly increased because of the additional fill required for the site. It is expected that a 3 to 4 year timeframe would be required to achieve sufficient settlement. Since the surcharge program would be completed in 3 phases, similar to the one currently underway, the timeframe for completion would be 9 to 12 years for the entire development. In addition to the surcharge program, it is estimated that up to 200,000 m^3 of additional imported material would be required, above and beyond the 115,000 m^3 required with the use of sump pumps [i.e. up to 2.7 m above existing ground], resulting in an additional cost of up to $3.9M to the development budget. Furthermore, there is no guarantee that after the substantial development delay for completion of planned surcharge program that the soils will be able to withstand the proposed grades: additional surcharging or the use of lightweight fill may still be required.

- Option 3, Slab on Grade Construction for All Land Uses – Notwithstanding the costs, Glenview has considered the construction of slab-on-grade dwellings for this community, but based on market research and consultant feedback, have sited two-storey single detached homes with traditional basements and two-storey townhomes with traditional basements, as these remain the most 'in-demand' in the Ottawa region by a significant margin.

Conclusion

Given the site constraints, the use of private sump pumps is proposed as it permits timely cost-effective development of the property by significantly reducing the amount of soil preparation (e.g. imported fill, surcharge, lightweight fill) while still protecting against basement flooding. The servicing approach, although not typically applied in Greenfield developments in the City of Ottawa, has been implemented in rural and infill developments within the City limits. Policies set out by the PPS, City of Ottawa Building Better and Smarter Suburbs action plan, Ontario Building Code and MOECC are considered to provide support for the use of private sump pumps, where warranted to permit cost-effective development by minimizing servicing costs while protecting private property from basement flooding.

Yours truly,

David Schaeffer Engineering Ltd.

Per: Laura Maxwell, B.Sc. (Civil Eng), M.Pl.

David Schaeffer Engineering Ltd.

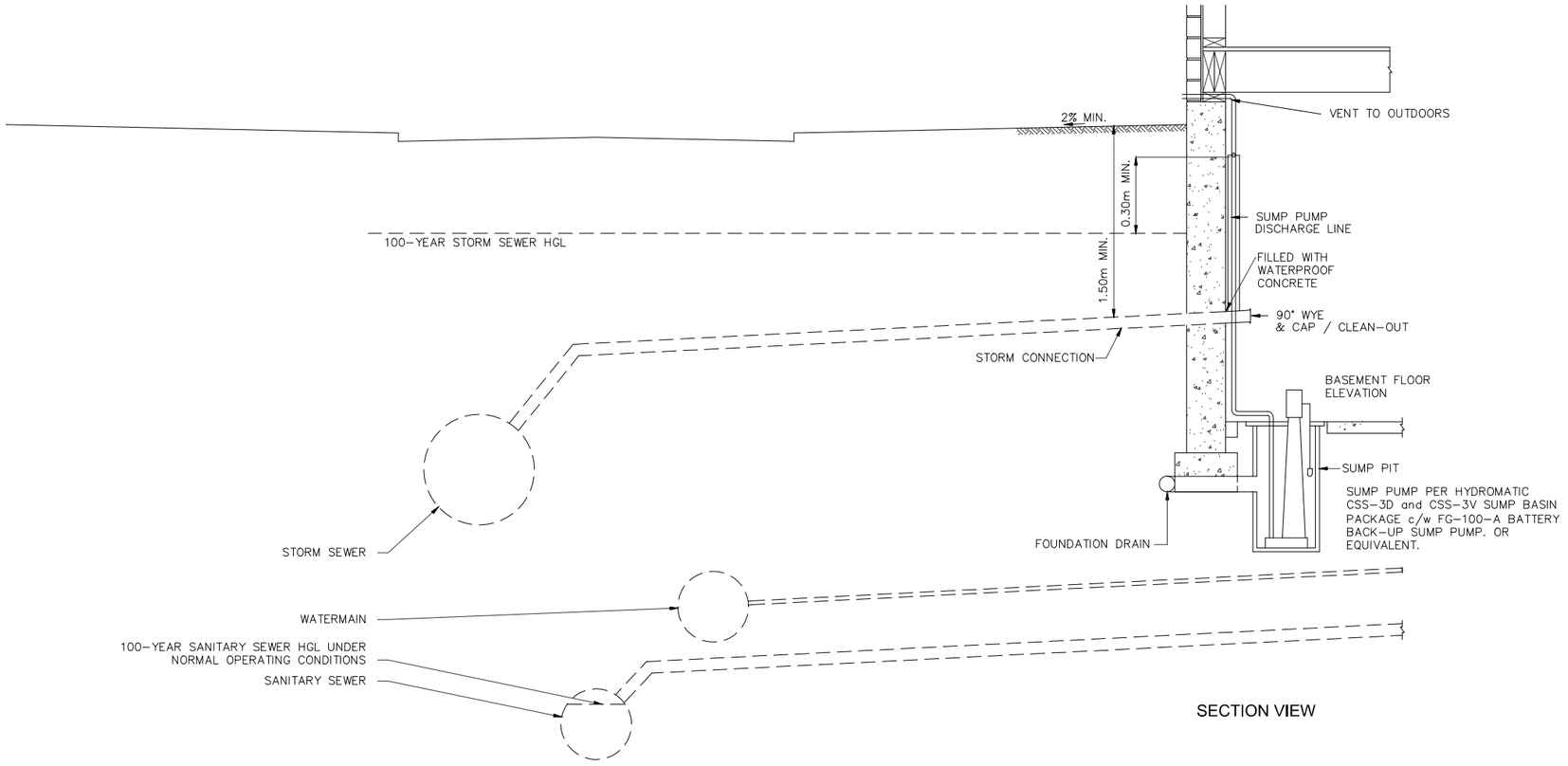
Per: Matt Wingate, P.Eng.

Paterson Group Inc.

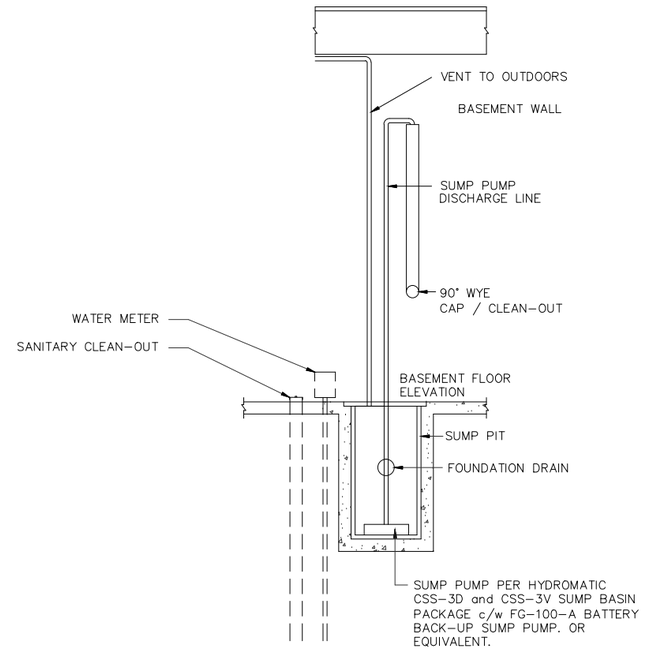
Per: David Gilbert, P.Eng.

Attachments:

- **Figure 2: Detail of Sump Pump Connection to Storm Sewer, Richmond Village Western Expansion Lands (DSEL, 2013)**
- **Figure 3: Borrisokane Sump Pump Concept Low Point Example**
- **Figure 4: Settlement Surcharge Monitoring Program**



SECTION VIEW



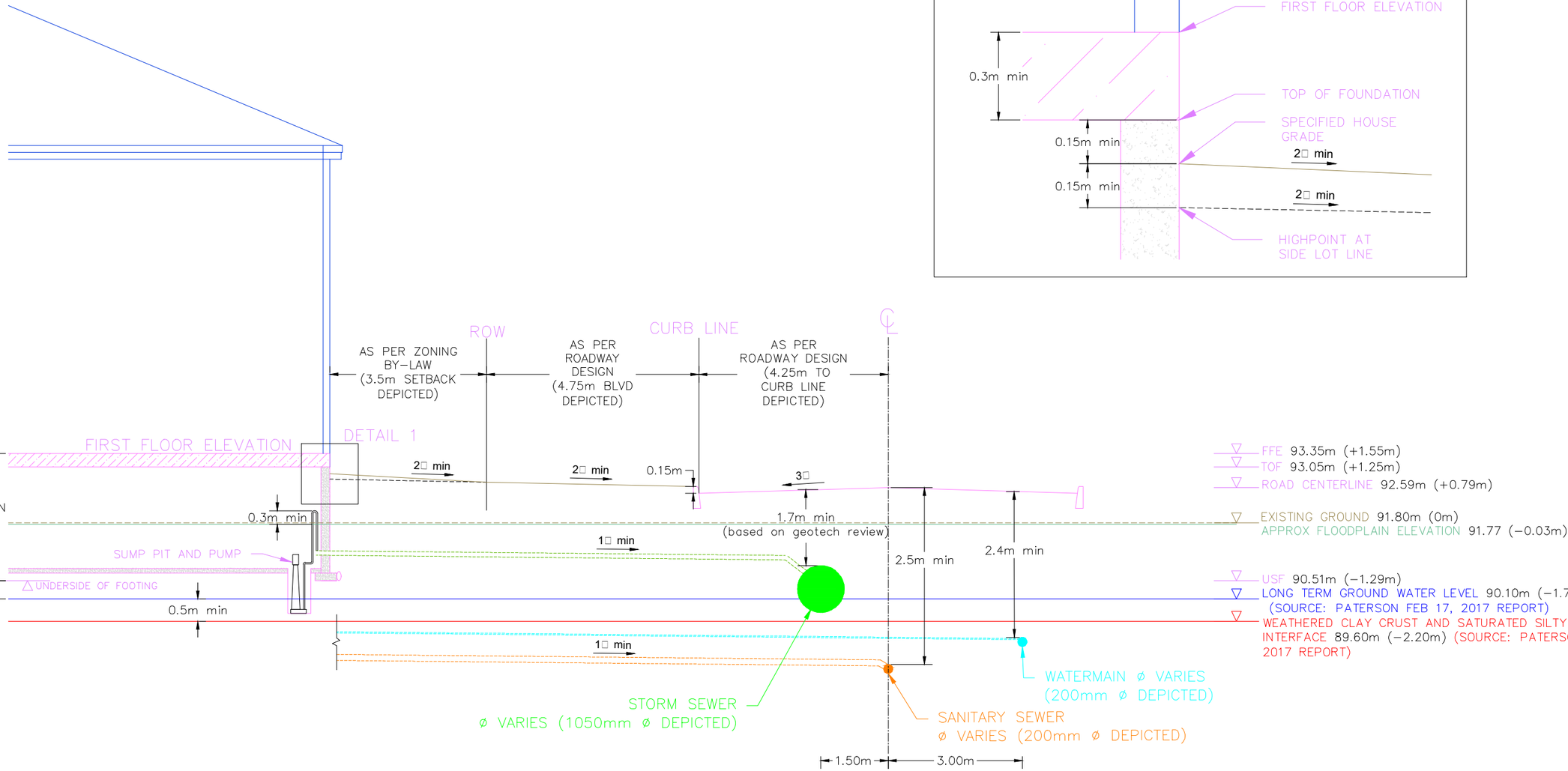
FRONT VIEW

david schaeffer engineering ltd

120 Iber Road, Unit 203
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

SUMP PUMP - DETAIL

DATE: Originally Dated Nov 2013
SCALE: N.T.S.
PROJECT No.: Excerpt from 11-468
FIGURE 2



DETAIL 1
N.T.S.

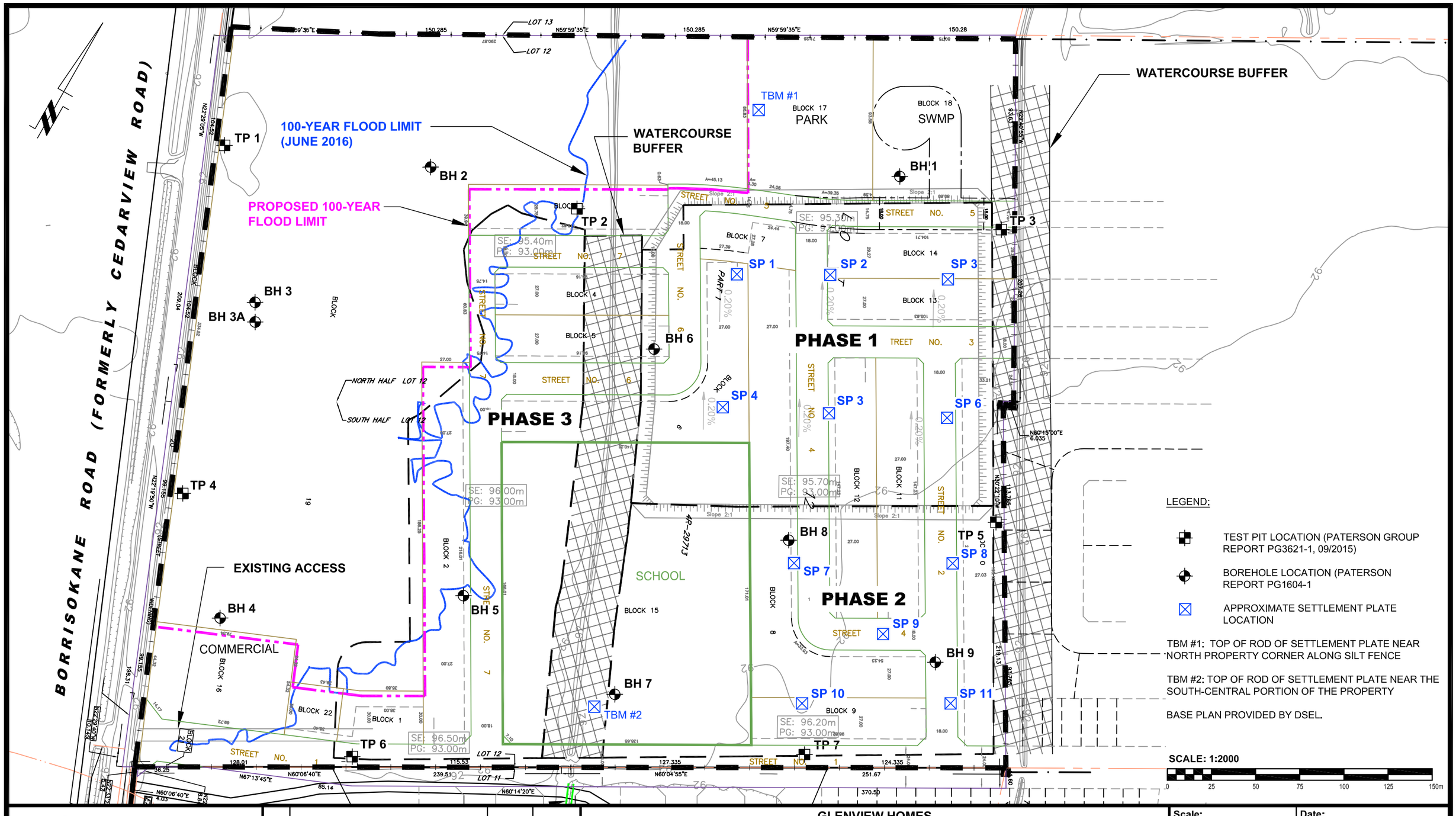
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

Borrisokane Sump Pump Concept
Low Point Example

PROJECT No.:	15-809
SCALE:	1:100
DATE:	FEB 2017
FIGURE:	3

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2017-02-16_sump_pump_profiles\2017-02-21-bk_809_sump_pump_profiles.dwg



patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
2	UPDATED TO INCLUDE TBM #2	29/11/2016	RG
1	ADDITIONAL SETTLEMENT PLATES PLACED IN PHASE II	25/11/2016	RG

GLENVIEW HOMES

FIGURE 4: SETTLEMENT SURCHARGE MONITORING PROGRAM
3387 BORRISOKANE ROAD
OTTAWA, ONTARIO

Title:
SETTLEMENT PLATE LOCATION PLAN

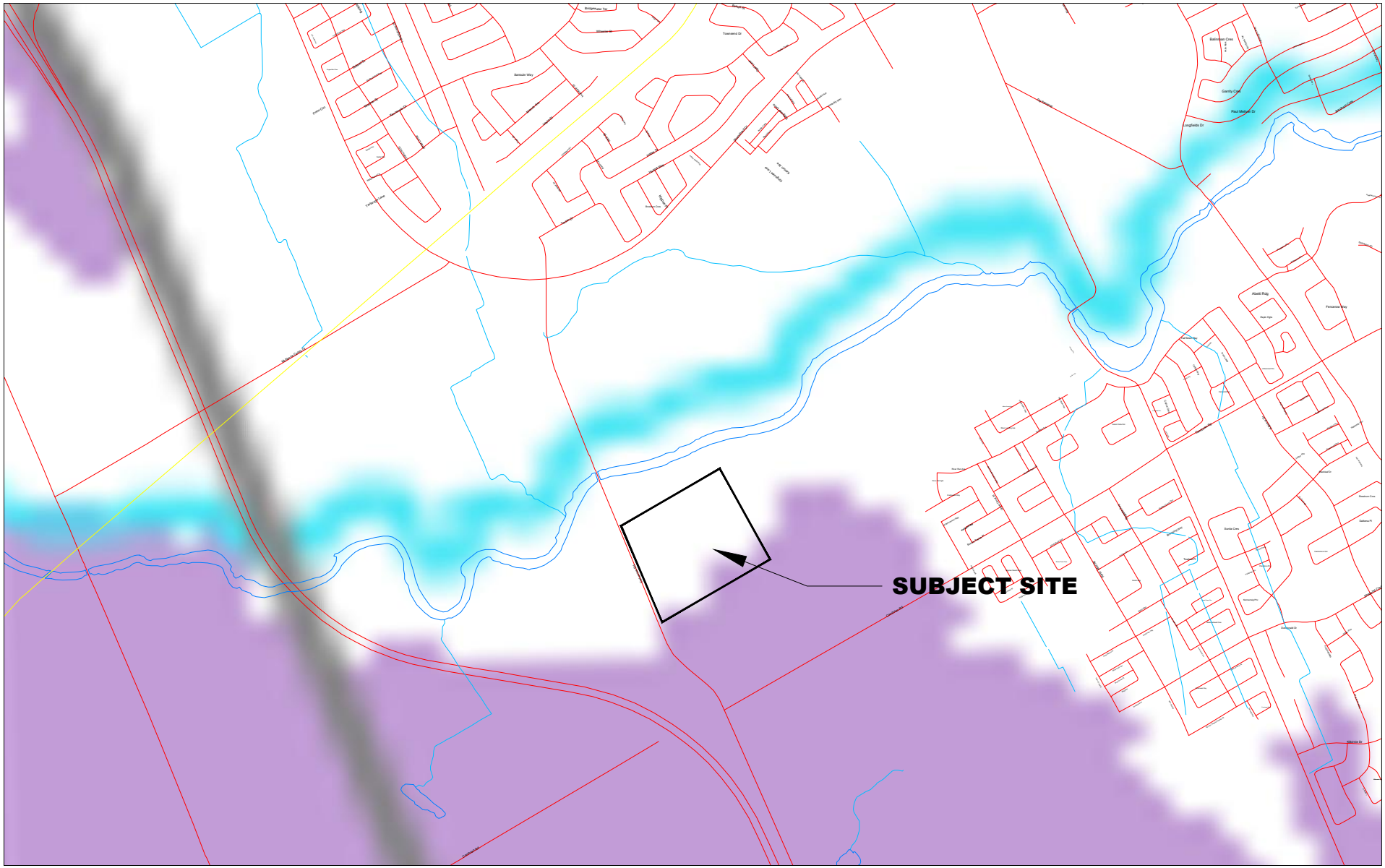
Scale: 1:2000	Date: 11/2016
Drawn by: RCG	Report No.: PG3621
Checked by: RG	Dwg. No.: PG3621-2
Approved by: RG	Revision No.: 2

p:\autocad drawings\geotechnical\pg36xx\pg3621\pe3621-2 settlement plate plan rev1.dwg

Appendix I

- Excerpt from Mississippi-Rideau Source Water Protection Plan, Schedule M (MVCA & RVCA, August 2014)

Overlay of Subject Site on Mississippi-Rideau Source Water Protection Plan, Schedule M (August 28, 2014)



Significant Groundwater Recharge Area

Prepared By: DSEL, Sept 2016

Appendix J

- Original Cut/Fill Proposal (DSEL, July/August 2016)

Laura Maxwell

From: Laura Maxwell
Sent: Monday, August 8, 2016 1:24 PM
To: Evelyn Liu
Cc: 'Hal Stimson'; 'Matt Wingate'; Fairouz Wahab; Jake Shabinsky; Jocelyn Chandler
Subject: RE: RVCA preliminary review re: Glenview home Cut & Fill (Borisokane land)
Attachments: mem_2016-07-04_RVCA_cut-fill-analysis_Att2_FIG-2.pdf

Hi Evelyn,

In case it helps with your review, I've prepared an additional summary table to be read in conjunction with Fig 2 (originally submitted July 4th, re-attached here for ease of reference):

Depth from 100-Year Floodline	Cut Area	Cut Volume	Fill Area	Fill Volume
0cm – 12cm	3313.61 m2	780.23 m3	6569.62 m2	743.28 m3
12cm – 24cm	4107.67 m2	257.87 m3	2975.47 m2	223.77 m3
24cm – 36cm	620.5 m2	10.89 m3	501.44 m2	8.86 m3
TOTAL	**8042 m2**	**1049 m3**	**10047 m2**	**976 m3**

The cut volume is equal to or greater than the fill volume for each slice.

The geodetic table reported in my August 3rd email still applies.

Thank you,

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

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 527
cell: (613) 293-8750
email: lmaxwell@DSEL.ca

From: Laura Maxwell
Sent: Wednesday, August 3, 2016 2:55 PM
To: 'Jocelyn Chandler'
Cc: 'Evelyn Liu' ; 'Hal Stimson' ; 'Matt Wingate' ; 'Fairouz Wahab' ; Jake Shabinsky
Subject: RE: RVCA preliminary review re: Glenview home Cut & Fill (Borisokane land)

Hi Jocelyn,

Responses provided below in red:

1. The explanation regarding upstream water level and velocity is acceptable.

   Noted, thank you.

2. Please provide cross section view of the other two proposed cut and fill areas as well.

   See attached for the two additional cross sections and the updated key plan. Note that the cut depth in Section D-D (1 cm below floodplain) and fill depths in Section C-C (less than or equal to 13 cm) are shallow, so they are somewhat hard to discern at this scale. However, the scale was kept consistent with Sections A-A & B-B for ease of comparison and to illustrate the scale of the proposed cut/fill in relation to the floodplain.

3. Please provide the Cut/fill Elevation Table in the geodetic format, and include the slice volume. The cut volume at each slice should be balanced or larger than the fill volume.

   The following geodetic table is to be read in conjunction with Fig 2 (originally submitted July 4th, re-attached here for ease of reference). Total cut area [8,042 m2], total cut volume [1,049 m3], total fill area [10,047 m2], and total fill volume [976 m3] reported in the geodetic table are consistent with Fig 2.

   The lowest elevation in the table (91.47m) represents the lowest elevation for the proposed cut. The highest elevation in the table (91.80m) represents the highest 100-year floodplain elevation (just east of Borisokane Road, formerly Cedarview Road).

   The cut volume is equal to or greater than the fill volume for each slice.

Elevation (m)	FILL		CUT	
	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)
91.47 – 91.61	1724	64	2863	137
91.62 – 91.80	8323	912	5179	912
TOTAL	**10047**	**976**	**8042**	**1049**

4. Also, as discussed, given the additional intention by Glenview and Mattamy to relocate the watercourse on site, we would strongly suggest some coordination be undertaken between the two and the proposed alignment and setbacks be circulated for review now that we have seen the headwater assessment. There may be some issues with fill area and the possible expected setback to adjacent roads and development.

   Please see the attached latest concept plan, showing the proposed conceptual ditch realignment as a dashed black line from Woodlot 1 to the Jock River. The proposed location will allow for additional connected floodplain to be cut near Section D-D.

   Glenview is seeking advice on:
   - **the proposed conceptual realignment;**
   - **required setbacks;**
   - **opportunities for entombment within specific land uses; and**
   - **design parameters.**

   We'd appreciate the opportunity to sit down with yourselves this week or next to discuss these items further, as Glenview would like to present the concept plan to City staff ASAP to get their buy-in and commence work

on the draft plan application submission. Please let us know your availability and Glenview will set up a meeting with Kilgour, DSEL, Mattamy, and RVCA to discuss the above in more detail.

We look forward to hearing back from you, thank you.

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

DSEL
david schaeffer engineering ltd.

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

phone: (613) 836-0856 ext. 527
cell: (613) 293-8750
email: lmaxwell@DSEL.ca

From: Jocelyn Chandler [mailto:jocelyn.chandler@rvca.ca]
Sent: Monday, July 25, 2016 3:12 PM
To: 'lmaxwell@dsel.ca' <lmaxwell@dsel.ca>
Subject: FW: RVCA preliminary review re: Glenview home Cut & Fill (Borisokane land)

Hello Laura,
RVCA technical review staff are looking for a bit more detail to support the proposal as it doesn't meet the RVCA cut/fill policies (2.1 ii) exactly. Detail should allow them to determine if they are able to provide some flexibility on this. Evelyn's comments are directly below:

I reviewed the recent July 20th updates, via email prepared by Laura Maxwell, DSEL.

1. The explanation regarding upstream water level and velocity is acceptable.
2. Please provide cross section view of the other two proposed cut and fill areas as well.
3. Please provide the Cut/fill Elevation Table in the geodetic format, and include the slice volume. The cut volume at each slice should be balanced or larger than the fill volume.

Also, as discussed, given the additional intention by Glenview and Mattamy to relocate the watercourse on site, we would strongly suggest some coordination be undertaken between the two and the proposed alignment and setbacks be circulated for review now that we have seen eth headwater assessment. There may be some issues with fill area and the possible expected setback to adjacent roads and development.

Jocelyn Chandler M.Pl. MCIP, RPP
Planner, RVCA
t) 613-692-3571 x1137
f) 613-692-0831
jocelyn.chandler@rvca.ca
www.rvca.ca
mail: Box 599 3889 Rideau Valley Dr., Manotick, ON K4M 1A5
courier: 3889 Rideau Valley Dr., Nepean, ON K2C 3H1

you have received this email in error, please contact the sender and delete the original and any copy of the email and any print out thereof, immediately. Your cooperation is appreciated.

From: Laura Maxwell [mailto:lmaxwell@dsel.ca]
Sent: Wednesday, July 20, 2016 10:20 AM
To: Jocelyn Chandler <jocelyn.chandler@rvca.ca>
Cc: Hal Stimson <hal.stimson@rvca.ca>; Evelyn Liu <evelyn.liu@rvca.ca>; Matt Wingate <mwingate@dsel.ca>; 'Fairouz Wahab P. Eng.' <FWahab@glenview.ca>; 'Jake Shabinsky' <JShabinsky@glenview.ca>
Subject: RE: RVCA preliminary review re: Glenview home Cut & Fill (Borisokane land)

Hi Jocelyn,

Attached are the cross sections to address Comment #2 below.

To address Comment #3:

1. We've confirmed that the proposed cut & fill do not impact the waterlevels or velocities defined in the HEC RAS model for the Jock River. Rationale provided via the attached correspondence with the JFSA office.

2. Per the July 4th memo, the proposed cut is below the minimum existing ground elevation in the fill area by 5 cm (lowest proposed cut elevation = 91.47 m, compared to lowest surveyed existing ground in fill area = 91.52 m). Although RVCA policy requires the cut be no lower than the minimum existing ground in the fill area (e.g. 0 cm difference), we believe the proposed cut should be considered consistent with the intent of the policy because:
    - The cut depth (0.3 m) is within 2 cm of the proposed fill depth (0.28 m);
    - Despite the 5 cm difference, the proposed fill and cut activities are both above the 25-year water level;
    - The area of the proposed cut is 80% of the area of the proposed fill, suggesting that generally the floodplain is being replaced like-for-like (+/- 20%);
    - The low point (91.47 m) in the cut area is connected to an existing ditch (inv = 90.50 m) and therefore the cut area will drain appropriately; and,
    - The proposed low point (91.47 m) is 0.3 m below the 100-year water level elevation and the proposed cut will not impact flow velocities or waterlevels in the Jock River (as defined in the Jock River HEC RAS model) – both consistent with other RVCA cut/fill policy clauses.

Please let us know if you have any further questions/comments.

We look forward to hearing back from you soon, so the development limits can be locked and planning and preliminary design can proceed.

Thanks,

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

DSEL
david schaeffer engineering ltd.

phone: (613) 836-0856 ext. 527
cell: (613) 293-8750
email: lmaxwell@DSEL.ca

From: Jocelyn Chandler [mailto:jocelyn.chandler@rvca.ca]
Sent: July-14-16 3:59 PM
To: 'lmaxwell@dsel.ca' <lmaxwell@dsel.ca>
Cc: Hal Stimson <hal.stimson@rvca.ca>
Subject: RVCA preliminary review re: Glenview home Cut & Fill (Borisokane land)

Hello Laura,
Evelyn has undertaken a brief review and has provided the comments below. She requires some additional details/information.
Thanks, jocelyn

Jocelyn Chandler M.Pl. MCIP, RPP
Planner, RVCA
t) 613-692-3571 x1137
f) 613-692-0831
jocelyn.chandler@rvca.ca
www.rvca.ca
mail: Box 599 3889 Rideau Valley Dr., Manotick, ON K4M 1A5
courier: 3889 Rideau Valley Dr., Nepean, ON K2C 3H1

From: Evelyn Liu
Sent: Wednesday, July 13, 2016 3:42 PM
To: Jocelyn Chandler <jocelyn.chandler@rvca.ca>; Hal Stimson <hal.stimson@rvca.ca>
Subject: Glenview home Cut & Fill

Hi all,

I reviewed the recent July 4th submission, memo titled "3387 Borrisokane Cut/Fill Analysis" prepared by Laura Maxwell, DSEL.

I have the following comments:

1. The proposed floodplain cut volume at the site is 1049 m^3 and the proposed floodplain fill volume is 976 m^3. This is a net increase floodplain volume generated which is acceptable to RVCA.
2. Please provide cross section views in the proposed cut/fillareas.
3. Please provide more details, as indicated in the RVCA Section 28 Policy 2.0, Item ii (page 19), regarding the minimum proposed ground elevation, no increase in upstream water surface elevation and velocity. A copy of the Policy is attached for your reference.

Thanks,

Evelyn Liu, P.Eng., M.A.Sc.

Water Resources Engineer
Rideau Valley Conservation Authority
Tel: 613-692-3571 Ext. 1104
Evelyn.liu@rvca.ca

david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

MEMORANDUM

DATE: July 4, 2016

TO: Rideau Valley Conservation Authority

Attention: Evelyn Liu

SUBJECT: 3387 Borrisokane (formerly 3387 Cedarview Road)
Cut/Fill Analysis

Dear Ms. Liu,

This memo is prepared to summarize the Jock River cut/fill analysis presented in the attached Figures 1 & 2, dated June 28, 2016.

The attached figures illustrate the existing and proposed topographic conditions encountered onsite as they relate to the 2005 Jock River Flood Risk Map 100-year regulatory flood elevations (cross sections 5538 + 5737 + 5910). Existing topographic conditions are based on Stantec Geomatics survey (June 3, 2016). Proposed topographic conditions are based on Gleview Homes 3387 Borrisokane Development Concept Plan (June 27, 2016) and DSEL's proposed grading along the Regulatory Flood Limit.

Glenview homes is expected to obtain an RVCA permit to close & fill the two existing ditches on site from south property line to north property line. The closure and fill of the ditches (and any required mitigation measures) are expected to be addressed as part of the separate Headwater Assessment process. As such, the existing ditches are assumed to be infilled for the purpose of this cut/fill analysis.

Figure 1 illustrates the line of intersection of the 100-year Flood Limit Elevation and Existing Topography within the property. The line created at this intersection is considered to represent the Regulatory Flood Limit.

Figure 2 illustrates the proposed floodplain infill via the calculated volume between the surfaces created by i) the 100-year Regulatory Flood Elevation and ii) Stantec topographic survey (June 3, 2016) within the development areas within the Regulatory Flood Limit. The total fill proposed below the 100-year water level elevation is 976 m^3, with the majority of fill (67%) attributed to the commercial block at the intersection of Cedarview Road and Street 6. The lowest surveyed data point within the proposed fill area is within the commercial block and is 91.52 m. This is 0.28 m below the interpolated 100-year water level of 91.80 m, meaning the proposed depth of fill does not exceed 0.3 m in accordance with RVCA policy.

Figure 2 also illustrates the proposed cut areas that were identified by comparing the surfaces created by i) the proposed concept plan (Glenview Homes, July 27, 2016) and DSEL's proposed grading along the Regulatory Flood Limit, and ii) the 100-year Regulatory Flood Elevation. The proposed concept plan provides two distinct areas to cut below the 100-year water level elevation: behind the model homes on Street 6 and northwest of Street 1 beside the park.

- Cut north of model homes on Street 6:
  The proposed cut ties into the existing floodplain topography on the northwest side (as surveyed by Stantec, June 3, 2016), and to the proposed subdivision on the east and south sides. The proposed cut does not exceed 4 cm in this area in order to provide a connected and continuous floodplain.
- Cut northwest of Street 1, beside the park:
  The proposed cut ties into the existing topography on the north and west sides (as surveyed by Stantec, June 3, 2016), and to the proposed subdivision on the south and east sides. Sloping at 3:1 is proposed along the boundary of the proposed cut, creating a basin that maximizes the cut volume. The proposed cut area will drain from the SE to the NW at a proposed slope of 0.2%, which is greater than the average slope (<0.1%) in the existing floodplain. The proposed depth of cut does not exceed 0.3 m below the reported 100-year water level elevation, in accordance with RVCA regulations. (The 100-year water level is 91.77 m per RVCA 2005 Jock River Flood Risk Map, and the minimum cut elevation is 91.47 m.) The existing ditch north of the proposed cut area (north of the Glenview property line) is expected to remain open. The existing ditch invert at the property line is 90.5 m.

The total cut proposed under the 100-year water level elevation is 1049 m^3, which is 73 m^3 greater than the proposed fill within the floodplain.

David Schaeffer Engineering Ltd.

Per: Laura Maxwell, B.Sc. (Civil Eng)

David Schaeffer Engineering Ltd.

Per: Matt Wingate, P. Eng

z:\projects\15-809_glenview_leiken-property\a_project-mgmt\a5_correspondence\mem_2016-06-10_rvca_cut-fill-analysis.doc

Attach.
- Figure 1, 3387 Cedarview Road, Flood Limit Elevation -vs- Existing Topography (June 28, 2016)
- Figure 2, 3387 Cedarview Road, Floodplain Cut -vs- Proposed Fill (June 28, 2016)

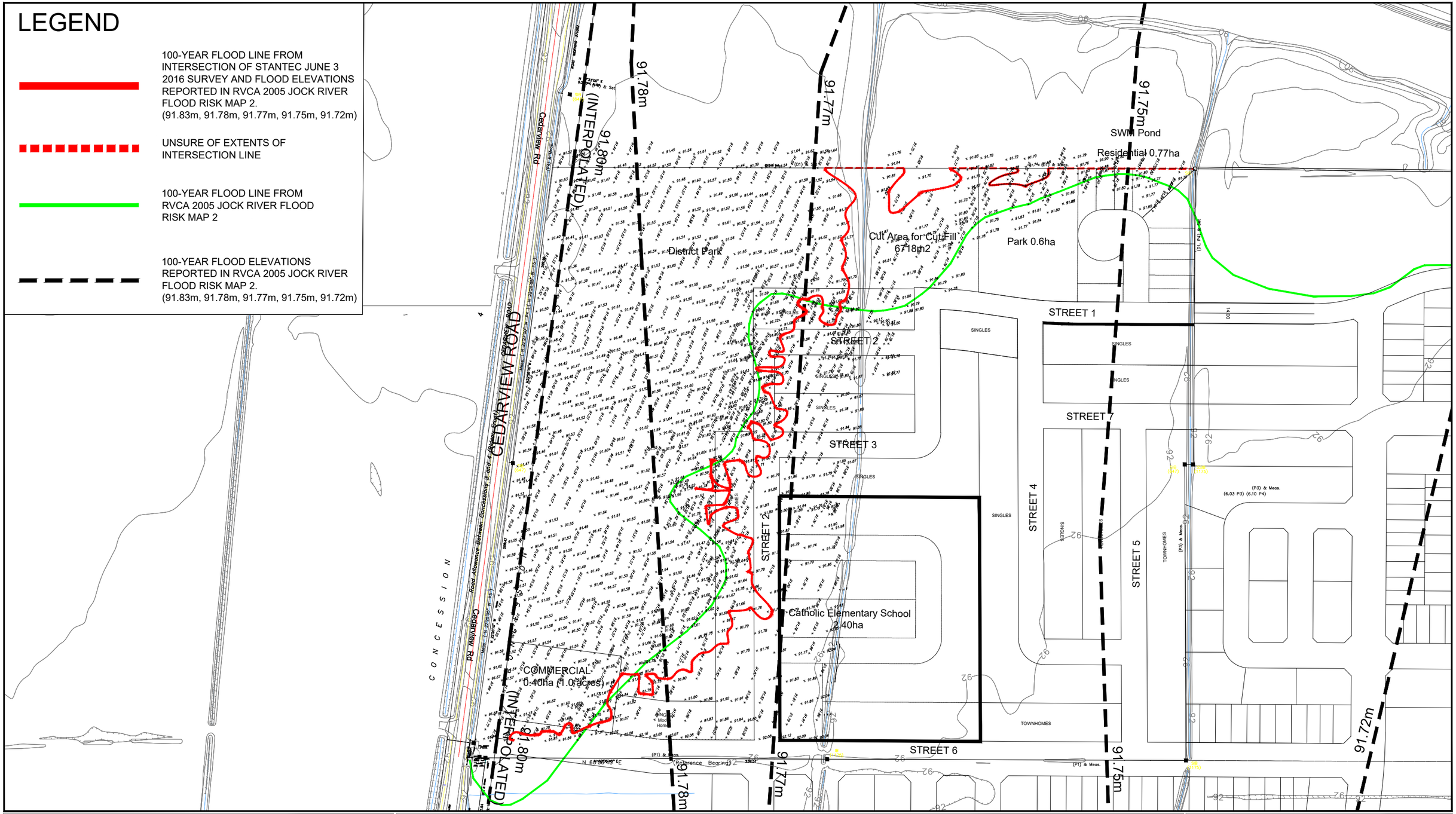
LEGEND

100-YEAR FLOOD LINE FROM INTERSECTION OF STANTEC JUNE 3 2016 SURVEY AND FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2.
(91.83m, 91.78m, 91.77m, 91.75m, 91.72m)

UNSURE OF EXTENTS OF INTERSECTION LINE

100-YEAR FLOOD LINE FROM RVCA 2005 JOCK RIVER FLOOD RISK MAP 2

100-YEAR FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2.
(91.83m, 91.78m, 91.77m, 91.75m, 91.72m)



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

3387 CEDARVIEW ROAD
FLOOD LIMIT ELEVATION -vs- EXISTING TOPOGRAPHY

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	JUNE 28, 2016
FIGURE:	1

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-06-28_809_cut_fill_rev.dwg

Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.04	1272.92	
2	0.04	0.08	278.37	
3	0.08	0.12	1762.32	
4	0.12	0.16	2151.82	
5	0.16	0.20	1260.92	
6	0.20	0.24	694.93	
7	0.24	0.28	572.37	
8	0.28	0.32	48.13	

AREA 1

SURFACE 1: RVCA FLOODPLAIN
SURFACE 2: PROPOSED CUT ELEV.

TOTAL AREA: 8 042m²

TOTAL VOLUME: 1 049m³

Elevations Table				
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.04	2852.74	
2	0.04	0.08	2358.43	
3	0.08	0.12	1358.45	
4	0.12	0.16	1033.68	
5	0.16	0.20	1228.84	
6	0.20	0.24	712.95	
7	0.24	0.28	485.57	
8	0.28	0.32	15.87	

AREA 2

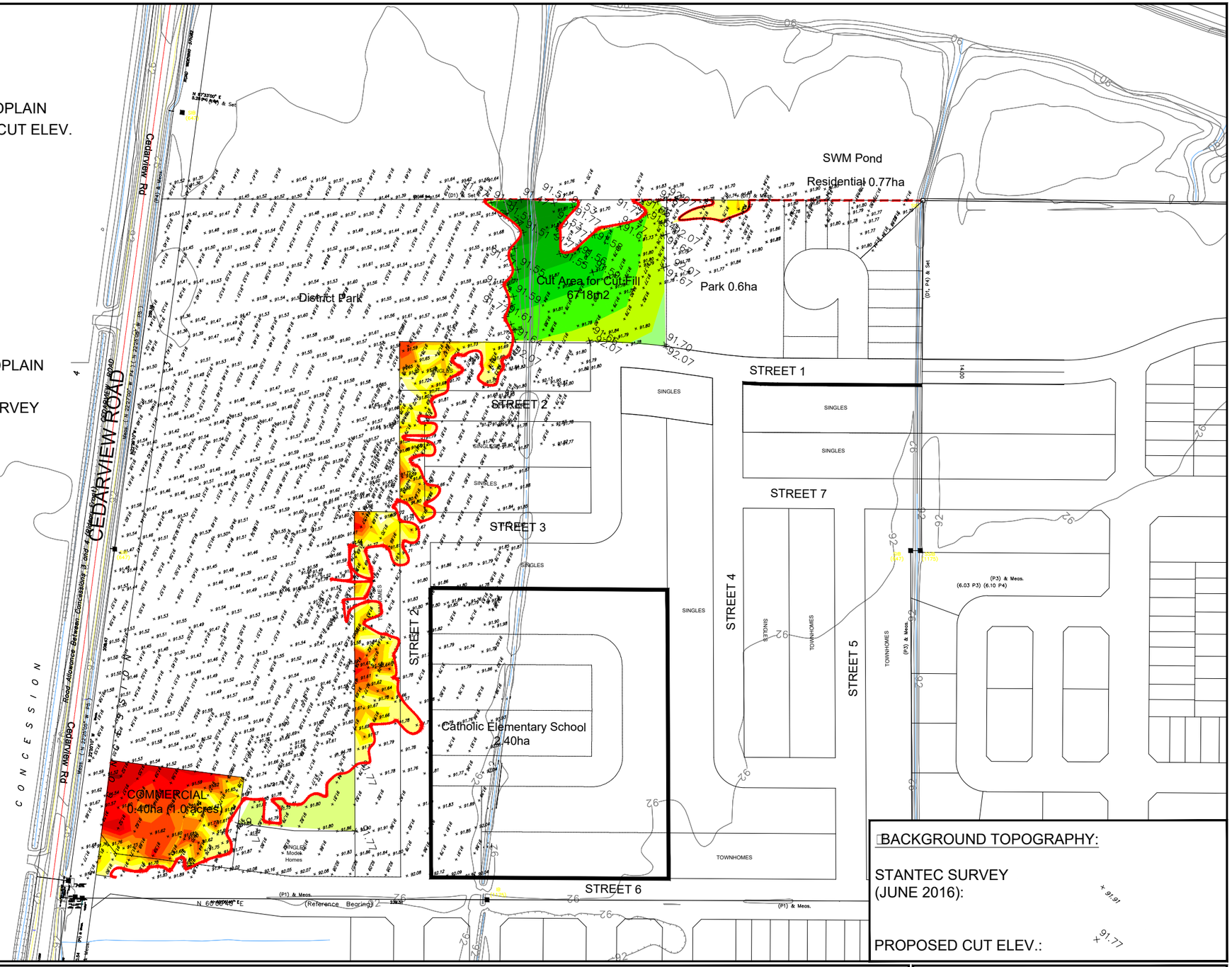
SURFACE 1: RVCA FLOODPLAIN ELEVATION
SURFACE 2: STANTEC SURVEY (JUNE 2016)

TOTAL AREA: 10 047m²

TOTAL VOLUME: 976m³

COMMERCIAL: 651m³

RESIDENTIAL: 325m³



LEGEND

100-YEAR FLOOD LINE FROM INTERSECTION OF STANTEC JUNE 3 2016 SURVEY AND FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2.
(91.83m, 91.78m, 91.77m, 91.75m, 91.72m)

UNSURE OF EXTENTS OF INTERSECTION LINE

BACKGROUND TOPOGRAPHY:

STANTEC SURVEY (JUNE 2016): × 91.91

PROPOSED CUT ELEV.: × 91.77

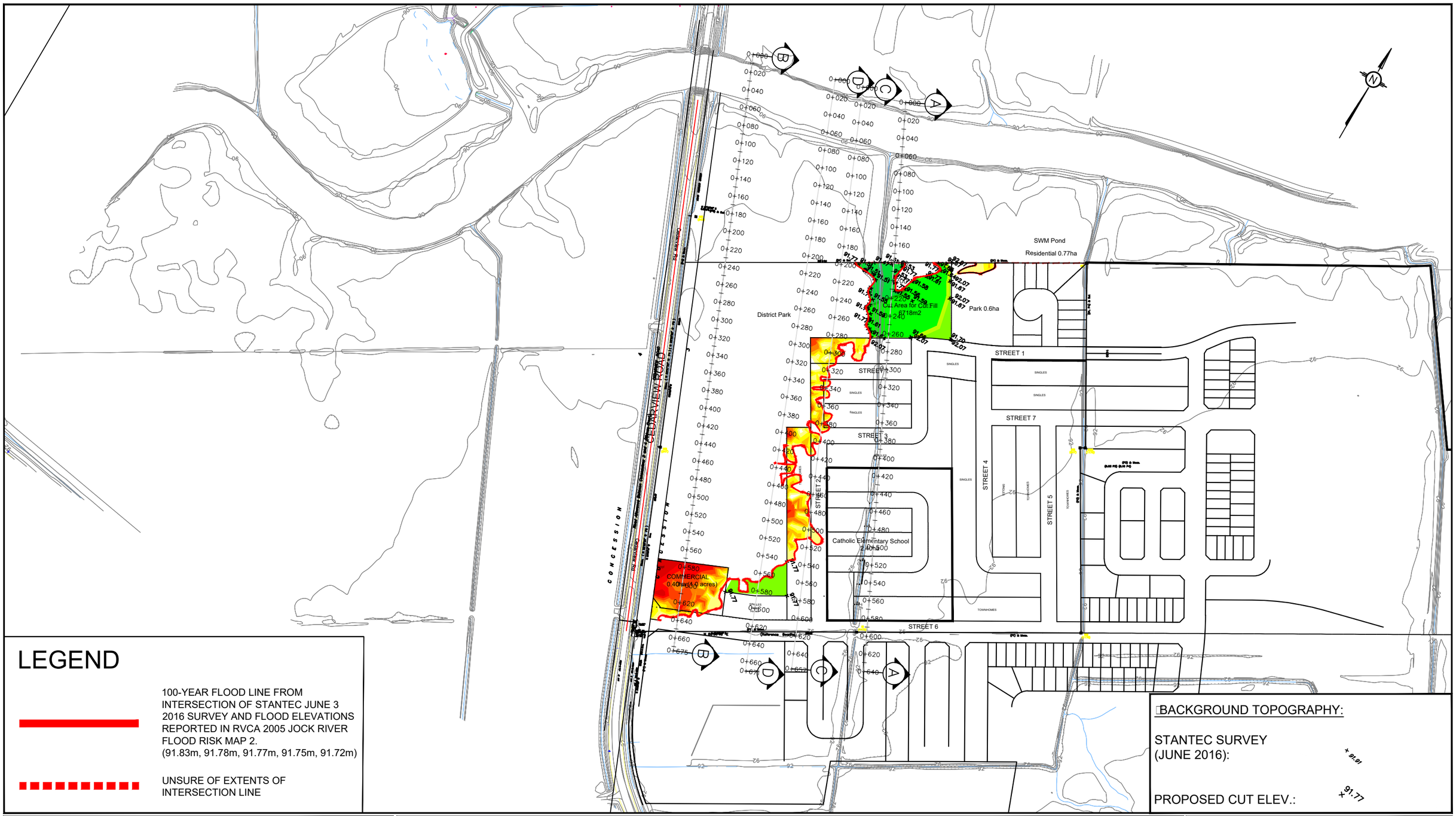
DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

3387 CEDARVIEW ROAD
FLOODPLAIN CUT -vs- FILL

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	JUNE 28, 2016
FIGURE:	2

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-06-28_809_cut_fill_rev_0.2p.dwg



LEGEND

100-YEAR FLOOD LINE FROM INTERSECTION OF STANTEC JUNE 3 2016 SURVEY AND FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2.
(91.83m, 91.78m, 91.77m, 91.75m, 91.72m)

UNSURE OF EXTENTS OF INTERSECTION LINE

BACKGROUND TOPOGRAPHY:

STANTEC SURVEY (JUNE 2016): + 91.91

PROPOSED CUT ELEV.: x 91.77

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

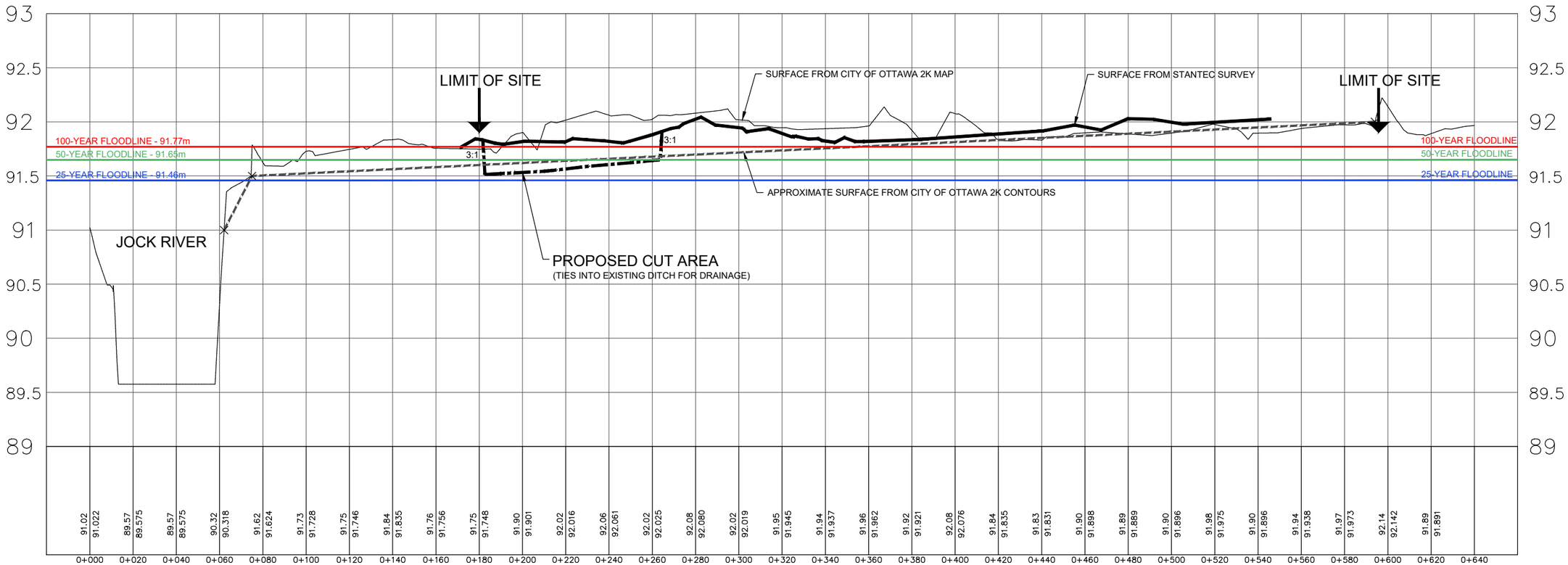
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

3387 CEDARVIEW ROAD
KEY PLAN FOR CROSS-SECTIONS

PROJECT No.:	15-809
SCALE:	1:4000
DATE:	JULY 28, 2016
FIGURE:	KEY

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-07-26_809_cross-sections_rvca_extra.dwg

A-A PROFILE



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

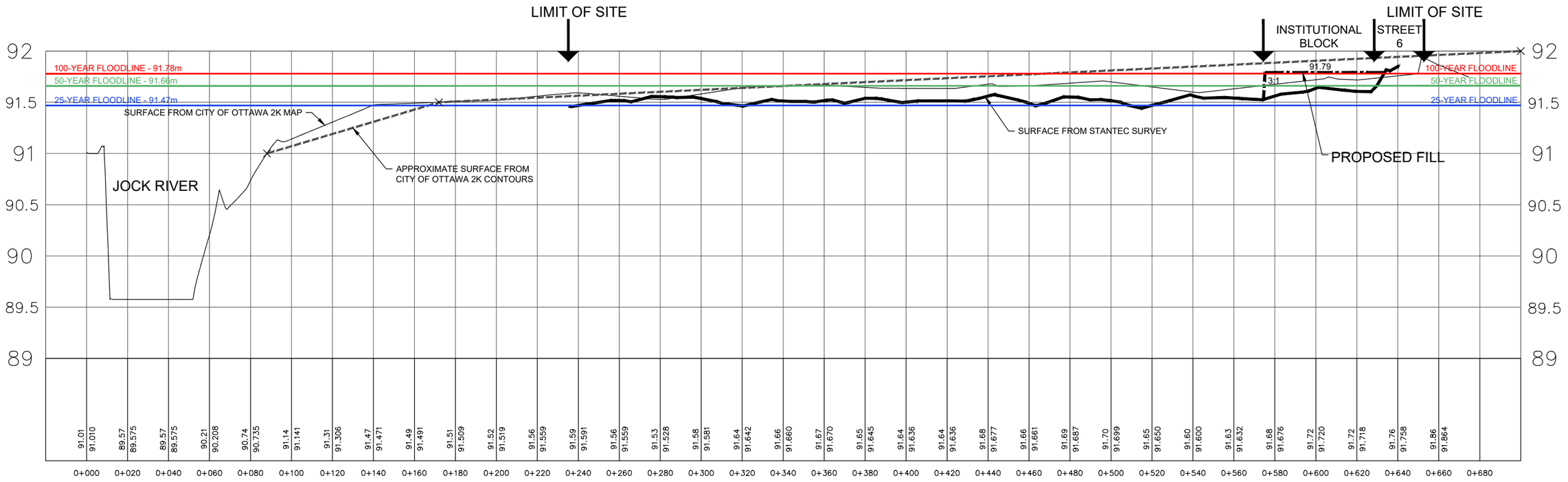
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

3387 CEDARVIEW ROAD
50m EAST OF RVCA CROSS-SECTION 5737
PROFILE A-A

PROJECT No.:	15-809
SCALE:	1:2000 (H) 1:400 (V)
DATE:	JULY 19, 2016
FIGURE:	A-A

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-07-19_809_cross-sections_rvca.dwg

B-B PROFILE



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

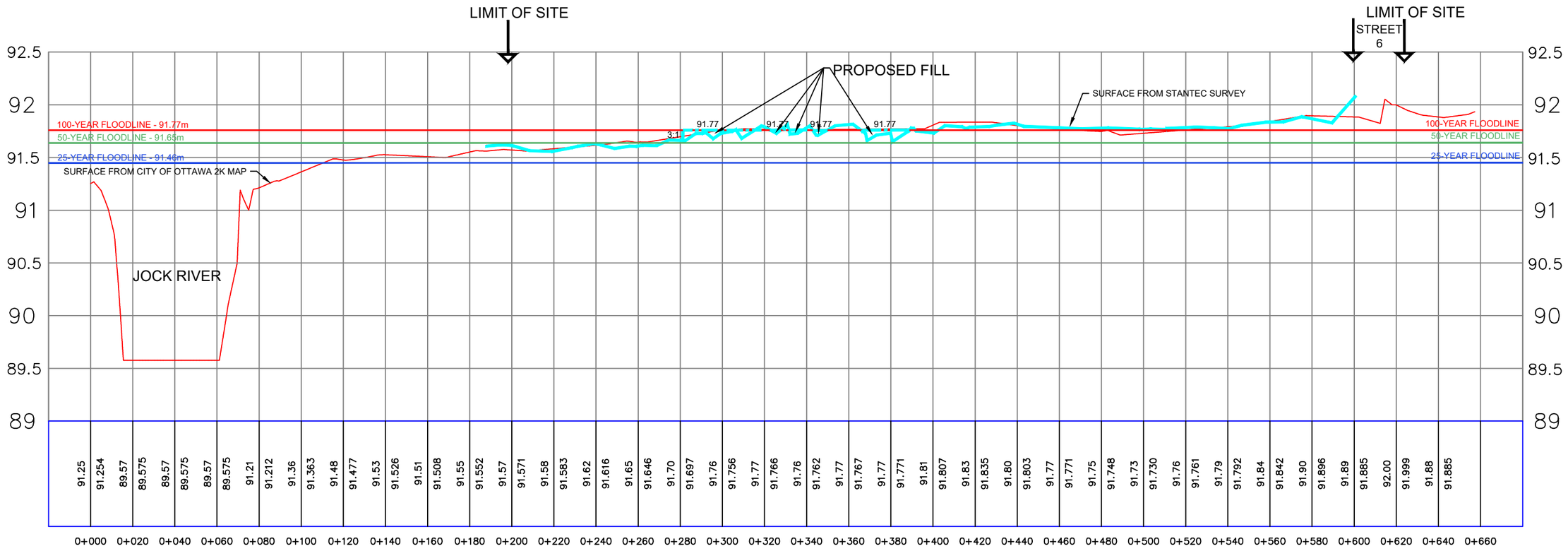
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

3387 CEDARVIEW ROAD
30m EAST OF RVCA CROSS-SECTION 5910
PROFILE B-B

PROJECT No.:	15-809
SCALE:	1:2000 (H) 1:400 (V)
DATE:	JULY 19, 2016
FIGURE:	B-B

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-07-19_809_cross-sections_rvca.dwg

Alignment - C-C PROFILE



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

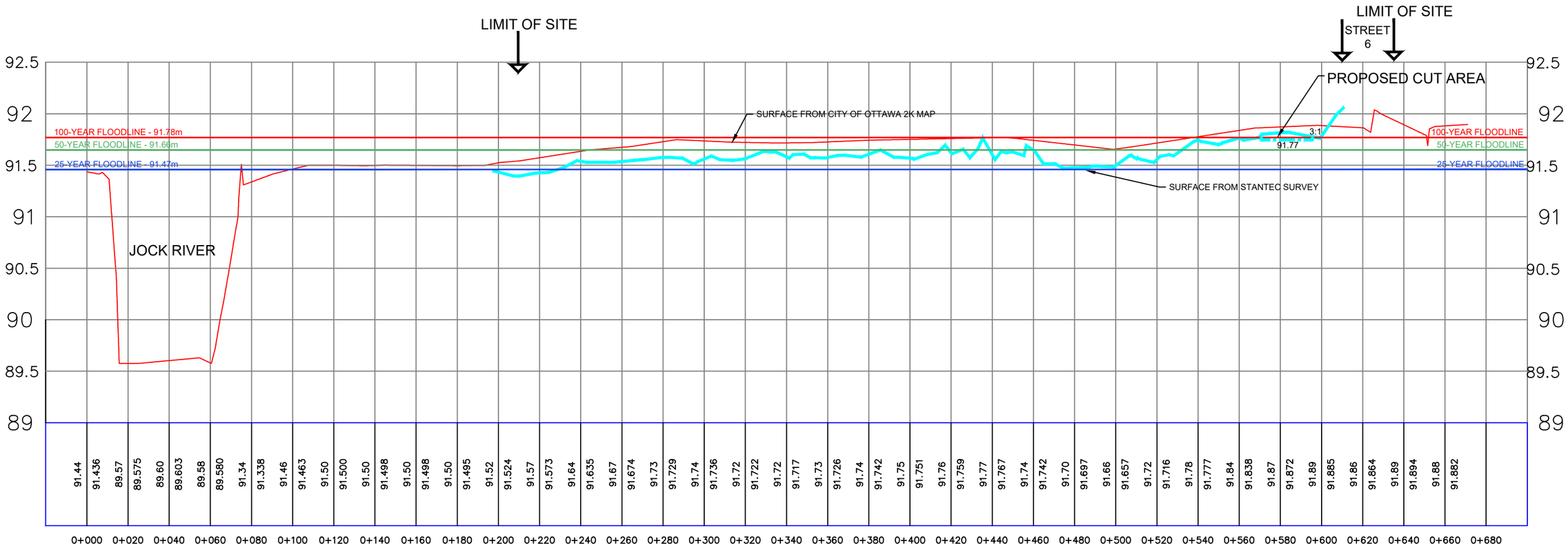
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

3387 CEDARVIEW ROAD
30m WEST OF RVCA CROSS-SECTION 5737
PROFILE C-C

PROJECT No.:	15-809
SCALE:	1:2000 (H) 1:400 (V)
DATE:	JULY 28, 2016
FIGURE:	C-C

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-07-26_809_cross-sections_rvca_extra.dwg

Alignment - D-D PROFILE



david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

3387 CEDARVIEW ROAD
@ RVCA CROSS-SECTION 5910
PROFILE D-D

PROJECT No.:	15-809
SCALE:	1:2000 (H) 1:400 (V)
DATE:	JULY 28, 2016
FIGURE:	D-D

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2016-04-19_cut_fill_analysis\2016-07-26_809_cross-sections_rvca_extra.dwg

Laura Maxwell

From: L. Pipkins [mailto:lpipkins@jfsa.com]
Sent: July-19-16 4:38 PM
To: Laura Maxwell <lmaxwell@dsel.ca>
Cc: Matt Wingate <mwingate@dsel.ca>; jfsabourin@jfsa.com
Subject: Re: P1416: Glenview Cedarview Cut/Fill

Hi Laura,

Thank you for the excellent summary! I agree with your points 1, 2 and 3. I've added one change to point 3 in **blue** for your consideration, to clarify that the 0 m/s velocity is for the ineffective flow area, not the whole cross-section.

Please feel free to contact me should you require any further input.

Thank you,
Laura

Laura Pipkins, P.Eng., LEED Green Associate
Project Engineer in Water Resources

JFSA Water Resources and Environmental Consultants

J.F. Sabourin and Associates Inc.
52 Springbrook Drive, Ottawa, ON K2S 1B9
tel.: 613.836.3884 ext. 225, fax: 613.836.0332, **www.jfsa.com**

----- Original Message -----
From: Laura Maxwell
To: 'L. Pipkins'
Cc: Matt Wingate ; jfsabourin@jfsa.com
Sent: Tuesday, July 19, 2016 3:35 PM
Subject: Glenview Cedarview Cut/Fill

Hi Laura P,

As discussed, Glenview Homes is proposing a cut & fill in the regulatory Jock River floodplain, per the attached figures. The proposed fill is to occur near Jock River Station 5910 (downstream of Cedarview Road) and the proposed cut is to occur near Jock River Station 5737 (downstream of station 5910). Cross sections through the fill area and the cut area are attached, showing existing and proposed conditions. The sections are 30m – 50m away from the HEC-RAS cross sections. The cut & fill activities are proposed above the 25-year flood elevation.

The method used to define the Jock River floodplain is reported in the *Hydraulics Report, Jock River, Flood Risk Mapping (within the City of Ottawa), Prepared for Rideau Valley Conservation Authority (PSR Group Ltd. in association with JF Sabourin and Associates Inc., November 2004).* The report explains that:

- Hydraulic simulation using HEC-RAS software (version 3.1.1 – May 2003) was used to estimate Jock River water levels, in conformance with the HEC-RAS manual, with MNR approved technical guidelines for floodplain mapping, and with floodplain mapping regulations.
- Cross section locations were chosen less than 500m apart, including at locations where significant changes in stream alignment and slope occurred and at locations where the stream width/floodplain significantly increased or decreased.
- For overbank (floodplain) areas at stations 5910 & 5737, the HEC-RAS model cross sections were based on City of Ottawa 1:2000 base mapping with 0.5m contours [0.12m horizontal accuracy and 0.08m vertical accuracy]. This level of detail was deemed appropriate by RVCA for purpose of hydraulic simulation for flood risk assessment.
- For stations 5910 & 5737, an ineffective area was applied to the cross sections, to capture the effects of the Cedarview Road bridge on flow characteristics. This is consistent with HEC-RAS manual directive that ineffective flow areas can be defined for "areas of the cross section that will contain water that is not actively being conveyed. Ineffective flow areas are often used to describe portions of a cross section in which water will pond, but the velocity of the water, in the downstream direction, is close to or equal to zero. This water is included in the storage calculations and other wetted cross section parameters, but is not included in the active flow area" (HEC-RAS River Analysis System, User's Manual, January 2010).
- The simulated & calibrated 100-year flood levels presented in the report were plotted on the base mapping to form regulatory floodplain maps.

The RVCA's policy is that:

- *The proposed site grading (cut and fill) must be designed to result in no increase in upstream water surface elevations and no increase in flow velocities in the affected river cross-sections under a full range of potential flood discharge conditions (1:2 year to 1:100 year return periods); compliance with this requirement shall be demonstrated by means of hydraulic computations completed to the satisfaction of the RVCA.*

Based on the information above, can you please confirm that:

1. **Because all proposed work is above the 25-year water level, the 2-year to 25-year results from the 2004 HEC-RAS simulation would not be affected by the proposed cut & fill modifications.**
2. **Because the proposed cut (91.47m - 91.77m) and fill (91.52m – 91.80m) activities are within the 91.5m (+/- 0.08m) and 92.0m (+/- 0.08m) contours used to define the cross sections in the 2004 HEC-RAS simulation, the sections and resulting 50-year and 100-year simulations would not be affected by the proposed cut & fill modifications.**
3. **Furthermore, the proposed cut and proposed fill are within the ineffective area of the 2004 HEC-RAS simulation cross sections, so the 50-year and 100-year flow velocities reported in the 2004 HEC-RAS simulation (~0 m/s in the ineffective flow areas) would not be affected by the proposed cut & fill modifications.**

I've re-attached my markups of the HEC RAS models, in case they are of assistance to you.

Thanks,

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

DSEL
david schaeffer engineering ltd.

120 Iber Road, Unit 103

Stittsville, ON K2S 1E9

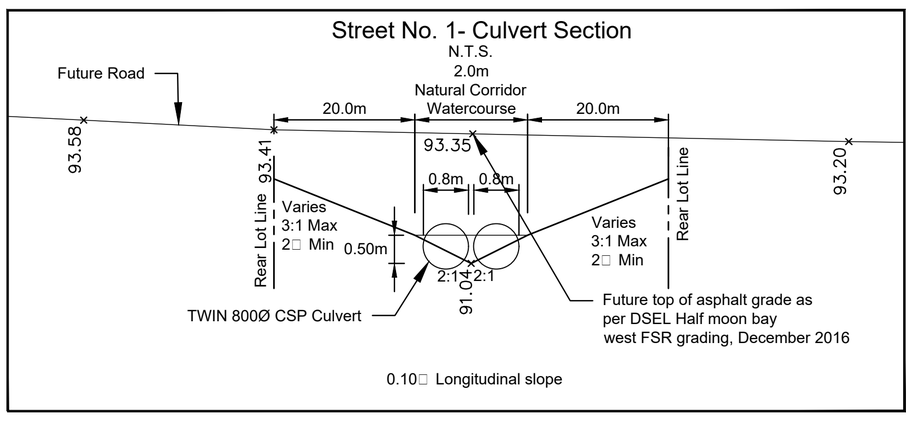
phone: (613) 836-0856 ext. 527
cell: (613) 293-8750
email: lmaxwell@DSEL.ca

Appendix K

- Natural Channel Corridor, per City of Ottawa and RVCA Recommendations (DSEL, April 2017)

Street No. 1- Culvert Section

N.T.S.



NOTE: Culverts to be perched if possible, based on detail design and hydraulic review

NOTE: Landscaping to be proposed for natural corridor (by others)

NOTE: Alignment and Cross Section of watercourse subject to change at detail design

Twin 800Ø CSP Culvert @ 0.10% (sunken 10cm)
(Culvert oversized to limit backwater impacts to 100yr WL on upstream lands.
Culvert details to be confirmed
as part of detailed hydraulic analysis of Channel)

Proposed New
Temporary Access Road
(Location TBD)

Potential Rock Check Dam
as Fish Barrier,if re□uired
(Location TBD @ Detailed Design)

Twin 800Ø CSP Culvert @ 0.10% (sunken 10cm)
(Culvert oversized to limit backwater impacts to 100yr WL on upstream lands.
Culvert details to be confirmed
as part of future detailed hydraulic analysis)

Existing Outlet to
Borrisokane Roadside Ditch

NOTE: CORRIDOR DETAILS WITHIN AND SOUTH OF STREET NO.1 RIGHT-OF-WAY TO BE DETERMINED

Station 5737 W.S. Elevation (m)
100yr - 91.77
50yr - 91.65
25yr - 91.46
10yr - 91.28
5yr - 91.08
2yr - 90.68
Per Appendix D - Jock River Flood Risk Mapping (within the City OF Ottawa)
Hydraulics Report - November 2004

Proposed Connection
to Existing Ditch

Existing Outlet ≈ 91.35

6.19ha

5.3ha

Drainage can be directed
to Natural Corridor

JOCK RIVER

Wet Meadow

SCHOOL

PARK 0.65 Ha

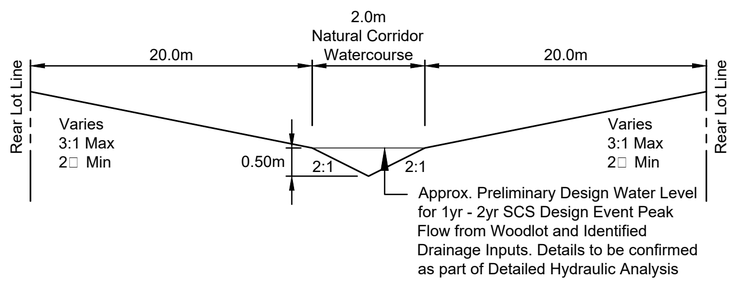
SWMP 0.82 Ha

LEGEND

- ×91.12 — ESTIMATED GRADE OF NATURAL CORRIDOR
- 0.1□ — PROPOSED SLOPE AND DIRECTION OF CORRIDOR
- NATURAL CORRIDOR WATERCOURSE
- POTENTIAL REAR YARD DRAINAGE TO NATURAL CORRIDOR
- EXISTING DRAINAGE AREA
- WET MEADOW

Urban - Typical Corridor Cross Section

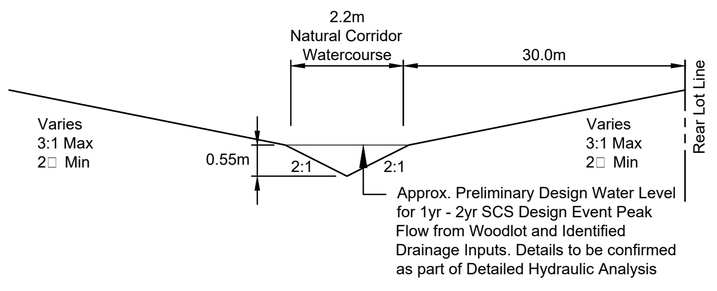
N.T.S.



0.10□ longitudinal slope

Floodplain - Typical Corridor Cross Section

N.T.S.



0.10□ longitudinal slope

david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

Natural Channel Corridor
Per City of Ottawa and RVCA Recommendations

PROJECT No. :	15-809
SCALE:	1:1500
DATE:	2017-04-26
DRAWING No.	1

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-5_sketches and figures\2017-03-23_natural cooridor\2017-04-26_natural_corridor_slm.dwg

Appendix L

- Update to Cut/Fill Analysis (DSEL, April 2017)

david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

MEMORANDUM

DATE: April 26, 2017

TO: Rideau Valley Conservation Authority

Attention: Evelyn Liu

SUBJECT: 3387 Borrisokane Road
Update to Cut/Fill Analysis

Dear Ms. Liu,

In July/August 2016, the Rideau Valley Conservation Authority (RVCA) reviewed the proposed cut/fill for the subdivision and concluded that the proposal seemed feasible and met the RVCA's cut/fill policies. Subsequently, the plan has been modified to address City of Ottawa and RVCA comments. This memo is prepared to summarize the updated Jock River cut/fill analysis presented in the attached Figures 9 and 10, dated April, 2017. Figure 9 shows the proposed cut/fill in the context of servicing the site via a storm pond, while Figure 10 shows the option of servicing the site via Oil-Grit Separator (OGS) units.

The attached figures illustrate the existing and proposed topographic conditions encountered onsite as they relate to the 2005 Jock River Flood Risk Map 100-year regulatory flood elevations (cross sections 5538 + 5737 + 5910). Existing topographic conditions are based on Stantec Geomatics survey (June 3, 2016). Proposed topographic conditions are based on Gleview Homes 3387 Borrisokane Development Concept Plan (April 7, 2017) and DSEL's proposed grading along the Regulatory Flood Limit.

Glenview Homes is expected to obtain an RVCA permit to close & fill the two existing ditches on site from south property line to north property line. The closure and fill of the ditches (and any required mitigation measures) are expected to be addressed as part of the separate Headwater Assessment process. As such, the existing ditches are assumed to be infilled within Glenview's property for the purpose of this cut/fill analysis.

In order to provide adequate drainage for the site, the existing ditch that bisects the property is proposed to be diverted through the existing floodplain using a natural channel design. The proposed grading associated with the proposed natural corridor has been included in the updated cut/fill analysis. Only cut areas located outside of the existing regulatory floodplain were counted for the purpose of this analysis, per RVCA policies and as detailed herein.

Figures 9 and 10 illustrate the following:

1) The line of intersection of the 100-year Flood Limit Elevation and Existing Topography within the property. The line created at this intersection is considered to represent the Regulatory Flood Limit.

2) The proposed floodplain infill via the calculated volume between the surfaces created by i) the 100-year Regulatory Flood Elevation and ii) Stantec topographic survey (June 3, 2016) within the development areas within the Regulatory Flood Limit. The total fill proposed below the 100-year water level elevation is 1 069 m^3, with the majority of fill (64%) attributed to the commercial block at the intersection of Borrisokane Road and Street 1. The lowest surveyed data point within the proposed fill area is within the commercial block and is 91.52 m. This is 0.28 m below the interpolated 100-year water level of 91.80 m, meaning the proposed depth of fill does not exceed 0.3 m in accordance with RVCA policy.

3) The proposed cut areas that were identified by comparing the surfaces created by i) the proposed concept plan (Glenview Homes, March 17, 2017) and DSEL's proposed grading along the Regulatory Flood Limit, and ii) the 100-year Regulatory Flood Elevation. The proposed concept plan provides three distinct areas to cut below the 100-year water level elevation: behind Block 118 on Street 7, in the Open Space block (Block 143) between the commercial block and model homes on Street 1 and northwest of Street 5 beside the park.

   - Cut behind Block 118 on Street 7:
     The proposed cut ties into the existing floodplain topography on the northwest side (as surveyed by Stantec, June 3, 2016), and to the proposed subdivision on the east and south sides. The proposed cut does not exceed 8 cm in this area in order to provide a connected and continuous floodplain.
   - Cut in Block 143 on Street 1:
     The proposed cut ties into the existing floodplain topography to the north (as surveyed by Stantec, June 3, 2016), and to the proposed realigned watercourse/natural channel corridor feature. The proposed cut also ties into the proposed subdivision on the east and west sides. The proposed depth of cut that is accounted for in this cut/fill analysis does not exceed 0.3 m below the reported 100-year water level elevation, in accordance with RVCA regulations. The 100-year water level is 91.78 m per RVCA 2005 Jock River Flood Risk Map, and the minimum cut elevation that is considered in this area is 91.48 m. Please note that the proposed watercourse feature will require additional cut greater than 0.3 m from existing topography. The proposed natural channel corridor is to be reviewed, approved and permitted by the RVCA as part of the separate Headwater Assessment process, prior to construction.
   - Cut northwest of Street 5, beside the park:
     The proposed cut ties into the existing topography on the north and west sides (as surveyed by Stantec, June 3, 2016), and to the proposed subdivision on the south and east sides. Sloping at 3:1 is proposed along the boundary of the proposed cut, creating a basin that maximizes the cut volume. The proposed cut area will drain from the SE to the NW at a proposed slope of 0.2%, which is greater than the average slope (<0.1%) in the existing floodplain. The proposed depth of cut does not exceed 0.3 m below the reported 100-year water level elevation, in accordance with RVCA regulations (The 100-year water level is 91.77 m per RVCA 2005 Jock River Flood Risk Map, and the minimum cut

elevation is 91.47 m.). The existing ditch north of the proposed cut area (north of the Glenview property line) is expected to remain open. The existing ditch invert at the property line is 90.45 m. Note that in the OGS servicing option, additional cut will be created in this area, given the proposed outlet channel from the OGS units, but is not counted as part of the cut/fill analysis.

The total cut proposed under the 100-year water level elevation is 1 176 m^3, which is 107 m^3 greater than the proposed fill within the floodplain.

Table 1 illustrates the area and volume of cut and fill with respect to the 100-year Flood Limit Elevation:

Table 1 – Cut / Fill Relative to 100-year Flood Limit Elevation

Depth from 100-Year Floodline	CUT		FILL	
	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)
0 cm – 12 cm	3 196	853	6 774	806
12 cm – 24 cm	4 323	306	3 227	252
24 cm – 36 cm	827	17	616	11
TOTAL	**8 346**	**1 176**	**10 617**	**1069**

Table 2 illustrates the area and volume of cut and fill with respect to Geodetic Elevation:

Table 2 – Cut / Fill Relative to Geodetic Elevation

Elevation (m)	CUT		FILL	
	Area (m^2)	Volume (m^3)	Area (m^2)	Volume (m^3)
91.47 – 91.61	3 276	164	1 971	77
91.61 – 91.80	5 070	1012	8 646	992
TOTAL	**8 346**	**1 176**	**10 617**	**1 069**

As demonstrated in **Table 1** and **Table 2**, the cut volume is greater than or equal to the fill volume at every stage of the analysis, which is consistent with the original July/August 2016 cut/fill analysis.

The proposed cut is below the minimum existing ground elevation in the fill area by 5 cm (lowest proposed cut elevation is 91.47 m, compared to lowest surveyed existing ground in fill area = 91.52 m). Although RVCA policy requires the cut be no lower than the minimum existing ground in the fill area (e.g. 0 cm difference), the proposed cut is considered consistent with the intent of the policy, based on the acceptance of the original cut/fill analysis because:

- The cut depth (0.3 m) is within 2 cm of the proposed fill depth (0.28 m);
- Despite the 5 cm difference, the proposed fill and cut activities are both above the 25-year water level;
- The area of proposed cut is 80% of the area of the proposed fill, suggesting that generally the floodplain is being replaced like-for-like (+/- 20%);
- The low point (91.47 m) in the cut area is connected to an existing ditch (inv. = 90.45 m) and therefore the cut area will drain appropriately; and,

- The proposed low point (91.47 m) is 0.3 m below the 100-year water level elevation and the proposed cut will not impact flow velocities or water levels in the Jock River (as defined in the Jock River HEC RAS model) – both consistent with other RVCA cut/fill policy clauses.

David Schaeffer Engineering Ltd. **David Schaeffer Engineering Ltd.**

Per: Laura Maxwell, B.Sc. (Civil Eng) Per: Matt Wingate, P. Eng

z:\projects\15-809_glenview_leiken-property\a_project-mgmt\a5_correspondence\mem_2017-04-26_rvca_cut-fill-analysis.doc

Attach.
- Figure 9, 3387 Borrisokane Road, Composite Plan – SWM Option 1 (April 2017);
- Figure 10, 3387 Borrisokane Road, Composite Plan – SWM Option 2 (April 2017).

FIGURES

JOCK RIVER

BORRISOKANE ROAD

PROPOSED CHANNEL REALIGNMENT

WET MEADOW

POTENTIAL ROCK CHECK DAM

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

STREET 8

18.0m

15.0m

24.0m

42.0m

300m LANDFILL SETBACK

CLARKE POND
(BY OTHERS)

FENCE

NO

LEGEND:

- SITE BOUNDARY
- PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
- RVCA FLOODPLAIN PER JOCK RIVER RISK MAP 2
- RVCA 100-YEAR FLOODPLAIN BOUNDARY
- COMMERCIAL
- PARK
- POND
- SCHOOL
- SINGLES
- TOWNHOMES
- NATURAL CORRIDOR

GLENVIEW - BORRISOKANE
CONCEPT PLAN

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	1

JOCK RIVER

BORRISOKANE ROAD

18.75

POTENTIAL WATERMAIN
UNDER SWM OPTION 2

STREET 7

STREET 5

STREET 3

STREET 6

STREET 4

STREET 2

STREET 7

STREET 4

STREET 1

STREET 1

305mmØ WM (B.O.)

305mmØ WM (B.O.)

305mmØ WM (B.O.)

500m LANDFILL SETBACK

CLARKE POND
(BY OTHERS)

LEGEND:

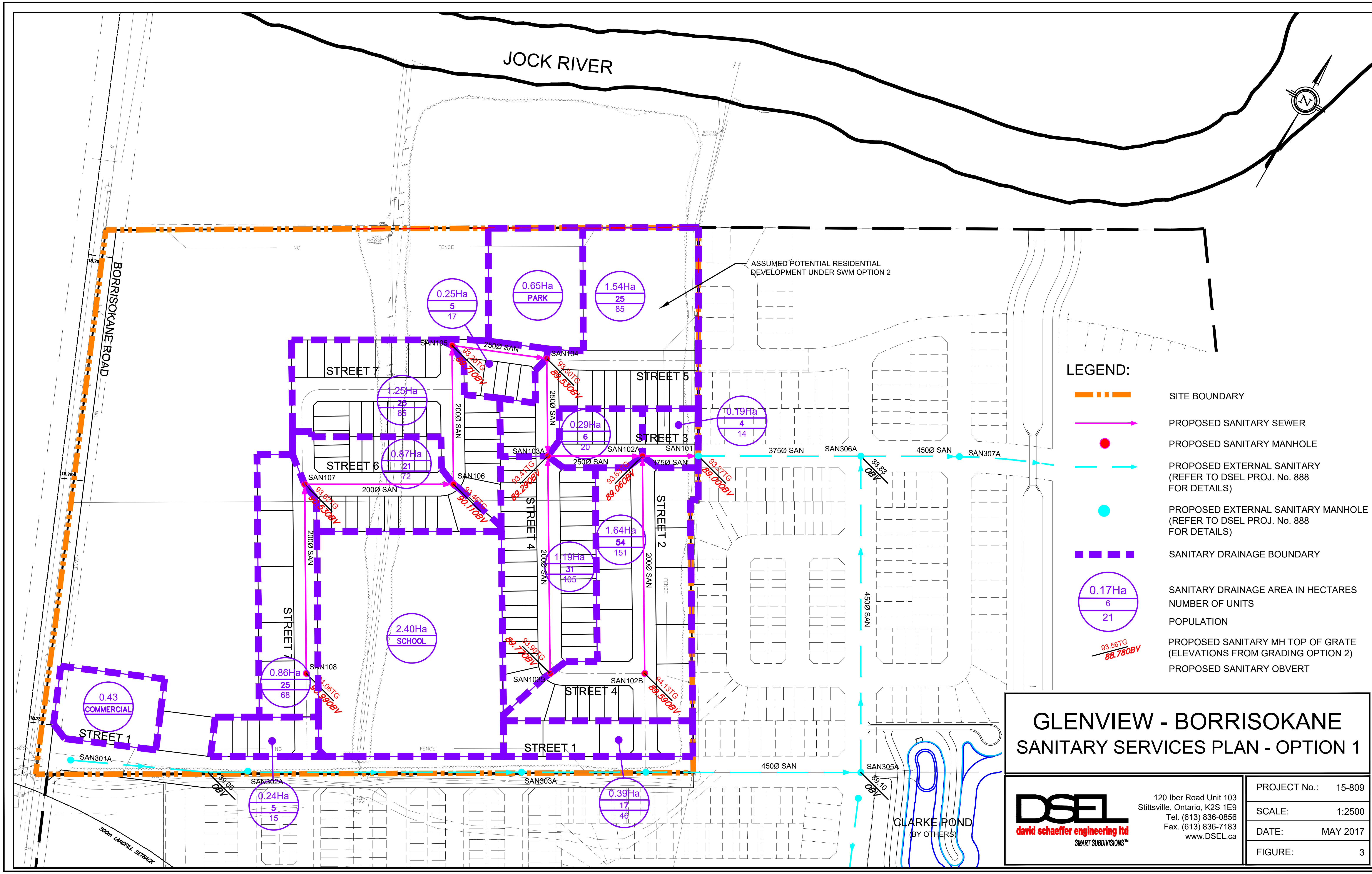
- SITE BOUNDARY
- PROPOSED WATERMAIN
- PROPOSED EXTERNAL WATERMAIN (REFER TO DSEL PROJ. No. 888 FOR DETAILS)

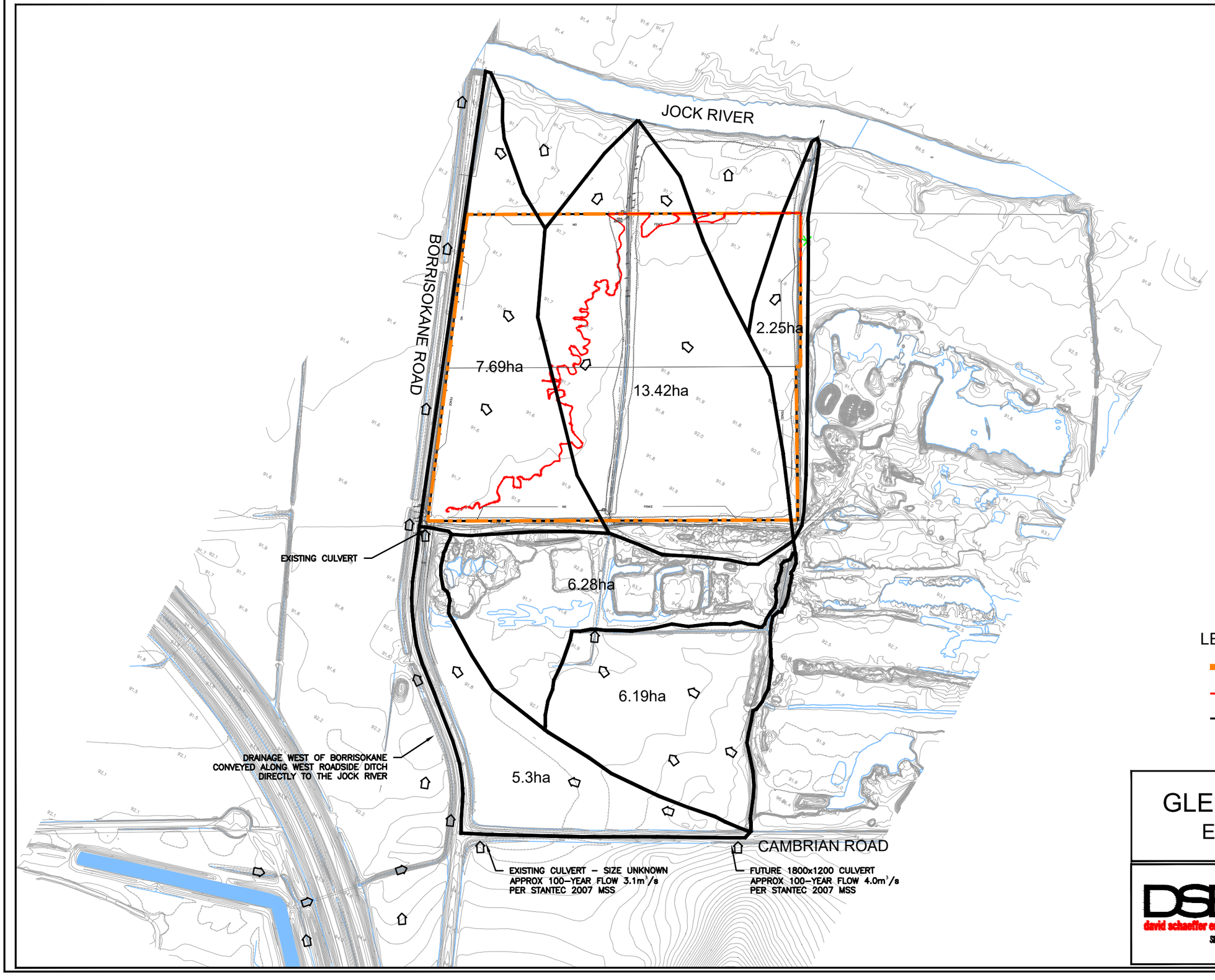
GLENVIEW - BORRISOKANE
WATERMAIN SERVICES PLAN

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	2


JOCK RIVER
BORRISOKANE ROAD
ASSUMED POTENTIAL RESIDENTIAL DEVELOPMENT UNDER SWM OPTION 2
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
0.25Ha 5 17
0.65Ha PARK
1.54Ha 25 85
1.25Ha 25 85
0.87Ha 21 72
0.29Ha 6 20
0.19Ha 4 14
1.64Ha 54 151
1.19Ha 31 105
2.40Ha SCHOOL
0.86Ha 25 68
0.43 COMMERCIAL
0.24Ha 5 15
0.39Ha 17 46
SAN101
SAN102A
SAN102B
SAN103A
SAN103B
SAN104
SAN105
SAN106
SAN107
SAN108
SAN301A
SAN302A
SAN303A
SAN305A
SAN306A
SAN307A
250Ø SAN
200Ø SAN
375Ø SAN
450Ø SAN
CLARKE POND (BY OTHERS)
500m LANDFILL SETBACK
LEGEND:
SITE BOUNDARY
PROPOSED SANITARY SEWER
PROPOSED SANITARY MANHOLE
PROPOSED EXTERNAL SANITARY (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
PROPOSED EXTERNAL SANITARY MANHOLE (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
SANITARY DRAINAGE BOUNDARY
0.17Ha 6 21
SANITARY DRAINAGE AREA IN HECTARES
NUMBER OF UNITS
POPULATION
93.56TG 88.780BV
PROPOSED SANITARY MH TOP OF GRATE (ELEVATIONS FROM GRADING OPTION 2)
PROPOSED SANITARY OBVERT
GLENVIEW - BORRISOKANE
SANITARY SERVICES PLAN - OPTION 1
DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™
120 Iber Road Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca
PROJECT No.: 15-809
SCALE: 1:2500
DATE: MAY 2017
FIGURE: 3



LEGEND:

- SITE BOUNDARY
- RVCA 100-YEAR FLOODPLAIN BOUNDARY
- EXISTING DRAINAGE DIVIDE
- EXISTING DIRECTION OF FLOW

GLENVIEW - BORRISOKANE
EXISTING DRAINAGE PLAN

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:4000
DATE:	MAY 2017
FIGURE:	4

JOCK RIVER

91.74 - 100 YEAR
91.62 - 50 YEAR
91.43 - 25 YEAR
91.25 - 10 YEAR
91.05 - 5 YEAR
90.66 - 2 YEAR
JOCK RIVER WL 89.62±
(PER MSS)

TIE INTO EXISTING

91.72 - 100 YEAR
91.59 - 50 YEAR
91.40 - 25 YEAR
91.22 - 10 YEAR
91.02 - 5 YEAR
90.65 - 2 YEAR
JOCK RIVER WL 89.57±
(PER MSS)

NOTE: ALL SINGLES AND TOWNHOME LOTS TO BE E□UIPPED WITH SUMP PUMPS

BORRISOKANE ROAD

PROPOSED CHANNEL REALIGNMENT

WET MEADOW

SWM POND
BOTTOM □87.12
PP □89.62
100yr WL □91.74
SEDIMENT FOREBAY
SEDIMENT MANAGEMENT AREA

POND OUTLET
INV □89.59

STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7

0.82Ha 0.55
0.26Ha 0.65
1.13Ha 0.50
1.24Ha 0.65
0.23Ha 0.65
0.47Ha 0.65
0.86Ha 0.65
1.56Ha 0.65
1.28Ha 0.65
2.40Ha 0.80
0.43Ha 0.80
0.24Ha 0.65
0.39Ha 0.65

975mmØ STM
825mmØ STM
750mmØ STM
600mmØ STM
525mmØ STM

STM101
STM102
STM103
STM104A
STM104B
STM105
STM106
STM107
STM108
STM109
STM110

MH11
MH12
MH13
MH21
MH22
MH23
MH34

POTENTIAL ROCK CHECK DAM

FLOW TO BE TREATED FOR □UALITY CONTROL ONSITE AND RELEASED TO ROADSIDE DITCH RESPECTING CAPACITY OF DITCH.

STM SEWER (REFER TO DSEL PROJ. No. 888)

500m LANDFILL SETBACK

CLARKE POND
(BY OTHERS)

LEGEND:

- SITE BOUNDARY
- PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
- RVCA FLOODPLAIN PER JOCK RIVER RISK MAP 2
- RVCA 100-YEAR FLOODPLAIN BOUNDARY
- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLAND FLOW ARROW
- PROPOSED EXTERNAL STORM SEWER (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- PROPOSED EXTERNAL STORM MANHOLE (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- EXISTING CONTOUR ELEVATION
- EXISTING SPOT ELEVATION
- PROPOSED OUTLET CHANNEL
- POST-DEVELOPMENT STORM DRAINAGE BOUNDARY
- 0.5Ha / 0.65 — POST-DEVELOPMENT STORM DRAINAGE AREA / RUN-OFF COEFFICIENT
- DRAINAGE TO CLARKE POND

GLENVIEW - BORRISOKANE
STORM SERVICES PLAN - OPTION 1

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	5

JOCK RIVER

91.74 - 100 YEAR
91.62 - 50 YEAR
91.43 - 25 YEAR
91.25 - 10 YEAR
91.05 - 5 YEAR
90.66 - 2 YEAR
JOCK RIVER WL 89.62±
(PER MSS)

MATCH EXISTING

91.72 - 100 YEAR
91.59 - 50 YEAR
91.40 - 25 YEAR
91.22 - 10 YEAR
91.02 - 5 YEAR
90.65 - 2 YEAR
JOCK RIVER WL 89.57±
(PER MSS)

BORRISOKANE ROAD

PROPOSED CHANNEL REALIGNMENT

SWM POND
BOTTOM 87.12
PP 89.62
100yr WL 91.74

SEDIMENT FOREBAY

SEDIMENT MANAGEMENT AREA

POND OUTLET INV 89.59

WET MEADOW

POTENTIAL ROCK CHECK DAM

STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7

CLARKE POND
(BY OTHERS)

500m LANDFILL SETBACK

NOTE: ALL SINGLES AND TOWNHOME LOTS TO BE E□UIPPED WITH SUMP PUMPS

LEGEND:

- SITE BOUNDARY
- PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
- RVCA FLOODPLAIN PER JOCK RIVER RISK MAP 2
- RVCA 100-YEAR FLODDPLAIN BOUNDARY
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLFOW DIRECTION
- 94.33 — PROPOSED CENTERLINE ELEVATION
- 0.3□ — PROPOSED GRADE AND DIRECTION
- 89.62 / 89.62 — PROPOSED ELEVATION□ EXISTING ELEVATION
- PROPOSED OUTLET CHANNEL
- 92.00 — EXISTING CONTOUR
- 91.83 — EXISTING SPOT ELEVATION

GLENVIEW - BORRISOKANE
GRADING PLAN - OPTION 1

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	6

JOCK RIVER

91.74 - 100 YEAR
91.62 - 50 YEAR
91.43 - 25 YEAR
91.25 - 10 YEAR
91.05 - 5 YEAR
90.66 - 2 YEAR
JOCK RIVER WL 89.62±
(PER MSS)

91.72 - 100 YEAR
91.59 - 50 YEAR
91.40 - 25 YEAR
91.22 - 10 YEAR
91.02 - 5 YEAR
90.65 - 2 YEAR
JOCK RIVER WL 89.57±
(PER MSS)

NOTE: ALL SINGLES AND TOWNHOME LOTS TO BE E□UIPPED WITH SUMP PUMPS

MATCH EXISTING

BORRISOKANE ROAD

PROPOSED CHANNEL REALIGNMENT

WET MEADOW

ASSUME RESIDENTIAL DEVELOPMENT

HEADWALL
INV 90.07

OGS

975mmØ STM

900mmØ STM

600mmØ STM

825mmØ STM

750mmØ STM

600mmØ STM

525mmØ STM

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

STM101

STM102

STM103

STM104

STM105

STM201

STM202A

STM202B

STM203A

STM203B

STM204

STM205

0.08Ha 0.65

0.18Ha 0.65

1.95Ha 0.55

1.24Ha 0.55

0.23Ha 0.65

0.47Ha 0.65

0.87Ha 0.65

0.86Ha 0.65

2.40Ha 0.80

1.28Ha 0.65

1.56Ha 0.65

0.43Ha 0.80

0.24Ha 0.65

0.39Ha 0.65

POTENTIAL ROCK CHECK DAM

FLOW TO BE TREATED FOR □UALITY CONTROL ONSITE AND RELEASED TO ROADSIDE DITCH RESPECTING CAPACITY OF DITCH.

STM SEWER (REFER TO DSEL PROJ. No. 888)

MH11

MH12

MH13

MH21

MH22

MH23

MH34

CLARKE POND
(BY OTHERS)

LEGEND:

- SITE BOUNDARY
- PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
- RVCA FLOODPLAIN PER JOCK RIVER RISK MAP 2
- RVCA 100-YEAR FLOODPLAIN BOUNDARY
- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLAND FLOW ARROW
- PROPOSED EXTERNAL STORM SEWER (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- PROPOSED EXTERNAL STORM MANHOLE (REFER TO DSEL PROJ. No. 888 FOR DETAILS)
- EXISTING CONTOUR ELEVATION
- EXISTING SPOT ELEVATION
- PROPOSED OUTLET CHANNEL
- POST-DEVELOPMENT STORM DRAINAGE BOUNDARY
- 0.5Ha / 0.65 — POST-DEVELOPMENT STORM DRAINAGE AREA / RUN-OFF COEFFICIENT
- DRAINAGE TO CLARKE POND

GLENVIEW - BORRISOKANE
STORM SERVICES PLAN - OPTION 2

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	7

JOCK RIVER

91.74 - 100 YEAR
91.62 - 50 YEAR
91.43 - 25 YEAR
91.25 - 10 YEAR
91.05 - 5 YEAR
90.66 - 2 YEAR
JOCK RIVER WL 89.62±
(PER MSS)

91.72 - 100 YEAR
91.59 - 50 YEAR
91.40 - 25 YEAR
91.22 - 10 YEAR
91.02 - 5 YEAR
90.65 - 2 YEAR
JOCK RIVER WL 89.57±
(PER MSS)

MATCH EXISTING

BORRISOKANE ROAD

PROPOSED CHANNEL REALIGNMENT

WET MEADOW

HEADWALL
INV 90.07
OGS

OGS

STREET 1

STREET 2

STREET 3

STREET 4

STREET 5

STREET 6

STREET 7

POTENTIAL
ROCK CHECK DAM

500m LANDFILL SETBACK

CLARKE POND
(BY OTHERS)

NOTE: ALL SINGLES AND TOWNHOME LOTS TO BE E□UIPPED WITH SUMP PUMPS

LEGEND:

- SITE BOUNDARY
- PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
- RVCA 100-YEAR FLOODPLAIN BOUNDARY
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLFOW DIRECTION
- 94.33 — PROPOSED CENTERLINE ELEVATION
- 0.3□ — PROPOSED GRADE AND DIRECTION
- 89.62 / 89.62 — PROPOSED ELEVATION□ EXISTING ELEVATION
- PROPOSED OUTLET CHANNEL
- 92.00 — EXISTING CONTOUR
- ×91.83 — EXISTING SPOT ELEVATION

GLENVIEW - BORRISOKANE
GRADING PLAN - OPTION 2

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	8

Elevations Table					
Number	Minimum Elevation	Maximum Elevation	Area	Color	
1	0.00	0.04	528.07		324.43
2	0.04	0.08	1151.57		289.21
3	0.08	0.12	1516.58		239.71
4	0.12	0.16	2074.73		163.76
5	0.16	0.20	1406.30		91.39
6	0.20	0.24	841.87		50.49
7	0.24	0.28	712.00		16.15
8	0.28	0.32	114.93		0.96
9	0.32	0.36	0.00		0.00

CUT

SURFACE 1: RVCA FLOODPLAIN
SURFACE 2: PROPOSED CUT ELEV.

TOTAL CUT AREA: 8 346m²
TOTAL CUT VOLUME: 1 176m³

Elevations Table					
Number	Minimum Elevation	Maximum Elevation	Area	Color	
1	0.00	0.04	2832.50		365.06
2	0.04	0.08	2453.26		260.56
3	0.08	0.12	1488.56		180.42
4	0.12	0.16	1151.49		131.62
5	0.16	0.20	1265.82		79.45
6	0.20	0.24	809.37		40.73
7	0.24	0.28	602.24		11.25
8	0.28	0.32	13.93		0.01
9	0.32	0.36	0.00		0.00

FILL

SURFACE 1: RVCA FLOODPLAIN ELEVATION
SURFACE 2: STANTEC SURVEY (JUNE 2016)

TOTAL FILL AREA: 10 617m²
TOTAL FILL VOLUME: 1 069m³
COMMERCIAL: 686m³
RESIDENTIAL: 383m³

LEGEND

- 100-YEAR FLOOD LINE FROM INTERSECTION OF STANTEC JUNE 3 2016 SURVEY AND FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2. (91.83m, 91.78m, 91.77m, 91.75m, 91.72m)
- UNKNOWN EXTENTS OF INTERSECTION LINE
- PROPOSED STORM SEWER
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLAND FLOW ARROW
- PROPOSED STORM MANHOLE

BACKGROUND TOPOGRAPHY:

STANTEC SURVEY (JUNE 2016): × 91.91

PROPOSED CUT ELEV.: × 91.77

DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

3387 BORRISOKANE ROAD
COMPOSITE PLAN - SWM OPTION 1

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	9

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-2_main (dsel)\02-fsr\fsr-2017-05-08_809_composite-plan_bnc.dwg

Elevations Table					
Number	Minimum Elevation	Maximum Elevation	Area	Color	
1	0.00	0.04	528.07		324.43
2	0.04	0.08	1151.57		289.21
3	0.08	0.12	1516.58		239.71
4	0.12	0.16	2074.73		163.76
5	0.16	0.20	1406.30		91.39
6	0.20	0.24	841.87		50.49
7	0.24	0.28	712.00		16.15
8	0.28	0.32	114.93		0.96
9	0.32	0.36	0.00		0.00

CUT

SURFACE 1: RVCA FLOODPLAIN
SURFACE 2: PROPOSED CUT ELEV.

TOTAL CUT AREA: 8 346m²

TOTAL CUT VOLUME: 1 176m³

Elevations Table					
Number	Minimum Elevation	Maximum Elevation	Area	Color	
1	0.00	0.04	2832.50		365.06
2	0.04	0.08	2453.26		260.56
3	0.08	0.12	1488.56		180.42
4	0.12	0.16	1151.49		131.62
5	0.16	0.20	1265.82		79.45
6	0.20	0.24	809.37		40.73
7	0.24	0.28	602.24		11.25
8	0.28	0.32	13.93		0.01
9	0.32	0.36	0.00		0.00

FILL

SURFACE 1: RVCA FLOODPLAIN ELEVATION
SURFACE 2: STANTEC SURVEY (JUNE 2016)

TOTAL FILL AREA: 10 617m²

TOTAL FILL VOLUME: 1 069m³

COMMERCIAL: 686m³

RESIDENTIAL: 383m³

LEGEND

100-YEAR FLOOD LINE FROM INTERSECTION OF STANTEC JUNE 3 2016 SURVEY AND FLOOD ELEVATIONS REPORTED IN RVCA 2005 JOCK RIVER FLOOD RISK MAP 2. (91.83m, 91.78m, 91.77m, 91.75m, 91.72m)

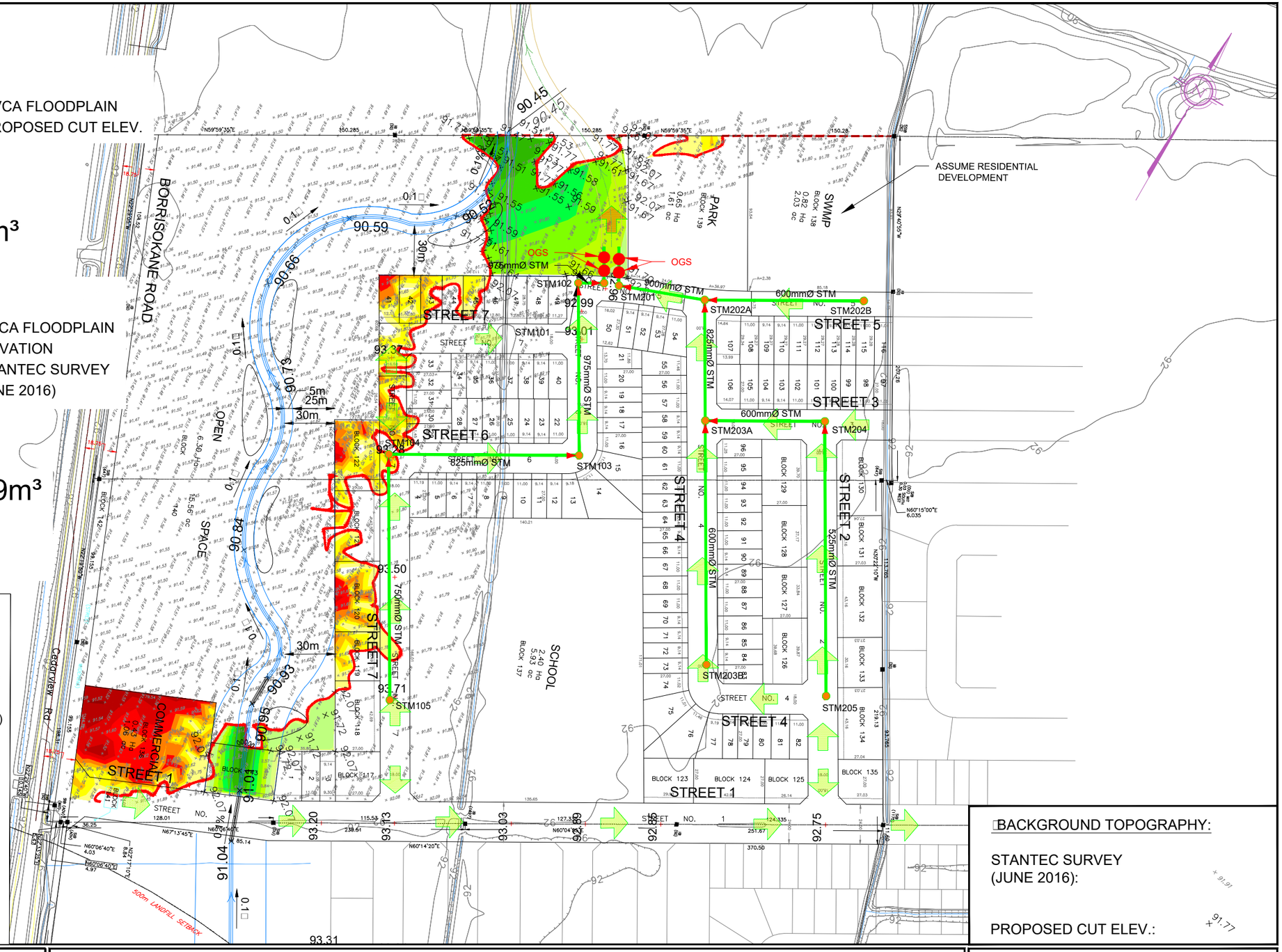
UNKNOWN EXTENTS OF INTERSECTION LINE

PROPOSED STORM SEWER

STORM OVERLAND FLOW ARROW

EMERGENCY OVERLAND FLOW ARROW

PROPOSED STORM MANHOLE



DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

3387 BORRISOKANE ROAD
COMPOSITE PLAN - SWM OPTION 2

PROJECT No.:	15-809
SCALE:	1:2500
DATE:	MAY 2017
FIGURE:	10

z:\projects\15-809_glenview_leiken-property\b_design\b2_drawings\b2-2_main (dsel)\02-fsr\fsr-2017-05-08_809_composite-plan_bnc.dwg