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

SEPTEMBER 2016 – REV 0

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

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

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

SEPTEMBER 2016 – REV 0

**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.

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 mix of low and medium density residential development, and a network of roads with a mix of 14.75m, 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). An existing roadside ditch runs along the eastern side 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.***

Paterson Group's *Geotechnical Investigations* (September 2016) for the subject lands explain that the long-term groundwater table is estimated to be between 89.7 m (northwest) and 90.5 m (southeast). The geotechnical investigations suggest that the subject property has a sensitive silty clay layer, and therefore the proposed development will be subjected 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 developments by Mattamy Homes Ltd. A potential road network is shown in ***Figures 1-10*** to provide context for the servicing strategies, but the network is conceptual in nature and will be subject to refinements through future planning applications for these neighbouring lands. Glenview Homes (Cedarview) Ltd. is proceeding with development applications for 3387 Borrisokane Road on the understanding that development applications for these neighbouring lands are to also proceed in the short term.

1.2 Development Concept

The proposed development concept is shown in ***Figure 1.*** Residential underlays are shown within the stormwater management pond block and school block, so as not to preclude residential development should:

- the school board choose not to purchase the identified land; or

- a stormwater management option is pursued that does not require a large dedicated parcel of land.

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

Table 1: Development Statistics (Glenview Homes, September 2016)

	Scenario A w SWMP Block w School Block	**Scenario B w/o SWMP Block w School Block**	**Scenario C w/o SWMP Block w/o School Block**
Total Area	**20.13 ha**	**20.13 ha**	**20.13 ha**
Streets	3.63 ha	4.18 ha	4.67ha
Road Widening Borrisokane	0.34 ha	0.34 ha	0.34 ha
Land Exchange	0.005 ha	0.005 ha	0.005 ha
Open Space	6.42 ha	6.42 ha	6.42 ha
Park	0.65 ha	0.65 ha	0.65 ha
SWM Pond	0.76 ha	0.00 ha	0.00 ha
School	2.40 ha	2.40 ha	0.00 ha
Commercial	0.43 ha	0.43 ha	0.43 ha
Residential	5.50 ha	6.05 ha	7.96ha
Total Units	**211 units**	**222 units**	**288 units**
Singles	117 units	128 units	179 units
Town Homes	94 units	94 units	109 units

In the sections that follow, the residential underlays are used for the purpose of calculating servicing demands (where applicable) to ensure adequate capacity is provided in the servicing networks.

The subject lands are expected to be developed in distinct phases according to the landowner’s preferred timing.

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 have been arranged with regard for the conceptual road layout for 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.

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 following additional approvals and permits 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.)*

Table 2: Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
RVCA	Permit under Ontario Regulation 153/06, MVCA'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 153/06, MVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Grading 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.***
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 and wastewater collection system by transfer of review submission. The MOECC is expected to review the stormwater management pond or oil/grit separator unit by direct 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	MOE 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 MOE through the Form 1 – Record of Watermains Authorized as a Future Alteration.

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***.

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.
  (MOE* Design Guidelines*)

- **Stormwater Planning and Design Manual,**
  Ministry of the Environment, March 2003.
  (SWMP Design Manual)

- **Ontario Building Code Compendium**
  Ministry of Municipal Affairs and Housing Building Development Branch, January 1, 2010 Update
  (OBC)

- **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.

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, in support of full buildout of the MSSA area:

- a 300 mm diameter watermain will be required on Street 1; and
- a 300 mm diameter watermain will be required along the N-S collector road adjacent to the site.

The timing of the 300 mm diameter trunk watermains 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. 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.

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.

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 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 MOE 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.*

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	316.4	219.7	791.0	549.3	1740.2	1208.5	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)*
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	**356.1**	**247.3**	**850.6**	**590.7**	**1847.4**	**1282.9**	

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. 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 MOE 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 will 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:

- Lots 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, 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.

Applying the wastewater parameters in ***Table 5*** to the development concept, the estimated peak sanitary flow from the subject property is expected to be 16.21 L/s. See ***Appendix D*** for detailed calculations. The residual capacity in the trunk sanitary sewer segment downstream of the N-S trunk sanitary sewer is 20%, which is the same value reported in the MSSA.

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 MOE 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 Jock River watershed. The existing drainage features and patterns are illustrated on ***Figure 4.***

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 5-year level of service or a 2-year level of service 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).
- Collector roads must leave at least one lane free of water at all times up to a 100-year return period.
- 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 m2/s on all roads.

5.3 Proposed Stormwater Management Options

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

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 established floodplain.

Per the *MOE Stormwater Management Planning and Design Manual* (MOE, 2008), for the development concept, enhanced treatment translates to a required permanent pool volume of 1481 m3 (based on a required volume of 177 m3/ha) and an extended detention volume of 434 m3 (based on a required volume of 40 m3/ha). A proposed pond footprint is provided in ***Figure 5***, meeting the quality control requirements. The pond is to be located near the Jock River, in approximately the same location as contemplated in the MSSA.

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 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 (per the MSSA) - while meeting MOE 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. There will be standing water in the storm sewer system under this higher ‘operational’ permanent pool level condition.

Per the MSSA, the pond weir is 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.

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 provide long-term average removal of 80% of suspended solids for greater than 90% 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 are proposed, both at the location of the existing headwater feature north of Street 6. The OGS system would discharge to the Jock River via an outlet channel, approximately 120m upstream of the outlet channel contemplated for Cedarview Pond in the MSSA. This outflow channel could tie into existing drainage features within the floodplain. Refer to ***Figure 7*** for details. Additional details and sizing information for the proposed OGS units are provided in ***Appendix F***.

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.

5.3.3 Option 3 – Clarke Pond

Deviating from the MSSA, the stormwater runoff from the subject property can be treated by the Clarke wet pond that is to be designed as part of the development of the neighbouring property and that is to outlet to the Jock River. The Clarke Pond can be designed to provide enhanced quality treatment (long-term average removal of 80% of suspended solids) per the MSSA requirements.

Per the operating waterlevel concept described in Section 5.3.1, it is assumed that the permanent pool level would be set at the normal water level of the Jock River (e.g. below the 2 year water level), thereby reducing standing water in the storm sewer system for normal and low water level conditions. The change in operating levels would modify the planned storm sewer system along Street 1. Please refer to ***Figure 9*** and ***Appendix G*** for details.

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 5-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, 2, or 3. Storm sewer design sheets for Options 1, 2, and 3 are provided in ***Appendix E, F, and G***, respectively. It should be noted that through the City's new design guidelines, as part of detailed design the pipes may be downsized to capture only the 2-year event (PIEDTB-2016-01).

In all cases, rear yard catchbasins will capture drainage from backyards. Perforated catch basin leads will be provided, except the last segment with connection to the right-of-way will be constructed with 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 4-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. 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) or 1:5 year
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 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 5-10*** for Options 1 and 2. For Option 3, some OLF is destined to the Jock River and some towards the Clarke Pond, following the storm sewer system.

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 Drainage

To achieve the planned stormwater drainage schemes and meet City of Ottawa guidelines pertaining to road and lot grading, all three 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, September 2016).

Table 7: Proposed Grading

	Existing	Option 1 Cedarview Pond	Option 2 OGS	Option 3 Clarke Pond
Lowest Finished Road Grade within Subject Property	91.5 m	92.7 m	92.9 m	93.6 m
Highest Finished Road Grade within Subject Property	92.0 m	94.2m	94.3 m	94.2m

Note that the *Geotechnical Investigations* (Paterson Group, September 2016) 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 for 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.***

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 153/06 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.

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 5%;
- Slope in grassed areas will be between 2% and 5%;
- 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 evestroughs 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

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

- Quality treatment provided by a new Cedarview stormwater management wet pond (modified from MSSA concept);
- Quality treatment provided by oil and grit separator units; or
- Quality treatment provided by redirecting flows to the planned Clarke stormwater management wet pond east of the site.

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 all three scenarios require surcharging and filling the site, as well as require sump pumps for all residential blocks and lots. Although the use of sump pumps is not supported by 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) or 5-year flow. Storm sewers sizing will be confirmed at the detailed design level, in conformance with MOE 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. Material stockpiles shall not be permitted within the Jock River floodplain.

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

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

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

- Limit extent of exposed soils at any given time.
- Re-vegetate exposed areas as soon as possible.
- Minimize the area to be cleared and grubbed.
- Protect exposed slopes with plastic or synthetic mulches.
- Install silt fence to prevent sediment from entering existing ditches.
- No refueling or cleaning of equipment near existing watercourses.
- Provide sediment traps and basins during dewatering.
- Install 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, September 2016) 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. Even with a surcharge program, grade raises cannot exceed 2 m – 2.5m within the subject property (Paterson Group, September 2016).
- 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.
- Three 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 MOE 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);
    - Oil and grit separator units; or
    - Redirecting flows to the planned Clarke stormwater management wet pond east of the site.

  All scenarios 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, with only Option 3 impacting MSSA-defined infrastructure (draining to the Clarke Pond).
- Grading options for all three stormwater management scenarios require surcharging and filling the site, as well as require sump pumps for all residential blocks and lots. Although the use of sump pumps is not supported by 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.

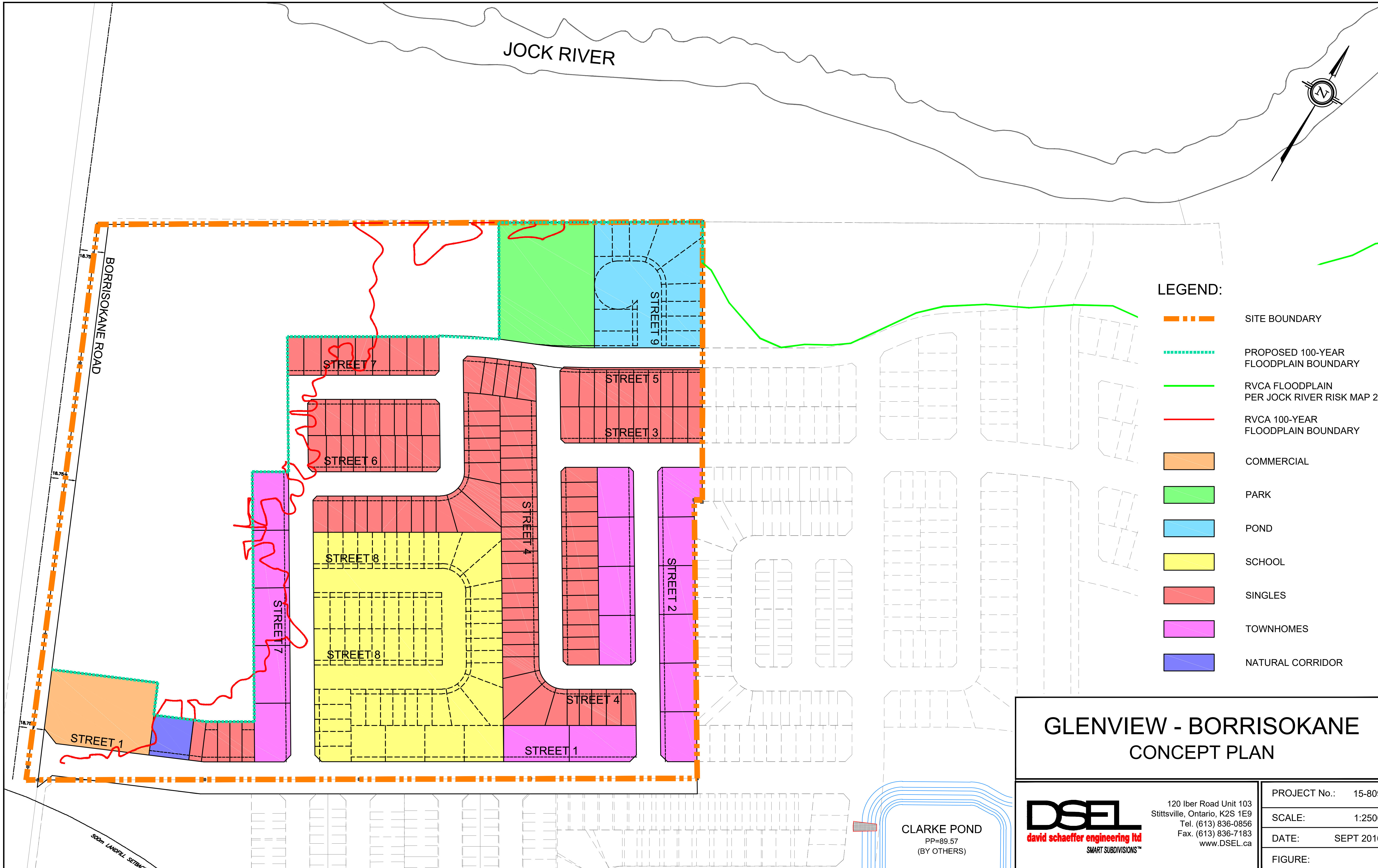
Prepared by,
David Schaeffer Engineering Ltd.

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)\2016-09-23_809_fsr\2016-09-28_809_fsr.docx

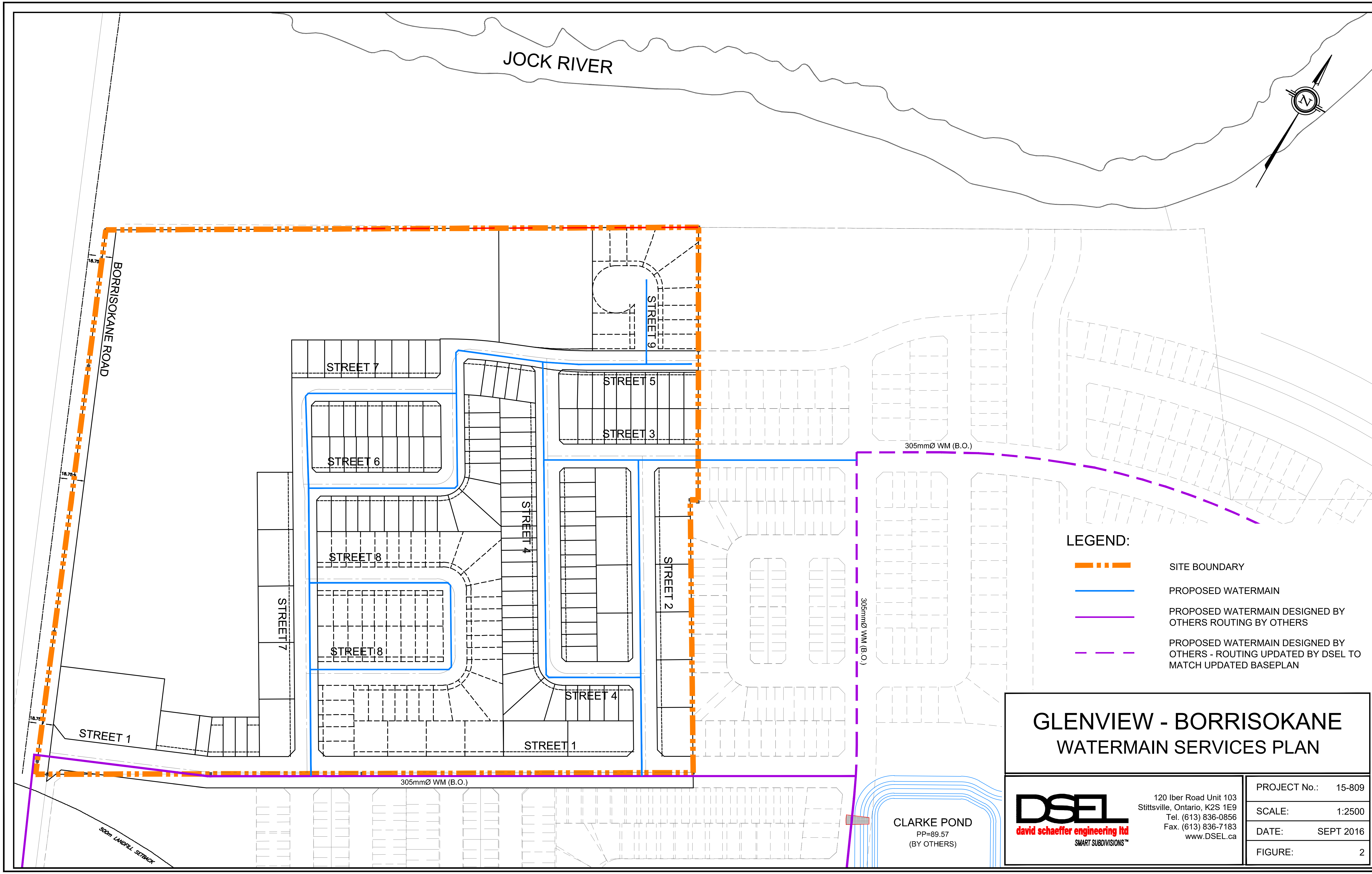


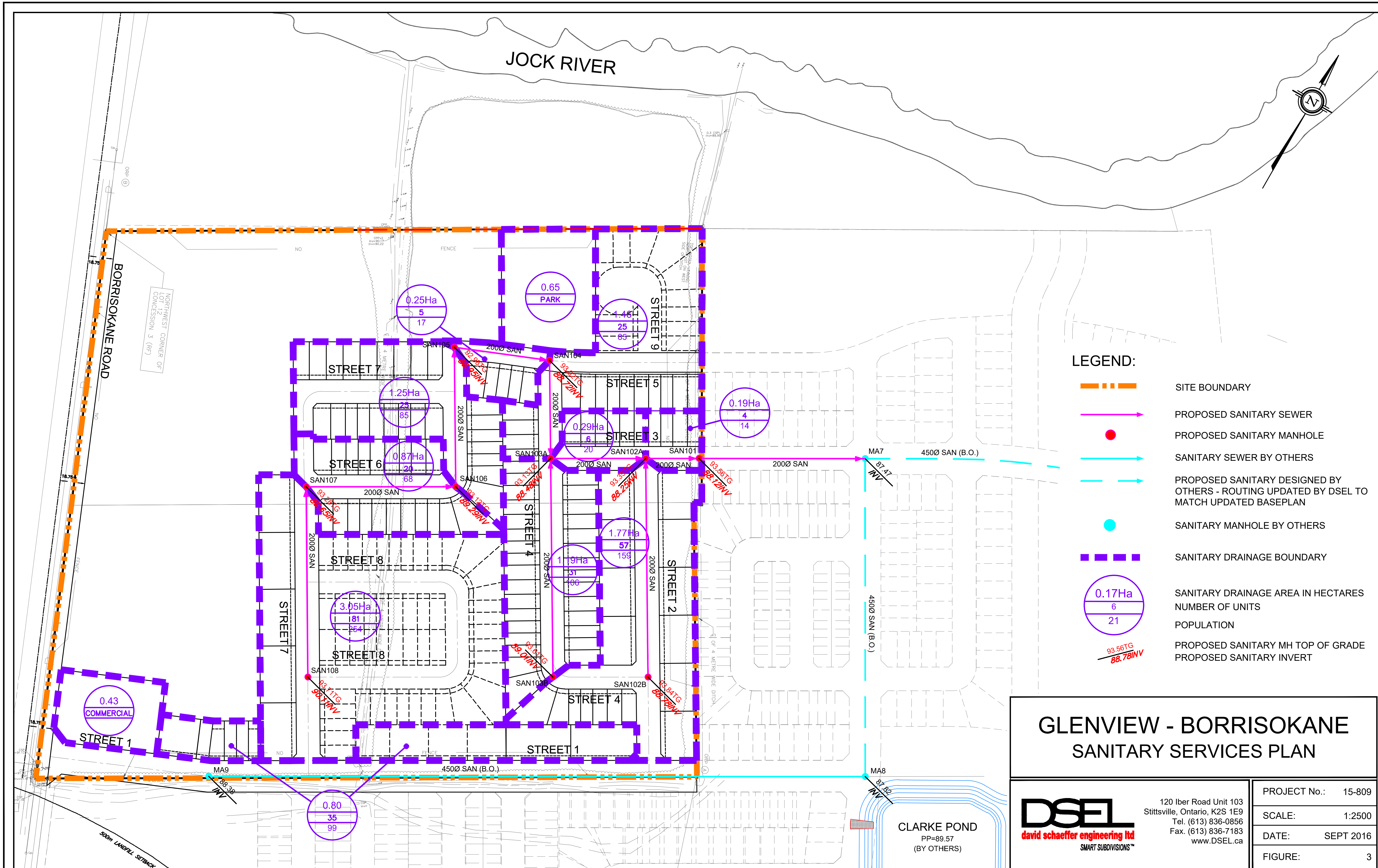
GLENVIEW - BORRISOKANE
CONCEPT PLAN

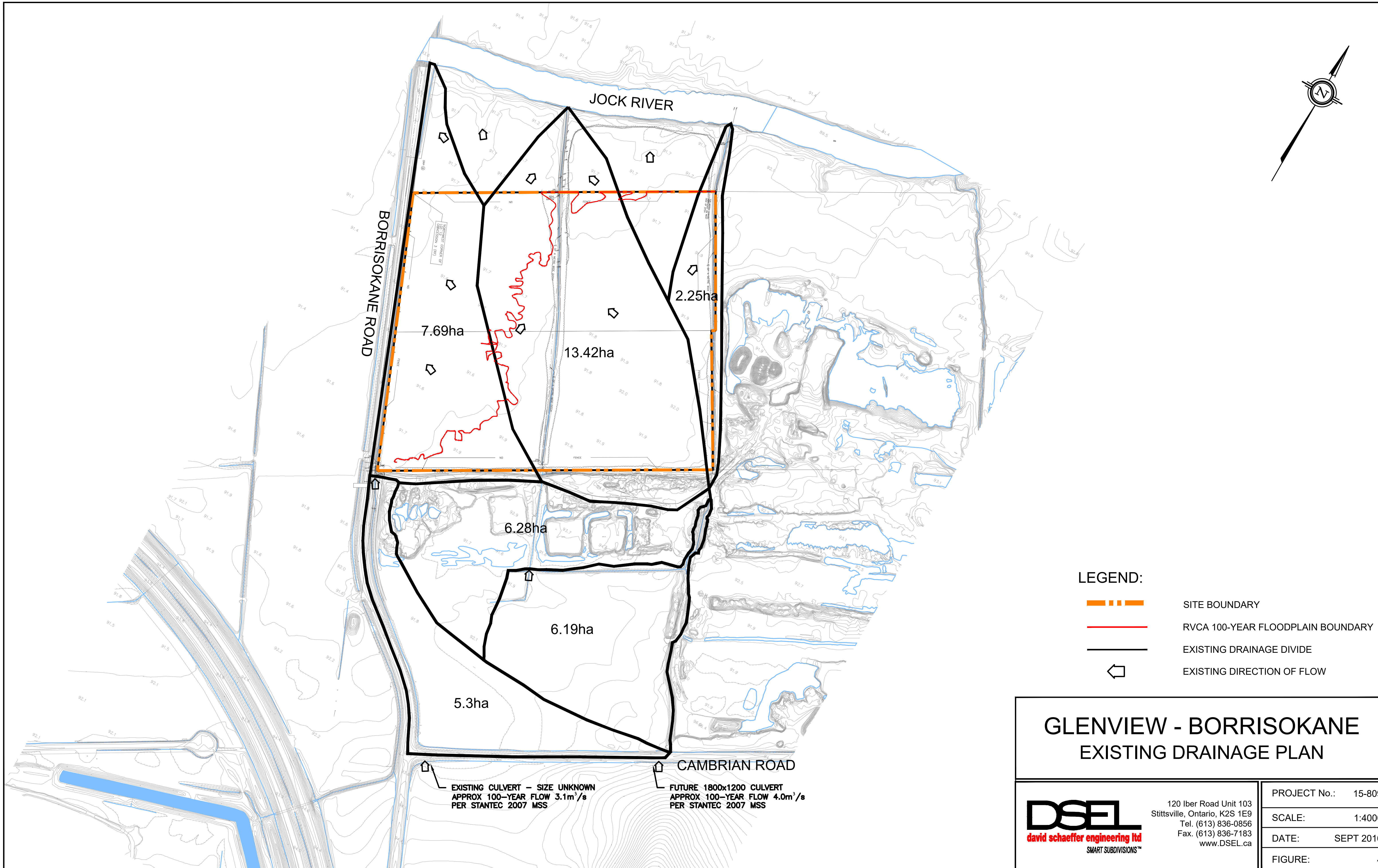
DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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:	SEPT 2016
FIGURE:	1


JOCK RIVER
BORRISOKANE ROAD
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
305mmØ WM (B.O.)
500m LANDFILL SETBACK
CLARKE POND
PP=89.57
(BY OTHERS)
LEGEND:
SITE BOUNDARY
PROPOSED WATERMAIN
PROPOSED WATERMAIN DESIGNED BY OTHERS ROUTING BY OTHERS
PROPOSED WATERMAIN DESIGNED BY OTHERS - ROUTING UPDATED BY DSEL TO MATCH UPDATED BASEPLAN
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: SEPT 2016
FIGURE: 2


JOCK RIVER
BORRISOKANE ROAD
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
SAN101
SAN102A
SAN102B
SAN103A
SAN103B
SAN104
SAN105
SAN106
SAN107
SAN108
MA7
MA8
MA9
200Ø SAN
450Ø SAN (B.O.)
0.65
PARK
0.43
COMMERCIAL
0.25Ha
5
17
1.46
25
85
1.25Ha
25
85
0.19Ha
4
14
0.29Ha
6
20
0.87Ha
20
68
1.77Ha
57
159
1.19Ha
31
106
3.05Ha
81
254
0.80
35
99
CLARKE POND
PP=89.57
(BY OTHERS)
LEGEND:
SITE BOUNDARY
PROPOSED SANITARY SEWER
PROPOSED SANITARY MANHOLE
SANITARY SEWER BY OTHERS
PROPOSED SANITARY DESIGNED BY OTHERS - ROUTING UPDATED BY DSEL TO MATCH UPDATED BASEPLAN
SANITARY MANHOLE BY OTHERS
SANITARY DRAINAGE BOUNDARY
0.17Ha
6
21
SANITARY DRAINAGE AREA IN HECTARES
NUMBER OF UNITS
POPULATION
93.56TG
88.78INV
PROPOSED SANITARY MH TOP OF GRADE
PROPOSED SANITARY INVERT
GLENVIEW - BORRISOKANE
SANITARY 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: SEPT 2016
FIGURE: 3

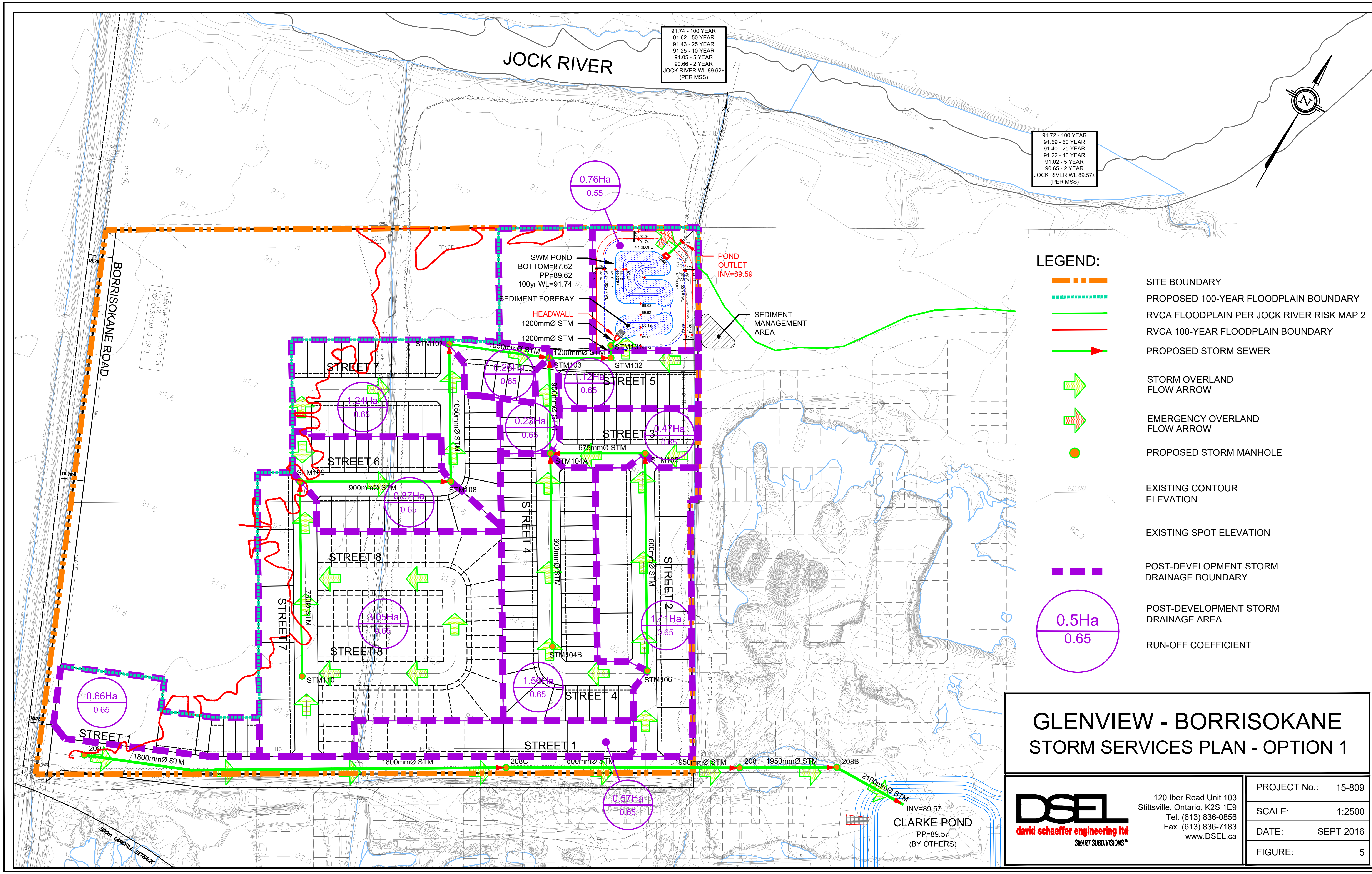


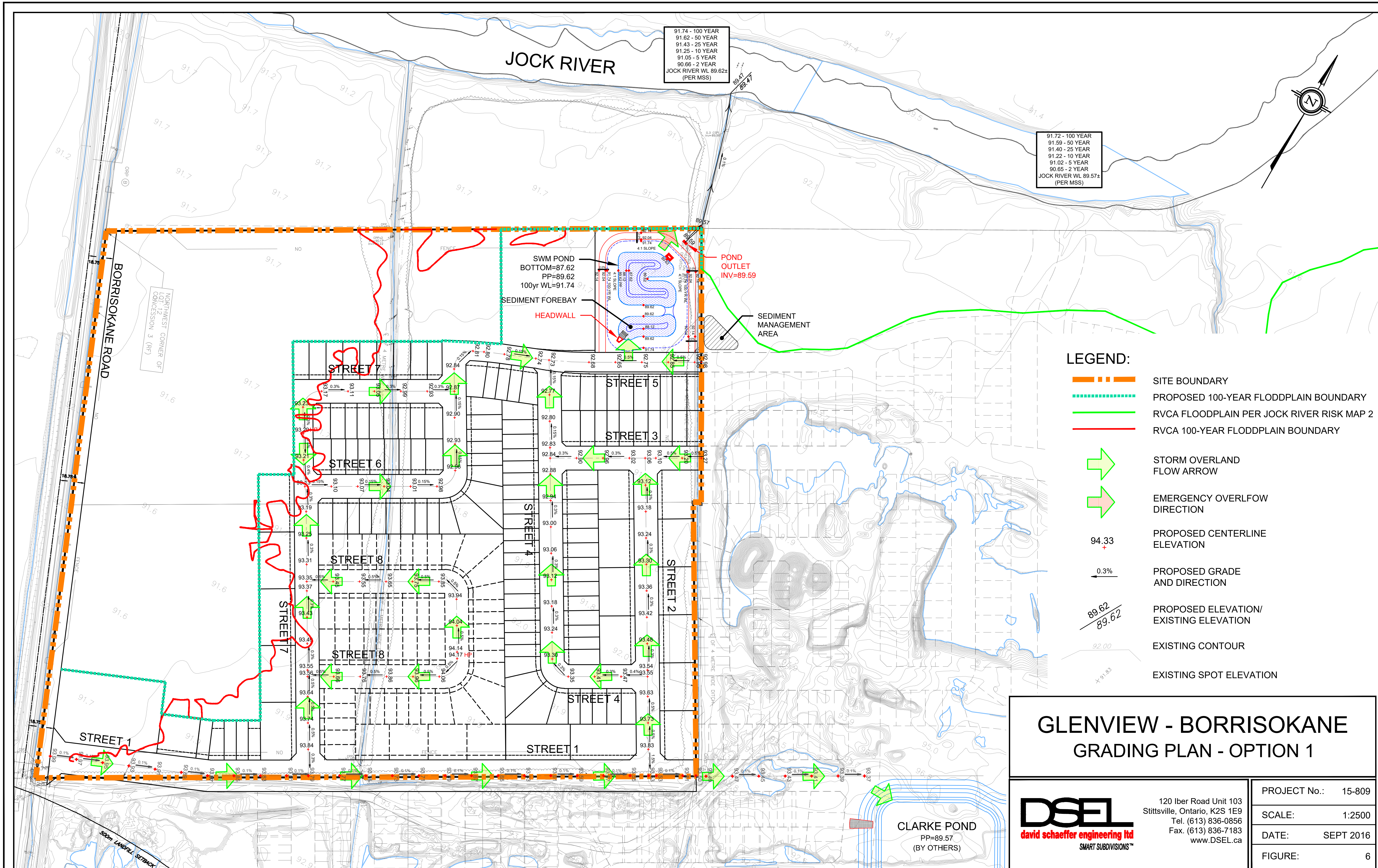
GLENVIEW - BORRISOKANE

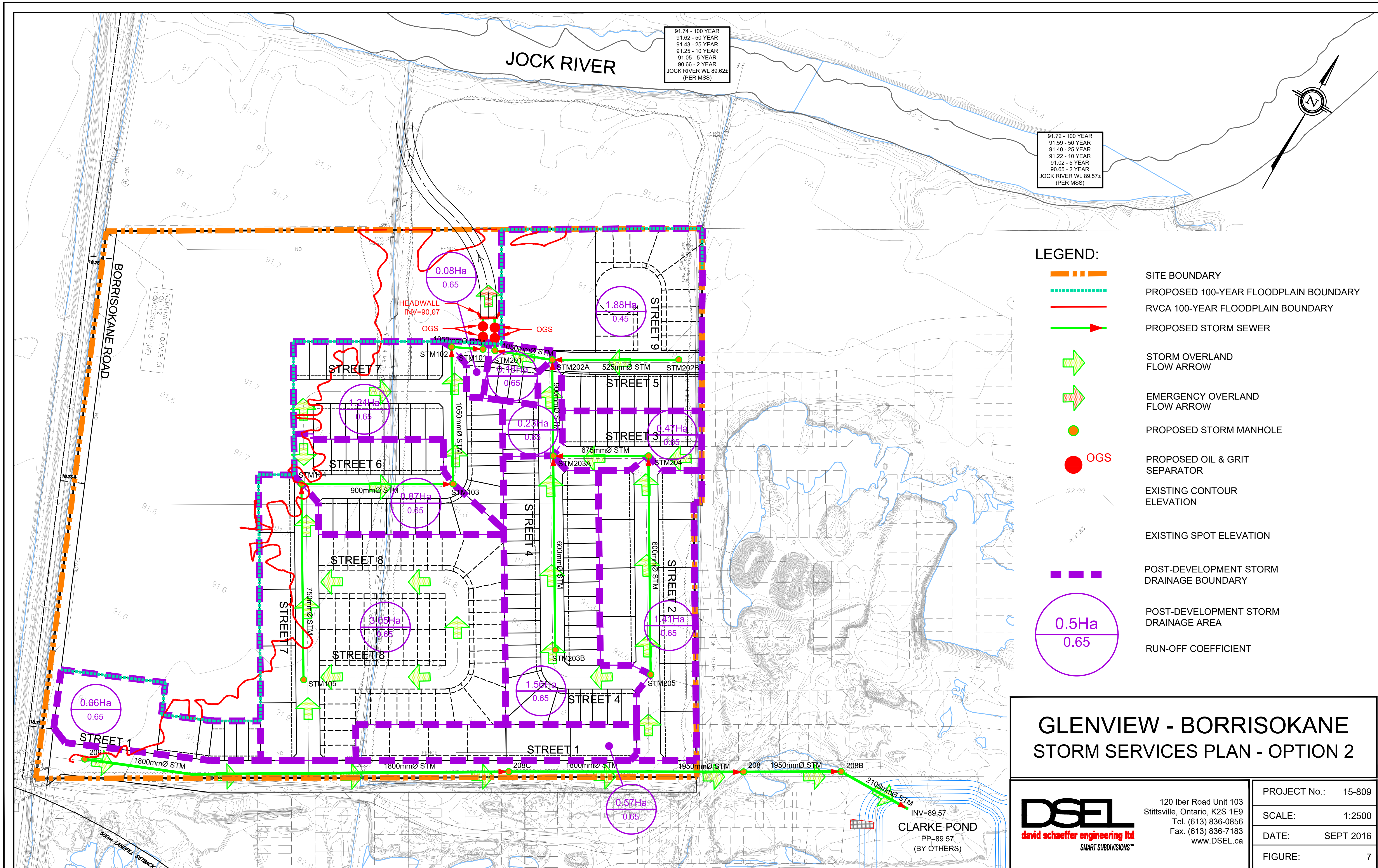
EXISTING DRAINAGE PLAN

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

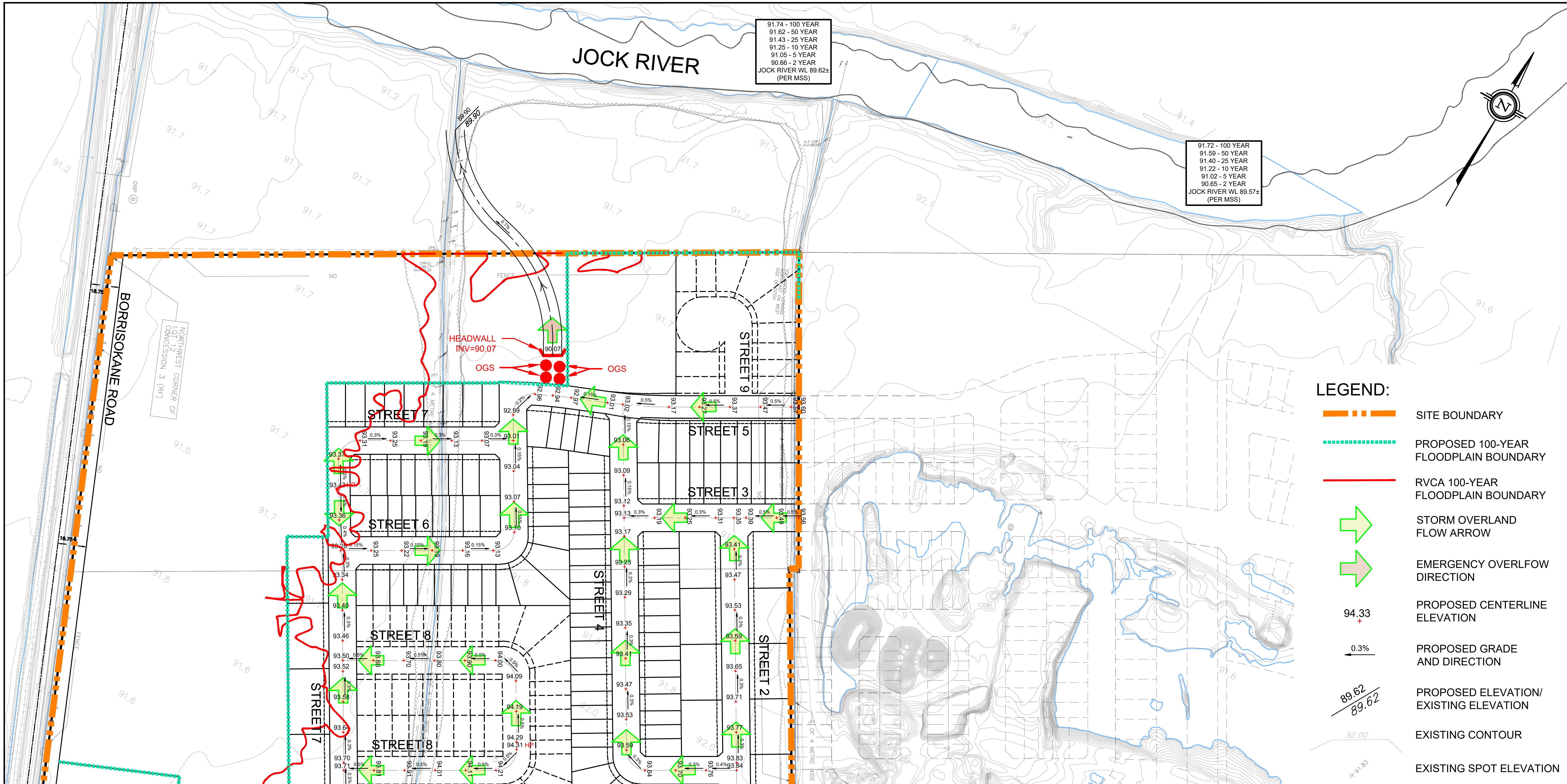
PROJECT No.:	15-809
SCALE:	1:4000
DATE:	SEPT 2016
FIGURE:	4


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)
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
SWM POND
BOTTOM=87.62
PP=89.62
100yr WL=91.74
SEDIMENT FOREBAY
HEADWALL
1200mmØ STM
1200mmØ STM
POND
OUTLET
INV=89.59
SEDIMENT
MANAGEMENT
AREA
0.76Ha
0.55
STREET 7
STREET 6
STREET 5
STREET 3
STREET 8
STREET 4
STREET 2
STREET 1
STM101
STM102
STM103
STM104A
STM104B
STM105
STM106
STM107
STM108
STM109
STM110
1050mmØ STM
1200mmØ STM
900mmØ STM
675mmØ STM
600mmØ STM
750Ø STM
1800mmØ STM
1950mmØ STM
2100mmØ STM
208
208B
208C
1.24Ha
0.65
0.26Ha
0.65
1.12Ha
0.65
0.23Ha
0.65
0.47Ha
0.65
0.87Ha
0.65
3.05Ha
0.65
1.41Ha
0.65
1.56Ha
0.65
0.66Ha
0.65
0.57Ha
0.65
INV=89.57
CLARKE POND
PP=89.57
(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
STORM OVERLAND FLOW ARROW
EMERGENCY OVERLAND FLOW ARROW
PROPOSED STORM MANHOLE
EXISTING CONTOUR ELEVATION
EXISTING SPOT ELEVATION
POST-DEVELOPMENT STORM DRAINAGE BOUNDARY
POST-DEVELOPMENT STORM DRAINAGE AREA
RUN-OFF COEFFICIENT
0.5Ha
0.65
GLENVIEW - BORRISOKANE
STORM 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: SEPT 2016
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)
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)
N
BORRISOKANE ROAD
NORTHWEST CORNER OF LOT 12 CONCESSION 3 (RF)
SWM POND
BOTTOM=87.62
PP=89.62
100yr WL=91.74
SEDIMENT FOREBAY
HEADWALL
POND OUTLET INV=89.59
SEDIMENT MANAGEMENT AREA
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
CLARKE POND
PP=89.57
(BY OTHERS)
500m LANDFILL SETBACK
LEGEND:
SITE BOUNDARY
PROPOSED 100-YEAR FLODDPLAIN 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
92.00
EXISTING CONTOUR
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: SEPT 2016
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)
BORRISOKANE ROAD
NORTHWEST CORNER OF LOT 12 CONCESSION 3 (RF)
HEADWALL INV=90.07
OGS
OGS
0.08Ha
0.65
1.88Ha
0.45
STREET 9
STREET 7
STREET 5
STREET 3
STREET 6
STREET 8
STREET 4
STREET 2
STREET 1
1.24Ha
0.65
0.18Ha
0.65
0.23Ha
0.65
0.47Ha
0.65
0.87Ha
0.65
3.05Ha
0.65
1.41Ha
0.65
1.56Ha
0.65
0.66Ha
0.65
0.57Ha
0.65
STM102
STM101
STM201
STM202A
525mmØ STM
STM202B
1050mmØ STM
900mmØ STM
675mmØ STM
STM203A
STM204
STM104
STM103
600mmØ STM
750mmØ STM
STM203B
STM205
STM105
1800mmØ STM
1950mmØ STM
2100mmØ STM
208
208B
208C
INV=89.57
CLARKE POND
PP=89.57
(BY OTHERS)
500m LANDFILL SETBACK
LEGEND:
SITE BOUNDARY
PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
RVCA 100-YEAR FLOODPLAIN BOUNDARY
PROPOSED STORM SEWER
STORM OVERLAND FLOW ARROW
EMERGENCY OVERLAND FLOW ARROW
PROPOSED STORM MANHOLE
OGS
PROPOSED OIL & GRIT SEPARATOR
92.00
EXISTING CONTOUR ELEVATION
EXISTING SPOT ELEVATION
POST-DEVELOPMENT STORM DRAINAGE BOUNDARY
0.5Ha
0.65
POST-DEVELOPMENT STORM DRAINAGE AREA
RUN-OFF COEFFICIENT
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: SEPT 2016
FIGURE: 7

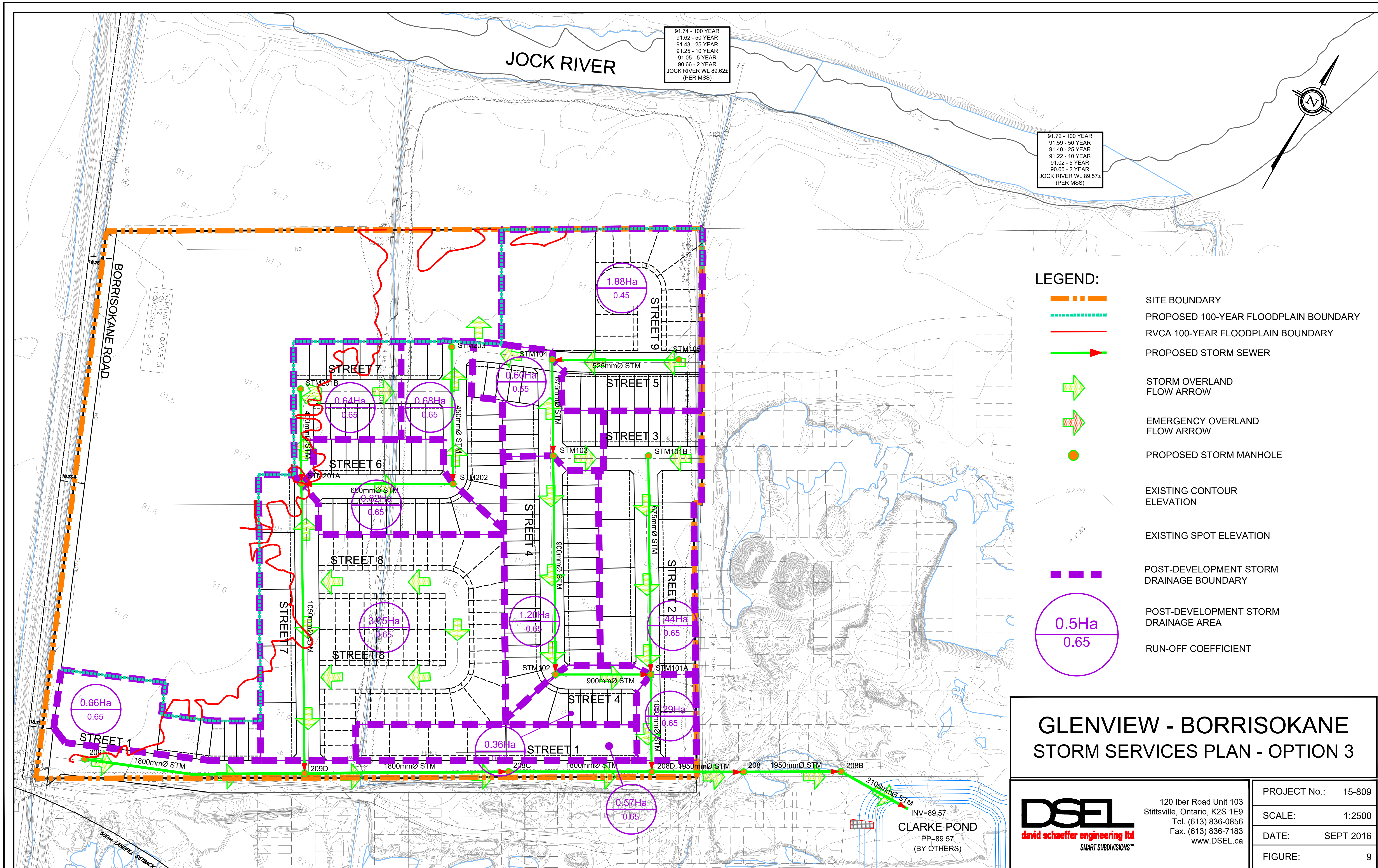


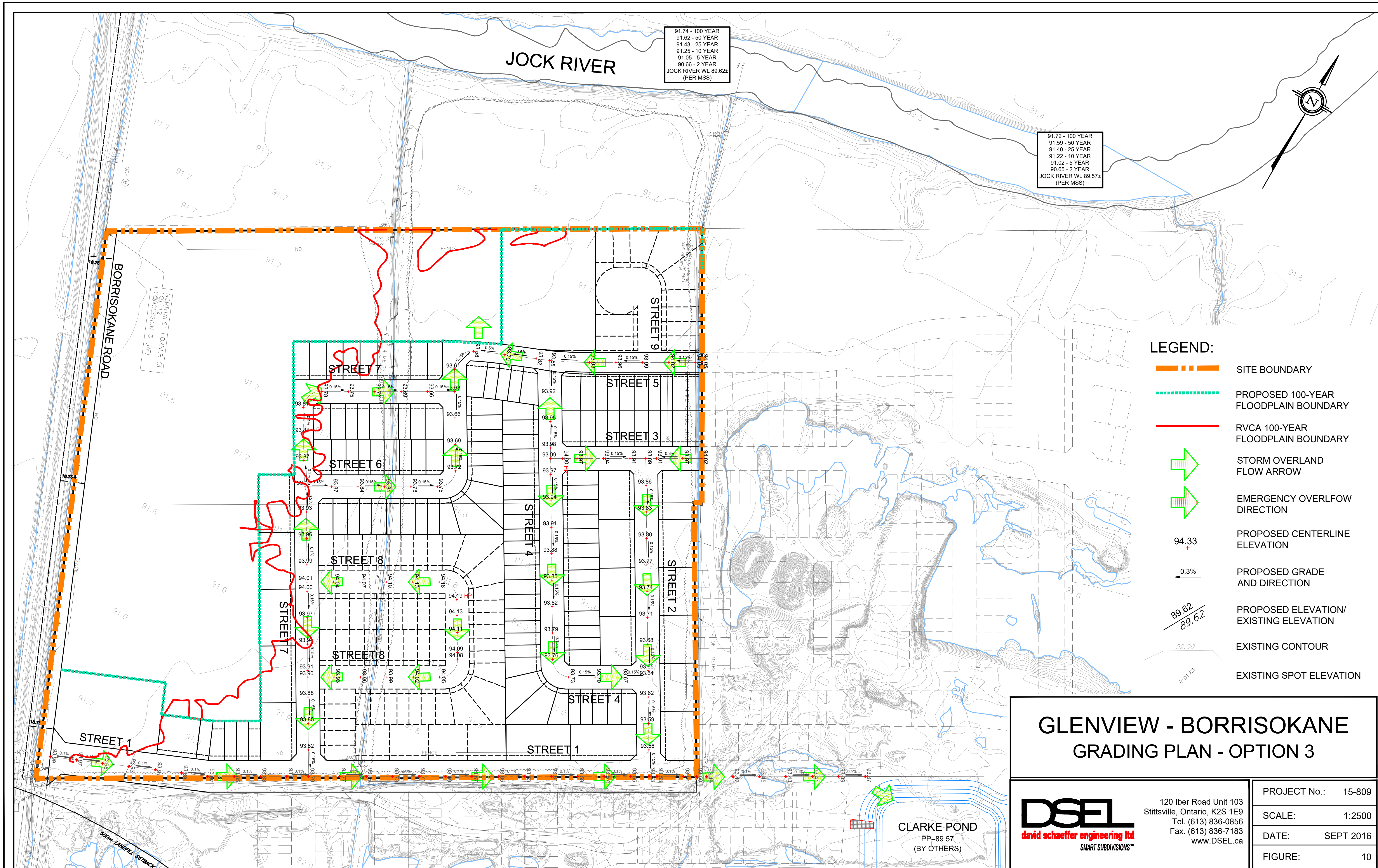
GLENVIEW - BORRISOKANE
GRADING PLAN - OPTION 2

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:	SEPT 2016
FIGURE:	8


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)
BORRISOKANE ROAD
NORTHWEST CORNER OF LOT 12 CONCESSION 3 (RF)
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
STM101A
STM101B
STM102
STM103
STM104
STM105
STM201A
STM201B
STM202
525mmØ STM
675mmØ STM
450mmØ STM
600mmØ STM
900mmØ STM
1050mmØ STM
1800mmØ STM
1950mmØ STM
2100mmØ STM
208
208B
208C
208D
209D
1.88Ha 0.45
0.60Ha 0.65
0.64Ha 0.65
0.68Ha 0.65
0.82Ha 0.65
3.05Ha 0.65
1.20Ha 0.65
1.44Ha 0.65
1.29Ha 0.65
0.36Ha 0.65
0.66Ha 0.65
0.57Ha 0.65
INV=89.57
CLARKE POND
PP=89.57
(BY OTHERS)
500m LANDFILL SETBACK
LEGEND:
SITE BOUNDARY
PROPOSED 100-YEAR FLOODPLAIN BOUNDARY
RVCA 100-YEAR FLOODPLAIN BOUNDARY
PROPOSED STORM SEWER
STORM OVERLAND FLOW ARROW
EMERGENCY OVERLAND FLOW ARROW
PROPOSED STORM MANHOLE
EXISTING CONTOUR ELEVATION
EXISTING SPOT ELEVATION
POST-DEVELOPMENT STORM DRAINAGE BOUNDARY
0.5Ha 0.65
POST-DEVELOPMENT STORM DRAINAGE AREA
RUN-OFF COEFFICIENT
GLENVIEW - BORRISOKANE
STORM SERVICES PLAN - OPTION 3
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: SEPT 2016
FIGURE: 9


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)
BORRISOKANE ROAD
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
CLARKE POND
PP=89.57
(BY OTHERS)
500m LANDFILL SETBACK
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
92.00
EXISTING CONTOUR
EXISTING SPOT ELEVATION
GLENVIEW - BORRISOKANE
GRADING PLAN - OPTION 3
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: SEPT 2016
FIGURE: 10

Appendix A

- Pre-Consultation Notes with City of Ottawa Staff (various)
- Servicing Guidelines Checklist (DSEL, September 2016)

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

Glenview
commercial | management | homes

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.	To be addressed in Paterson Group, September 2016
☐	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, Septmebr 2016) 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 E, Appendix F & Appendix G
☐	Set-back from private sewage disposal systems.	To be addressed in Paterson Group, September 2016
☐	Watercourse and hazard lands setbacks.	N/A - addressed in Drainage Feature Headwater Assessment, Kilgour August 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 E, 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 August 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 E, 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 & 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

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

☐	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	Section 7.0
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	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

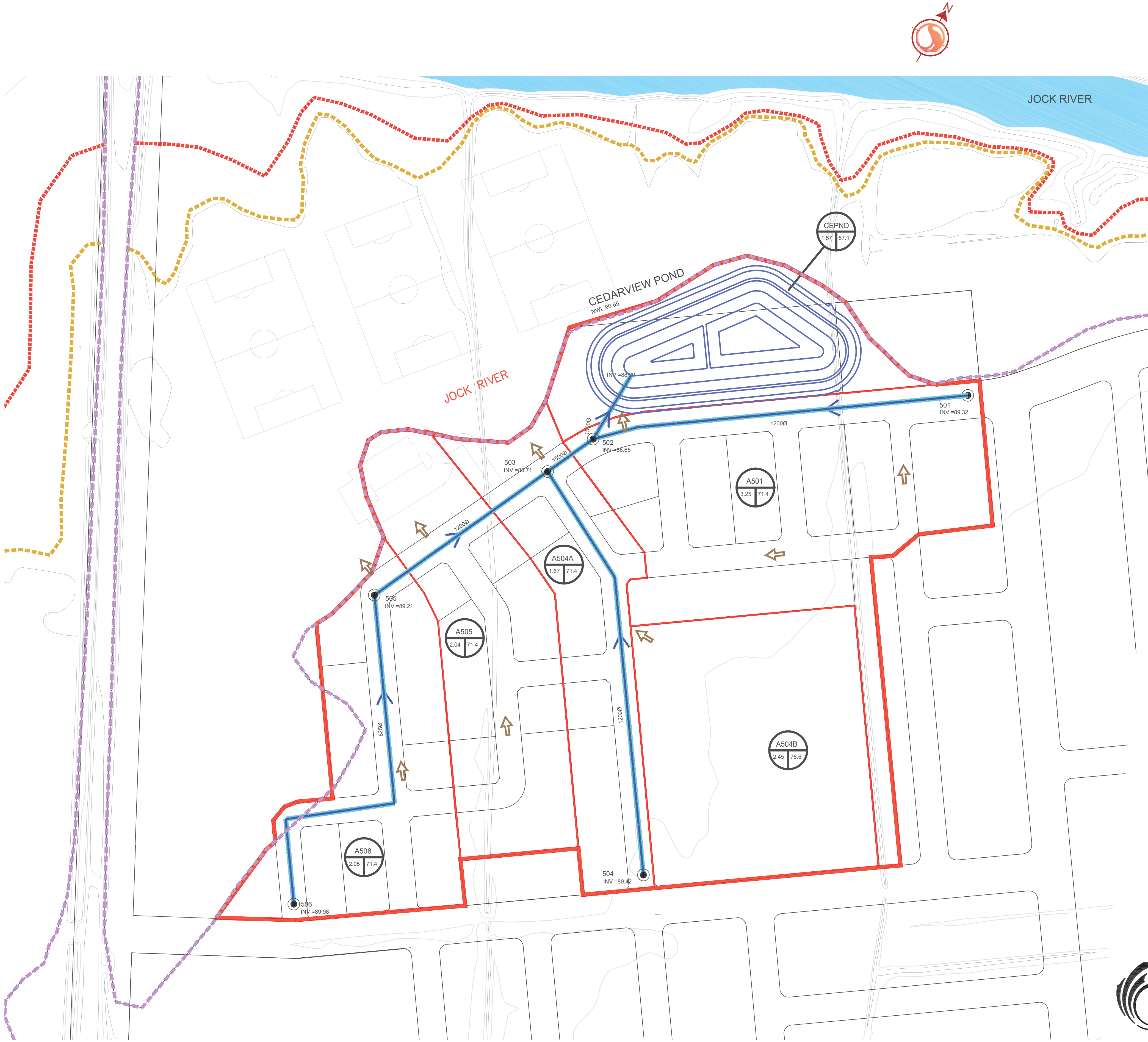
4.6 Conclusion Checklist

☐	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.	N/A – first submission
☐	All draft and final reports shall be signed and stamped by a professional Engineer registered in Ontario	Section 8.0

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

Appendix B

- Excerpts from Barrhaven South Master Servicing Study (Stantec, November 2014)



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
- CEDARVIEW POND — 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. 163400999

Scale 0 12.5 37.5 62.5m

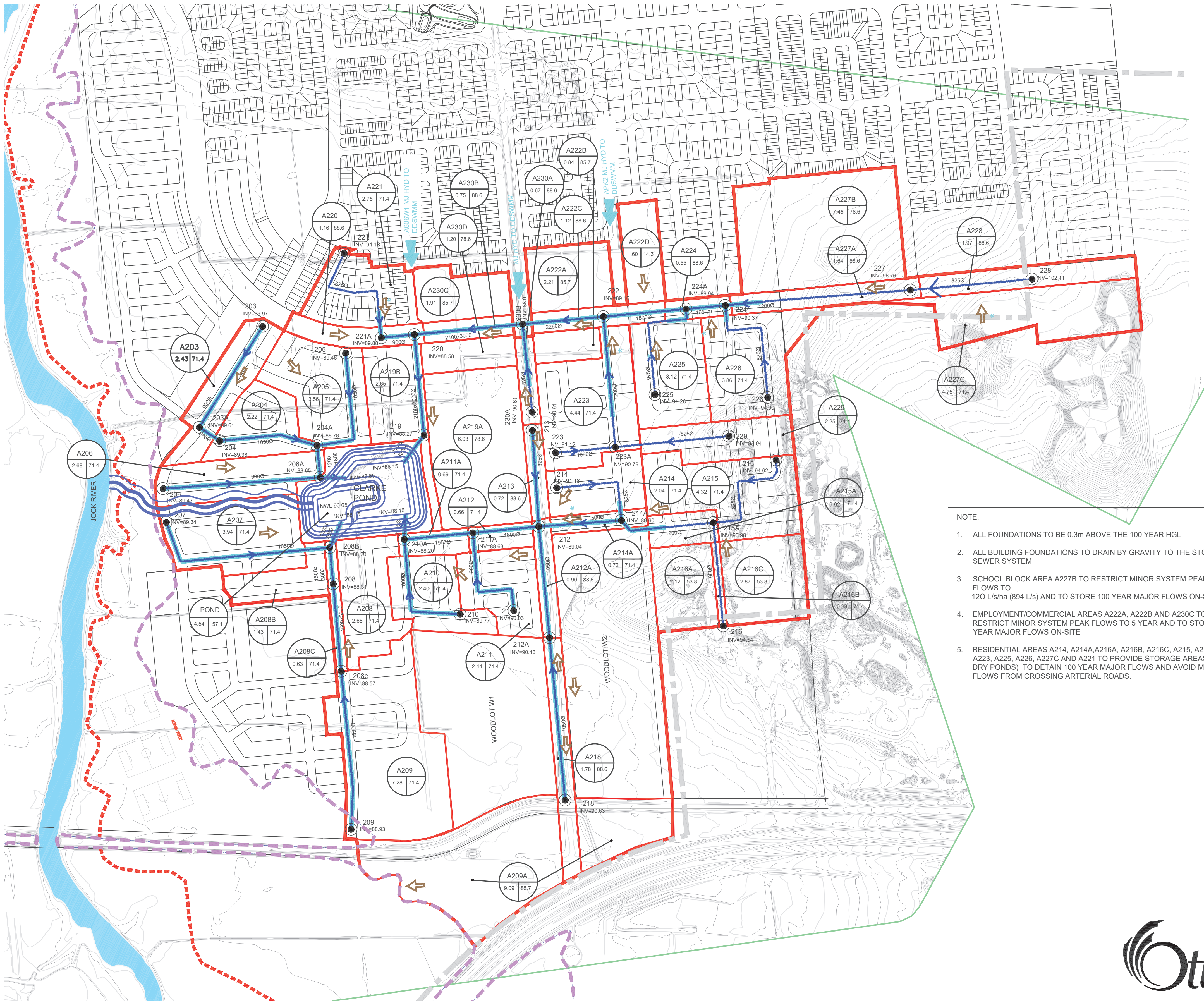
Drawing No. FIG 4-1

Sheet 1 of 3

Revision 1

Ottawa

ORIGINAL SHEET - ISO A1



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 12O 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

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

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

Permit-Seal

Client/Project
CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
CLARKE POND DRAINAGE PLAN

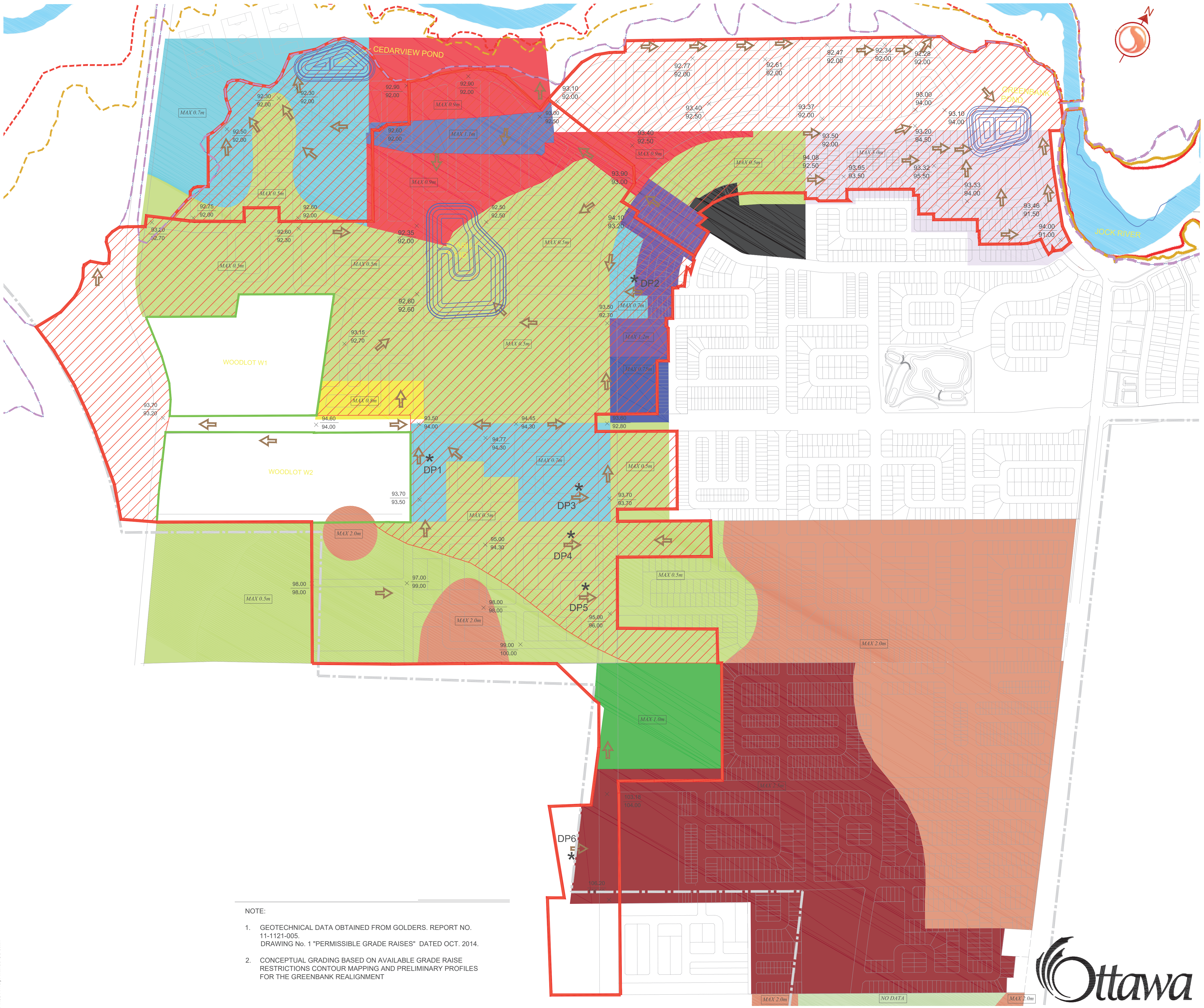
Project No. 163400999

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

ORIGINAL SHEET - ISO A1

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 PROPOSED ELEVATION
- 106.00 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	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

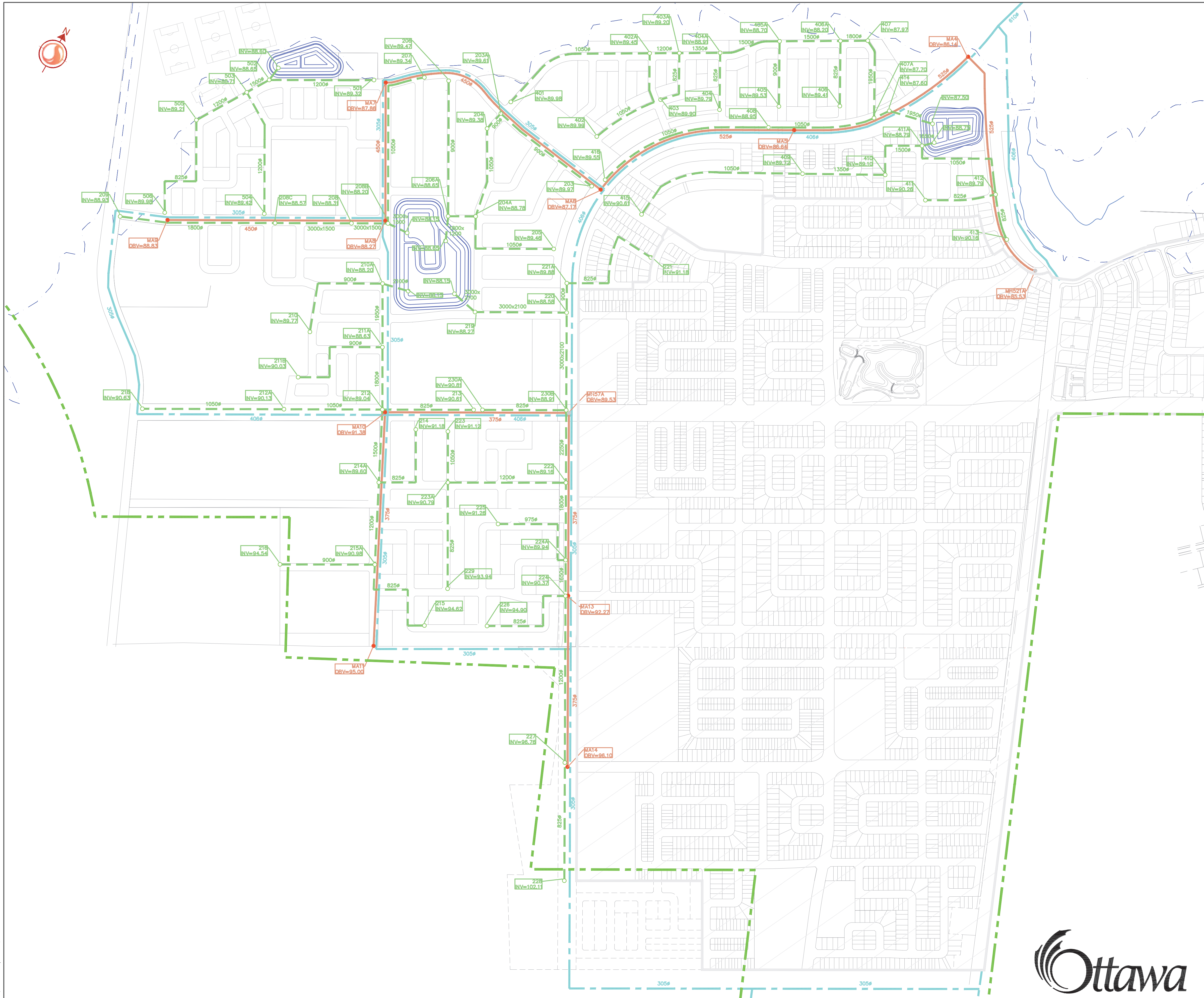
Project No. 163400999

Scale 1:4000 (0, 40, 120, 200m)

Drawing No. A-2

Sheet 2 of 9

Revision 1



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.

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

File Name: 163400999-DWG 3.DWG	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	ST	LP	AP	14.11.28

Permit-Seal

Client/Project

CITY OF OTTAWA

BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM

Ottawa, ON

Title

SERVICING KEY PLAN

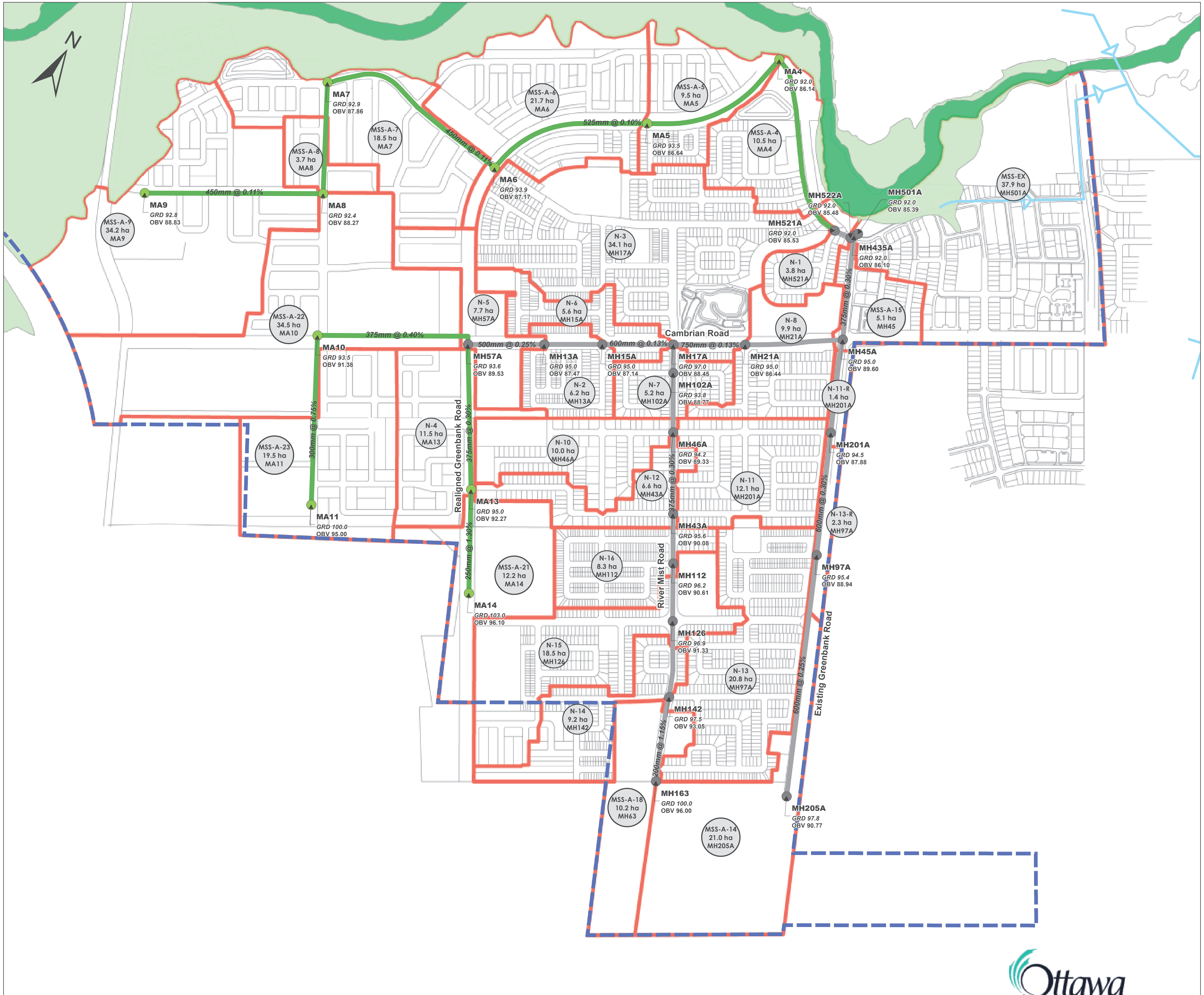
Project No. 163400999

Scale 1:4000 (0 40 120 200m)

Drawing No. A-3

Sheet 3 of 9

Revision 1



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
- SANITARY CATCHMENT INFORMATION (Area Name / Area (ha) / Manhole)

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

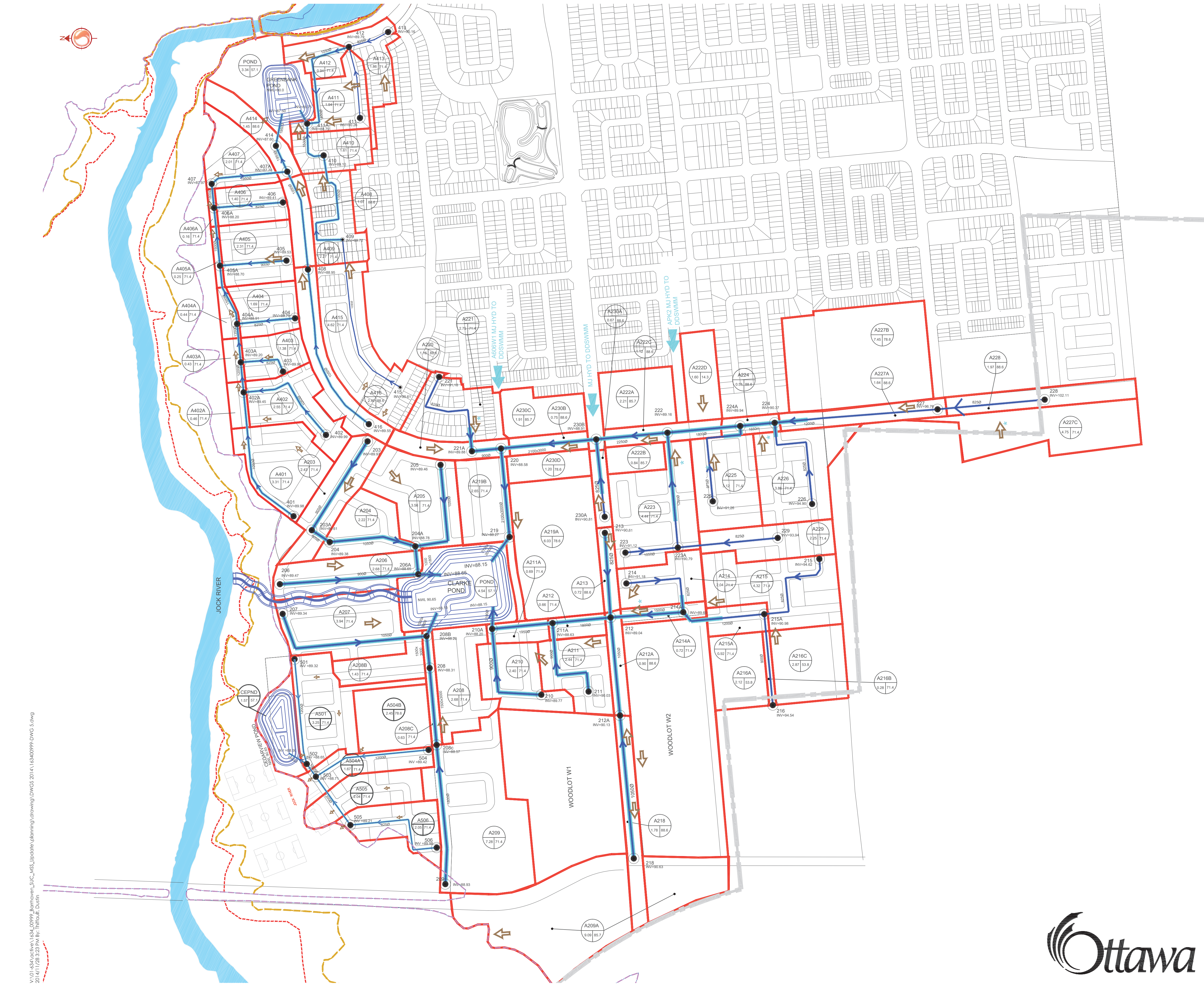
Ottawa, ON

Title

SANITARY SERVICING PLAN

Project No.	Scale	
163400999	1:5,000	0 75 150 300 Meters

Drawing No.	Sheet	Revision
A-4	4 of 9	1



Stantec

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

Legend

A414 / 1.45 / 88.6	AREA ID; TOTAL IMPERVIOUSNESS (%); AREA (ha)
	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
GREENBANK POND	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

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

File Name: 163400999-DWG 5.DWG	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	ST	AP	AP	14.11.21

Permit-Seal

Client/Project
CITY OF OTTAWA

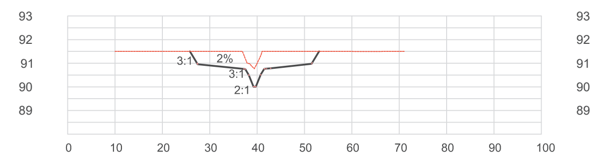
BARRHAVEN SOUTH MASTER SERVICING STUDY ADDENDUM
Ottawa, ON

Title
STORM WATER SERVICING PLAN

Project No. 163400999
Scale 1:4000 (0, 40, 120, 200m)

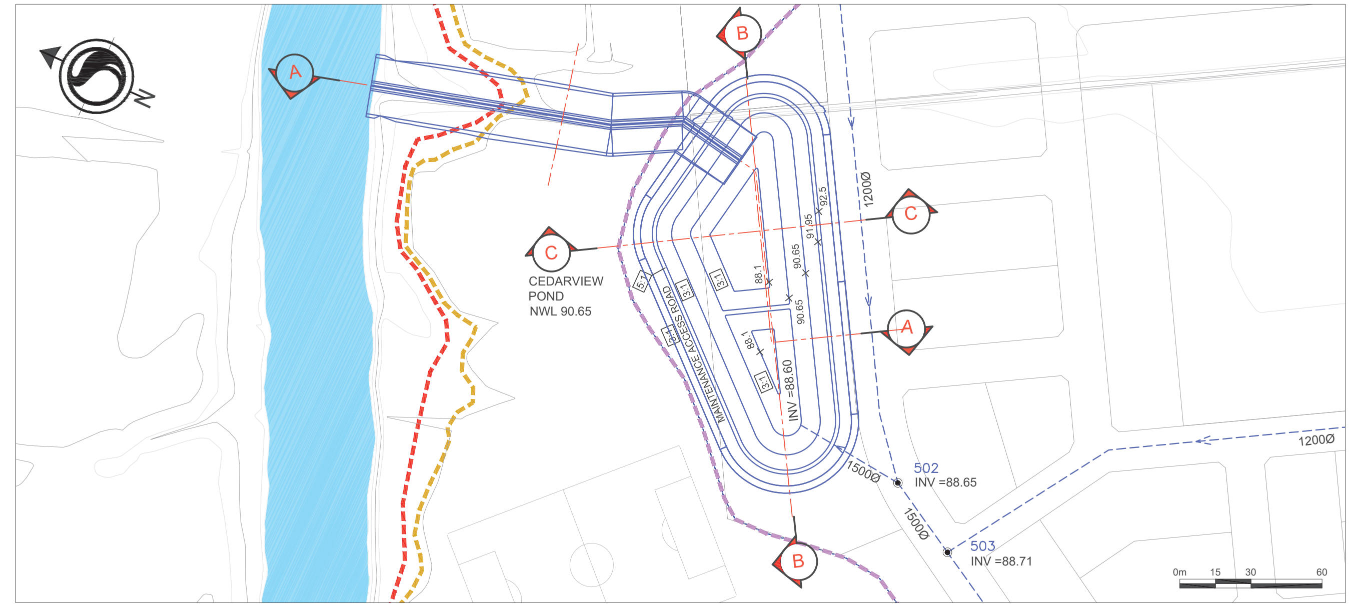
Drawing No. A-5
Sheet 5 of 9
Revision 1

Ottawa

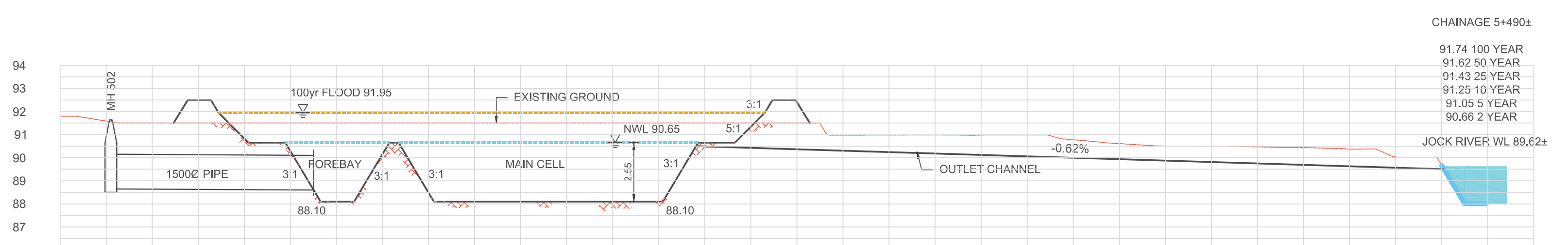


SECTION D

1:750 (HORIZ.) 1:150 (VERT.)

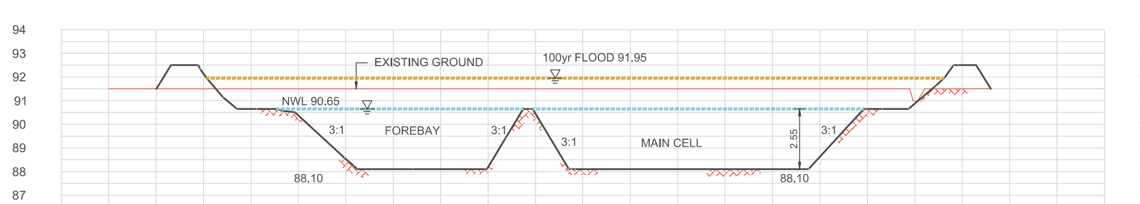


CEDARVIEW POND - PLAN

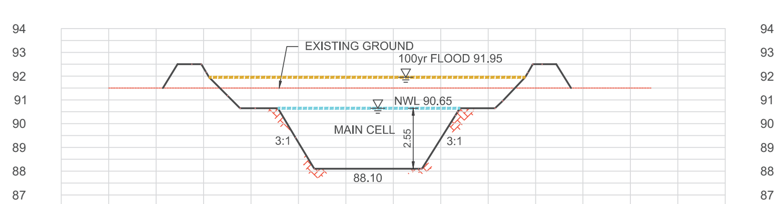


SECTION A

1:750 (HORIZ.) 1:150 (VERT.)



SECTION B



SECTION C

1:750 (HORIZ.) 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

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

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

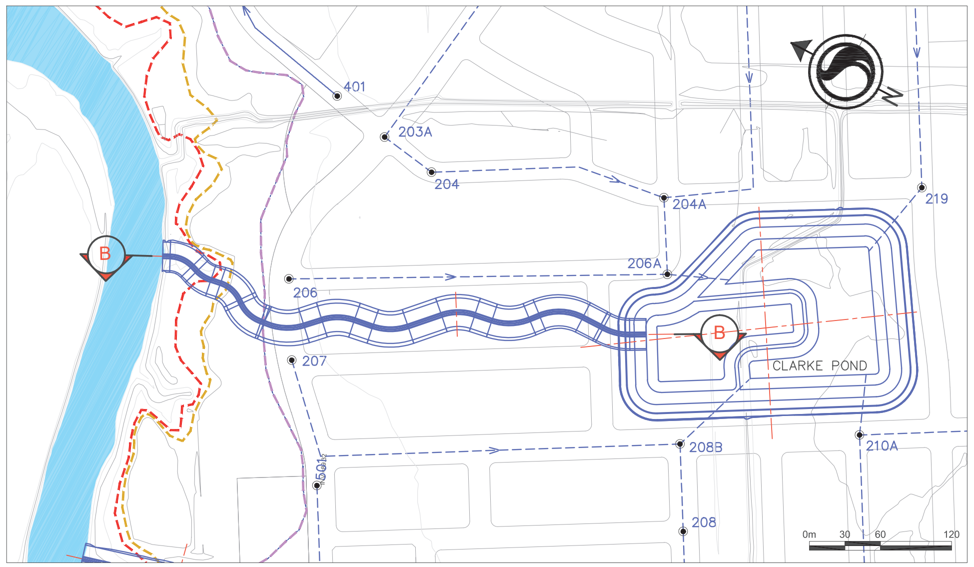
BARRHAVEN SOUTH MASTER
SERVICING STUDY ADDENDUM
Ottawa, ON

Title
CEDARVIEW POND - CONCEPTUAL
POND CONFIGURATION AND PROFILES

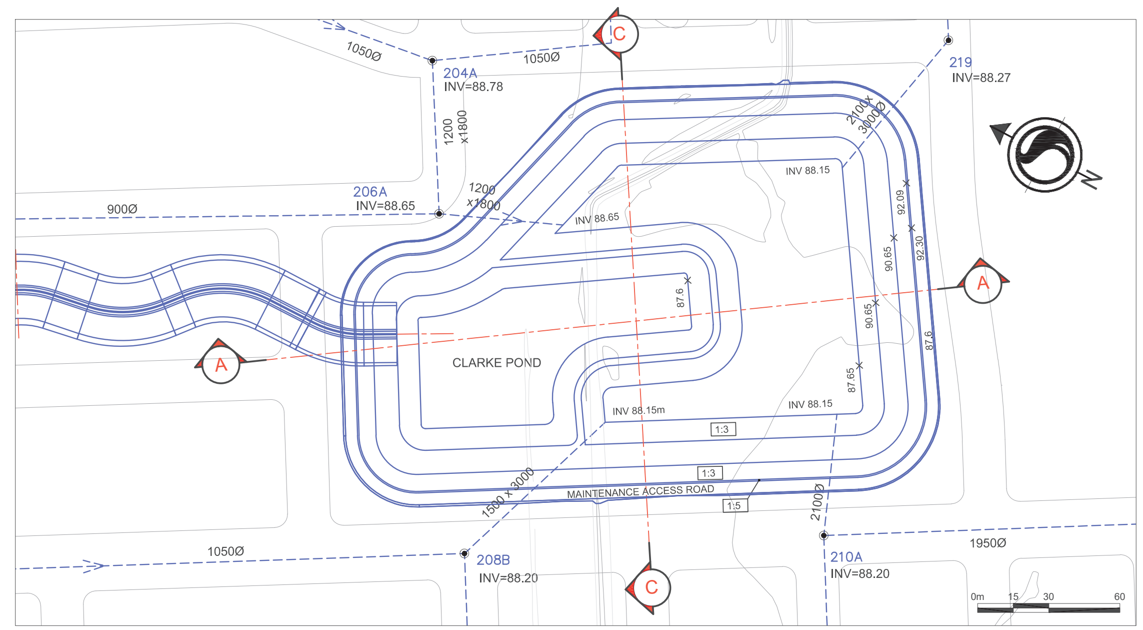
Project No. 163400999 | Scale AS SHOWN

Drawing No. A-6 | Sheet 6 of 9 | Revision 1

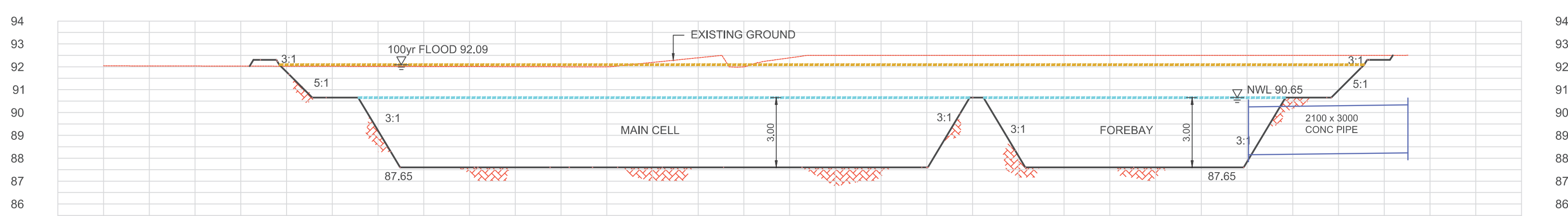
ORIGINAL SHEET - ISO A1



CLARKE POND / DRAINAGE DITCH - PLAN

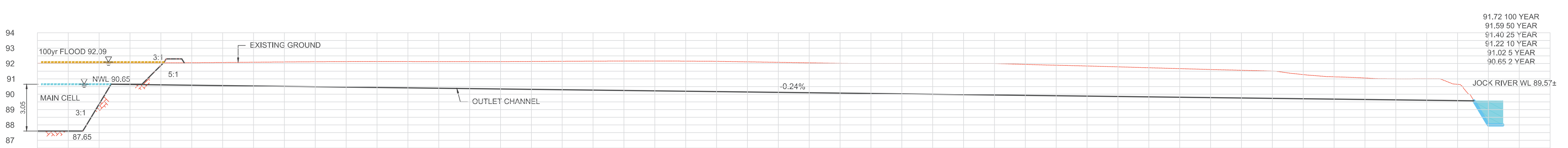


CLARKE POND - PLAN



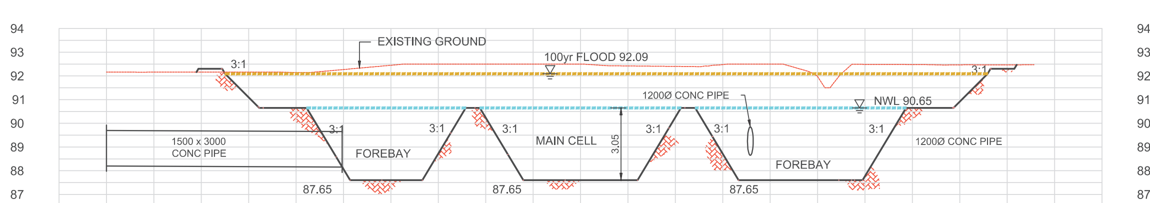
SECTION A

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



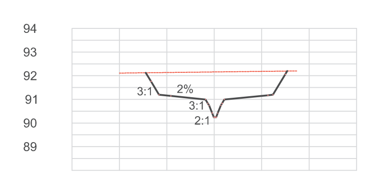
SECTION B

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



SECTION C

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



SECTION D

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

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

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

File Name: 163400999-DWG 6-8.DWG	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	ST	AP	AP	14.11.21

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

ORIGINAL SHEET - ISO A1

Appendix C

- Water Demand Calculations (DSEL, September 2016)

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	179	609
Semi-detached	2.7		0
Townhouse	2.7	109	295
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	904	316.4	219.7	791.0	549.3	1740.2	1208.5

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		0.00	0.0	0.0	0.0	0.0	0.0
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	39.7	27.6	59.6	41.4	107.2	74.4
			Total Demand	**356.1**	**247.3**	**850.6**	**590.7**	**1847.4**	**1282.9**

Appendix D

- Sanitary Sewer Design Sheet (DSEL, September 2016)

SANITARY SEWER CALCULATION SHEET

2016-09-23

PROJECT:
LOCATION:
FILE REF:
DATE:

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				Pop.	Cumulative		Peak.	Q_{res}	Area	Accu.	Area	Accu.	Area	Accu.	Q_{C+I+I}	Total	Accu.	Infiltration	Total	DIA	Slope	Length	$A_{hydraulic}$	R	Velocity	Q_{cap}	Q / Q full
				by type					Area	Pop.	Fact.			Area		Area		Area		Area	Area	Flow	Flow								
			(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)	(-)
Area MSS-A-9 From Stantec MSS, November 2014, areas and population updated to exclude subject site			12.49					1336	12.49	1336	3.72	20.11	0	0	0	0	9.54	9.54	7.7	22.030	22.030	6.168	34.01								
	MA9	MA8	0.800	6		29		99.0	13.290	1435.0	3.69	21.47	0.43	0.43	0.00	0.00	0.00	9.54	8.1	1.230	23.260	6.513	36.09	450	0.11	507.5	0.159	0.113	0.59	94.6	0.38
MSS-A-8	MA8	MA7	2.880					308.0	16.170	1743.0	3.63	25.64	0.00	0.43	0.00	0.00	0.78	10.32	8.7	3.660	26.920	7.538	41.91	450	0.11	317.1	0.159	0.113	0.59	94.6	0.44
	SAN108	SAN107	3.050	51		30		254.0	3.050	254.0	4.00	4.12	0.00	0.00	0.00	0.00	0.00	0.00	0.0	3.050	3.050	0.854	4.97	200	0.32	144.0	0.031	0.050	0.59	18.6	0.27
	SAN107	SAN106	0.870	20				68.0	3.920	322.0	4.00	5.22	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.870	3.920	1.098	6.32	200	0.32	113.0	0.031	0.050	0.59	18.6	0.34
	SAN106	SAN105	1.250	25				85.0	5.170	407.0	4.00	6.59	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.250	5.170	1.448	8.04	200	0.32	106.0	0.031	0.050	0.59	18.6	0.43
	SAN105	SAN104	0.250	5				17.0	5.420	424.0	4.00	6.87	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.250	5.420	1.518	8.39	200	0.32	73.0	0.031	0.050	0.59	18.6	0.45
	SAN104	SAN103A	1.460	25				85.0	6.880	509.0	3.97	8.19	0.00	0.00	0.00	0.00	0.65	0.65	0.5	2.110	7.530	2.108	10.82	200	0.32	74.0	0.031	0.050	0.59	18.6	0.58
	SAN103B	SAN103A	1.190	31				105.0	1.190	105.0	4.00	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.190	1.190	0.333	2.03	200	0.32	165.0	0.031	0.050	0.59	18.6	0.11
	SAN103A	SAN102A	0.290	6				20.0	8.360	634.0	3.92	10.06	0.00	0.00	0.00	0.00	0.00	0.65	0.5	0.290	9.010	2.523	13.11	200	0.32	71.0	0.031	0.050	0.59	18.6	0.71
	SAN102B	SAN102A	1.770	7		50		159.0	1.770	159.0	4.00	2.58	0.00	0.00	0.00	0.00	0.00	0.00	0.0	1.770	1.770	0.496	3.07	200	0.32	165.0	0.031	0.050	0.59	18.6	0.17
	SAN102A	SAN101	0.190	4				14.0	10.320	807.0	3.86	12.61	0.00	0.00	0.00	0.00	0.00	0.65	0.5	0.190	10.970	3.072	16.21	200	0.32	41.3	0.031	0.050	0.59	18.6	0.87
	SAN101	MA7	0.000					0.0	10.320	807.0	3.86	12.61	0.00	0.00	0.00	0.00	0.00	0.65	0.5	0.000	10.970	3.072	16.21	200	0.32	113.0	0.031	0.050	0.59	18.6	0.87
MSS-A-7	MA7	MA6	18.500					1979.0	44.990	4529.0	3.28	60.26	0.00	0.00	0.00	0.00	0.00	0.00	0.0	18.500	56.390	15.789	76.05	450	0.11	573.1	0.159	0.113	0.59	94.6	0.80

Highlighted information from Barrhaven South Master Servicing Study by Stantec, dated November 2014

Appendix E

- Option 1 – Storm Sewer Design Sheet (DSEL, 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 #1 - Cedarview Pond per MSS																		
To Cedarview Pond																		
204	STM204	STM203	1.41	0.65	0.92	0.92	11.6	96.4	245.5	600	0.30	163	0.283	0.150	1.19	336.3	2.3	0.73
203	STM203	STM202A	0.47	0.65	0.31	1.22	13.9	87.3	296.5	675	0.30	72	0.358	0.169	1.29	460.4	0.9	0.64
202B	STM202B	STM202A	1.56	0.65	1.01	1.01	10.8	100.1	282.1	600	0.30	147	0.283	0.150	1.19	336.3	2.1	0.84
202A	STM202A	STM201A	0.23	0.65	0.15	2.39	14.8	84.2	557.6	900	0.15	72	0.636	0.225	1.10	701.1	1.1	0.80
201B	STM201B	STM201A	0.48	0.65	0.31	0.31	10.0	104.2	90.3	375	0.50	96	0.110	0.094	1.12	124.0	1.4	0.73
201A	STM201A	STM101	0.18	0.65	0.12	2.81	15.9	80.7	631.2	900	0.15	77	0.636	0.225	1.10	701.1	1.2	0.90
105	STM105	STM104	3.05	0.65	1.98	1.98	12.6	92.2	507.8	750	0.30	148	0.442	0.188	1.38	609.8	1.8	0.83
104	STM104	STM103	0.87	0.65	0.57	2.55	14.4	85.6	605.8	900	0.15	115	0.636	0.225	1.10	701.1	1.7	0.86
103	STM103	STM102	1.24	0.65	0.81	3.35	16.1	80.1	746.1	1050	0.15	105	0.866	0.263	1.22	1057.6	1.4	0.71
102	STM102	STM101	0.08	0.65	0.05	3.41	17.6	76.1	720.1	1050	0.15	77	0.866	0.263	1.22	1057.6	1.1	0.68
	STM101	Pond	0	0.65	0.00	6.22	18.6	73.5	1269.3	1200	0.15	20	1.131	0.300	1.34	1510.0	0.2	0.84
To Clarke Pond																		
From Subject Site			1.23	0.65	0.80	0.80												
A209, A209A	209	208C	16.37	0.76	12.44	13.24	10.0	104.2	3832.2	1800	0.15	240	2.545	0.450	1.75	4451.9	2.3	0.86
A208C	208C	208	0.63	0.7	0.44	13.68	12.3	93.5	3553.1	1950	0.10	178	2.986	0.488	1.51	4499.9	2.0	0.79
A208C	208	208B	2.68	0.7	1.88	15.56	14.3	86.0	3718.4	1950	0.10	74	2.986	0.488	1.51	4499.9	0.8	0.83
A208B, A207	208B	Pond	5.37	0.7	3.76	19.32	15.1	83.3	4470.7	2100	0.10	31	3.464	0.525	1.58	5483.1	0.3	0.82
Highlighted information from Barrhaven South Master Servicing Study by Stantec, dated November 2014																		
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																		

Appendix F

- Option 2 – Storm Sewer Design Sheet (DSEL, September 2016)
- Option 2 - 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	1.41	0.65	0.92	0.92	11.6	96.4	245.5	600	0.30	163	0.283	0.150	1.19	336.3	2.3	0.73
204	STM204	STM203A	0.47	0.65	0.31	1.22	13.9	87.3	296.5	675	0.30	72	0.358	0.169	1.29	460.4	0.9	0.64
203B	STM203B	STM203A	1.56	0.65	1.01	1.01	10.8	100.1	282.1	600	0.30	147	0.283	0.150	1.19	336.3	2.1	0.84
203A	STM203A	STM202A	0.23	0.65	0.15	2.39	14.8	84.2	557.6	900	0.15	72	0.636	0.225	1.10	701.1	1.1	0.80
202B	STM202B	STM202A	1.88	0.45	0.85	0.85	10.0	104.2	244.9	525	0.50	96	0.216	0.131	1.40	304.1	1.1	0.81
202A	STM202A	STM201	0.18	0.65	0.12	3.35	15.9	80.7	751.0	1050	0.15	77	0.866	0.263	1.22	1057.6	1.1	0.71
	STM201	OGS	0	0.65	0.00	3.35	17.0	77.7	723.0	1050	0.15	10	0.866	0.263	1.22	1057.6	0.1	0.68
105	STM105	STM104	3.05	0.65	1.98	1.98	12.6	92.2	507.8	750	0.30	148	0.442	0.188	1.38	609.8	1.8	0.83
104	STM104	STM103	0.87	0.65	0.57	2.55	14.4	85.6	605.8	900	0.15	115	0.636	0.225	1.10	701.1	1.7	0.86
103	STM103	STM102	1.24	0.65	0.81	3.35	16.1	80.1	746.1	900	0.15	104	0.636	0.225	1.10	701.1	1.6	1.06
102	STM102	STM101	0.08	0.65	0.05	3.41	17.7	75.7	716.6	1050	0.15	24	0.866	0.263	1.22	1057.6	0.3	0.68
	STM101	OGS	0	0.65	0.00	3.41	18.0	74.9	708.7	1050	0.15	10	0.866	0.263	1.22	1057.6	0.1	0.67
To Clarke Pond																		
From Subject Site			1.23	0.65	0.80	0.80												
A209, A209A	209	208C	16.37	0.76	12.44	13.24	10.0	104.2	3832.2	1800	0.15	240	2.545	0.450	1.75	4451.9	2.3	0.86
A208C	208C	208	0.63	0.7	0.44	13.68	12.3	93.5	3553.1	1950	0.10	178	2.986	0.488	1.51	4499.9	2.0	0.79
A208C	208	208B	2.68	0.7	1.88	15.56	14.3	86.0	3718.4	1950	0.10	74	2.986	0.488	1.51	4499.9	0.8	0.83
A208B, A207	208B	Pond	5.37	0.7	3.76	19.32	15.1	83.3	4470.7	2100	0.10	31	3.464	0.525	1.58	5483.1	0.3	0.82
Highlighted information from Barrhaven South Master Servicing Study by Stantec, dated November 2014																		
Starting Tc 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

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

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

APPENDIX I
CDS TSS REMOVAL CALCULATIONS, Unit 1
PSD VALIDATION

CONTECH ENGINEERED SOLUTIONS

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

CDS TECHNOLOGIES

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
Weighted C 0.67
CDS Model 4040

Rainfall Station # 215
Particle Size Distribution FINE
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.

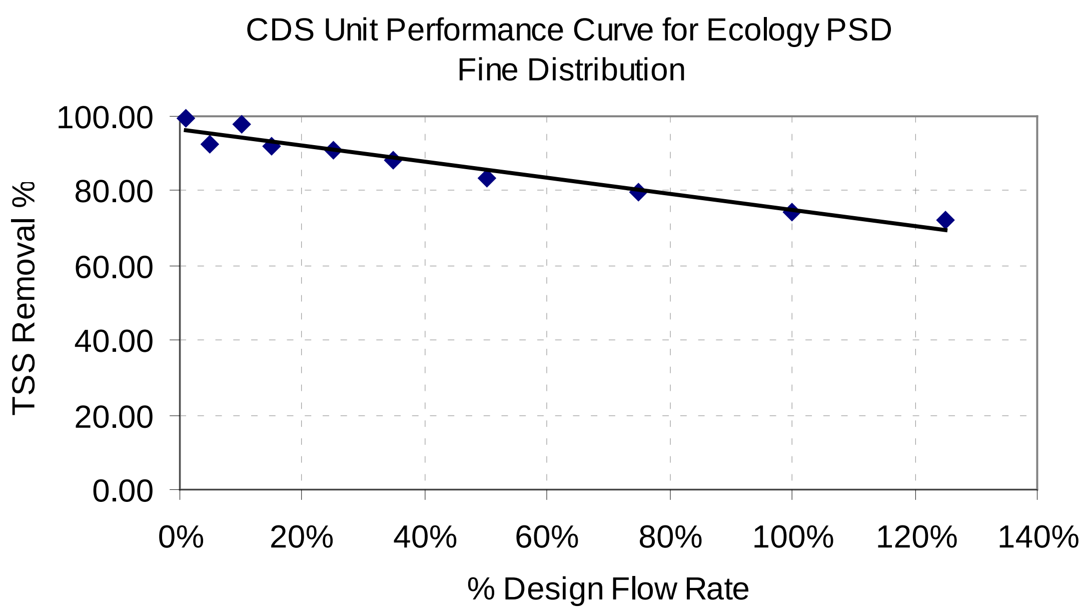


Figure 1. CDS Unit Performance for Fine PSD

CDS Unit Performance Testing Protocol

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.

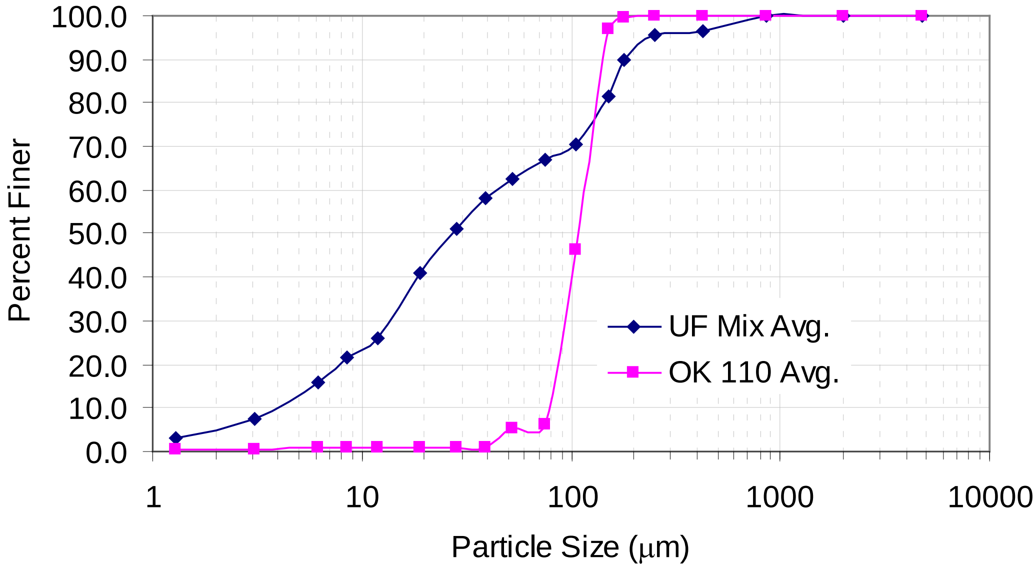


Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

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

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
Weighted C 0.67
CDS Model 4040

Rainfall Station # 215
Particle Size Distribution FINE
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.

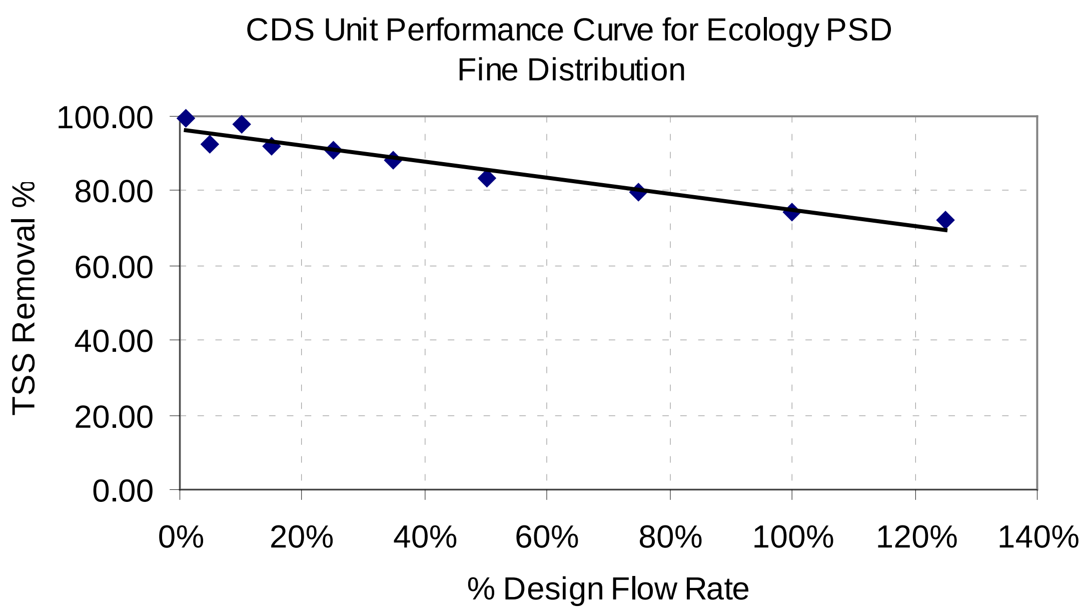


Figure 1. CDS Unit Performance for Fine PSD

CDS Unit Performance Testing Protocol

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.

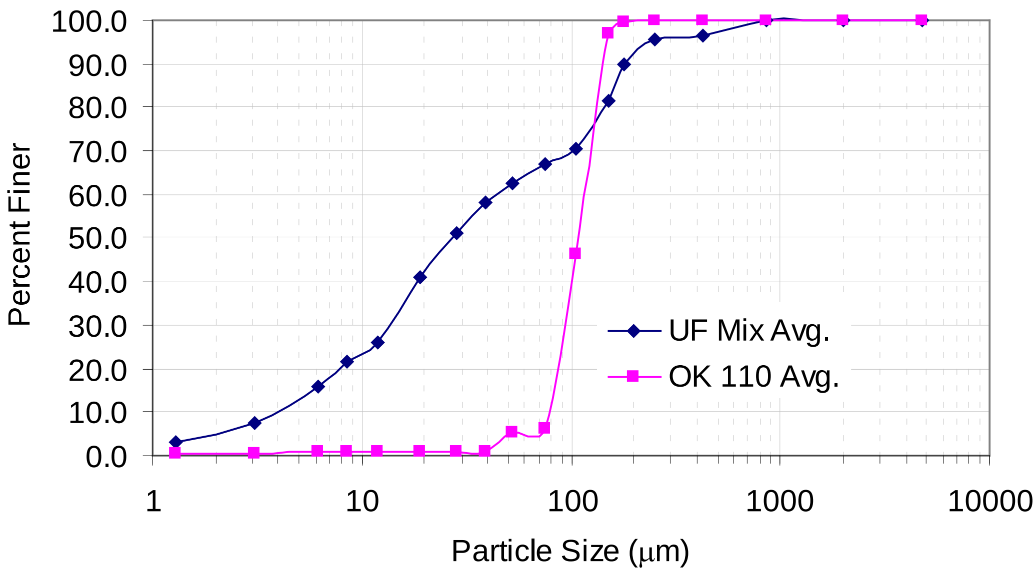


Figure 2. Test material particle size gradations - CDS Model PMSU20_20 test
(Analytical results provided by MACTEC Engineering and Consulting Inc. FL
ASTM D-422 with Hydrometer method)

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.

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	**Project:**	Glenview leikin, unit 1
Contact:	Mr. S. Merrick EIT	**CDS Model:**	40_40_8
Report Date:	23-Sep-16	**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

CDS

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.

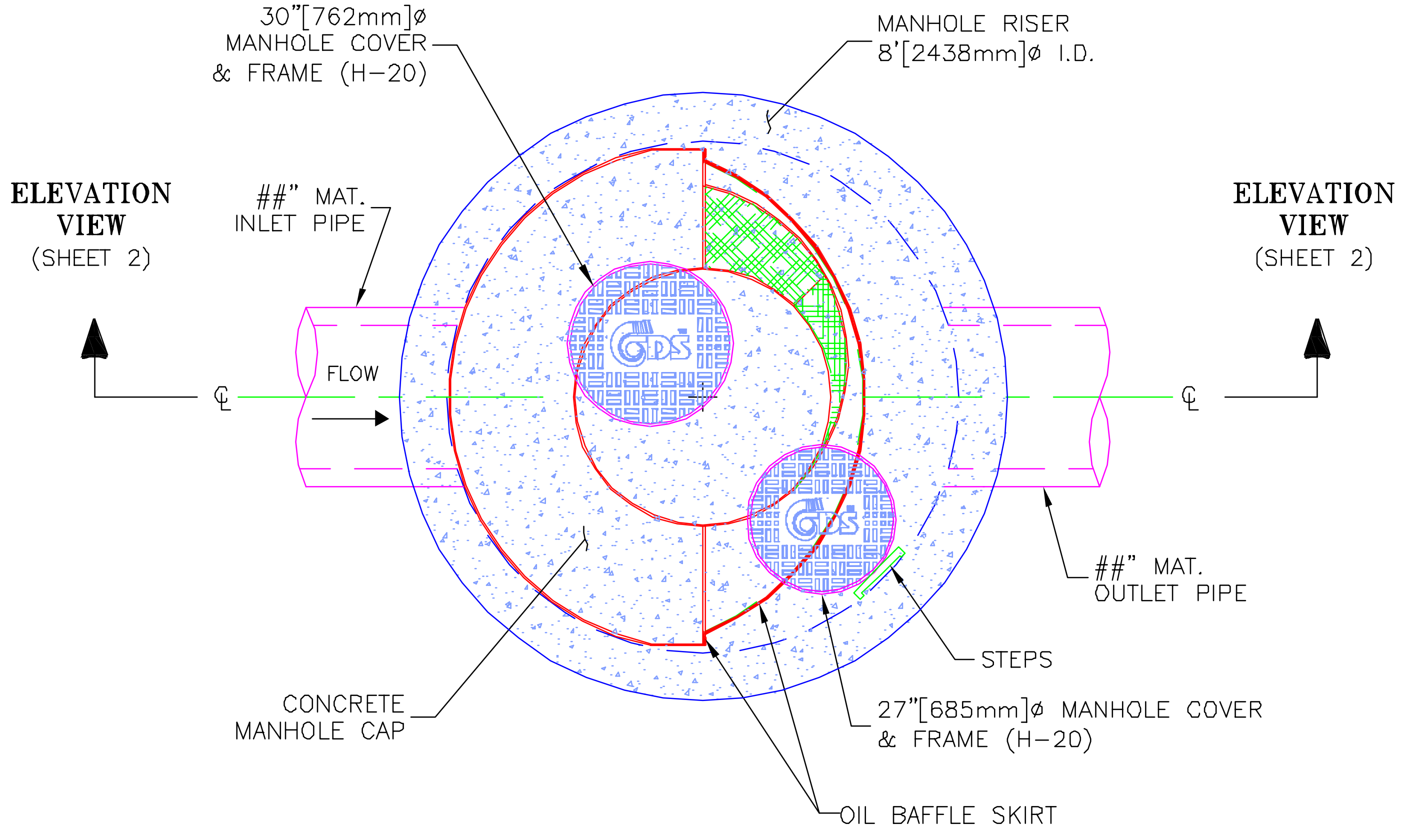
Sump Capacity of CDS unit = 4.270 cu.m

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

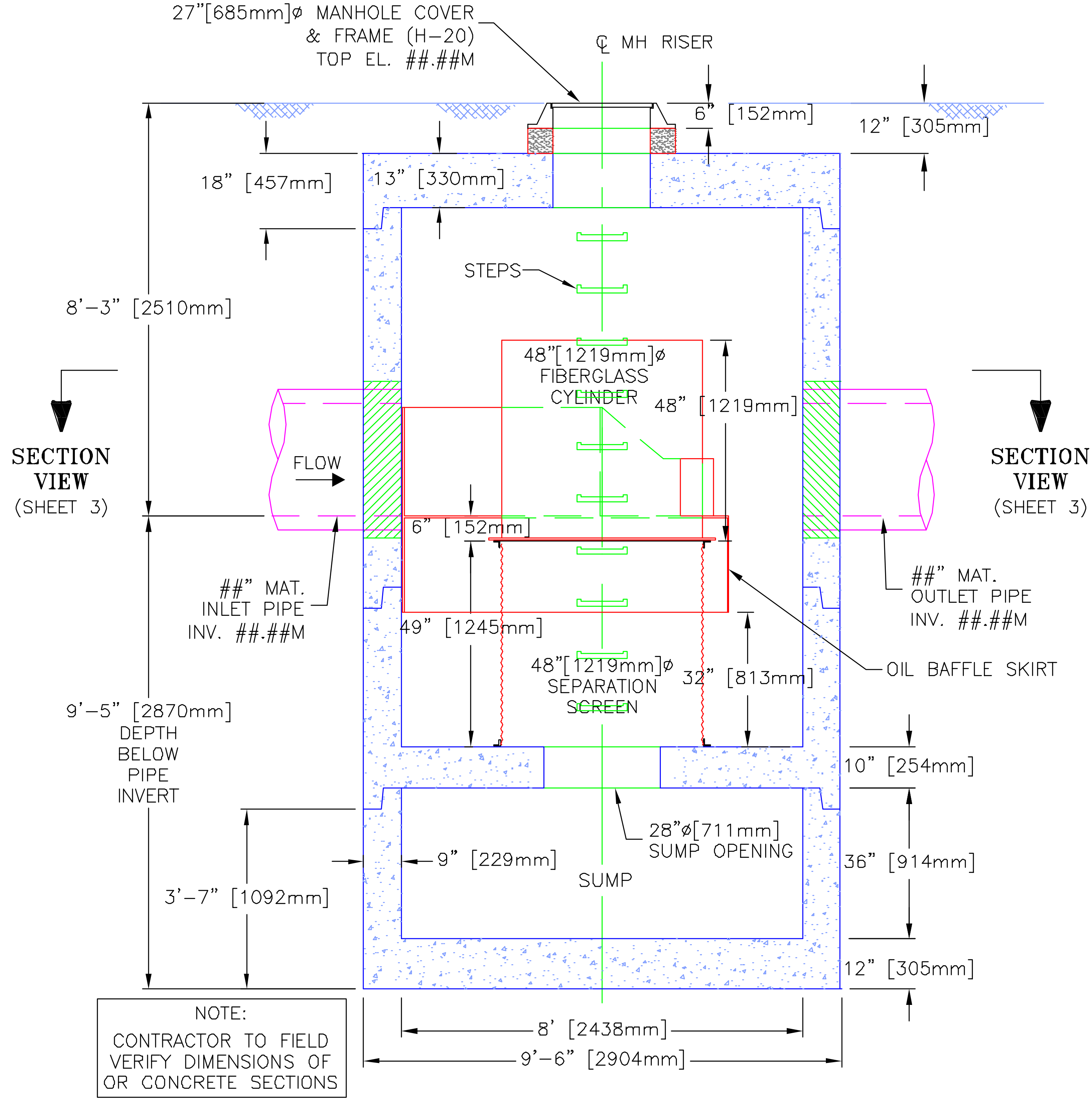


CDS MODEL PMSU40_40m, 6.0 CFS TREATMENT CAPACITY STORM WATER TREATMENT UNIT

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



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

PROJECT NAME CITY, STATE	JOB#	XX–##–###	SCALE 1" = 3'
	DATE	##/##/##	SHEET
	DRAWN	INITIALS	2
	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**

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.

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**

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.

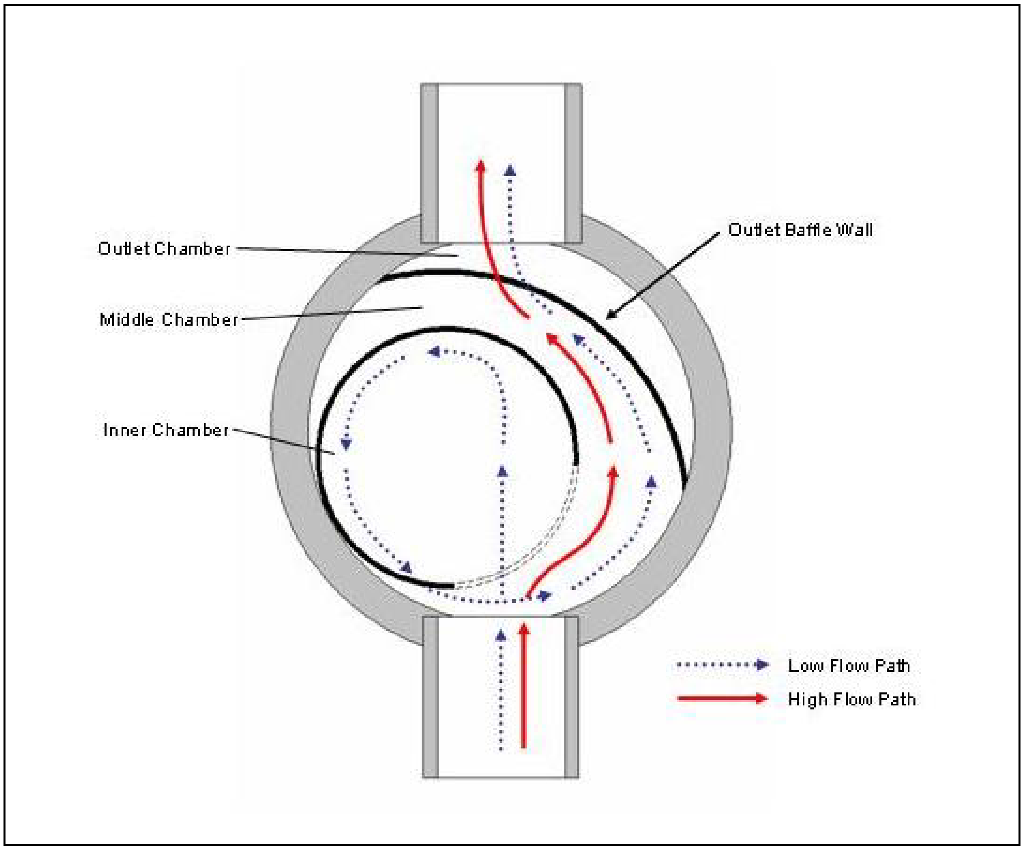


Figure 1. Hydroworks HG Operation – Plan View

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.

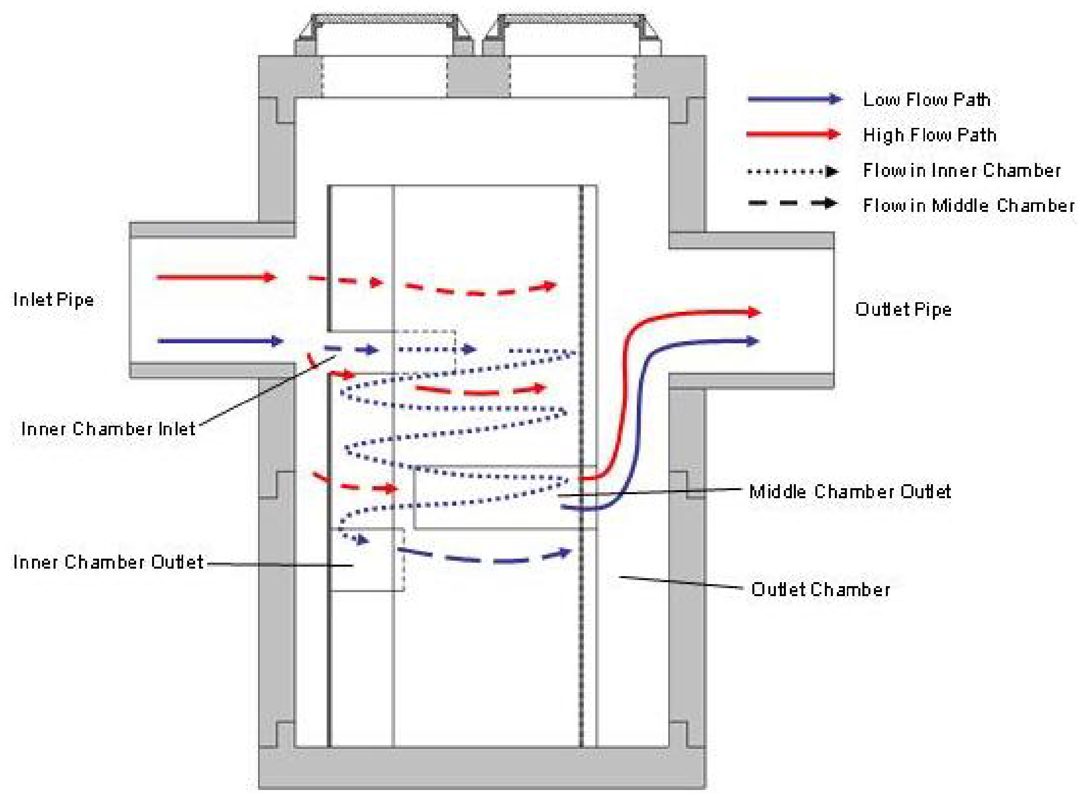


Figure 2. Hydroworks HG Operation – Profile View

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.

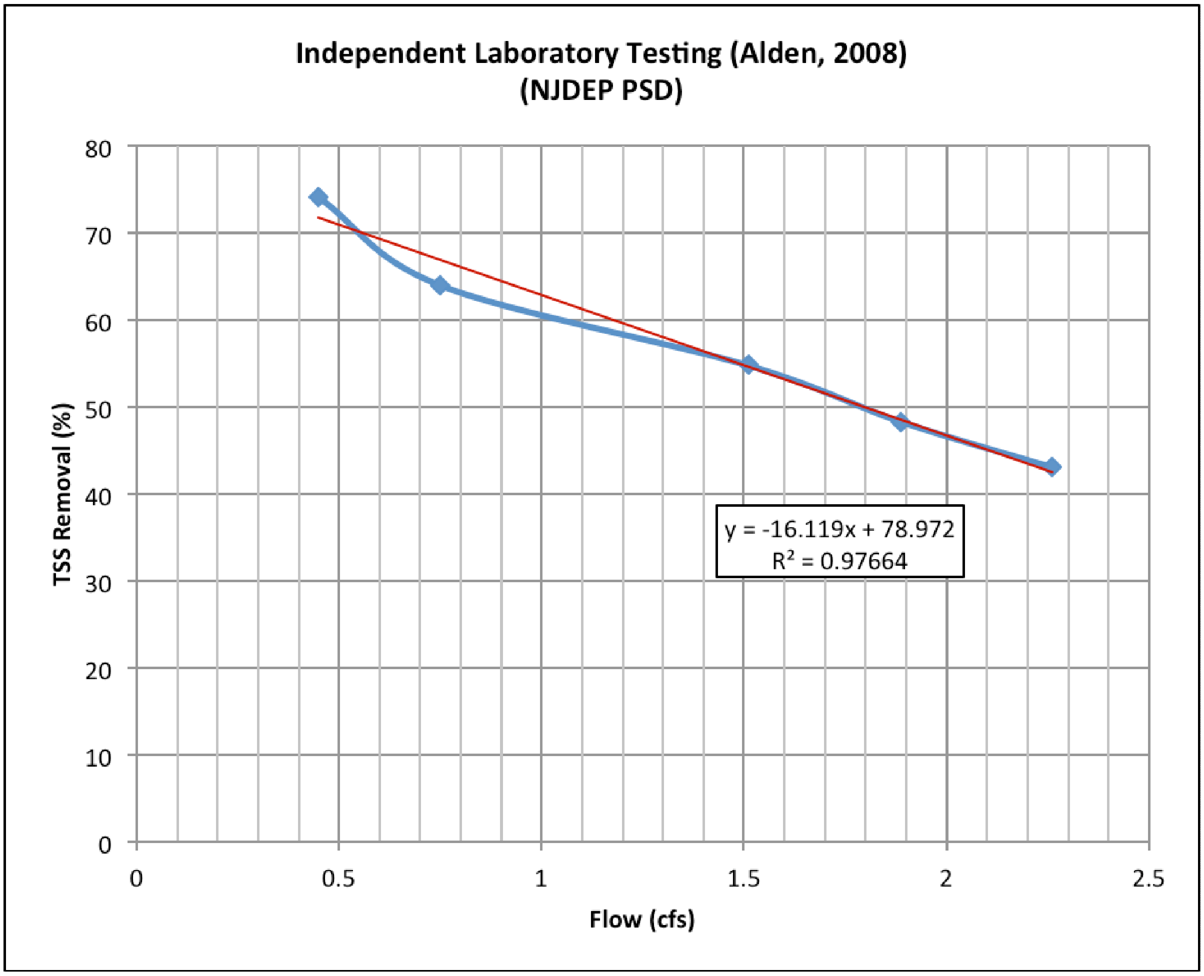


Figure 3. Independent Laboratory Results (Alden, 208)

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

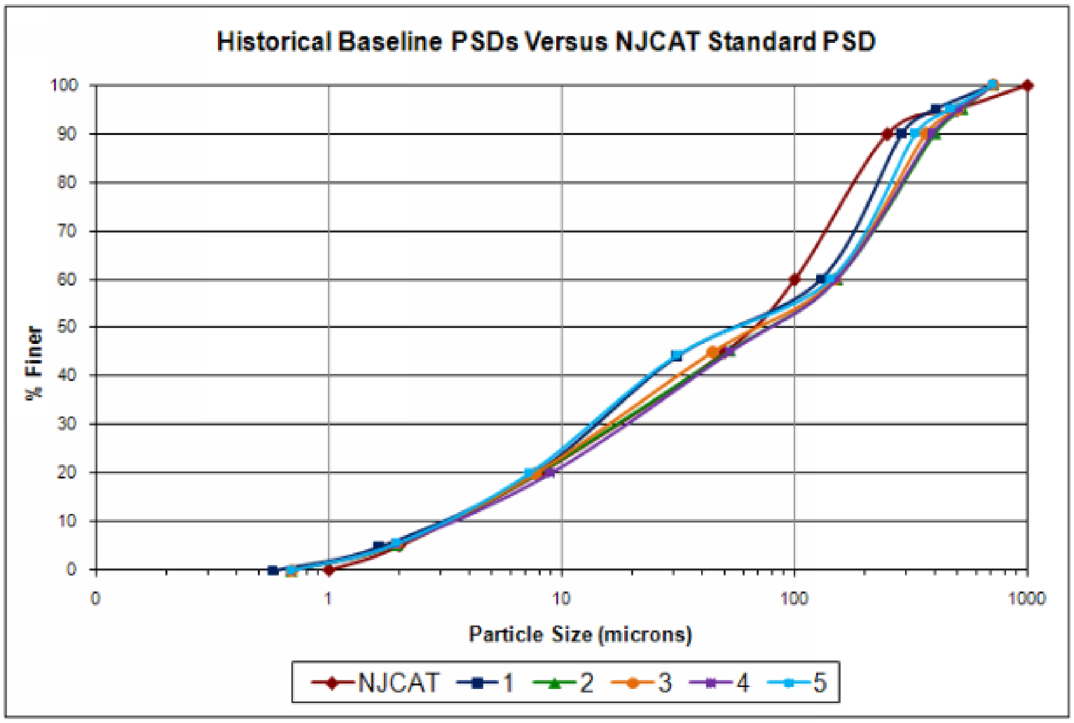


Figure 9: Test sediment mix PSD

ALDEN

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.

$Pe = Vs\ h\ d / Q$ 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).

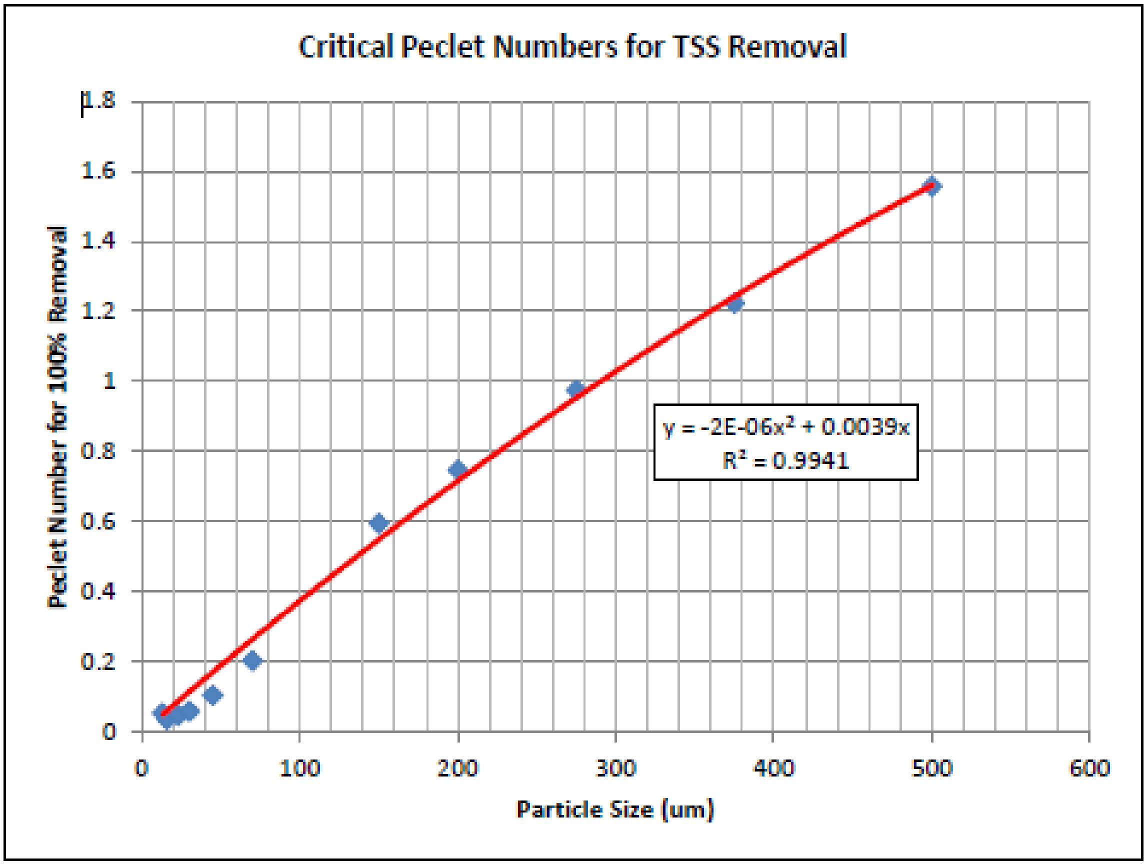


Figure 5. Critical Peclet Number Curve

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.

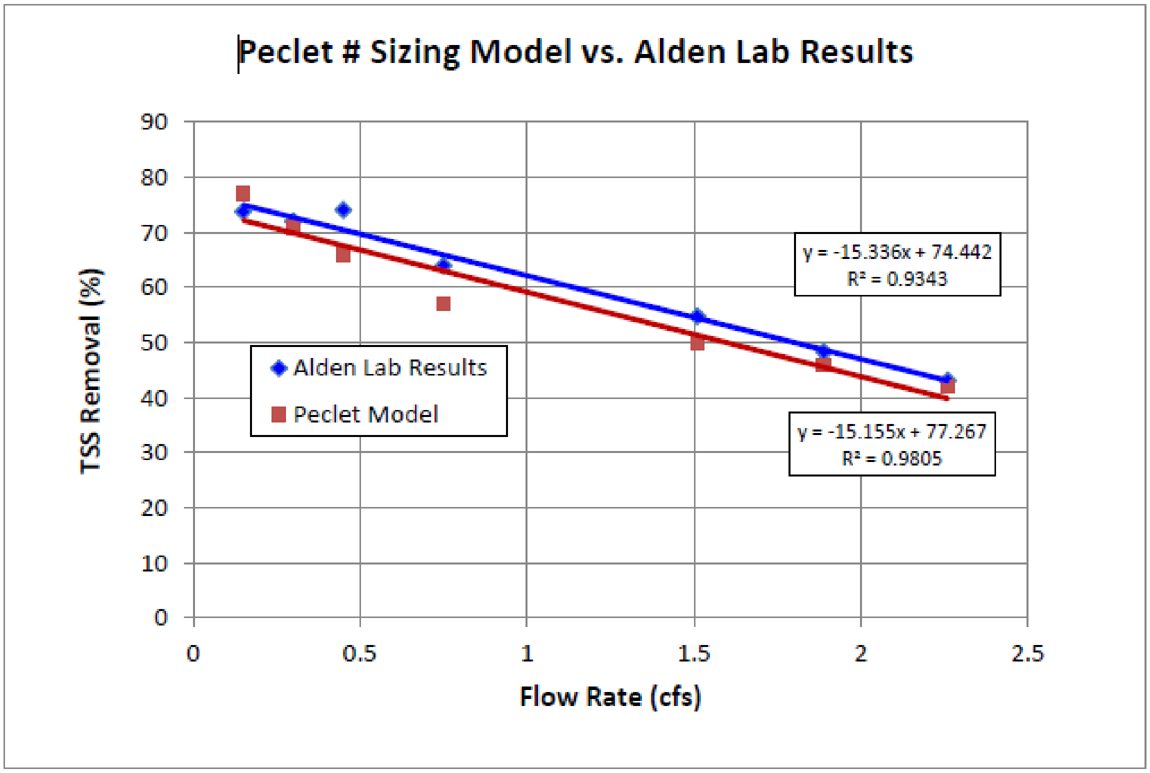


Figure 6. Independent Laboratory TSS Removal Performance versus Peclet Sizing Model

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

<u>Sizing Results</u>

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.

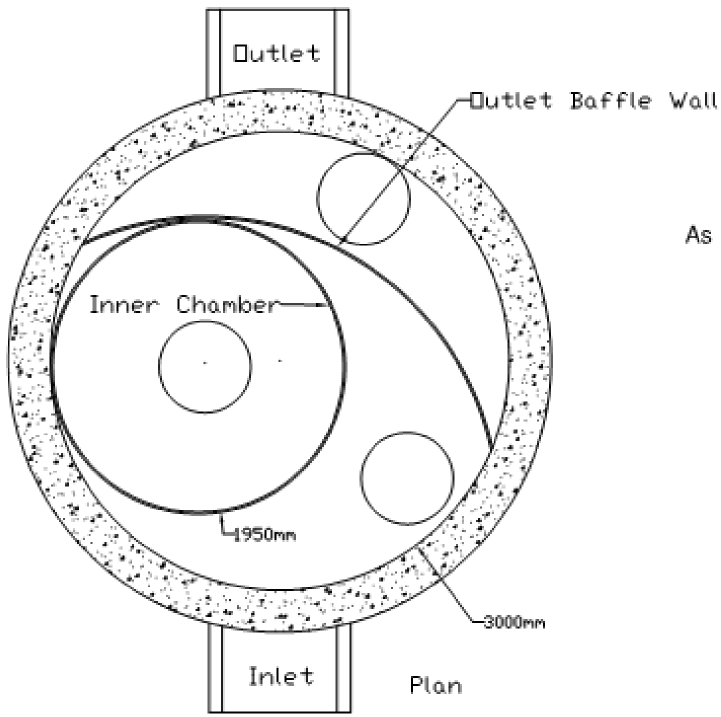
Contacts

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.

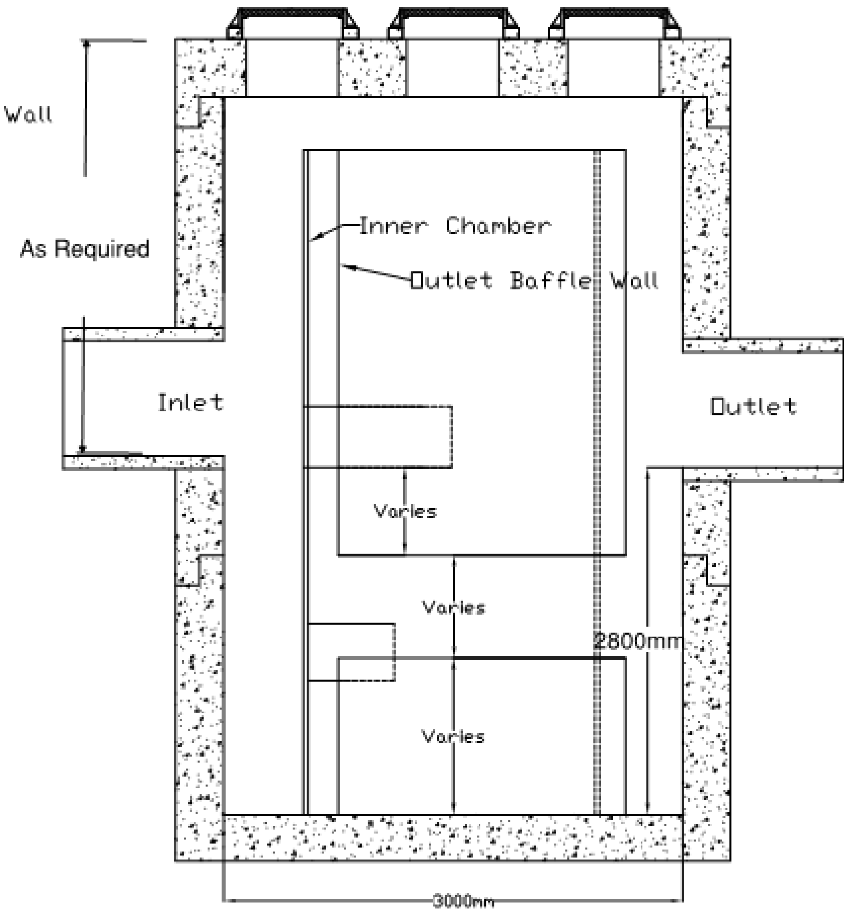
APPENDIX 1

CAD Drawings

Not for Construction



Plan



Can. Patent No. 2,536,300

Profile

U.S. Patent No. 6,951,619

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

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

Hydroworks

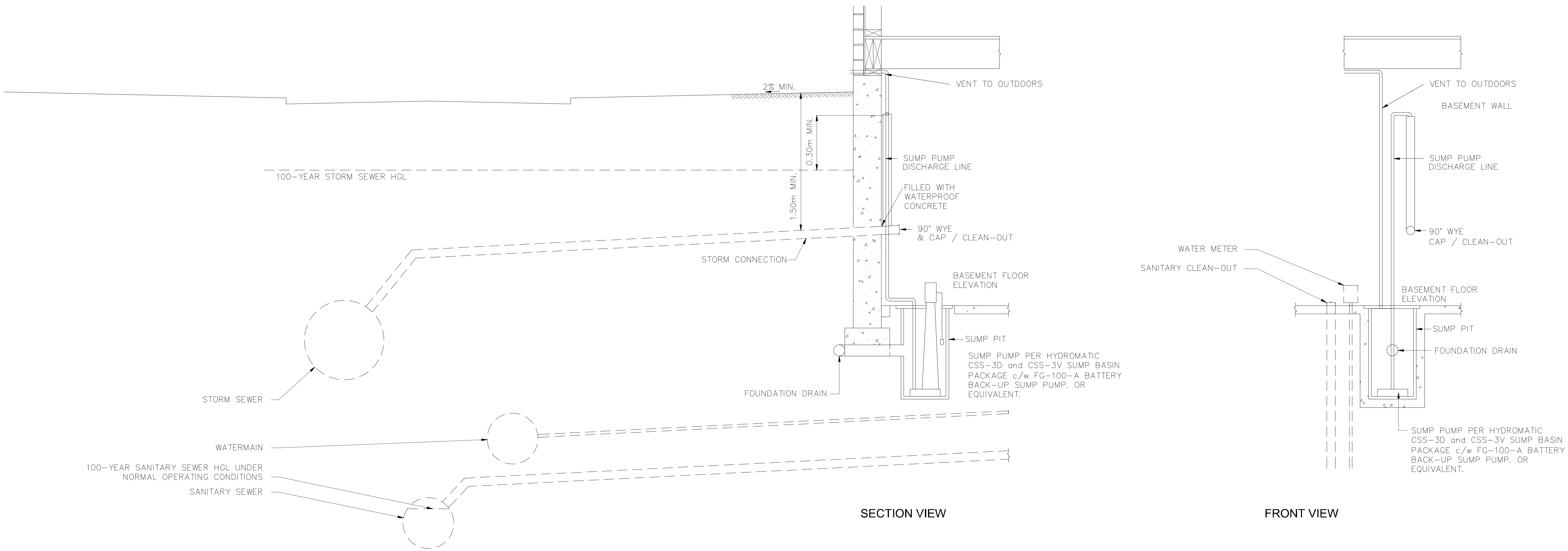
Appendix G

- Option 3 – Storm Sewer Design Sheet (DSEL, 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 #3 - Clarke Pond																		
203	STM203	STM202	0.68	0.65	0.44	0.44	10.0	104.2	127.9	450	0.30	104	0.159	0.113	0.98	156.2	1.8	0.82
202	STM202	STM201A	0.82	0.65	0.53	0.98	11.8	95.7	259.2	600	0.30	115	0.283	0.150	1.19	336.3	1.6	0.77
201B	STM201B	STM201A	0.64	0.65	0.42	0.42	10.0	104.2	120.4	450	0.50	72	0.159	0.113	1.27	201.6	0.9	0.60
STM201A	STM201A	209D	3.05	0.65	1.98	3.37	13.4	89.2	835.8	1050	0.15	219	0.866	0.263	1.22	1057.6	3.0	0.79
From Subject Site			0.66	0.65	0.43	0.43												
209, 209A	209	209-D	16.37	0.76	12.44	12.87	10.0	104.2	3725.0	1800	0.15	167	2.545	0.450	1.75	4451.9	1.6	0.84
From Subject Site																		
209D	209D	208C	0.57	0.65	0.37	16.61	16.4	79.4	3664.0	1800	0.10	154	2.545	0.450	1.43	3635.0	1.8	1.01
208C	208C	208D	0.64	0.7	0.45	17.06	18.2	74.6	3533.9	1800	0.10	108	2.545	0.450	1.43	3635.0	1.3	0.97
105	STM105	STM104	1.88	0.45	0.85	0.85	10.0	104.2	244.9	525	0.50	96	0.216	0.131	1.40	304.1	1.1	0.81
104	STM104	STM103	0.6	0.65	0.39	1.24	11.1	98.5	338.3	675	0.30	73	0.358	0.169	1.29	460.4	0.9	0.73
103	STM103	STM102	1.2	0.65	0.78	2.02	12.1	94.3	528.3	900	0.15	165	0.636	0.225	1.10	701.1	2.5	0.75
102	STM102	STM101A	0.36	0.65	0.23	2.25	14.6	84.9	530.9	900	0.15	72	0.636	0.225	1.10	701.1	1.1	0.76
101B	STM101B	STM101A	1.44	0.65	0.94	0.94	10.0	104.2	270.9	675	0.15	165	0.358	0.169	0.91	325.6	3.0	0.83
101A	STM101A	STM101B	0.29	0.65	0.19	3.37	15.7	81.5	763.6	1050	0.15	74	0.866	0.263	1.22	1057.6	1.0	0.72
	208D	208	0	0.65	0.00	20.44	19.4	71.5	4061.6	1950	0.10	69	2.986	0.488	1.51	4499.9	0.8	0.90
208	208	208B	2.68	0.7	1.88	22.31	20.2	69.8	4329.1	1950	0.10	74	2.986	0.488	1.51	4499.9	0.8	0.96
208B, A207	208B	Pond	5.37	0.7	3.76	26.07	21.0	68.1	4933.5	2100	0.10	58	3.464	0.525	1.58	5483.1	0.6	0.90
Highlighted information from Barrhaven South Master Servicing Study by Stantec, dated November 2014																		
Starting Tc 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																		

Appendix H

- Proposed Sump Pump Detail (DSEL, September 2016)



DSEL
david schaeffer engineering ltd

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

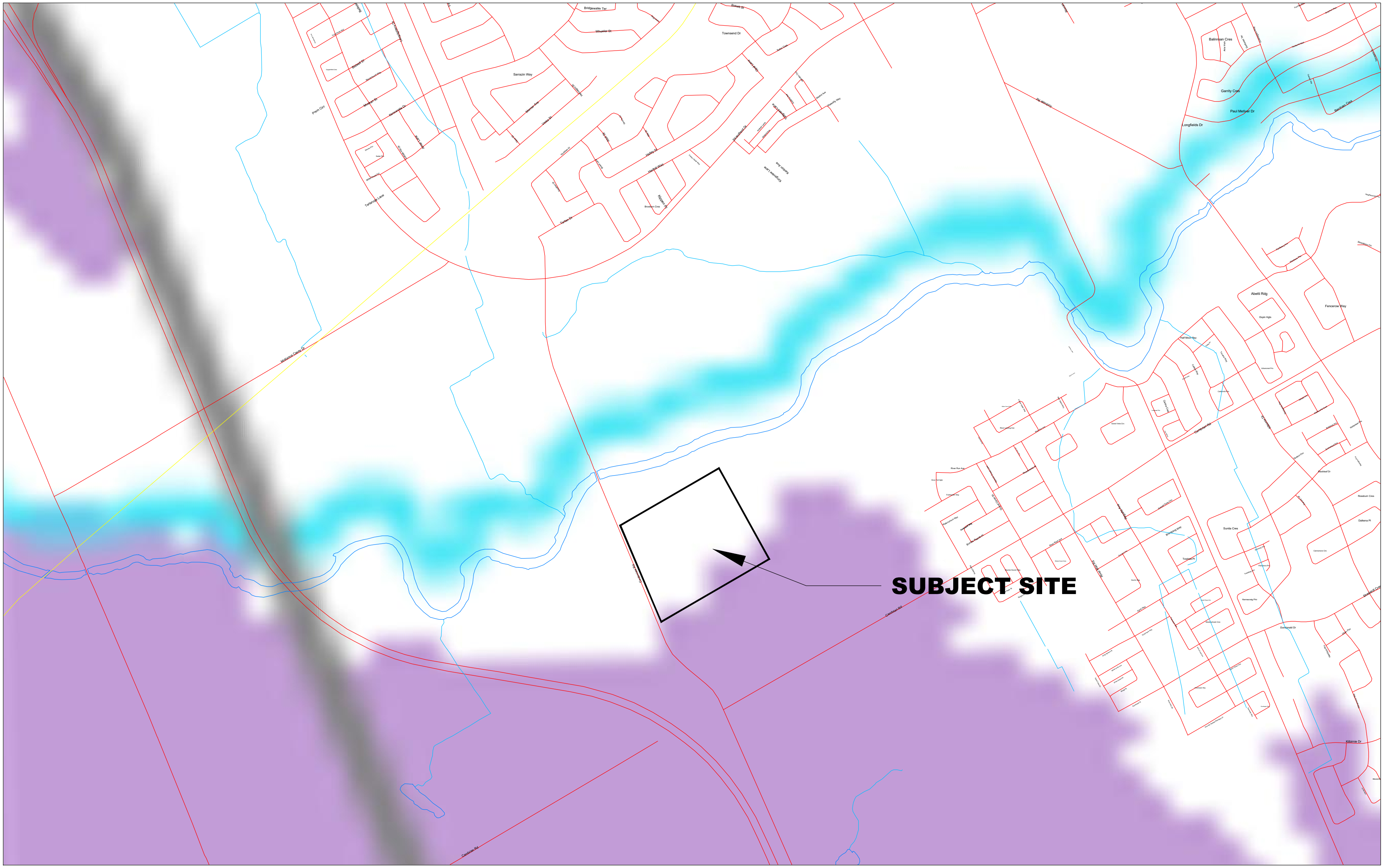
SUMP PUMP - DETAIL

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

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

- 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

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

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.

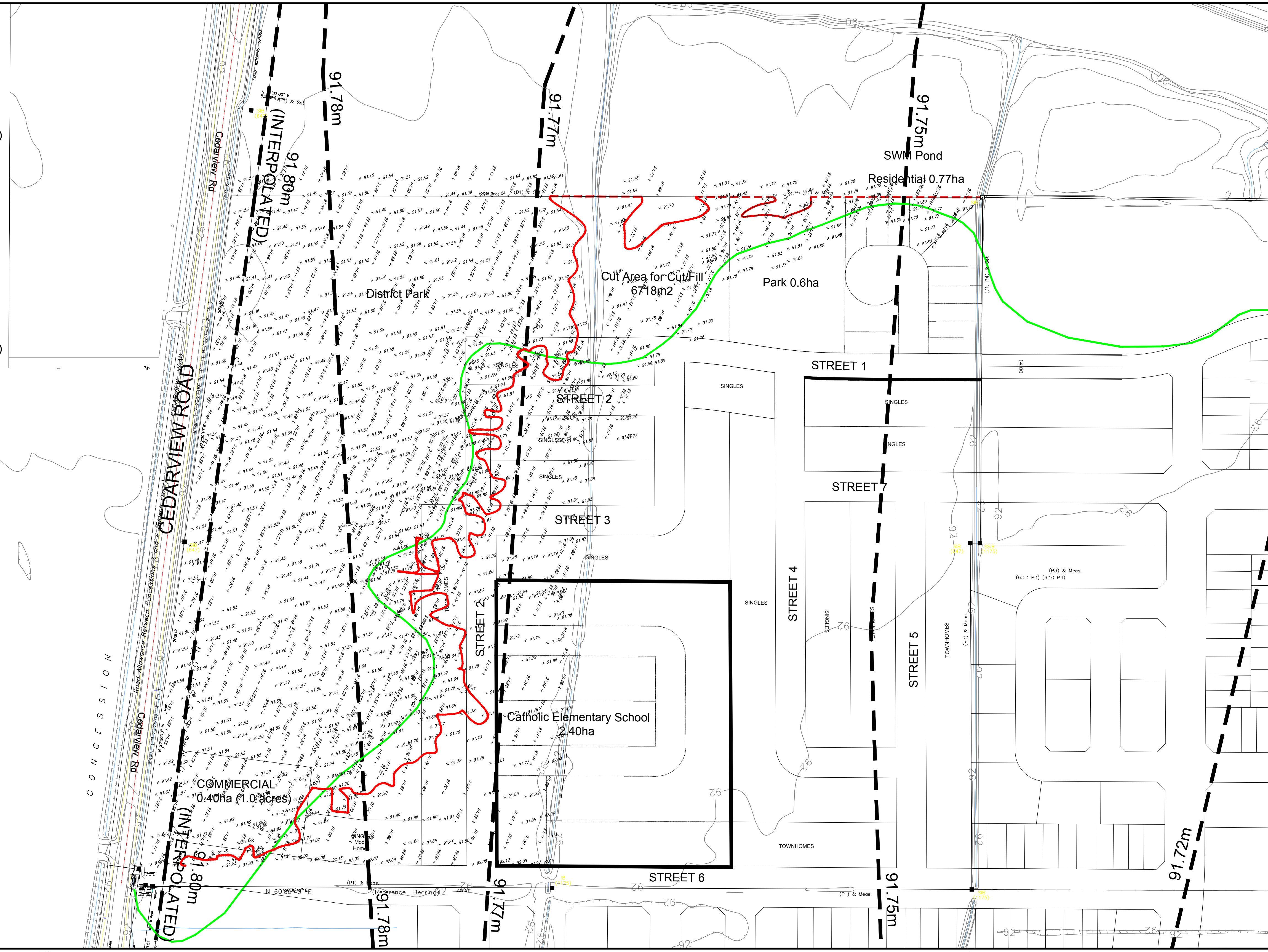
Per: Matt Wingate, P. Eng

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

- (solid red line) 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)
- (dashed red line) UNSURE OF EXTENTS OF INTERSECTION LINE
- (green line) 100-YEAR FLOOD LINE FROM RVCA 2005 JOCK RIVER FLOOD RISK MAP 2
- (dashed black line) 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

AREA 1

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

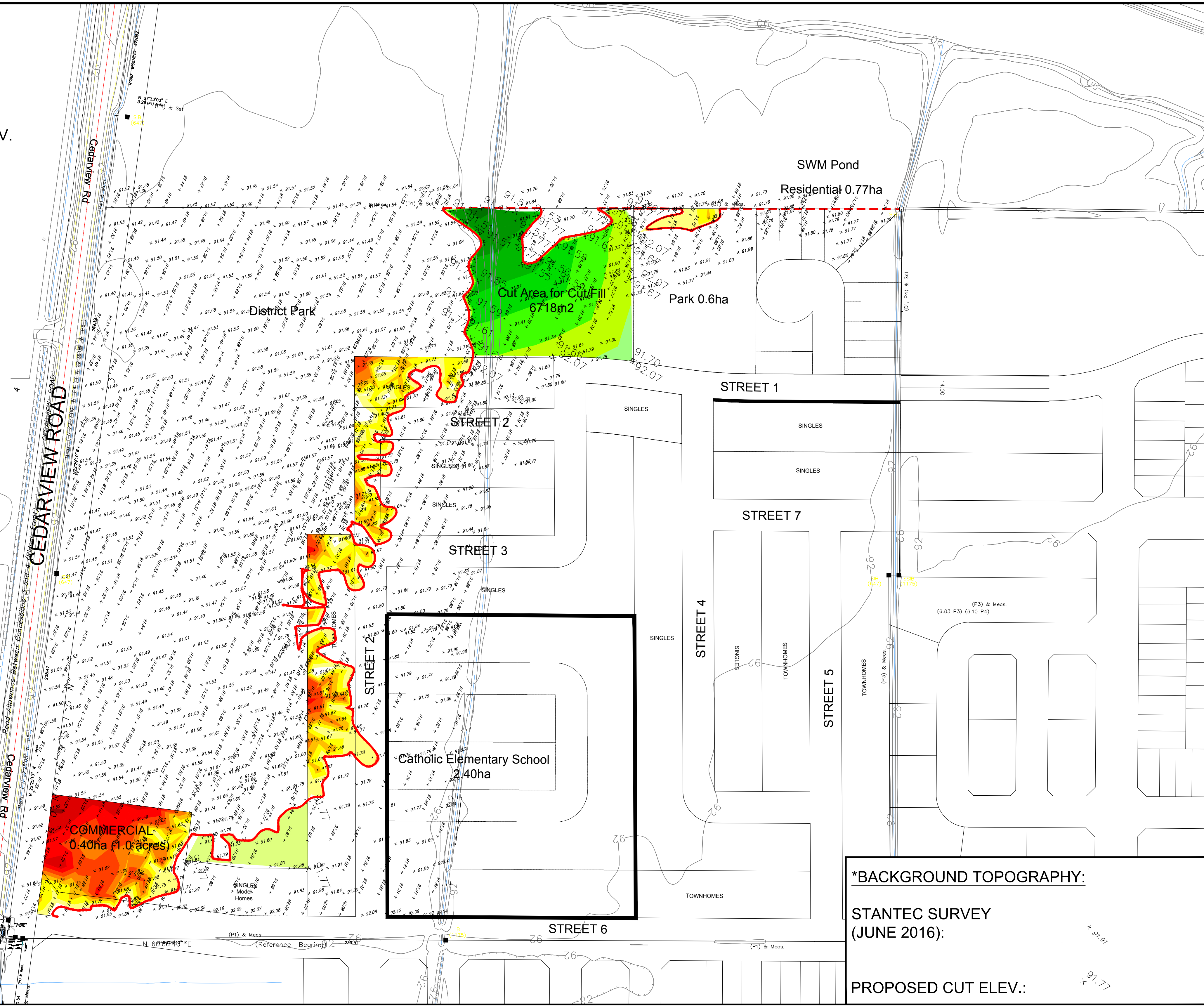
Number	Minimum Elevation	Maximum Elevation	Area	Color
1	0.00	0.04	2852.74	
2	0.04	0.08	2358.43	
3	0.08	0.12	1358.45	
4	0.12	0.16	1033.68	
5	0.16	0.20	1228.84	
6	0.20	0.24	712.95	
7	0.24	0.28	485.57	
8	0.28	0.32	15.87	

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

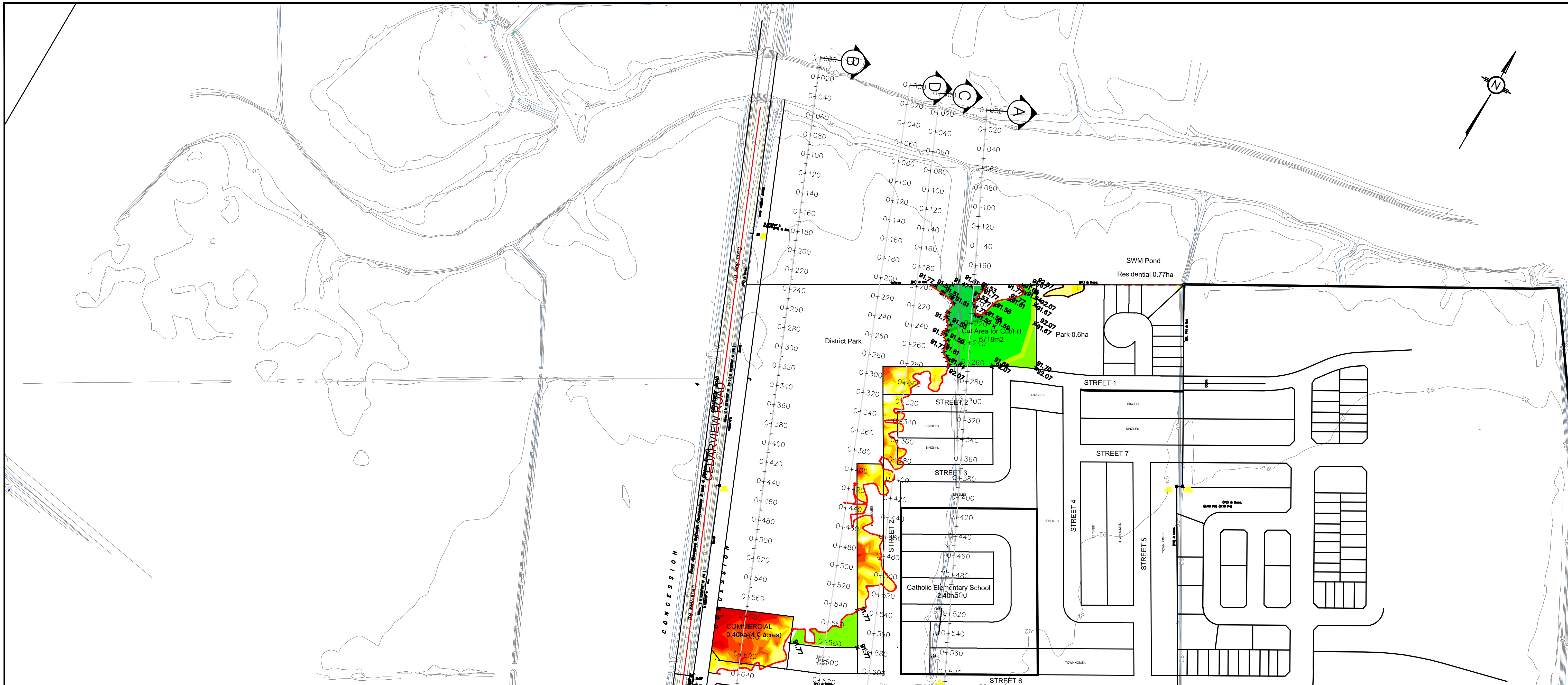
PROPOSED CUT ELEV.: × 91.77

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



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™

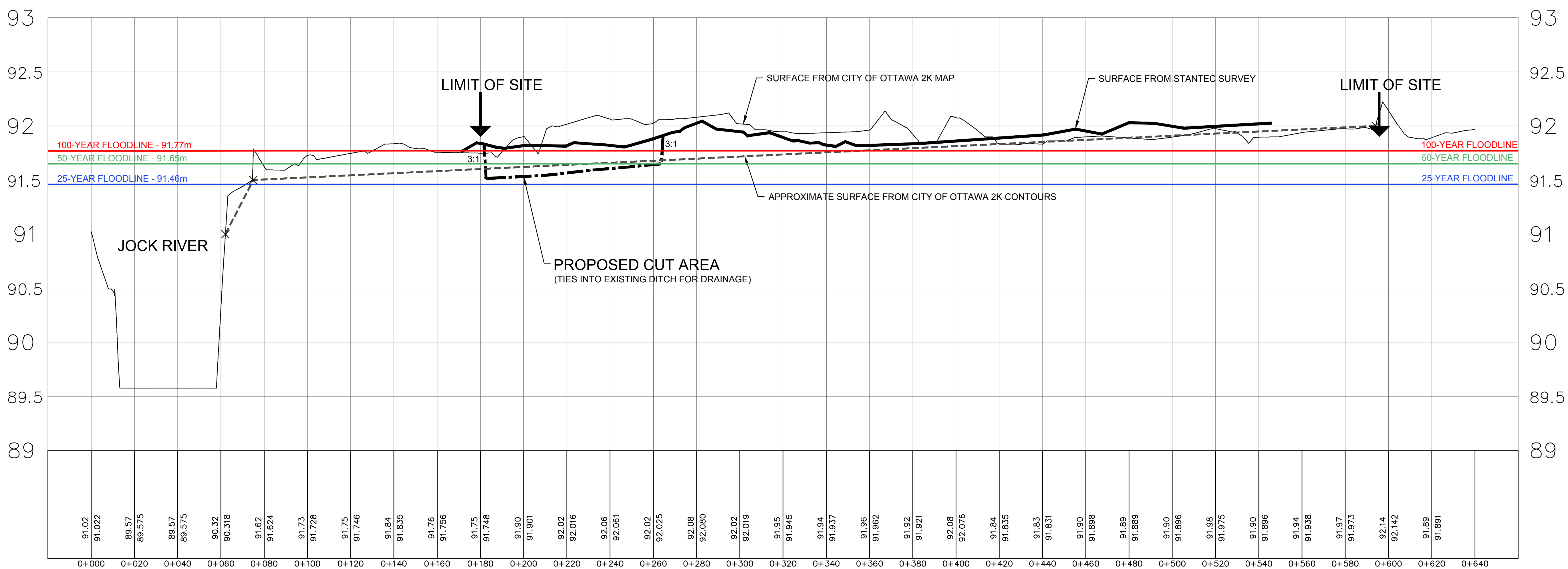
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

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™

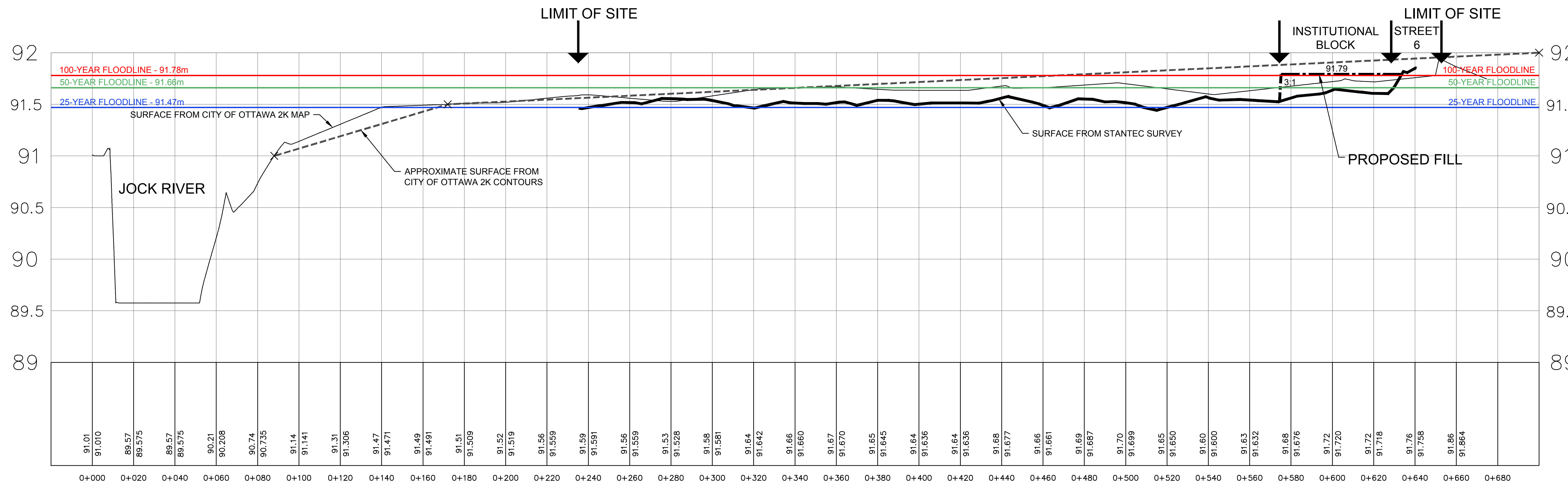
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

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™

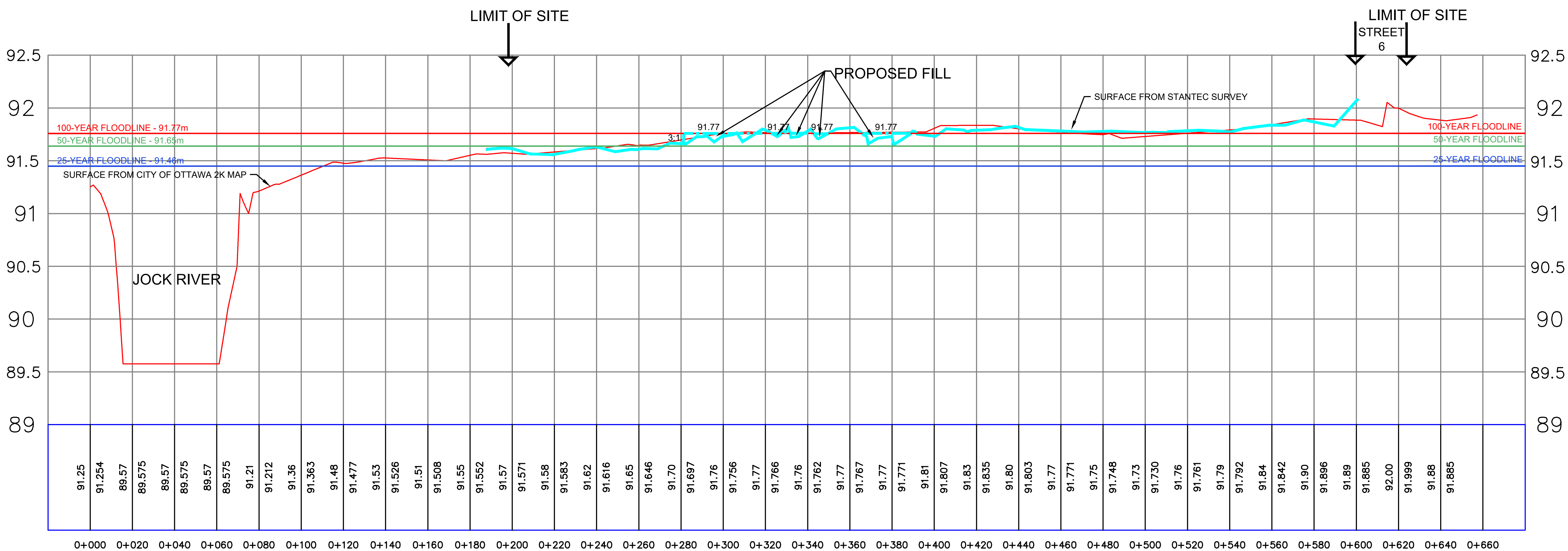
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

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



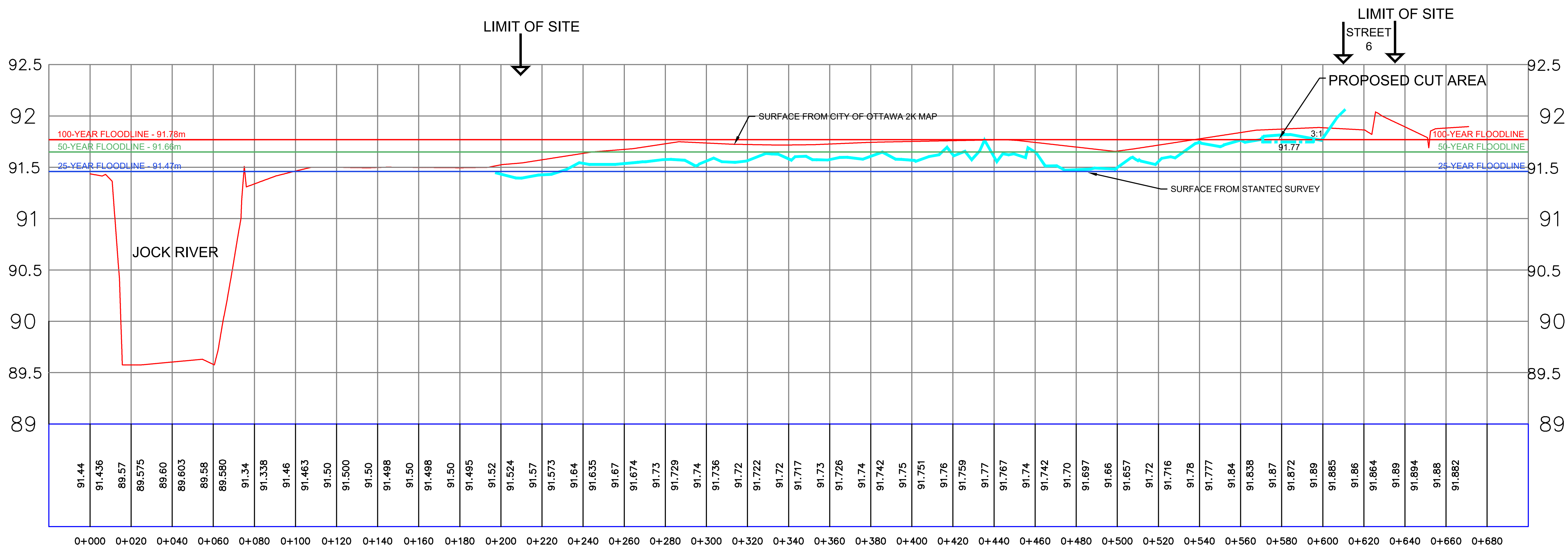
DSEL
david schaeffer engineering ltd
SMART SUBDIVISIONS™

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

Alignment - D-D 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
@ 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 <u>water surface elevations</u> and no increase in <u>flow velocities</u> 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