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FUNCTIONAL SERVICING REPORT

FOR

STITTSVILLE SOUTH URBAN EXPANSION AREA (W-4)

CAIVAN (STITTSVILLE SOUTH) INC. & CAIVAN (STITTSVILLE WEST) LTD.

CITY OF OTTAWA

PROJECT NO.: 21-1247

NOVEMBER 2025

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1.0 INTRODUCTION

This functional servicing report is submitted on behalf of Caivan (Stittsville South) Inc. and Caivan (Stittsville West) Ltd., which will collectively be referred to as "Caivan" herein, to support the Stittsville South Urban Expansion Area (SSUEA) draft plan application for property parcels within the community of Stittsville, Ontario. The properties are:

- ~20.4 ha 6115 Flewellyn Rd (Maguire Property);
- ~16.1 ha 6070 Fernbank Rd (Faulkner Property);
- ~17.4 ha 5993 Flewellyn Rd (Davidson Property);
- ~15.1 ha 6030 Fernbank Road (Eder Property) parcel, which is currently outside the City of Ottawa urban boundary; and,
- ~6.4 ha of holdout land parcels (including Hydro corridor owned lands west of Faulkner Drain) within the SSUEA study area.

The development areas are illustrated in ***Figure 1***, below. The Maguire/Faulkner/Davidson land parcels have recently (as of February 2021) been brought into the City of Ottawa urban boundary, except for the Eder parcel. Although the Eder parcel remains outside the City of Ottawa urban boundary, the approved ***DSEL Scoped MSS*** for the SSUEA (W-4) (DSEL, 2025) provides justification for its inclusion as it plays an important role for local infrastructure development that will be used to support the broader SSUEA lands. The overall development area is bound by Flewellyn Road to south, Shea Road to the east, an existing urban subdivision development to the north (*Stittsville South – Area 6*/*Edenwylde*) and an estate lot subdivision to the west.

The overall area is bisected diagonally (north/south) by an existing Hydro One 500kV utility corridor and the Faulkner Municipal Drain (FMD) which is parallel to the east boundary of the Faulkner Property.

The lands are planned to be developed with a mix of single-family homes, townhomes, stacked townhomes, park blocks, stormwater management (SWM) blocks, open space and a road network (see ***Appendix A.1*** and ***A.2*** for the Draft Plan and preliminary lotted Concept Plan).

The objective of this report is to provide sufficient details to demonstrate that the proposed development area can be supported by municipal services.

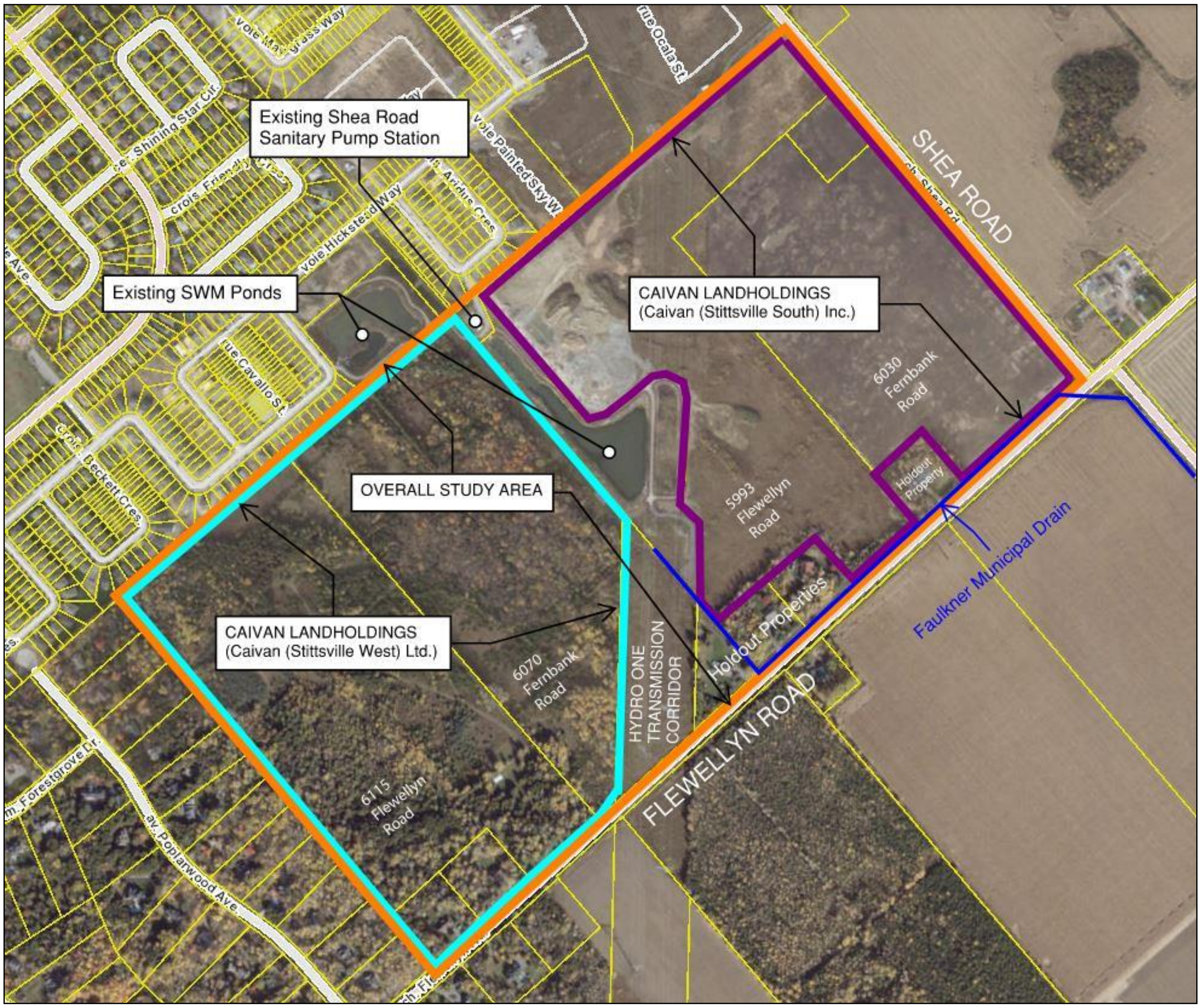

Figure 1: Caivan Stittsville Lands

1.1 Existing Conditions

The subject site is currently undeveloped and is a mix of active/former farmland in the eastern areas, forested areas in the western portion, and a total of four (4) holdout properties along the south boundary. The overall area is bisected diagonally (north/south) by an existing Hydro One 500kV utility corridor. The existing topography of the parcel west of the Hydro corridor generally slopes from the northwest to southeast with elevations ranging from 109 m to 103 m. For the land area east of the Hydro corridor the same southeast trend is present with elevations ranging from 104 m to 102 m at Flewellyn Road.

Per the approved ***DSEL Scoped MSS***, an existing stormwater management facility (Davidson SWM Facility) is located centrally within the property and manages flows from a portion of the Edenwylde (Area 6) Subdivision. Additionally, a stormwater conveyance channel extends from the existing subdivision to the North (at Friendly Crescent) via a storm sewer and concrete headwall structure and continues southward, parallel to the east boundary of the Faulkner Property, and officially transitions to the Faulkner Municipal Drain (FMD) approximately 215 m north of Flewellyn Road. The Faulkner Municipal Drain continues southward and makes a 90-degree bend along the north side of Flewellyn Road and directs flows east to Shea Road.

The ultimate storm outlet for the development area is the Faulkner Drain at the southeast corner of the site. The storm servicing existing conditions figure can be found in ***Appendix D.1***.

The Shea Road Sanitary Pump Station (SRSPS), located north of the Davidson SWM Facility and south of Aridius Crescent has an existing firm capacity of 84 L/s. The Fernbank Trunk has been extended within Fernbank Road which provides a gravity outlet to the SRSPS. The sanitary servicing existing conditions figure can be found in ***Appendix C.1***. The Fernbank Trunk has an available capacity of 130 L/s to support the SSUEA lands.

The subject lands are located adjacent to the boundary of the 3W pressure zone which is fed by the Glen Cairn and Campeau Drive Pump Stations and the Stittsville Elevated Tank. The watermain servicing existing conditions figure can be found in ***Appendix B.1***. Existing 200mm and 250mm watermains are located north of the subject site and are available to service the SSUEA lands.

1.2 Development Layout

The proposed development consists of park blocks, stormwater pond blocks, Natural Heritage Sites, existing Hydro Easement, and residential blocks with a mix of single-family homes, townhomes, and condo blocks. See proposed concept plan and draft plan of subdivision in ***Appendix A.1***.

The predicted populations currently associated with the development concept are described in the following table below.

Table 1: Development Statistics for Stittsville South Urban Expansion Area

	Unit Count			Population
	Stittsville West	Stittsville South	Total	
Single Family	402	271	673	2,288
Townhouse	454	415	869	2,347
High Density	264	178	442	797
Park	-	-	-	-
Residential Holdouts	-	-	-	-
Total	***1122***	***865***	***1984***	***5,432***

** NOTE: Population projections may differ from population estimates used in background Transportation Studies, Planning Rationale, and other studies.*

1.3 Required Permits / Approvals

Once Draft Plan of Subdivision is obtained, the City of Ottawa must approve detailed engineering design drawings and reports prior to construction of the municipal infrastructure identified in this report.

The following additional approvals and permits listed in ***Table 2*** are expected to be required prior to construction of the municipal infrastructure detailed herein. Other permits and approvals may be required, as detailed in the other studies submitted as part of the Planning Act applications (e.g. *Tree Conservation Report, Phase 1 Environmental Site Assessment, etc*.).

Table 2: Potential Required Permits/Approvals

Agency	Permit/Approval Required	Trigger	Remarks
City of Ottawa	MECP Form SS2 – Record of Future Alteration Authorized for Components of the Municipal Sewage Collection System	Construction of new sanitary sewers, Pump Station and forcemain.	City of Ottawa to review and approve plans prior to the completion of Form SS2.
City of Ottawa	MECP Form SW1 – Record of Future Alteration Authorized for Storm Sewers/Ditches/Culverts	Construction of new storm sewers, ditches, and culverts.	City of Ottawa to review and approve plans prior to the completion of Form SW1.
City of Ottawa	MECP Form SW2 – Record of Future Alteration Authorized for Stormwater Management Facilities	Construction of new Stormwater Management Facility.	City of Ottawa to review and approve plans prior to the completion of Form SW2.
MECP	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	MECP Form 1 – Record of Watermains Authorized as a Future Alteration.	Construction of watermains throughout the subdivision	The City of Ottawa will review the watermains on behalf of the MECP through the Form 1 – Record of Watermains Authorized as a Future Alteration.
RVCA	Permit under Ontario Regulation 174/06, RVCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation	Grading (proposed development & potential temporary access roads) within the subject lands (i.e. crossing drainage feature(s))	Supporting applications and documentation as required through consultation with the RVCA.
RVCA	Outlets to Faulkner Municipal Drain	In conjunction with issuance of MECP applications	Supporting applications and documentation as required through consultation with the RVCA.

RVCA	Alteration to Watercourses	As necessary through consultation with the RVCA	Supporting applications and documentation as required through consultation with the RVCA.
Hydro One (HONI)	Compatible Land Use Proposal Submission, and PSLUP - Planning Information Form	Approval for roadways and servicing infrastructure within the transmission corridor lands	Hydro One to review components of development within the transmission corridor lands.
City of Ottawa	Commence Work Notification (CWN)	Construction of new sanitary and storm sewers throughout the subdivision	The City of Ottawa will issue a commence work notification for construction of the sanitary and storm sewers once an approval is issued by the MECP.
City of Ottawa	Drainage Act (Section 65)	Change of land use within a Municipal Drain watershed	Caivan has initiated the request to start the process with the City of Ottawa.

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- Ottawa Sewer Design Guidelines
  City of Ottawa, October 2012
  (Sewer Design Guidelines)

  - Technical Bulletin ISDTB-2014-01
    City of Ottawa, February 5, 2014
    (ITSB-2014-01)

  - Technical Bulletin PIEDTB-2016-01
    City of Ottawa, September 6, 2016
    (PIEDTB-2016-01)

  - Technical Bulletin ISTB-2018-01
    City of Ottawa, March 21, 2018
    (ISTB-2018-01)

  - Technical Bulletin ISTB-2018-04
    City of Ottawa, June 27, 2018
    (ISTB-2018-04)

  - Technical Bulletin ISTB-2019-02
    City of Ottawa, July 8, 2019
    (ISTB-2019-02)

  - Technical Bulletin IWSTB-2024-04
    City of Ottawa, September 12, 2024
    (IWSTB-2024-04)

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

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

  - Technical Bulletin ISDTB-2014-2
    City of Ottawa, May 27, 2014.
    (ISDTB-2014-2)

  - Technical Bulletin ISTB-2018-02
    City of Ottawa, March 21, 2018
    (ISTB-2018-02)

  - Technical Bulletin ISTB-2021-03
    City of Ottawa, August 18, 2021
    (ISTB-2021-03)

- City of Ottawa Official Plan,
  adopted by Council 2022.
  (Official Plan)

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

- Erosion & Sediment Control Guidelines for Urban Construction
  Greater Golden Horseshoe Area Conservation Authorities, December 2006
  (E&S Guidelines)

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

- Stittsville South Subdivision, City of Ottawa: Detailed Servicing & Stormwater Management Report, Novatech, July 2016
  (Novatech Area 6 Report)

- Stittsville Area 6 – Potable Water Hydraulic Assessment Phase 1 & 2
  (Stantec, September 2015) – Included within the above Novatech report
  (Stantec Area 6 Report)

- Design Brief – Davidson Lands – OPA 76 Area 6a – 5993 Flewellyn Road (IBI, IBI, February 2018) [now referred to as the Edenwylde Subdivision]
  (IBI Edenwylde Report) Stittsville South Subdivision, City of Ottawa – Detailed

- Servicing & Stormwater Management Report, Novatech, July 2016
  (Stittsville South Servicing Report)

- Stittsville South Subdivision, City of Ottawa – Shea Road Sanitary Pump Station Design Brief Novatech, May 2016 *(Shea Road P.S. Design)*

- Design Brief for the Stormwater Management Pond for the Davidson Lands
  JFSA/DSEL, November 2017 *(Davidson Pond Brief)*

- Design Brief, Davidson Lands – OPA 76 Area 6a, Phase 1 (5993 Flewellyn Road)

  IBI Group, February 2018
  (IBI Phase 1)

- Design Brief, Davidson Lands – OPA 76 Area 6a, Phase 2 (5993 Flewellyn Road)

  IBI Group, July 2020
  (IBI Phase 2)

- Geotechnical Investigation, Proposed Residential Development, 5993, 6070 & 6115 Flewellyn Road, Ottawa
  Paterson Group (PG5570-2), July 5, 2024
  (Stittsville South Geotechnical)

- Hydrogeological Existing Conditions Report, Proposed Residential Development, 5993 & 6115 Flewellyn Road & 6030 & 6070 Fernbank Road, Ottawa, Ontario
  Paterson Group (PH4625-REP.01.R1), July 5, 2024
  (Stittsville South Hydrogeology)

- Stittsville South W4 Future Neighborhood Area – Existing Conditions Report
  Kilgour & Associates Ltd., October 3, 2023.
  (Kilgour Natural Heritage Conditions)

- Jock River Reach 2 & Mud Creek Subwatershed Study
  Marshall Macklin Monaghan / WESA, May 2009.
  (Jock River Reach 2 SWS)

- Amendment to the Engineer’s Report for the Faulkner Municipal Drain & Addendum #1
  Robinson, December 2020 and March 2021.
  (Faulkner Engineer’s Report)

- Engineer’s Report for the Flowing Creek Municipal Drain
  A.J. Graham Engineering, December 1973.
  (Flowing Creek Engineer’s Report)

- Flowing Creek Flood Risk Mapping from Flewellyn Road to Jock River
  Rideau Valley Conservation Authority, May 2017.
  (Flowing Creek Flood Mapping)

- Caivan – Stittsville Lands (5993, 6070 & 6115 Flewellyn Road): Conceptual SWM Ponds Sizing and Preliminary HGL Analysis.
  JFSA (P2267), November 2023. *(Davidson Pond Brief)*

- Hydraulic Capacity and Modeling Analysis – Stittsville South Urban Expansion Area Development (*Final Report*). GeoAdvice Engineering Inc., January 2025.

- Stittsville South Expansion Lands – Transportation Report. CGH Transportation (PN: 2021-128), November 2023.

- Sanitary Pump Station Pre-Design Report, Stittsville South (Novatech, July 2015)

- Hydrogeological Study and Water Budget Assessment, Proposed Residential Development, 5993 & 6115 Flewellyn Road & 6030 & 6070 Fernbank Road, Ottawa, Ontario
  Paterson Group (PH4681-REP.01.R1), August 22, 2025
  (Stittsville South Water Budget)

- Scoped Master Servicing Study for Stittsville South Urban Expansion Area (W-4), DSEL (21-1247), August 2025*. (DSEL Scoped MSS)*

- Shea Road Pump Station Upgrade Options, Novatech, December 19, 2024 (*SRSPS Upgrade Assessment Memo*)

- Preliminary Erosion Threshold Summary Memo, Stittsville South Urban Expansion Area, Faulkner Municipal Drain, GEO Morphix Project No. 25118, August 28, 2025.
  (Erosion Threshold Assessment)

3.0 WATER SUPPLY SERVICING

3.1 Existing Water Supply Services

The SSUEA is adjacent to the City's Pressure Zone 3W service area (see ***Appendix B.4*** for reference). The pressure zone receives supply from the Campeau Drive and Glen Cairn Pump stations. The Stittsville Elevated Tank provides balanced storage during peak usage and fire flow conditions. The following watermains are available to the subject lands:

- A 400mm diameter watermain along Fernbank Road, with a watermain stub approximately 300m southwest of the Fernbank Road and Shea Road intersection;
- An existing 250mm diameter watermain located within the Parade Drive ROW, immediately north of the western portion of the development area. A future southbound ROW block from Parade Drive is located between civic addresses 714 and 720 Parade Drive;
- An existing 250mm diameter watermain is located within the Aridus Crescent ROW which is north of the Davidson Lands parcel. An existing 50mm water service within a servicing block from Aridus Crescent to the SRPS pump station is also installed facilitating water supply to that facility;
- An existing 200mm diameter watermain located within the Painted Sky Way ROW at the northwest portion of the Davidson land parcel; and;
- An existing 200mm diameter watermain location within the Ocala Street ROW north of the northeastern portion of the Davidson land parcel.

3.2 Water Supply Servicing Design

Potable water will be supplied to the subject property via a local watermain network that will follow the road network and ultimately connect to off-site watermains based generally on the layout presented in ***Figure 1.1*** of the *Hydraulic Capacity and Modelling Analysis Stittsville South Urban Expansion Area Development* (*GeoAdvice, January 2025*) report, included in ***Appendix B.2***. Watermain connections and feeder watermain sizing were assessed as part of FSR-level design to address City of Ottawa and MECP requirements. It is noted that the ***GeoAdvice Hydraulic Analysis*** completed in January 2025 reflects a previous iteration of the Draft Plan. As the connections to the existing system, functional road elevations and overall population and unit mix are all generally consistent, the conclusions in the report discussed further in this section remain valid.

The ***GeoAdvice Hydraulic Analysis*** assessed the adequacy of sizing for feeder watermain infrastructure to ensure that the SSUEA can be adequately serviced. The local watermain network was sized to meet maximum hour and maximum day plus fire flow demands, with consideration to be given to subdivision phasing at detailed design. ***Table 3*** summarizes the Water Supply Design Criteria employed in the preparation of the preliminary water demand estimate as provided by the City of Ottawa for expansion areas where the population exceeds 3000 persons (See correspondence in ***Appendix B.3***).

Table 3: Water Supply Design Criteria

Design Parameter	Value
Extracted from Section 4: Ottawa Design Guidelines, Water Distribution (July 2010)	
Minimum Watermain Size	150 mm diameter
Minimum Depth of Cover	2.4 m from top of watermain to finished grade
During normal operating conditions desired operating pressure is within	350 kPa and 480 kPa
During normal operating conditions pressure must not drop below	276 kPa
During normal operating conditions pressure must not exceed	552 kPa
During fire flow operating pressure must not drop below	140 kPa
City of Ottawa – Email Correspondence (July 2024)	
Residential - Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – High Density	1.8 p/unit
Average Day Demand	
Single Detached	612 L/unit/day
Multifamily	535 L/unit/day
Apartment/Condo	394 L/unit/day
Water Loss per Connection	80 L/unit/day
Parkland	28,000 L/ha/day
Outdoor Water Demand	
Single Detached	700 L/unit/day
Multifamily	350 L/unit/day
Apartment/Condo	0 L/unit/day
Parkland	0 L/unit/day
Maximum Day Demand	
Single Detached	AVDY + OWD L/unit/day
Multifamily	AVDY + OWD L/unit/day
Apartment/Condo	AVDY + OWD L/unit/day
Parkland	1.5 x AVDY
Peak Hour Demand	
Single Detached	2.1 x MXDY L/unit/day
Multifamily	2.1 x MXDY L/unit/day
Apartment/Condo	1.6 x MXDY L/unit/day
Parkland	1.8 x MXDY L/unit/day

[1] Values represent L/cap/day for residential land uses.
[2] Occupancy factors chosen according to housing type. The values shown were extracted from Section 4.2.8 of the Ottawa Design Guidelines - Water Distribution (2010)
[3] Outdoor water demand is applied to single family, semi-detached and townhome units with rear yards.
[4] The 1.5 multiplier represents the additional outdoor water demand associated with employment areas.

As detailed in their report (***Appendix B.2***), GeoAdvice has concluded that the proposed water network for the development will adequately supply domestic and fire flow demands within City of Ottawa guidelines. Their model indicates that system pressures will be within the recommended range, not exceeding 80 PSI, and therefore pressure-reducing valves will not be required.

3.2.1 Fire Flow Requirements

The required fire flow for the development was established based on the Fire Underwriters Survey (FUS) methodology, with a conservative minimum fire flow of 167 L/s applied to all residential and parkland area. The ***GeoAdvice Hydraulic Analysis*** confirms that the proposed water distribution system is capable of supplying fire flow demands while maintaining the minimum residual pressure of 140 kPa as required by the City of Ottawa Water Distribution Guidelines (2010). The required and modeled available fire flows are summarized in ***Table 4***.

Table 4: Required and Available Fire Flow

Item	Value (L/s)	Notes	Reference
Required Fire Flow (All Residential + Park)	167 L/s	Assumed maximum required fire flow based on unit types.	*GeoAdvice Section 2.4*
Minimum Available Fire Flow (Modeled)	≥ 232 L/s	Maintains ≥ 140 kPa residual pressure	*GeoAdvice Table 4.2*

3.2.2 Boundary Conditions

The boundary conditions used in the hydraulic model were provided by the City of Ottawa and represent the expected hydraulic grade line (HGL) at each proposed connection point to the municipal water distribution system. These conditions were applied for Average Day, Peak Hour, and Maximum Day plus Fire Flow scenarios to ensure that system performance meets the City's pressure criteria under both normal and emergency operating conditions. The boundary conditions applied in the analysis are summarized in ***Table 5***.

Table 5: City of Ottawa Boundary Conditions (Scenario 3)

Demand Scenario	Connection 1 Parade (HGL m)	Connection 2 Aridus (HGL m)	Connection 3 Hickstead (HGL m)	Connection 4 Ocaia (HGL m)	Reference
Average Day (Max Pressure Check)	160.4	160.4	160.4	160.4	*GeoAdvice Table 2.5*
Peak Hour (Min Pressure Check)	152.0	151.8	151.8	151.8	*GeoAdvice Table 2.5*
Max Day + Fire (167 L/s)	143.9	141.7	141.7	137.5	*GeoAdvice Table 2.5*

3.2.3 Development Population and Water Demands

The water demands calculated using City parameters were applied within the hydraulic model prepared by GeoAdvice (January 2025). ***Table 6*** summarizes the projected Average Day, Maximum Day, and Peak Hour water demands for the proposed residential units, associated parkland, and adjacent holdout lands. Additionally, ***Table 6*** includes the water demand calculations based on Caivan's latest draft plan to further demonstrate that the modelling analysis and the conclusions presented in the ***GeoAdvice Hydraulic Analysis*** remain applicable and are representative of the current development plan.

Table 6: Development Water Demand Calculations & Comparison

Category/Dwelling Type	Units/Area	Population	ADD (L/s)	MDD (L/s)	PHD (L/s)
Caivan Concept Plan - April 29th, 2024[1]					
Single Detached	479	1,629	3.84	7.72	15.72
Back-to-Back Townhomes	674	1,214	3.70	3.70	7.08
Traditional Townhomes	991	2,677	7.05	11.07	22.23
Residential Subtotal	**2,144**	**5,520**	**14.59**	**22.48**	**45.03**
Parkland (per City rates)	3.51 ha	—	1.13	1.70	3.08
Holdout Lands (Residential)*	4.75 ha	—	1.00	2.02	4.14
Total (All Categories)	—	—	**16.72**	**26.21**	**52.24**
Caivan Concept Plan – September 23rd, 2025					
Single Detached	673	2,288	5.39	10.84	22.77
Stacked Condo Block	442	797	2.02	2.02	3.23
Traditional Townhomes	869	2,347	6.18	9.70	20.38
Residential Subtotal	**1,984**	**5,432**	**13.59**	**22.56**	**46.38**
Parkland (per City rates)	3.41 ha	—	1.11	1.67	3.00
Holdout Lands (Residential)*	3.05 ha	—	0.66	1.33	2.74
Total (All Categories)	—	—	**15.36**	**25.56**	**52.12**

1. Water demand calculations based on April 2024 Caivan draft plan presented in ***GeoAdvice Hydraulic Analysis*** (January 2025) Table 2.2, 2.3, and 2.4

3.3 Water Supply Conclusion

The SSUEA is to be serviced by a proposed network of feeder watermains varying in diameter from 200 mm to 250 mm. At this stage of analysis, only the feeder watermain within the West and South Lands are shown. A network of local watermains is assumed to service the development within the SSUEA and will be further assessed at detailed design based on full buildout and a phase-by-phase approach.

The ***GeoAdvice Hydraulic Analysis*** demonstrates that adequate water supply is available to the subject lands through connections from the local watermain network to existing surrounding water infrastructure.

All proposed water infrastructure is to be designed and constructed in accordance with Ministry of the Environment, Conservation, and Parks (MECP) and City of Ottawa guidelines as part of detailed design associated with the SSUEA.

4.0 WASTEWATER SERVICING

4.1 Existing Wastewater Services

The adjacent developments to the north of the subject lands are serviced by the existing Shea Road Sanitary Pumping Station (SRSPS). The existing SRSPS has a firm capacity of 84 L/s. There is currently 130 L/s of available capacity in the downstream Fernbank Trunk sanitary system to accommodate the SSUEA lands.

A 450mm diameter sanitary sewer connected to the SRSPS is available to service the SSUEA. Located between Aridus Crescent and SRSPS, the existing 450mm diameter inlet sanitary sewer has a residual capacity of approximately 80% which would allow for an additional ~390 L/s of sanitary flows which is more than the generated flows from the proposed site.

4.2 Wastewater Design

As outlined in the ***DSEL Scoped MSS***, Option 1 was selected as the preferable servicing approach where sanitary flows from the South and West Lands are to be directed to the Shea Road Sanitary Pump Station (SRSPS) via the proposed sanitary infrastructure as outlined in ***Drawing No. 4***. To support the full buildout of the proposed development, the SRSPS will require upgrades to increase the PS firm capacity including the addition of a 300mm diameter forcemain tributary to the existing Fernbank Trunk. There is currently available capacity to accommodate the first phases of development and future upgrade planning is in progress with City Staff.

The proposed wastewater collection system is illustrated on ***Drawing No. 4***. Preliminary plan and profiles of the sanitary sewer are shown in ***Drawing No.5*** to ***Drawing No.8***. The subject property is required to route a 200 mm to 375 mm diameter pipe throughout the development to adequately service the SSUEA lands.

The estimated population of the proposed subdivision is 5432 persons. The total peak flow of 72.79 L/s generated from the anticipated SSUEA population can be accommodated by the receiving sewer on Fernbank Road which has approximately 130 L/s of available capacity. The functional sanitary design sheet is provided in ***Appendix C.2*** for reference.

Table 7 below summarizes the **Design Standards** to be employed in the design of the proposed wastewater sewer system.

Table 7: Wastewater Design Criteria

Design Parameter	Value
Current Design Guidelines	
Residential - Single Family	3.4 p/unit
Residential – Townhome/ Semi	2.7 p/unit
Residential – Apartment	1.8 p/unit
Average Daily Demand	280 L/d/per
Peaking Factor	Harmon’s Peaking Factor. Max 4.0, Min 2.0
Infiltration and Inflow Allowance	0.33 L/s/ha for all areas
Park Flows	9300 L/ha/d (75 p/acre per Sewer Guidelines Appendix 4-A)

Park Peaking Factor	1.0
Sanitary sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} AR^{2/3} S^{1/2}$
Minimum Sewer Size	200mm diameter
Minimum Manning's 'n'	0.013
Minimum Depth of Cover	2.5m from crown of sewer to grade
Minimum Full Flowing Velocity	0.6m/s
Maximum Full Flowing Velocity	3.0m/s
Extracted from Sections 4 and 6 of the City of Ottawa Sewer Design Guidelines, October 2012, and recent residential subdivisions in City of Ottawa.	
Operational Parameters on Monitoring Data ***(Example Only, Values to be Reviewed on Case-by-Case Basis with City of Ottawa)***	
Average Daily Demand	280 L/d/per
Harmon – Correction Factor	0.8
Commercial / Institutional Peak Factor	1 (non-coincident peak)
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 Sanitary HGL Analysis

The sanitary HGL analysis completed as part of the ***DSEL Scoped MSS*** has been updated based on the Draft Plan and included in ***Appendix C.3***. PCSWMM was used to analyze the sanitary HGL elevations within the proposed development lands under Rare and Annual flow conditions. Per the information in ***Appendix C.3*** the minimum freeboard was found to be 3.30 m and 1.99 m (excluding MH-SANMH97, SAN-175, SAN-176A, and SAN-285A to SAN288A located within the pump station and SWM pond blocks) for the Rare and Annual scenarios respectively. Assuming the typical USF elevation is approximately 1.8 m below the proposed top of manhole elevations, the minimum freeboard is sufficient for both the Rare and Annual flow conditions. It is noted that the per the ***DSEL Scoped MSS*** a proposed sanitary overflow sewer to the proposed East Pond is required. As shown in ***Drawing 8*** this overflow is proposed to have an invert at MH2160A of 102.34 m. The 100-year water level elevation in the proposed East Pond is approximately 101.89 m and therefore a backflow preventor is not anticipated to be required, to be confirmed through detailed design.

Therefore, the proposed existing sanitary sewer infrastructure is sufficiently sized to convey sanitary flows away from the proposed development under various extreme conditions.

4.4 SRSPS Anticipated Upgrades

All wastewater from the subject lands will be conveyed to the Shea Road Sanitary Pump Station. Novatech, the original designers of the SRSPS, have reviewed staged flows to the SRSPS with consideration given to inclusion of flows from the Stittsville West/South Lands development area under various flow conditions, as outlined in the ***Novatech Memo*** found in ***Appendix C.4***.

The current firm capacity of the SRSPS is 84 L/s. The lands serviced by the existing facility are the Area 6 lands, including MD blocks, Bell lands, commercial lands, and Friendly PS decommissioned flows that have since been allocated to the SRSPS. These serviced areas are presented in Novatech's *Drawing 122163-SAN* within ***Appendix C.4***.

The Area 6 lands and Friendly PS decommissioned flows contribute 67.45 L/s to the SRSPS per design parameters, which results in a 16.55 L/s of residual capacity based on the current PS firm capacity. The SSUEA lands are anticipated to require 73.41 L/s per design parameters and it is recommended that flow monitoring (Option 1) be used to verify the timing of required upgrades. It is recommended that upgrades be in place once monitoring shows that the facility is at 85% of firm capacity, or 71.4 L/s peak inflow.

Per Novatech's ***SRSPS Upgrade Assessment Memo (Appendix C.5)***, the preferred Shea PS upgrade (Option 3) considers the existing facility maintaining the existing dual 200mm FMs and installing a new single 300mm FM (with potential for an additional 300mm FM as a spare of future upgrades flexibility) along a new alignment through the proposed vacant SSUEA (W-4) Lands and Hydro One Corridor (See *Drawing 122163-FM1* in ***Appendix C.5***). This upgrade option does not require electrical/instrumentation upgrades at the Shea PS and will limit the impact to the existing community of Edenwylde. This upgrade can accommodate the Design Flows of 130 L/s and is the most feasible and economical option that provides the capacity and operational flexibility to accommodate the Area W4 lands. See ***Table 8*** below summarizing the upgrades to the pump station that are required to service the proposed development or will be considered for implementation based on ongoing coordination with City of Ottawa staff.

Table 8: Shea Road Pump Station Upgrade Overview

Required PS Upgrades to SRSPS	
Upgraded Component	**Description of Upgrade**
New Forcemain	• 300mm dia. HDPE DR13.5, approximately 1225m long.
New Discharge Chamber	• 1800mm x 2400mm box manhole. • To Include odour control valve with rain shield, HDPE interior liner, Blueskin exterior liner, aluminum access hatch, FRP ladder and landing, and SS swab catcher.
New Surge Relief Valve	• Replacement of the existing surge relief valve.
Existing Bypass Chamber Retrofit	• Provide a complete retrofit of the existing 2400mm x 2400mm box manhole. • Otherwise, a partial retrofit with an additional new 2400mm x 2400mm box manhole. • Requires additional valving for the new forcemain and a 300mm dia. swab launcher.
Potential PS Upgrades to SRSPS	
Variable Frequency Driver (VFD)	• Potential upgrade since two VFDs are in one panel.
Power/Controls Updates	• May need modifications if the City requires changes, despite no additional power being needed.
Secondary Wet Well	• Needed if the City prefers traditional max pump start/hour criteria.

	• Provides isolation for maintenance, aligning with City guidelines.
New Forcemain (between pumps and Bypass Chamber)	• High velocities during rare peak flows exceed City guidelines. • Transient analysis deems forcemains are sufficient, however, upgrades may be required per City coordination due to velocities during rare high flow events.

Correspondence with Novatech is provided in ***Appendix C.6***. Novatech's analysis indicates that the selected option is a suitable strategy for the SSUEA (W-4) Lands as the development builds out.

4.5 Wastewater Servicing Conclusions

The design of the sanitary sewer network is in accordance with the City of Ottawa Sewer Design Guidelines and the proposed design is in accordance with the ***DSEL Scoped MSS***.

Drawing No. 4 depicts the proposed sanitary network design.

The preferred option for the SRSPS upgrades is to continue monitoring until the Annual Flows of the buildout approach 71.4 L/s (85% of current PS firm capacity) and reassess the timing of the PS upgrades in the future. Additionally, as the Annual Flows approach 71.4 L/s, the installation of a new single 300mm forcemain along a new alignment through the proposed vacant SSUEA (W-4) Lands and Hydro One Corridor (within Edenwylde) will provide the most cost-effective solution to service the entirety of the development lands. A conceptual plan view of the proposed 300mm forcemain can be found on ***Drawing No.5*** and a profile of the alignment on ***Drawing No. 9***.

All proposed sanitary sewer infrastructure is to be designed and constructed in accordance with the City of Ottawa Sewer Design Guidelines and MECP guidelines as part of detailed design.

5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

Per the Storm Servicing Existing Conditions Figure within ***Appendix D.1**,* the existing site topography generally drains eastward and southward, with the Faulkner Municipal Drain (FMD) bisecting the development area.

West of the Hydro One corridor, the site drains eastward and southward with drainage ultimately being conveyed to the FMD. Similarly, the development area east of the Hydro One corridor also drains eastward and southward to the portion of the FMD along the northern Flewellyn Road right-of-way. The FMD conveys flows from north to south to the north side of Flewellyn Road (i.e. roadside ditch) then eastward to Shae Road, then crosses Flewellyn Road southwards and continues south along the west side of Shea Road. The FMD drain begins at approximately 215 m north of Flewellyn Road (within the development lands) and ultimately discharges to Flowing Creek Municipal Drain 5.45 km away (approximately 330 m south of the intersection of Shea Road and Brownlee Road).

The existing development to the north of the Davidson/Eder properties is serviced by the central "Davidson" stormwater management pond. The existing Davidson stormwater pond occupies approximately 3.2 ha of land and is partially located under the existing Hydro One tower line. The facility outlets from the south end of its configuration to a ditched outlet that ultimately conveys flows southwest to the FMD.

5.2 Post-Development Stormwater Management Target

As outlined in the ***DSEL Scoped MSS***, the subject lands are required to adhere to the performance criteria outlined in Appendix A of the City of Ottawa Environmental Compliance Approval (ECA):

- Water Balance: The Water Balance criteria for the site has been set through a combination of the Provincial Guidelines, the City of Ottawa OP and IMP, the ***Jock River Reach 2 SWS, Water Budget*** and the ***EIS*** reports. The ***Water Budget*** recommends establishing the post-development mitigation target as retaining 33% of the post-development infiltration deficit of the annual water budget.
- Water Quality: Enhanced quality treatment corresponding to a long-term average Total Suspended Solid removal efficiency of 80%, as defined by the MECP prescribed treatment levels.
- Erosion Control: Per the ***Erosion Threshold Assessment***, the drainage area of the site accounts for less than 2% of the drainage area for Flowing Creek at its confluence with the Faulkner Drain. Therefore, given the implementation of the proposed stormwater management strategies to mitigate increases in erosion potential along Faulkner Drain, the potential for a detectable impact to erosion processes along Flowing Creek is expected to be negligible.
- Water Quantity and Flood Control: Control post-development runoff to pre-development levels for all rain events up to and including the 100-year storm. Lot level controls to promote retention and filtration of stormwater runoff. Stormwater management ponds to incorporate baseflow augmentation in their outlet structure to mimic the existing lateral groundwater movement.

5.3 Proposed Stormwater Management Strategy

The stormwater management (SWM) design for the site will consist of minor and major systems. Frequent storm events will be collected by a network of storm sewers. Runoff in excess of the capacity of the minor system will be conveyed overland, away from properties to proposed stormwater management facilities. The proposed stormwater management facilities will provide erosion, quantity and quality controls before discharging into the existing Faulkner Municipal Drain (FMD). As noted in the ***DSEL Scoped MSS***, no downstream improvements are required to the FMD to support the proposed development.

The proposed stormwater design layout is shown on ***Drawing No. 3***.

A stormwater control assessment was completed as part of the ***DSEL Scoped MSS***. The stormwater control assessment evaluated the following hierarchical order, with each step exhausted before proceeding to the next:1) retention, 2) filtration and 3) conventional SWM measures.

5.3.1 Retention

It was determined that due to the presence of shallow bedrock, a shallow water table elevation, high RQD values identified during coring activities, and soils within the site having dual classification containing clay and silt there are no opportunities for infiltration-based LID measures.

5.3.2 Filtration

Stormwater filtration can be achieved via LIDs that are placed within the public realm and equipped with a filter media and an underdrain. Feasible filtration-based LIDs include stormwater planters, bioretention (rain gardens, bioswales, enhanced swales), exfiltration trenches, and filter-based manufactured treatment devices (catchbasin or maintenance hole MTDs) located within the municipal ROW. Permeable pavements could be considered within the park blocks but are not appropriate within the ROWs and therefore are not applicable at this stage.

Due to the limited opportunities for filtration-based LIDs, it is not expected that the inclusion of filtration-based LIDs will make a large enough impact to reduce the proposed SWM facility blocks. Therefore, it is assumed at this stage that no filtration-based LIDs are proposed with respect to the design of the SWM facilities, while working with the municipality to develop potential implementation of LIDs at detailed design as discussed further in ***Section 5.4***.

5.3.3 Conventional Stormwater Management

Lastly, the remaining volume that can't be controlled through retention and filtration are to be treated via conventional stormwater management. Two SWM facilities (wet ponds) are proposed and will be sized to ensure adequate extended detention of the control volume assuming additional upstream controls are not feasible and/or sufficient. The stormwater management facilities are discussed further in ***Section 5.6***.

5.4 Low Impact Development (LID) Opportunities

In accordance with City of Ottawa guidelines and the MECP's requirements for sustainable stormwater management, the proposed development will incorporate Low Impact Development (LID) measures where practical and feasible within the right-of-way (ROW). The primary objective of these measures is to provide enhanced water quality treatment and reduce minor system loading through distributed source control.

Two filtration-based LID types that were applicable to be applied within the proposed municipal ROWs were reviewed for potential implementation within the subdivision:

- Green Gutter (Continuous Narrow Bioswale at Curb)
- Bioretention Curb Extension (Bump-Out Cells at Nodes)

Details for both LID types have are included in ***Appendix D.2*** and are discussed in more detail in the following section.

5.4.1 Green Gutter (Continuous Narrow Bioswale at Curb)

The term green gutter refers to a narrow, linear bioretention facility located adjacent to the curb, designed to convey and treat roadway runoff prior to discharge to the storm sewer system. It functions as a vegetated swale with engineered soil media and a perforated underdrain, facilitating sedimentation and filtration.

This feature is best suited to long, uninterrupted frontages such as:

- Collector road boulevards where driveway and curb cuts are limited.
- Park and stormwater management (SWM) pond frontages where boulevard width is available and conflicts with utilities are minimized.

Typical implementation would involve linear segments between catchbasins or as inlet lead-ins to larger bioretention cells near intersections.

Typical Section and Design Criteria

- Width: Variable up to 1.0 m maximum.
- Curb-cut inlets: Typically spaced at ~15 m intervals.
- Underdrain: 200 mm perforated PVC pipe, provided where native infiltration <15 mm/h or where the system is lined.
- Erosion protection: 300 mm rip-rap aprons at inlet/outlet transitions.
- Longitudinal grade: Matches roadway/sidewalk profile.
- Clearances: Maintain outside the 2.1 m pedestrian clearway and clear of buried utilities.

Key Conflicts to Review:

- Driveway crossings and private service laterals.
- Joint Utility Trench (JUT) under sidewalks.
- Gas main and hydrant lateral clearances (0.6 m and 1.2 m, respectively).

- Streetlight foundations, transit pads, and tree root zones near inlets.

Given its narrow footprint and flexible geometry, the green gutter represents the most easily integrated LID within constrained ROW cross sections. Park and pond frontages, as well as the long collector segments with limited access interruptions, present the most realistic corridors for implementation.

5.4.2 Bioretention Curb Extension (Bump-Out Cells at Nodes)

Bioretention curb extensions, or bump-out cells, are localized vegetated depressions integrated into curb extensions at intersections or mid-block locations. They capture roadway runoff through curb-cut inlets and provide filtration through engineered bioretention media. Each cell discharges to the storm sewer via an underdrain and overflow structure.

These systems are ideally located at:

- Intersection corners and mid-block traffic-calming bump-outs.
- Collector and park edges, where space and visibility allow integration without impacting driveways or sightlines.

Typical Section and Design Criteria

- Width: Varies (full bump-out width typically 1.85–3.5 m).
- Bioretention media: 600 mm typical depth (greater if trees incorporated) over drainage layer with 200 mm PVC outlet.
- Overflow: Beehive inlet tied to storm sewer.
- Underdrain: 200 mm perforated PVC as required.
- Pedestrian clearways: Maintain accessible landings (150 mm min. step-up), detectable edge treatments, and full barrier curbs at the rear.

Key Conflicts to Review:

- Catchbasin relocations and curb radii adjustments.
- Bus stop pads, accessible ramps, and crosswalks.
- Driveway sight triangles and tree spacing.
- Electrical and communication utilities within bump-out footprint.

Bump-out bioretention cells are best suited to intersection nodes and collector street corners where boulevard space and drainage patterns converge. They can also serve dual purposes for traffic calming and aesthetic enhancement. Their implementation should be limited to locations with sufficient visibility, minimal underground utility conflicts, and available offset from travel lanes.

5.4.3 Summary of Feasible LID Locations

Table 9: LID Location Considerations and Feasibility

LID Type	Preferred Location	Typical Width	Key Feasibility Considerations	Most Realistic Corridors
Green Gutter	Continuous curb sections with minimal driveways	≤ 1.0 m	Avoid JUT, hydrants, gas mains, and tree roots; maintain 2.1 m pedestrian clearway	Park/SWM pond frontages, collector boulevards
Bioretention Curb Extension	Intersection corners and bump-outs	1.85–3.5 m	Maintain turning paths, sightlines, and pedestrian access; avoid bus pads	Collector intersections and park edge bump-outs

The reviewed LID options provide viable opportunities to integrate stormwater quality treatment into the ROW. Green gutters offer the most straightforward application within linear corridors, while bioretention bump-outs present targeted treatment and aesthetic enhancement at intersection nodes. Both measures align with the City's LID guidance and can be advanced into detailed design where site grading, drainage patterns, and utility layouts confirm available space and feasibility.

5.5 Best Management Practices

As indicated in **Section 5.3** there are no opportunities for municipally owned and operated infiltration-based LIDs. Therefore, there is limited opportunity for groundwater recharge. To provide a reduction in the post-development infiltration deficit as outlined in the Paterson ***Water Budget*** report a suite of Best Management Practices (BMP) is proposed. The appropriate BMPs for the proposed development include:

- Downspout / foundation drain disconnection;
- Roof leaders to grassed areas;
- Reduced lot grading;
- and Grassed swales.

Additional means to promote retention of stormwater may include:

- Soil amendments;
- And vegetated filter strips.

As shown in the Water Budget report, these BMPs result in a 33% reduction in the post-development infiltration deficit, matching the previously set target.

5.6 Proposed Minor System

Under post-development conditions, approximately 34.77 ha of the development will drain southeast to the Faulkner Municipal Drain through a proposed SWM facility (West Pond). The remaining 25.96 ha of the development will drain southeast to the second proposed SWM facility (East Pond) and outlet to the Faulkner Municipal Drain within Flewellyn Road. In addition, 4.13 ha of the development will be captured by the existing Davidson Pond. These drainage areas have been based on the proposed draft plan development layout and their respective SWM pond outlet locations. Each area will be treated by independent SWM facilities to provide both water quality, erosion and quantity control for the development. The proposed and existing SWM facilities within the development have been sized to ensure that the post-development runoff from the site will be attenuated in the ponds to a rate that matches pre-development conditions.

The subject property will be serviced by an internal gravity storm sewer system that is to generally follow the local road network and servicing easements as required. The functional storm design sheet is provided in ***Appendix D.3*** for reference. ***Drawing No. 3*** illustrates the contemplated storm sewer collection system. ***Drawing No. 6*** to ***Drawing No. 9*** illustrates the preliminary plan and profiles. ***Table 9*** outlines the storm sewer design criteria used in the storm sewer functional design.

Table 10: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding 1:5 year (PIEDTB-2016-01) for collector roads, without ponding 1:10 year (PIEDTB-2016-01) for arterial road, without ponding
Major System Design Return Period	1:100 year
Intensity Duration Frequency Curve (IDF) 2-year storm event: A=732.951 | B=6.199 | C=0.810 5-year storm event: A = 998.071 | B = 6.053 | C = 0.814	$i = \frac{A}{(t_c + B)^C}$
Minimum Time of Concentration	10 minutes
Rational Method	$Q = CiA$
Storm sewers are to be sized employing the Manning's Equation	$Q = \frac{1}{n} A R^{2/3} S^{1/2}$
Runoff coefficient for paved and roof areas	0.9
Runoff coefficient for landscaped areas	0.2
Minimum Sewer Size	250 mm diameter
Minimum Manning's 'n' for pipe flow	0.013
Minimum Depth of Cover	1.5 m from crown of sewer to grade
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) XPSWMM (v. 10), PCSWMM (v. 7.7)
Model Parameters	Of = 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.
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 ISSU, based on recent residential subdivisions in City of Ottawa.	

The following key City standards will be required for stormwater management within the subject lands and conveyance to the proposed stormwater management ponds, among other requirements:

- *For less frequent storms (i.e. larger than the minimum level of service), the minor system sewer capture will be restricted with the use of inlet control devices to prevent excessive hydraulic surcharges;*
- *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; and,*
- *The product of the maximum flow depths on streets and maximum flow velocity must be less than 0.60 m^2/s on all roads.*

The following additional grading criteria and guidelines will be applied to the detailed grading designs as per City of Ottawa Guidelines:

- *Driveway slopes will have a maximum slope of 6%;*
- *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 0.15 m deep with 3:1 side slopes unless otherwise indicated; and,*

- *Perforated pipe will be required for drainage swales if they are less than 1.5% in slope (preferred to promote infiltration) and will be used to interconnect rear yard catchbasins where possible.*

5.7 Stormwater Management Facilities

Stormwater runoff will be treated and attenuated within Storm Water Management Facilities per ***MECP Design Guidelines***. A preliminary Storm Water Management (SWM) Pond sizing for the proposed development and an existing conditions model to evaluate pre-development hydrology was completed as part of the ***DSEL Scoped MSS***. This analysis has been updated to accommodate the latest draft plan. A summary of the updated pond designs is described below, and the stormwater management results are provided in ***Appendix D.4*** for reference.

There are two (2) proposed SWM facilities and one (1) existing SWM facility to service the proposed development. The existing Davidson Pond was assessed as part of the ***DSEL Scoped MSS*** and was found to have adequate residual volume to incorporate the proposed development. As the proposed drainage area and imperviousness are consistent with the ***DSEL Scoped MSS,*** the existing Davidson Pond will adequately service the proposed development.

The proposed west and east SWM facilities are contemplated as hybrid wetland / wet ponds per MECP guidelines. The permanent pools were sized per the SWMPDM guidance for wet ponds, while the wetland features were incorporated to optimize the active storage area and promote naturalized features in the facilities. The wetland features will assist to enhance baseflow discharge to the FMD. The west facility has a total drainage area of 34.77 ha and as such will require 5690m³ of extended detention volume. Extended detention will be released over 71.3 hours (2.97 days), at a peak outflow rate of 42 L/s. The east facility has a total drainage area of 25.96 ha and as such will require 4440m³ of extended detention which will be released over 71.8 hours (2.98days), at a peak rate of 33 L/s. The West and East SWM facilities are illustrated in ***Figure 4*** and ***Figure 5***, respectively.

The west and east facilities have been analyzed under both free and restrictive downstream conditions according to the 100-year water levels for the FMD, which is consistent with the ***DSEL Scoped MSS***. The boundary condition for the west and east facilities are 102.77m and 101.05m respectively. ***Tables 10 & 11*** summarize the post development pond storage characteristics. Per ongoing discussion with City of Ottawa staff, it is anticipated that both facilities will require a liner similar to that of the Davidson pond. Preliminary recommendations are per the Paterson memo in ***Appendix D.5***.

Table 11: West SWM Facility: Allowable Discharge and Volume (SCS 24hr Storm)

Pond Component	Target Outflow[1]	Normal Conditions: Peak Outflow	Normal Conditions: Pond Volume[2]	Normal Conditions: Pond Elevation	Restrictive Conditions[4]: Peak Outflow	Restrictive Conditions[4]: Pond Volume[2]	Restrictive Conditions[4]: Pond Elevation
	m^3/s	m^3/s	m^3	masl	m^3/s	m^3	masl
Permanent Pool	N/A	N/A	7010	101.8	N/A	7010	101.8
Erosion Control/Extended Det.[3]	0.061	0.042	12926	102.45	0.000	12926	102.45
2 Year Design Storm	0.140	0.100	15199	102.67	0.029	17588	102.89
5 Year Design Storm	0.177	0.169	17794	102.9	0.093	19456	103.04
10 Year Design Storm	0.206	0.204	19964	103.08	0.139	21280	103.19
25 Year Design Storm	0.321	0.239	22715	103.3	0.195	23898	103.4
50 Year Design Storm	0.430	0.301	24680	103.46	0.295	25621	103.53
100 Year Design Storm	0.590	0.424	26560	103.6	0.432	27411	**103.66**

[1]Target outflow based on maximum release rate between free and restrictive downstream conditions as per JFSA SWM Pond Report.
[2]Active storage volume plus permanent pool volume.
[3]Erosion Control / Extended Detention based on total runoff volume from Chicago 25mm 3hr storm event.
[4]Restricted outlet based on 102.77m as per JFSA SWM Pond Report.

The West Facility has a maximum HGL of 103.66m and will need approximately 20,401 m^3 of active storage to attenuate post-development flows to pre-development conditions up to and including the 100-year event under the restricted outlet condition.

Table 12: East SWM Facility: Allowable Discharge and Volume (SCS 24hr Storm)

Pond Component	Target Outflow[1]	Normal Conditions: Peak Outflow	Normal Conditions: Pond Volume[2]	Normal Conditions: Pond Elevation	Restrictive Conditions[4]: Peak Outflow	Restrictive Conditions[4]: Pond Volume[2]	Restrictive Conditions[4]: Pond Elevation
	m^3/s	m^3/s	m^3	masl	m^3/s	m^3	masl
Permanent Pool	N/A	N/A	5721	100.50	N/A	5721	100.50
Erosion Control/Extended Det.[3]	0.060	0.033	10435	101.05	0.000	10435	101.05
2 Year Design Storm	0.131	0.102	11968	101.21	0.099	12268	101.24
5 Year Design Storm	0.306	0.23	13657	101.38	0.237	13937	101.41
10 Year Design Storm	0.398	0.343	14887	101.5	0.355	15168	101.53
25 Year Design Storm	0.553	0.488	16324	101.64	0.500	16633	101.67
50 Year Design Storm	0.682	0.598	17495	101.75	0.602	17870	101.78
100 Year Design Storm	0.877	0.705	18777	101.86	0.733	19144	**101.89**

[1]Target outflow based on maximum release rate between free and restrictive downstream conditions as per JFSA SWM Pond Report.
[2]Active storage volume plus permanent pool volume.
[3]Erosion Control / Extended Detention based on total runoff volume from Chicago 25mm 3hr storm event.
[4]Restricted outlet based on 101.05m as per JFSA SWM Pond Report.

The East Facility has a maximum HGL of 101.89m and will need approximately 13,423 m³ of active storage to attenuate post-development flows to pre-development conditions up to and including the 100-year event under the restricted outlet condition.

5.8 Preliminary Storm HGL Update

The hydraulic grade line (HGL) analysis completed as part of the ***DSEL Scoped MSS*** was updated based on the latest draft plan to ensure there will be sufficient freeboard between the HGL and the proposed manhole elevations within the site, as the underside of footing (USF) information is not available at this time. The analysis incorporates the latest minor system layout and assumes the highest estimated 100-year water levels for the West and East SWM facilities (103.66m and 101.89m respectively).

As shown in ***Appendix D.6*** the average freeboard was found to be 2.48 m (excluding MHs located within the SWM pond blocks) which is sufficient to provide a minimum of 0.3 m of freeboard between the HGL and proposed USF elevations, assuming USF elevations will be approximately 1.8 m below the proposed top of MH elevations. Therefore, the updated HGL analysis continues to demonstrate that gravity service connections to the storm sewer are generally feasible throughout the site.

5.9 Proposed Major System

The majority of the proposed major system flows for subdivision are to be conveyed to the three SWM facilities (Davidson, West & East Ponds) via overland flow. The Davidson Pond and West Pond overland flow routes into the ponds will utilize the storm sewer inlet blocks. The East Pond overland flow route will be directly from the adjacent ROW at the ultimate low point. It is noted that at this stage, all major system drainage is designed to be directed to a SWM facility. It is noted that both proposed ROW connections to Flewellyn Road will result in a small amount of uncontrolled major system drainage to be directed to the Flewellyn Road ditch and FMD. These areas will be accounted for at detailed design once these entrances and associated storm sewer design have been completed. As shown in **Tables 10 & 11,** the proposed outflow from the West and East Ponds are well below the target flows, therefore the additional flow from these minor areas is not expected to have an impact on the overall stormwater management design.

5.10 Grading and Drainage Design

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

- Slope for soft landscaped areas will be a minimum of 2.0% for all surfaces
- Slopes for all hard-surfaced walkways shall have a minimum of 2.0% and a maximum of 5.0%
- 3:1 maximum side slope for all swales and slopes
- 200 mm minimum swale depth, with a 1.0% minimum longitudinal gradient
- 300 mm minimum depth of rear yard swales and ditch outlets

Drawing No. 1 illustrates a conceptual grading plan for the subdivision and ***Figure 6*** and ***Figure 7*** illustrate the conceptual park grading for the site.

5.11 Stormwater Servicing Conclusions

Consistent with the ***DSEL Scoped MSS***, the proposed stormwater management strategy will consist of two new SWM facilities and utilize the existing Davidson Pond.

It is recommended that the contemplated development include two (2) new SWM facilities (West Pond and East Pond) to provide erosion, quality and quantity control. Further, the HGL analysis was updated, and it was confirmed that there will be sufficient freeboard between the HGL and proposed manhole elevations within the site.

The contemplated stormwater management plan meets the design objectives provided by the City and conservation authority.

6.0 CONCLUSION AND RECOMMENDATIONS

Caivan has proposed development within the SSUEA (W-4) lands within the City of Ottawa west of Flewellyn Road and Shea Road. The proposed plan consists of park blocks, stormwater pond blocks, and residential blocks with a mix of single-family homes, townhomes, and stacked condo units.

Potable water is available to support the development to the north. There are four available water supply connection locations to support the contemplated development.

Wastewater contribution from the subject lands were contemplated in the downstream sewers and a schedule of upgrades will be provided for the Shea Road Sanitary Pump Station.

The contemplated stormwater management system utilizes the existing outlets central and southeast of the development. Stormwater runoff within the development is proposed to be controlled to pre-development levels and adhere to the treatment requirements outlined in the City of Ottawa CLI-ECA.

The contemplated development is supported by the existing water, wastewater, and stormwater infrastructure.

Prepared by,
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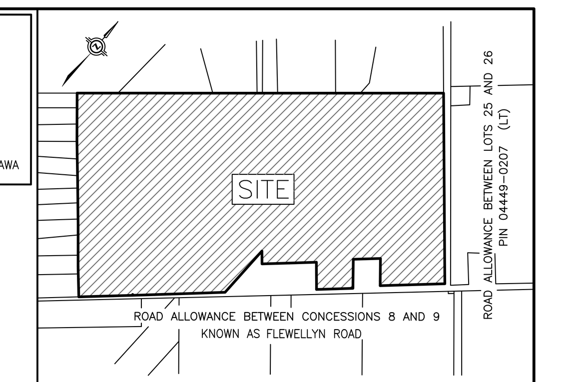
APPENDIX A

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED......................,THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT THIS .... DAY OF ...., 2025.

KERSTEN NITSCHE, MCIP, RPP, ACTING MANAGER
DEVELOPMENT REVIEW–WEST
PLANNING, DEVELOPMENT AND BUILDING SERVICES DEPARTMENT – CITY OF OTTAWA



KEY PLAN (NOT TO SCALE)

DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 24 AND 25 CONCESSION 9

GEOGRAPHIC TOWNSHIP OF GOULBOURN
NOW IN THE
CITY OF OTTAWA

SCALE 1 : 1000

J.D. BARNES LIMITED

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

NOTES

ALL DISTANCES ON CURVES ARE ARC DISTANCES UNLESS OTHERWISE SPECIFIED

ADDITIONAL INFORMATION
As required under section 51(17) of the Planning Act R.S.O. 2001

(a)(b)(e)(f)(g)(j) and (l) – As shown on this Plan.
(c) – As shown on this Draft and Key Plan
(d) – Land to be used in accordance with the Schedule of Land Use.
(h)(k) – Full Municipal Services
(i) – See Soils Report

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ARE CORRECTLY SHOWN.

DATE

SHAWN LEROUX
ONTARIO LAND SURVEYOR

SCHEDULE OF LAND USE

LAND USE	BLOCK(S)	AREA (sq. m)
SINGLE DETACHED	BLOCKS 1 TO 56, BOTH INCLUSIVE	189,656.86
STANDARD TOWNHOUSE	BLOCKS 57 TO 90, BOTH INCLUSIVE	126,036.28
STACKED CONDOMINIUM BLOCKS	BLOCKS 91 AND 92	50,716.93
VISTA	BLOCKS 93 TO 100, BOTH INCLUSIVE, AND BLOCKS 114 TO 116, BOTH INCLUSIVE	3,593.93
PARK	BLOCKS 101 AND 102	33,952.26
SWM POND	BLOCKS 103 AND 104	42,620.94
ROAD WIDENING	BLOCKS 105 TO 107, BOTH INCLUSIVE	3027.81
NATURAL HERITAGE	BLOCKS 108 TO 111, BOTH INCLUSIVE	22,797.14
UTILITY CORRIDOR	BLOCKS 112 TO 113, BOTH INCLUSIVE	39,439.42
STREETS	STREETS 1 TO 26, BOTH INCLUSIVE	177,136.29
TOTAL:		688,976.96

OWNER'S CERTIFICATE

CAIVAN (STITTSVILLE WEST) LIMITED, BEING THE REGISTERED OWNER OF PINS 04449–0189(LT), 04449–0190(LT), AND 04449–3262(LT) HEREBY AUTHORIZES J.D. BARNES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

FRANK CAIRO
PRESIDENT
(I HAVE THE AUTHORITY TO BIND THE CORPORATION)
CAIVAN (STITTSVILLE WEST) LIMITED.

OWNER'S CERTIFICATE

CAIVAN (STITTSVILLE WEST 2) LIMITED, BEING THE REGISTERED OWNER OF PIN 04449–3262(LT) HEREBY AUTHORIZES J.D. BARNES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

FRANK CAIRO
PRESIDENT
(I HAVE THE AUTHORITY TO BIND THE CORPORATION)
CAIVAN (STITTSVILLE WEST 2) LIMITED

OWNER'S CERTIFICATE

CAIVAN (STITTSVILLE SOUTH) INC., BEING THE REGISTERED OWNER OF PIN 04449–0212(LT) AND 04449–3395(LT) HEREBY AUTHORIZES J.D. BARNES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

FRANK CAIRO
PRESIDENT
(I HAVE THE AUTHORITY TO BIND THE CORPORATION)
CAIVAN (STITTSVILLE SOUTH) INC.

OWNER'S CERTIFICATE

CAIVAN (STITTSVILLE SOUTH 2) INC., BEING THE REGISTERED OWNER OF PIN 04449–3385(LT) HEREBY AUTHORIZES J.D. BARNES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

FRANK CAIRO
PRESIDENT
(I HAVE THE AUTHORITY TO BIND THE CORPORATION)
CAIVAN (STITTSVILLE SOUTH 2) INC.

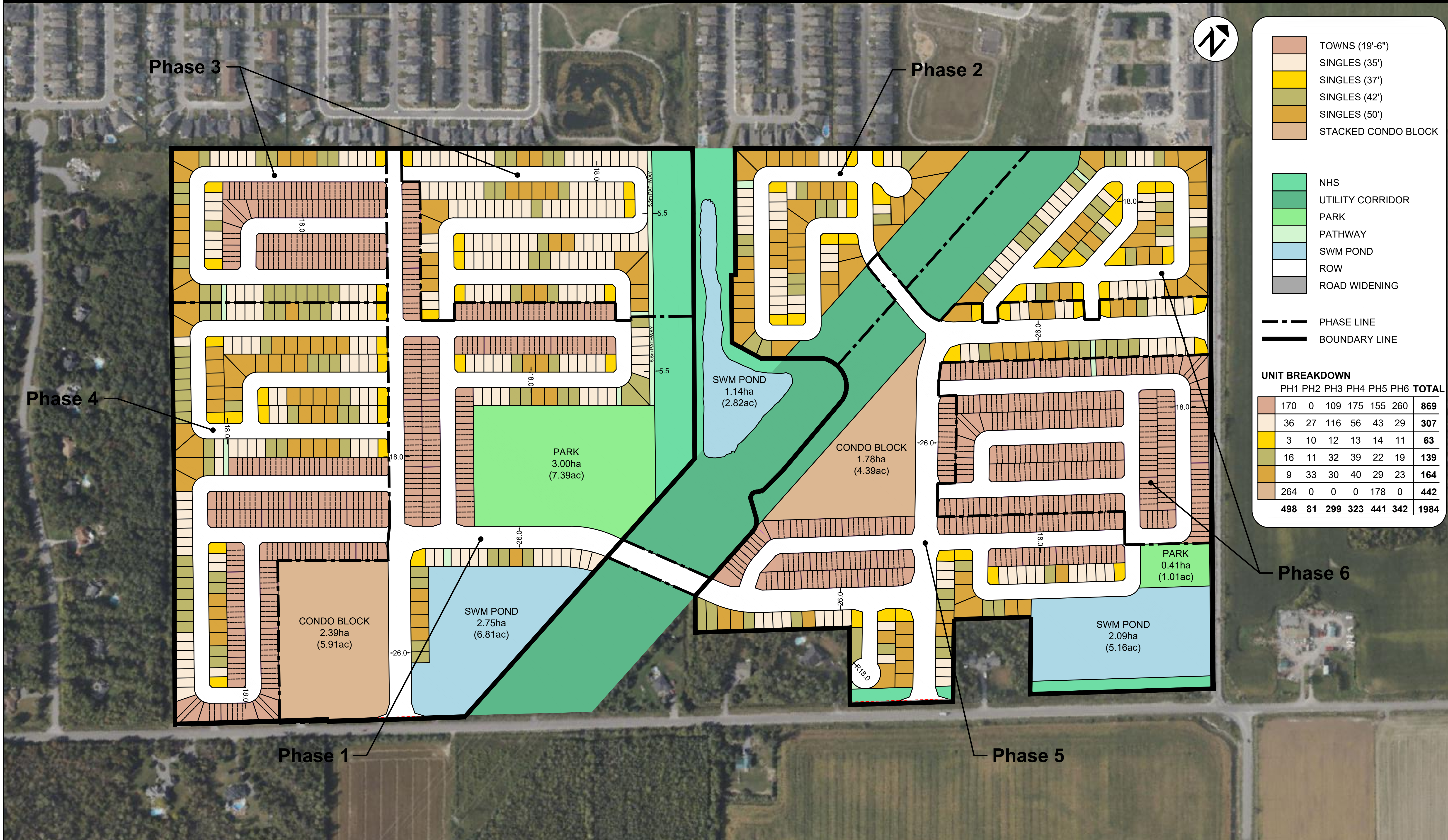
J.D. BARNES LIMITED
LAND INFORMATION SPECIALISTS
SURVEYING
MAPPING
GIS
62 STEACIE DRIVE, SUITE 103, KANATA, ON K2K 2A9
T: (613) 731-7244 F: (613) 254-8659 www.jdbarnes.com

DRAWN BY: CE/JM	CHECKED BY: SL	REFERENCE NO.: 23–10–060–00 VER E
		DATED: 03/28/2025

CAIVAN

STITTSVILLE

DRAWING: CP-16
DATE: 09/23/2025
AUTHOR: JG
SCALE: 1:4,000

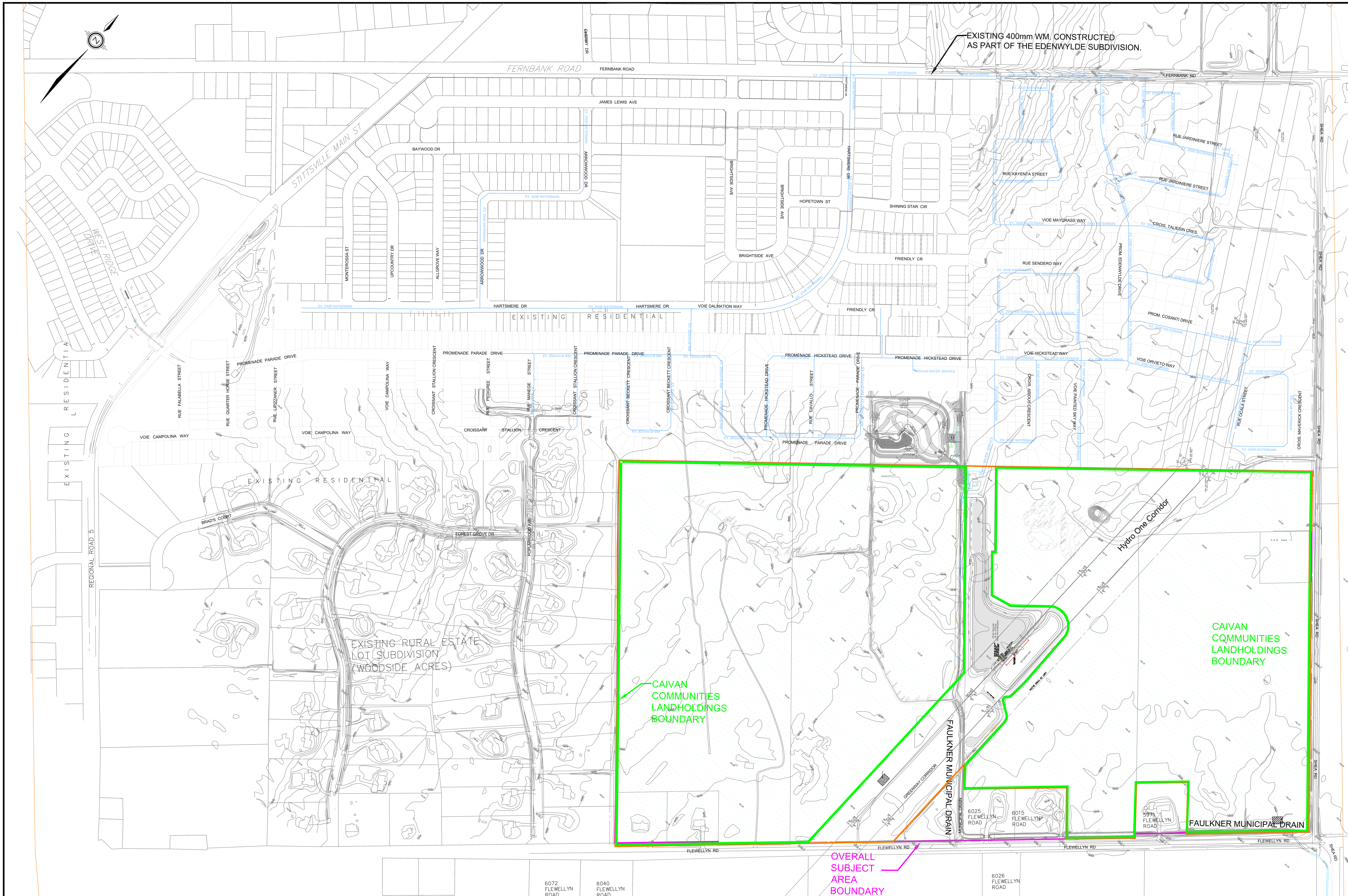


UNIT BREAKDOWN

	PH1	PH2	PH3	PH4	PH5	PH6	**TOTAL**
	170	0	109	175	155	260	**869**
	36	27	116	56	43	29	**307**
	3	10	12	13	14	11	**63**
	16	11	32	39	22	19	**139**
	9	33	30	40	29	23	**164**
	264	0	0	0	178	0	**442**
	498	**81**	**299**	**323**	**441**	**342**	**1984**

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

APPENDIX B



DSEL

120 Iber Road, Unit 103
Stittsville, Ontario, K2S 1E9
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www.DSEL.ca

STITTSVILLE SOUTH URBAN EXPANSION AREA
WATERMAIN EXISTING CONDITIONS FIGURE
CITY OF OTTAWA

LEGEND

- EXISTING WATERMAIN
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

PROJECT No.:	21-1247
DATE:	OCT 2025
SCALE:	1:2000
DRAWING:	3

Hydraulic Capacity and Modeling Analysis Stittsville South Urban Expansion Area Development

Technical Memorandum

FINAL

Prepared for:
David Schaeffer Engineering Ltd.
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9

Prepared by:
GeoAdvice Engineering Inc.
Unit 203, 2502 St. John's Street
Port Moody, BC V3H 2B4

Submission Date: January 17, 2025

Contact: Mr. Werner de Schaetzen, Ph.D., P.Eng.
Project: 2022-018-DSE

Document History and Version Control

Revision No.	Date	Document Description	Revised By	Reviewed By
R0	December 1, 2023	Draft	Ben Loewen	Werner de Schaetzen
R1	December 6, 2023	Updated Draft	Ben Loewen	Werner de Schaetzen
R2	August 8, 2024	Final	Ben Loewen	Werner de Schaetzen
R3	January 10, 2025	Draft	Jim Lee	Werner de Schaetzen
R4	January 17, 2025	Final	Jim Lee	Werner de Schaetzen

Statement of Qualifications and Limitations

This document represents GeoAdvice Engineering Inc. best professional judgment based on the information available at the time of its completion and as appropriate for the project scope of work. Services performed in developing the content of this document have been conducted in a manner consistent with that level and skill ordinarily exercised by a member of the engineering profession currently practicing under similar conditions. No warranty, express or implied is made.

1 Introduction

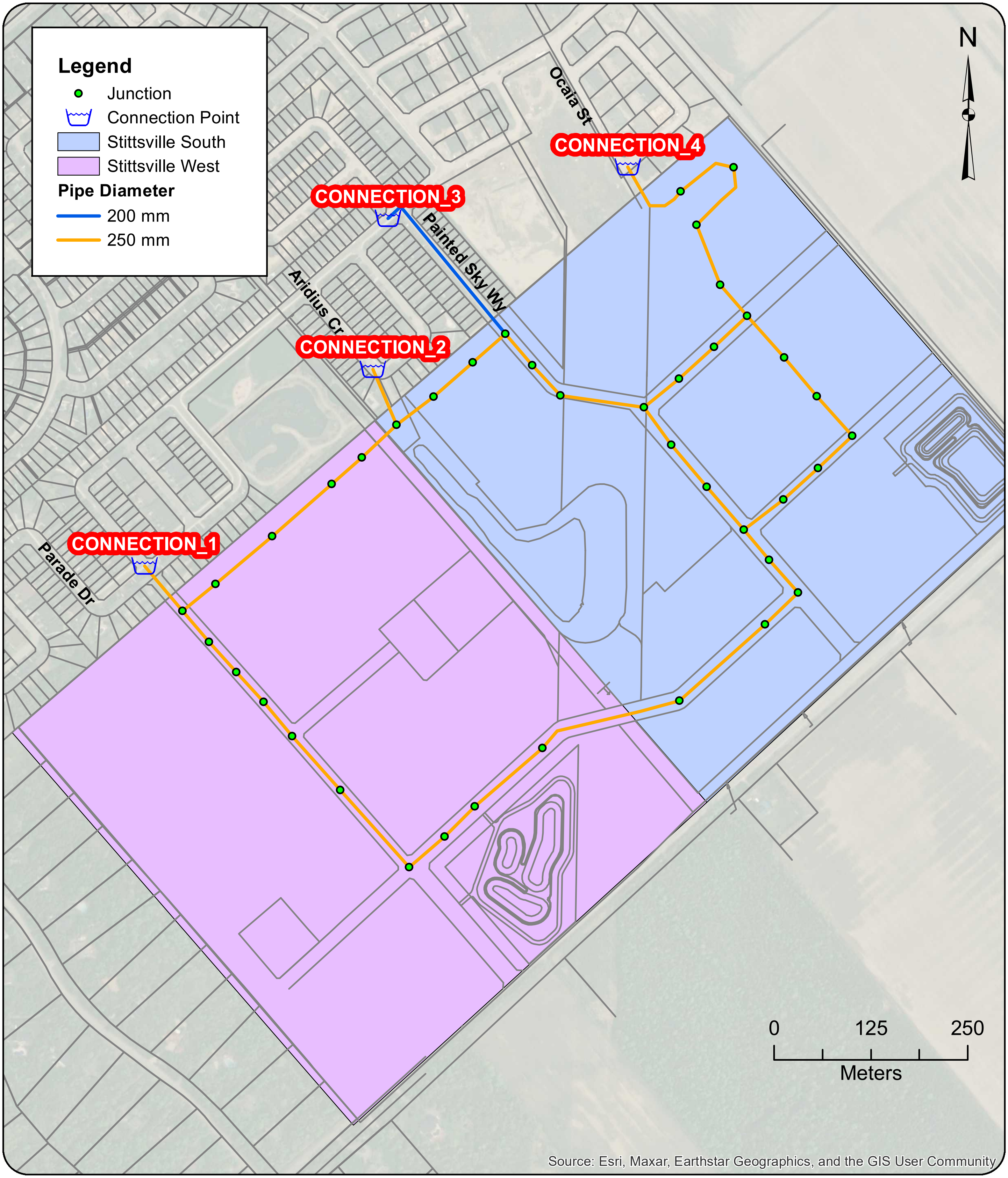
GeoAdvice Engineering Inc. (“GeoAdvice”) was retained by David Schaeffer Engineering Ltd. (“DSEL”) to size the proposed trunk water main network for the Stittsville South Urban Expansion Area (SSUEA) development (“Development”) in the City of Ottawa, ON (“City”).

The development will have four (4) connections to the City’s water distribution system on Parade Drive, Aridius Crescent, Hickstead Way via Painted Sky Way, and Ocaia Street that will feed the proposed development. The connections used for modeling the proposed development were based on the boundary conditions provided by the City on July 25, 2024 (refer to **Appendix C**).

The development site is shown in **Figure 1.1** on the following page, with the recommended trunk main pipe diameter.

This memo describes the assumptions and results of the hydraulic modeling and capacity analysis using InfoWater (Innovyze/Autodesk), a GIS water distribution system modeling and management software application.

The results presented in this memo are based on the analysis of steady state simulations. The predicted available fire flows, as calculated by the hydraulic model, represent the flow available in the water main while maintaining a residual pressure of 20 psi at the hydrant. No extended period simulations were completed in this analysis to assess the water quality or to assess the hydraulic impact on storage and pumping.



GeoAdvice Engineering Inc.

Project: **Hydraulic Capacity and Modeling Analysis**
SSUEA
2022-018-DSE
Client: **David Schaeffer Engineering Ltd.**
Date: **January 2025**
Created by: **JL**
Reviewed by: **WdS**

Site Layout and Connection Point

Figure 1.1

2 Modeling Considerations

2.1 Water Main Configuration

The trunk water main network was modeled based on drawings prepared by DSEL and provided to GeoAdvice on November 17, 2023.

2.2 Elevations

Elevations of the modeled junctions were assigned according to a preliminary site grading plan at road level, which was prepared by DSEL and provided to GeoAdvice on September 1, 2023.

2.3 Consumer Demands

The demand factors were based on the City of Ottawa's internally developed parameters (DraftFinal_SystemLevelDemandParameters_24May2024(JB).xls) for populations exceeding 3,000. A summary of the rates relevant for this development is presented in **Table 2.1**.

Table 2.1: City of Ottawa Demand Factors*

Demand Type	Amount	Units	Outdoor Water Demand (OWD)	Units
Average Day Demand (ADD)				
Single Family Home	180	L/c/d	700	L/unit/d
Multi Family Townhome	198	L/c/d	350	L/unit/d
High Density Building	219	L/c/d	0	L/unit/d
Institutional/Park**	28,000	L/ha/d		
Maximum Daily Demand (MDD)				
Single Family Home	ADD + OWD	L/d		
Multi Family Townhome	ADD + OWD	L/d		
High Density Building	ADD	L/d		
Institutional/Park	1.5 x ADD	L/ha/d		
Peak Hour Demand (PHD)				
Single Family Home	2.1 x MDD	L/d		
Multi Family Townhome	2.1 x MDD	L/d		
High Density Building	1.6 x MDD	L/d		
Institutional/Park	1.8 x MDD	L/ha/d		

***For ADD, a connection loss of 80 L/unit/day was applied to each unit, except for high density buildings**
****City of Ottawa Design Guidelines – Water Distribution (2010)**

Table 2.2 and **Table 2.3** summarize the water demand calculations for proposed development.

Table 2.2: Development Population and Demand Calculations - Residential

Dwelling Type	Number of Units	Population	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Single Detached	479	1,629	3.84	7.72	15.72
Back-to-back Townhome	674	1,214	3.70	3.70	7.08
Traditional Townhome	991	2,677	7.05	11.07	22.23
Total	**2,144**	**5,520**	**14.59**	**22.48**	**45.03**

Table 2.3: Park Demand Calculations

Dwelling Type	Area (ha)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Park	3.51	1.13	1.70	3.08

Table 2.4 summarizes the water demand calculations for the hold-out lands adjacent to the development**.**

Table 2.4: Holdout Lands Demand Calculations

Dwelling Type	Area (ha)	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential	4.75	1.00	2.02	4.14

Detailed demand calculations are provided in **Appendix A**.

2.4 Fire Flow Demand

Fire flow demands are typically determined in accordance with the Fire Underwriters Survey's Water Supply for Public fire Protection guideline (2020). FUS calculations are based on the types of building, floor area, number of storeys, construction class, occupancy class and exposure factor. At this time, there is not enough information about the building construction details to complete FUS calculations.

As agreed with DSEL, the following required fire flow were assumed:

- Park: 167 L/s
- Residential (all dwelling types): 167 L/s

FUS calculations should be completed once detailed drawings become available to validate the required fire flow assumption. The FUS fire flows may vary from those assumed in this report.

Fire flow simulations were completed at each model node under the most conservative required fire flow value. The locations of nodes do not necessarily represent hydrant locations. Detailed FUS fire flow calculations as well as the illustrated spatial allocation of the required fire flows are shown in **Appendix B**.

2.5 Boundary Conditions

The boundary conditions were provided by the City of Ottawa in the form of Hydraulic Grade Line (HGL) at the following locations:

- Connection 1: Parade Drive
- Connection 2: Aridius Crescent
- Connection 3: Hickstead Way via Painted Sky Way
- Connection 4: Ocaia Street

The four connections to the proposed development are illustrated in **Figure 1.1**.

Boundary conditions were provided for Peak Hour (PHD), Maximum Day plus Fire (MDD+FF) and Average Day (high pressure check, ADD) demand conditions. The City boundary conditions were provided to GeoAdvice on July 25, 2024, and can be found in **Appendix C**.

Table 2.5 summarizes the City of Ottawa boundary conditions ("Scenario 3") used to size the water network, as agreed with DSEL.

Table 2.5: Boundary Conditions ("Scenario 3")

Condition	Connection 1 HGL (m)	Connection 2 HGL (m)	Connection 3 HGL (m)	Connection 4 HGL (m)
Average Day (max. pressure)	160.4	160.4	160.4	160.4
Peak Hour (min. pressure)	152.0	151.8	151.8	151.8
Max Day + Fire Flow (167 L/s)	143.9	141.7	141.7	137.5

3 Hydraulic Capacity Design Criteria

3.1 Pipe Characteristics

Pipe characteristics of internal diameter (ID) and Hazen-Williams C factors were assigned in the model according to the City of Ottawa Design Guidelines for PVC water main material. Pipe characteristics used for the development are outlined in **Table 3.1** below.

Table 3.1: Model Pipe Characteristics

Nominal Diameter (mm)	ID PVC (mm)	Hazen Williams C-Factor (/)
200	204	110
250	250	110

3.2 Pressure Requirements

As outlined in the City of Ottawa Design Guidelines, the generally accepted best practice is to design new water distribution systems to operate between 350 kPa (50 psi) and 480 kPa (70 psi). The maximum pressure at any point in the distribution system in occupied areas outside of the public right-of-way shall not exceed 552 kPa (80 psi). Pressure requirements are outlined in **Table 3.2.**

Table 3.2: Pressure Requirements

Demand Condition	Minimum Pressure		Maximum Pressure	
	(kPa)	(psi)	(kPa)	(psi)
Normal Operating Pressure (maximum daily flow)	350	50	480	70
Peak Hour Demand (minimum allowable pressure)	276	40	-	-
Maximum Fixture Pressure (Ontario Building Code)	-	-	552	80
Maximum Distribution Pressure (minimum hour check)	-	-	552	80
Maximum Day Plus Fire	140	20	-	-

4 Hydraulic Capacity Analysis

The proposed trunk water mains within the development were sized to the minimum diameter which would satisfy the greater of maximum day plus fire and peak hour demand. Modeling was carried out for average day, peak hour and maximum day plus fire flow using InfoWater.

4.1 Development Pressure Analysis

Modeled service pressures for the development are summarized in **Table 4.1**.

Table 4.1: Summary of Available Service Pressures

Average Day Demand Maximum Pressure	Peak Hour Demand Minimum Pressure
79 psi (543 kPa)	61 psi (421 kPa)

As outlined in the City of Ottawa Design Guidelines, the generally accepted best practice is to design new water distribution systems to operate between 350 kPa (50 psi) and 480 kPa (70 psi). The maximum pressure at any point within the distribution system in occupied areas outside of the public right-of-way shall not exceed 552 kPa (80 psi) and the minimum pressure at any point within the distribution system shall not fall below 270 kPa (40 psi). **The maximum service pressure is 79 psi, below the 80 psi threshold. As such, pressure reducing valves may not be required for the proposed development. The minimum pressure is 61 psi under PHD, meeting the required 40 psi threshold.**

Figures showing the pressures under ADD and PHD scenarios are provided in **Appendix D.**

4.2 Development Fire Flow Analysis

Summary of the minimum available fire flow in the development is shown in **Table 4.2**.

Table 4.2: Summary of the Minimum Available Fire Flows

Required Fire Flow	Minimum Available Flow*
167 L/s	232 L/s

*The predicted available fire flows, as calculated by the hydraulic model, represent the flow available in the water main while maintaining a residual pressure of 20 psi at the hydrant. High available fire flows (>500 L/s) are theoretical values. Actual available fire flow is limited by the hydraulic losses through the hydrant lateral and hydrant port sizes.

As shown in Table 4.2, the fire flow requirements can be met at all junctions within the development.

Summaries of the residual pressures in the development are shown in **Table 4.3**. The minimum allowable pressure under fire flow conditions is 140 kPa (20 psi) at the location of the fire.

Table 4.3: Summary of the Residual Pressures (MDD + FF)

Minimum Residual Pressure	Average Residual Pressure	Maximum Residual Pressure
33 psi (226 kPa)	41 psi (280 kPa)	48 psi (333 kPa)

As shown in Table 4.3, there is sufficient residual pressure at all the junctions within the development.

The figure illustrating the fire flow results can be found in **Appendix E.**

Additional hydraulic modeling should be conducted once the internal water main network has been designed, in order to validate the proposed trunk main diameters discussed within this report.

Submission

Prepared by:

Jim Lee, E.I.T.
Hydraulic Modeler / Project Engineer

Approved by:

LICENSED PROFESSIONAL ENGINEER
W. B. F. de Schaetzen
100116349
PROVINCE OF ONTARIO

Werner de Schaetzen, Ph.D., P.Eng.
Senior Modeling Review / Project Manager

Appendix A Demand Calculations

Consumer Water Demands

Stittsville West - Residential Demands***

Dwelling Type	Number of Units	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Unit	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Single Detached	317	3.4	1,078	612	219,364	2.54	700	2.57	5.11	10.40
Stacked	337	1.8	607	394	159,738	1.85	-	-	1.85	3.54
Traditional Townhome	578	2.7	1,561	535	355,470	4.11	350	2.34	6.46	12.97
Subtotal	**1,232**		**3,246**		**734,572**	**8.50**		**4.91**	**13.41**	**26.91**

Stittsville West - Non Residential Demands

Property Type	Area (ha)			Average Day Demand			OWL		Max Day 1.5 x Avg. Day (L/s)	Peak Hour 1.8 x Max Day (L/s)
				(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Park	0.91			28,000	25,480	0.29			0.44	0.80
Subtotal	**0.91**				**25,480**	**0.29**			**0.44**	**0.80**

Future Development & Holdouts 1 - Residential Demands***

Dwelling Type	Area (ha)	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Residential**	1.67	90.0	150	612	30,529	0.35	700	0.36	0.71	1.45
Subtotal	**1.67**		**150**		**30,529**	**0.35**		**0.36**	**0.71**	**1.45**

Stittsville South - Residential Demands***

Dwelling Type	Number of Units	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Unit	Population Per Dwelling Type	(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Single Detached	162	3.4	551	612	112,104	1.30	700	1.31	2.61	5.32
Stacked	337	1.8	607	394	159,738	1.85	-	-	1.85	3.54
Traditional Townhome	413	2.7	1,116	535	253,995	2.94	350	1.67	4.61	9.27
Subtotal	**912**		**2,274**		**525,837**	**6.09**		**2.99**	**9.07**	**18.12**

Stittsville South - Non Residential Demands

Property Type	Area (ha)			Average Day Demand			OWL		Max Day 1.5 x Avg. Day (L/s)	Peak Hour 1.8 x Max Day (L/s)
				(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Park	0.75			28,000	21,000	0.24			0.36	0.66
Park	1.85			28,000	51,800	0.60			0.90	1.62
Subtotal	**2.60**				**21,000**	**0.84**			**1.26**	**2.28**

Future Development & Holdouts 2 - Residential Demands***

Dwelling Type	Area (ha)	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Residential**	1.60	90.0	145	612	29,512	0.34	700	0.35	0.69	1.40
Subtotal			**145**		**29,512**	**0.34**		**0.35**	**0.69**	**1.40**

Future Development & Holdouts 3 - Residential Demands***

Dwelling Type	Area (ha)	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Residential**	0.67	90.0	61	612	10,980	0.13	700	0.15	0.27	0.59
Subtotal			**61**		**10,980**	**0.13**		**0.15**	**0.27**	**0.59**

Future Development & Holdouts 4 - Residential Demands***

Dwelling Type	Area (ha)	Population		Average Day Demand			OWL		Max Day	Peak Hour 2.1 x Max Day (L/s)
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		
Residential**	0.81	90.0	73	612	15,029	0.17	700	0.17	0.35	0.70
Subtotal			**73**		**15,029**	**0.17**		**0.17**	**0.35**	**0.70**

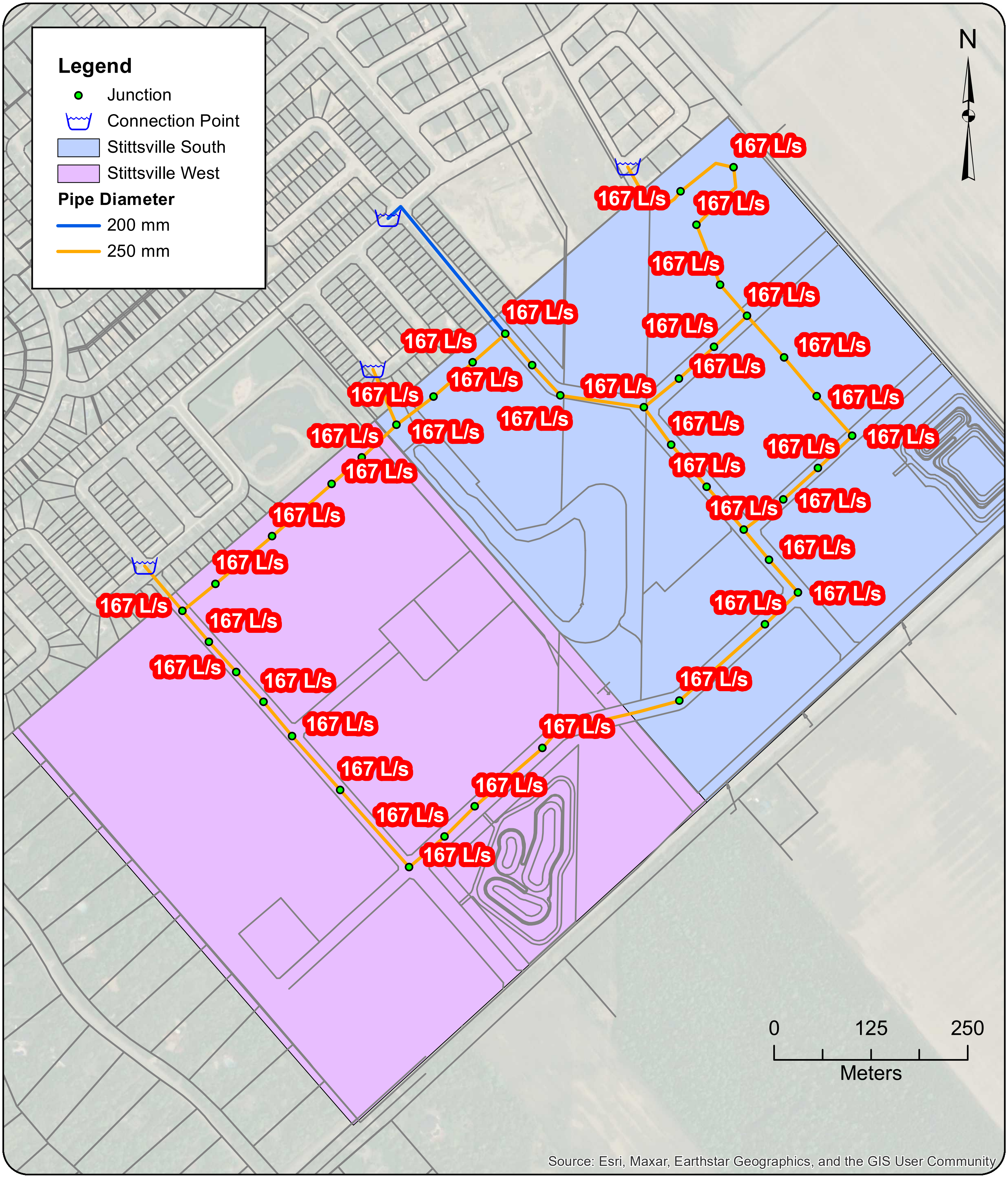
		Average Day	**Max Day**	**Peak Hour**
Stittsville West		**9.15**	**14.56**	**29.15**
Stittsville South		**7.57**	**11.64**	**23.09**

*Peaking factors based on the updated City water demand parameters

**Assumed to be single family, to be confirmed in detailed design by DSEL

***As requested by the City, a demand of 80 L/unit was added to each scenario (ADD, MDD, PHD) for residential demands, no peaking factor included

Appendix B Required Fire Flows



GeoAdvice Engineering Inc.

Project: **Hydraulic Capacity and Modeling Analysis SSUEA**
2022-018-DSE
Client: **David Schaeffer Engineering Ltd.**
Date: **January 2025**
Created by: **JL**
Reviewed by: **WdS**

Required Fire Flow

Figure B.1

Appendix C Boundary Conditions

Boundary Conditions
Stittsville South Urban Expansion Area

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	1,264	16.72
Maximum Daily Demand	2,494	26.21
Peak Hour	3,772	52.24
Fire Flow Demand #1	10,000	167
Fire Flow Demand #2	13,000	217
Fire Flow Demand #3	17,000	283

Location

Existing Condition with **Conceptual** Looping for Future Servicing Scenario 1

Existing Condition with **Conceptual** Looping for Future Servicing Scenario 2

<u>Results</u>

1. <u>Existing Condition Model (No Future Demand)</u>

Connection 1 - Parade Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.2	72.5
Peak Hour	155.2	65.4
Max Day plus Fire Flow #1	143.5	48.7
Max Day plus Fire Flow #2	135.7	37.7
Max Day plus Fire Flow #3	123.2	19.8
[1] Ground Elevation =	109.2	m

Connection 2 - Aridus Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.2	79.2
Peak Hour	155.2	72.1
Max Day plus Fire Flow #1	137.3	46.6
Max Day plus Fire Flow #2	125.6	30.0
Max Day plus Fire Flow #3	106.6	2.9
[1] Ground Elevation =	104.5	m

Connection 3 - Hickstead Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.2	77.9
Peak Hour	155.2	70.8
Max Day plus Fire Flow #1	139.7	48.8
Max Day plus Fire Flow #2	129.6	34.4
Max Day plus Fire Flow #3	113.1	11.0
[1] Ground Elevation =	105.4	m

Connection 4 - Ocaia St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.2	79.8
Peak Hour	155.2	72.7
Max Day plus Fire Flow #1	127.3	33.0
Max Day plus Fire Flow #2	109.3	7.5
Max Day plus Fire Flow #3	80.0	-34.3
[1] Ground Elevation =	104.1	m

2. Existing Condition Model with Future Demands

Connection 1 - Parade Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	72.8
Peak Hour	152.0	60.8
Max Day plus Fire Flow #1	143.4	48.6
Max Day plus Fire Flow #2	135.2	37.0
Max Day plus Fire Flow #3	122.0	18.2
[1] Ground Elevation =	109.2	m

Connection 2 - Aridus Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	79.5
Peak Hour	151.7	67.1
Max Day plus Fire Flow #1	136.1	45.0
Max Day plus Fire Flow #2	123.8	27.5
Max Day plus Fire Flow #3	104.0	-0.7
[1] Ground Elevation =	104.5	m

Connection 3 - Hickstead Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	78.2
Peak Hour	151.7	65.8
Max Day plus Fire Flow #1	138.7	47.4
Max Day plus Fire Flow #2	128.0	32.1
Max Day plus Fire Flow #3	110.8	7.6
[1] Ground Elevation =	105.4	m

Connection 4 - Ocaia St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	80.1
Peak Hour	151.6	67.6
Max Day plus Fire Flow #1	125.5	30.5
Max Day plus Fire Flow #2	106.8	3.9
Max Day plus Fire Flow #3	76.5	-39.2
[1] Ground Elevation =	104.1	m

3. Future Servicing Scenario 1 - 254 mm Looping

Connection 1 - Parade Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	72.8
Peak Hour	152.0	60.7
Max Day plus Fire Flow #1	143.9	49.3
Max Day plus Fire Flow #2	136.1	38.1
Max Day plus Fire Flow #3	123.5	20.2
[1] Ground Elevation =	109.2	m

Connection 2 - Aridus Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	79.5
Peak Hour	151.8	67.3
Max Day plus Fire Flow #1	141.7	52.8
Max Day plus Fire Flow #2	132.6	39.9
Max Day plus Fire Flow #3	118.0	19.2
[1] Ground Elevation =	104.5	m

Connection 3 - Hickstead Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	78.2
Peak Hour	151.8	66.0
Max Day plus Fire Flow #1	141.7	51.5
Max Day plus Fire Flow #2	132.6	38.6
Max Day plus Fire Flow #3	118.0	17.9
[1] Ground Elevation =	105.4	m

Connection 4 - Ocaia St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	80.1
Peak Hour	151.8	67.9
Max Day plus Fire Flow #1	137.5	47.6
Max Day plus Fire Flow #2	126.0	31.2
Max Day plus Fire Flow #3	107.4	4.7
[1] Ground Elevation =	104.1	m

4. Future Servicing Scenario 2 – 254 mm Looping

Connection 1 - Parade Dr.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	72.8
Peak Hour	152.0	60.7
Max Day plus Fire Flow #1	143.9	49.3
Max Day plus Fire Flow #2	136.1	38.2
Max Day plus Fire Flow #3	123.5	20.2
[1] Ground Elevation =	109.2	m

Connection 2 - Aridus Cres.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	79.5
Peak Hour	151.8	67.3
Max Day plus Fire Flow #1	141.7	52.9
Max Day plus Fire Flow #2	132.6	40.0
Max Day plus Fire Flow #3	118.0	19.3
[1] Ground Elevation =	104.5	m

Connection 3 - Hickstead Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	78.2
Peak Hour	151.8	66.0
Max Day plus Fire Flow #1	141.7	51.5
Max Day plus Fire Flow #2	132.6	38.6
Max Day plus Fire Flow #3	118.0	17.9
[1] Ground Elevation =	105.4	m

Connection 4 - Ocaia St.

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	160.4	80.1
Peak Hour	151.8	67.9
Max Day plus Fire Flow #1	137.9	48.1
Max Day plus Fire Flow #2	126.5	32.0
Max Day plus Fire Flow #3	108.3	6.0
[1] Ground Elevation =	104.1	m

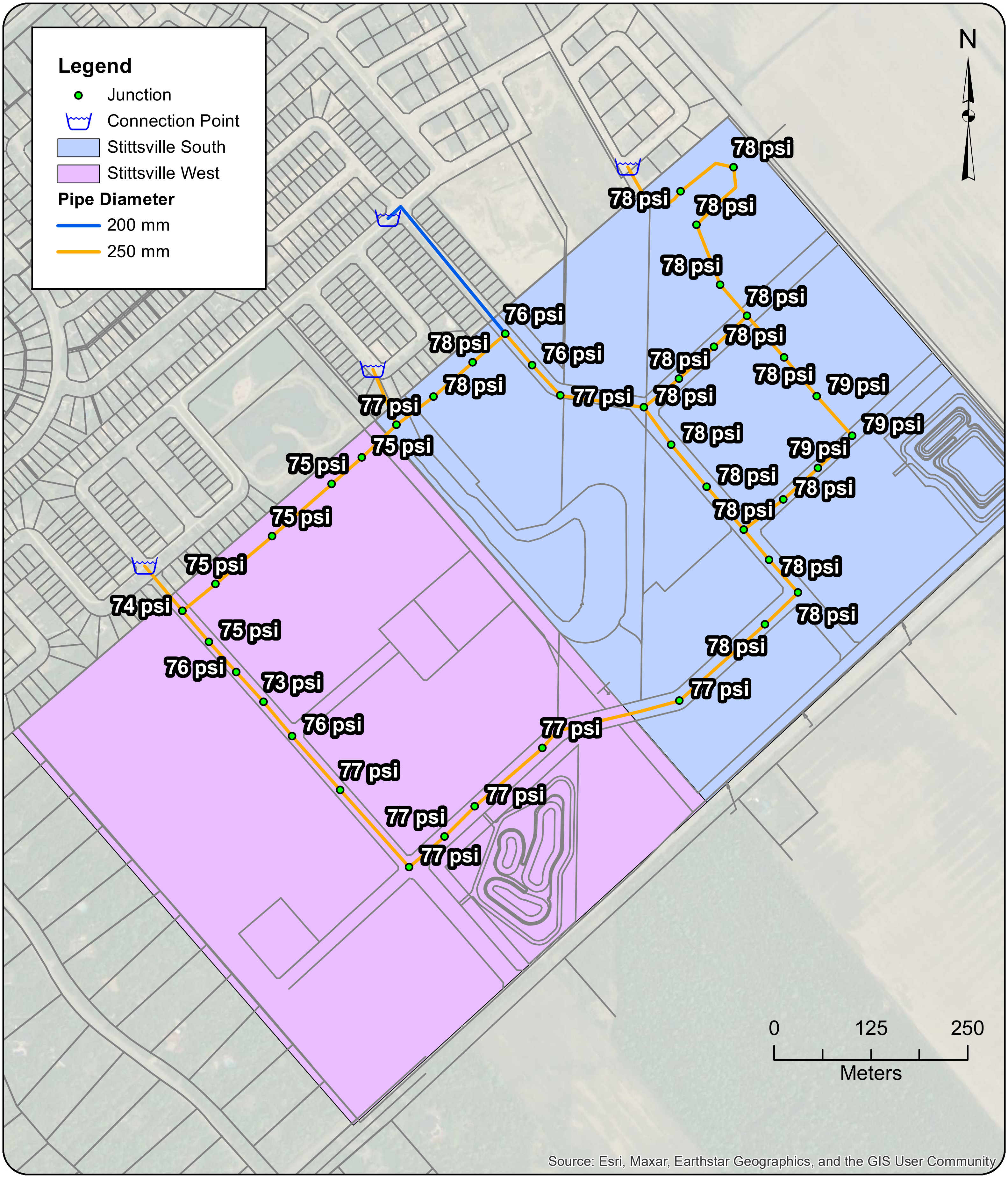
Notes

1. *Per the OWDG Section 4.2.2:*
   - *During periods of maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 20 psi.*

Disclaimer

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

Appendix D Pressure Results



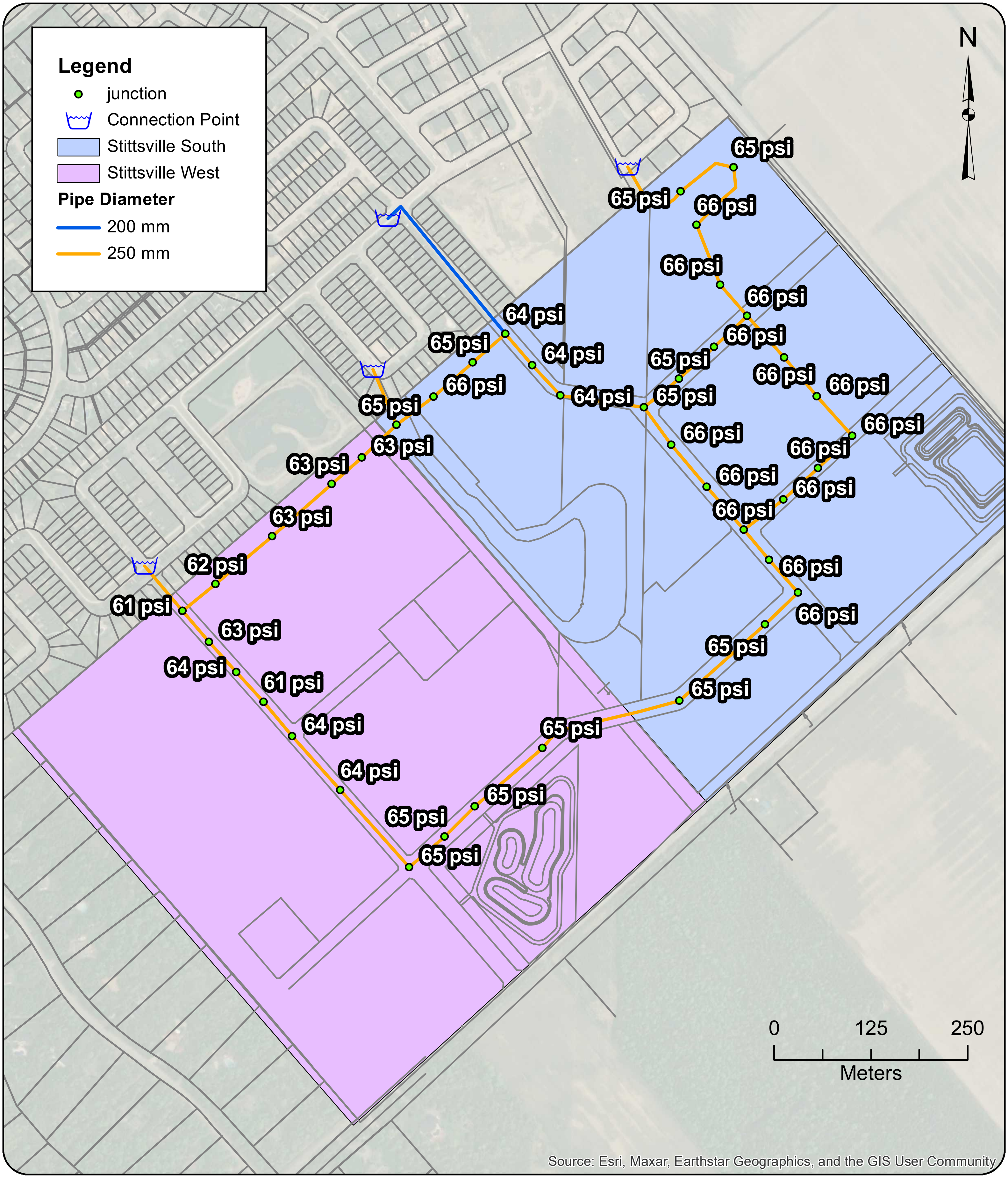
GeoAdvice Engineering Inc.

Project:	**Hydraulic Capacity and Modeling Analysis SSUEA 2022-018-DSE**
Client:	**David Schaeffer Engineering Ltd.**
Date:	**January 2025**
Created by:	**JL**
Reviewed by:	**WdS**

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.

ADD Pressure Modeling Results

Figure D.1



GeoAdvice Engineering Inc.

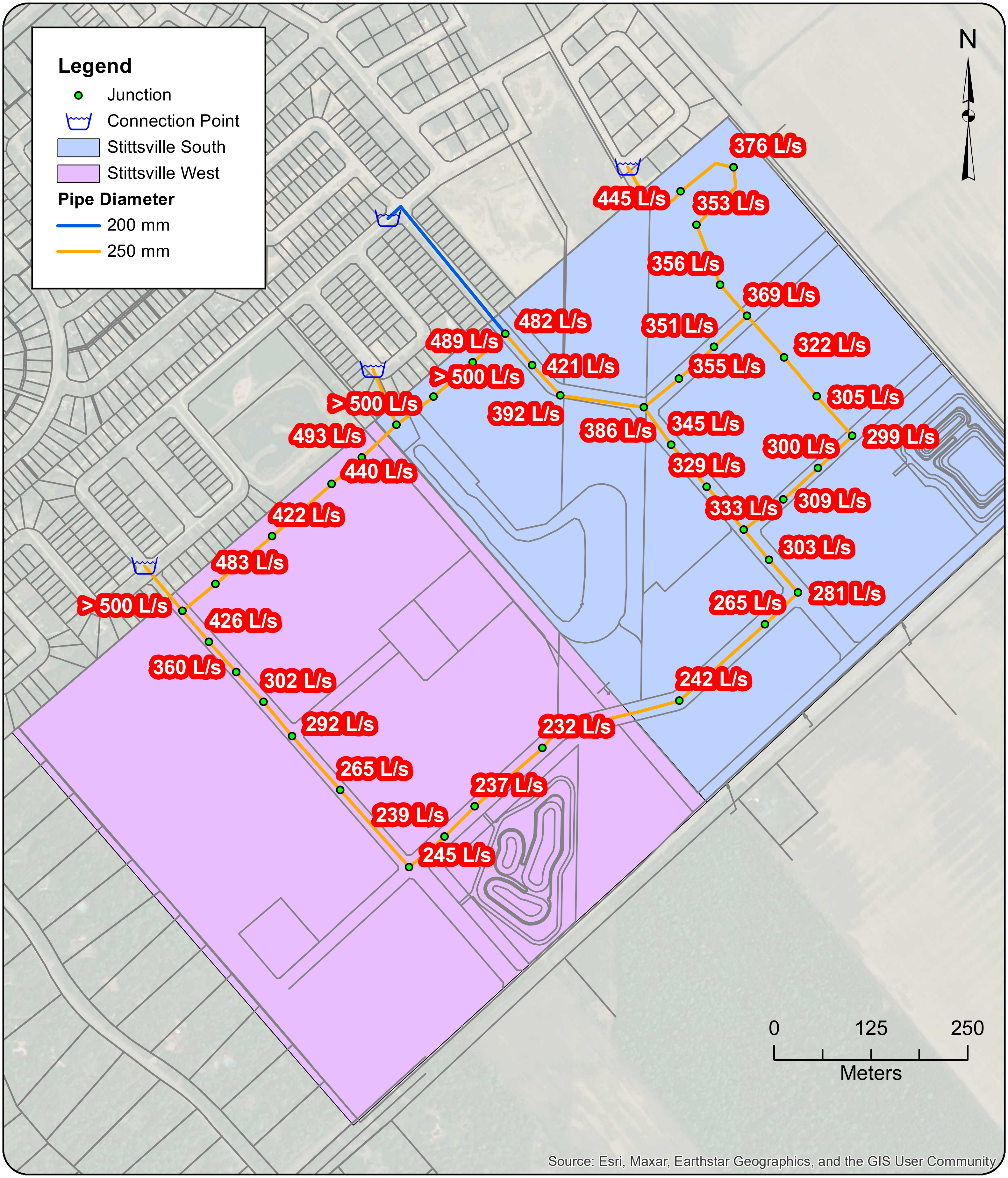
Project: **Hydraulic Capacity and Modeling Analysis SSUEA 2022-018-DSE**
Client: **David Schaeffer Engineering Ltd.**
Date: **January 2025**
Created by: **JL**
Reviewed by: **WdS**

DISCLAIMER: GeoAdvice does not warrant in any way the accuracy and completeness of the information shown on this map. Field verification of the accuracy and completeness of the information shown on this map is the sole responsibility of the user.

PHD Pressure Modeling Results

Figure D.2

Appendix E MDD+FF Model Results



GeoAdvice Engineering Inc.

Project: **Hydraulic Capacity and Modeling Analysis SSUEA 2022-018-DSE**
Client: **David Schaeffer Engineering Ltd.**
Date: **January 2025**
Created by: **JL**
Reviewed by: **WdS**

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Available Fire Flow Modeling Results

Figure E.1

From:	Bougadis, John <John.Bougadis@ottawa.ca>
Sent:	July 19, 2024 9:47 AM
To:	Peter Mott; van de Lande, Robin
Cc:	Marc Pichette; Steve Pichette; Gong, Qiaoqiao
Subject:	Re: Stittsville South - Urban Expansion area - Request for hydraulic boundary conditions
Attachments:	DraftFinal_SystemLevelDemandParameters_24May2024(JB).xlsx

Hi Peter

I have attached the water demand parameters to be used for expansion areas where the population exceeds 3000 persons. Please update the demand calculatioms for Stittsville South and resubmit your boundary conditions request.

Thanks,

John

From: Peter Mott <PMott@dsel.ca>
Sent: Friday, July 12, 2024 2:28 PM
To: van de Lande, Robin <Robin.vandeLande@ottawa.ca>
Cc: Marc Pichette <MPichette@dsel.ca>; Steve Pichette <spichette@dsel.ca>; Bougadis, John <John.Bougadis@ottawa.ca>
Subject: RE: Stittsville South - Urban Expansion area - Request for hydraulic boundary conditions

Good afternoon Robin – In keeping consistent with previous requests, see previous correspondence below, I would like to request the updated hydraulic boundary conditions for the SSUEA. The density estimates for the development have increased which will require remodelling of the proposed supply network.

Could you please have this information provided as soon as possible as it will be used to inform our MSS and FSR design for the area. Please see the, request, attached from GeoAdvice Engineering Inc.

Please let me know if you have any questions or require additional information.

Thanks,

System Level Parameters for MSS (2024)	Consumption Rate[1]	Population Density cap/unit[3]	Average Day Demand (L/unit/day)	Residential Outdoor Water Demand (OWD) (L/unit/day)[4]	Maximum Day Demand (L/unit/day)	Peak Hour Demand
SFH	180	3.4	612	700	Average Day Demand + OWD	2.1 x Maximum Day Demand
MLT	198	2.7	535	350	Average Day Demand + OWD	2.1 x Maximum Day Demand
MLT without rear yards	198	2.7	535	0	Average Day Demand	1.6 x Maximum Day Demand
APT	219	1.8	394	0	Average Day Demand	1.6 x Maximum Day Demand
EMP[2]	138	1	138	N/A	1.5 x Average Day Demand[5]	1.8 x Maximum Day Demand
Water Loss per connection	N/A	N/A	80	N/A	Average Day Demand	Average Day Demand
Total Demand			**Sum above for Total Average Day**		**Sum above for Total Max Day**	**Sum above for Total Peak Hour**

[1] Values represent L/cap/day for residential land uses and L/emp/day for employment areas.

[2] Apply a rate of 17,000 l/h/day if employment totals are unknown. The rate represents the average demand for ICI areas at the 90th percentile.

[3] Occupancy factors should be chosen according to housing type. The values shown were extracted from Section 4.2.8 of the Ottawa Design Guidelines - Water Distribution (2010)

[4] Outdoor water demand is applied to single family, semi-detached and townhome units with rear yards.

[5] The 1.5 multiplier represents the additional outdoor water demand associated with employment areas.

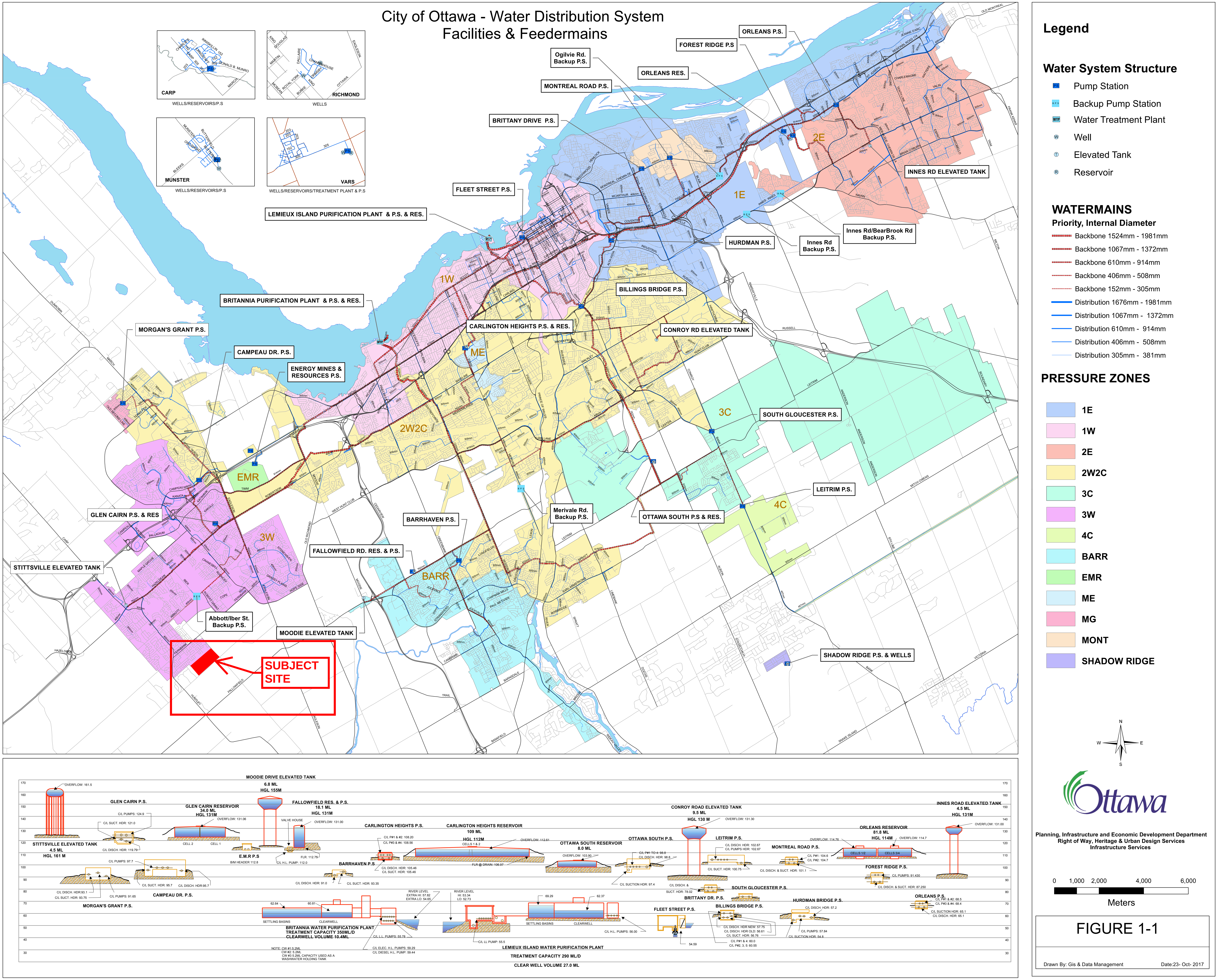
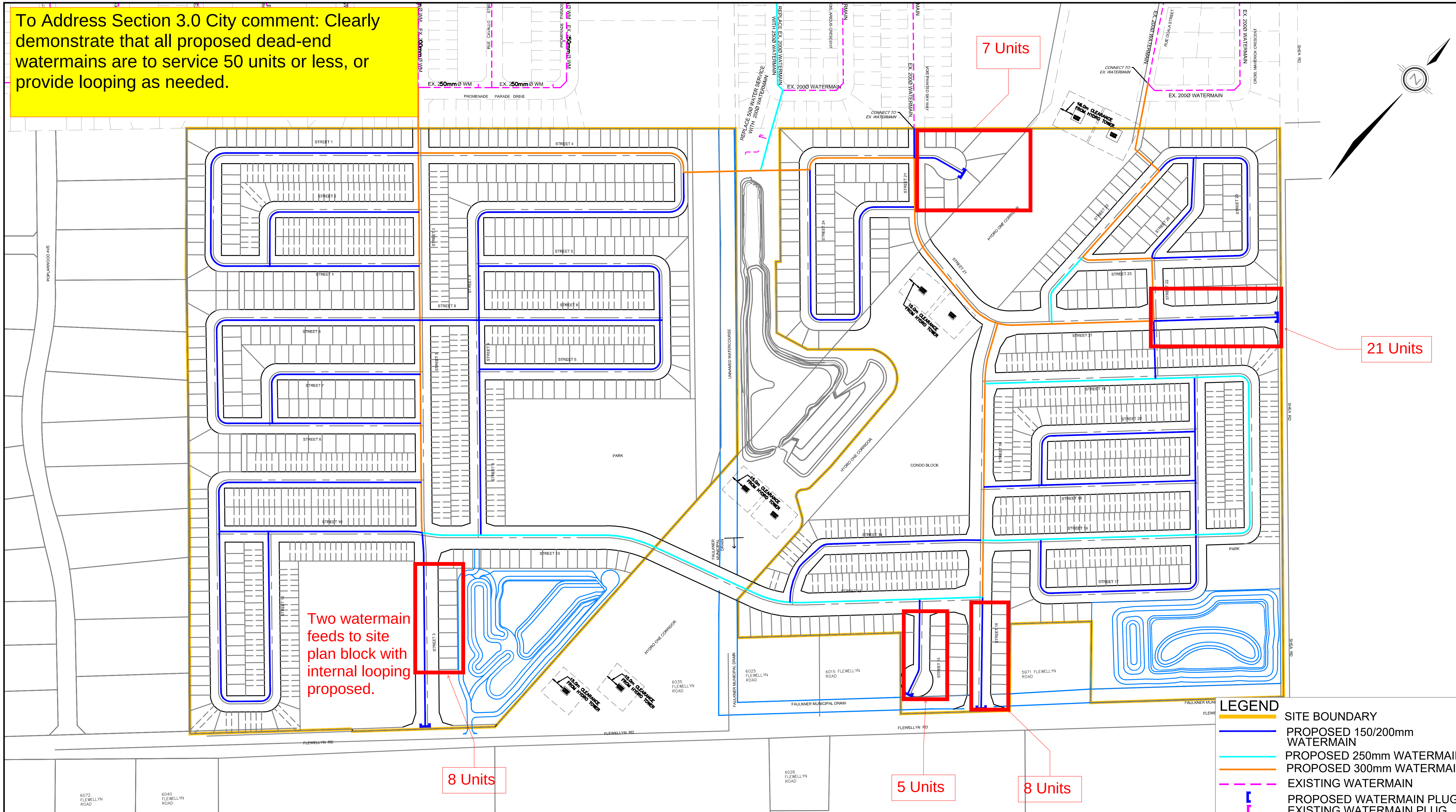

City of Ottawa - Water Distribution System
Facilities & Feedermains
CARP
WELLS/RESERVOIRS/P.S
RICHMOND
WELLS
MUNSTER
WELLS/RESERVOIRS/P.S
VARS
WELLS/RESERVOIRS/TREATMENT PLANT & P.S
ORLEANS P.S.
FOREST RIDGE P.S
Ogilvie Rd.
Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
INNES RD ELEVATED TANK
Innes Rd/BearBrook Rd
Backup P.S.
HURDMAN P.S.
Innes Rd
Backup P.S.
BILLINGS BRIDGE P.S.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
ENERGY MINES &
RESOURCES P.S.
SOUTH GLOUCESTER P.S.
LEITRIM P.S.
GLEN CAIRN P.S. & RES
Merivale Rd.
Backup P.S.
OTTAWA SOUTH P.S & RES.
BARRHAVEN P.S.
FALLOWFIELD RD. RES. & P.S.
STITTSVILLE ELEVATED TANK
Abbott/Iber St.
Backup P.S.
MOODIE ELEVATED TANK
SHADOW RIDGE P.S. & WELLS
SUBJECT
SITE
1E
1W
2E
2W2C
3C
3W
4C
BARR
EMR
ME
Legend
Water System Structure
Pump Station
Backup Pump Station
Water Treatment Plant
Well
Elevated Tank
Reservoir
WATERMAINS
Priority, Internal Diameter
Backbone 1524mm - 1981mm
Backbone 1067mm - 1372mm
Backbone 610mm - 914mm
Backbone 406mm - 508mm
Backbone 152mm - 305mm
Distribution 1676mm - 1981mm
Distribution 1067mm - 1372mm
Distribution 610mm - 914mm
Distribution 406mm - 508mm
Distribution 305mm - 381mm
PRESSURE ZONES
1E
1W
2E
2W2C
3C
3W
4C
BARR
EMR
ME
MG
MONT
SHADOW RIDGE
MOODIE DRIVE ELEVATED TANK
6.8 ML
HGL 155M
GLEN CAIRN P.S.
GLEN CAIRN RESERVOIR
34.0 ML
HGL 131M
FALLOWFIELD RES. & P.S.
18.1 ML
HGL 131M
STITTSVILLE ELEVATED TANK
4.5 ML
HGL 161 M
CARLINGTON HEIGHTS P.S.
CARLINGTON HEIGHTS RESERVOIR
109 ML
HGL 112M
OTTAWA SOUTH RESERVOIR
8.0 ML
CONROY ROAD ELEVATED TANK
9.5 ML
HGL 130 M
OTTAWA SOUTH P.S.
LEITRIM P.S.
MONTREAL ROAD P.S.
ORLEANS RESERVOIR
81.8 ML
HGL 114M
INNES ROAD ELEVATED TANK
4.5 ML
HGL 131M
FOREST RIDGE P.S.
BARRHAVEN P.S.
E.M.R P.S
CAMPEAU DR. P.S.
MORGAN'S GRANT P.S.
BRITANNIA WATER PURIFICATION PLANT
TREATMENT CAPACITY 350ML/D
CLEARWELL VOLUME 10.4ML
SOUTH GLOUCESTER P.S.
BRITTANY DR. P.S.
HURDMAN BRIDGE P.S.
BILLINGS BRIDGE P.S.
FLEET STREET P.S.
ORLEANS P.S.
LEMIEUX ISLAND WATER PURIFICATION PLANT
TREATMENT CAPACITY 290 ML/D
CLEAR WELL VOLUME 27.0 ML
Planning, Infrastructure and Economic Development Department
Right of Way, Heritage & Urban Design Services
Infrastructure Services
0 1,000 2,000 4,000 6,000
Meters
Drawn By: Gis & Data Management
Date:23- Oct- 2017

FIGURE 1-1



DSEL

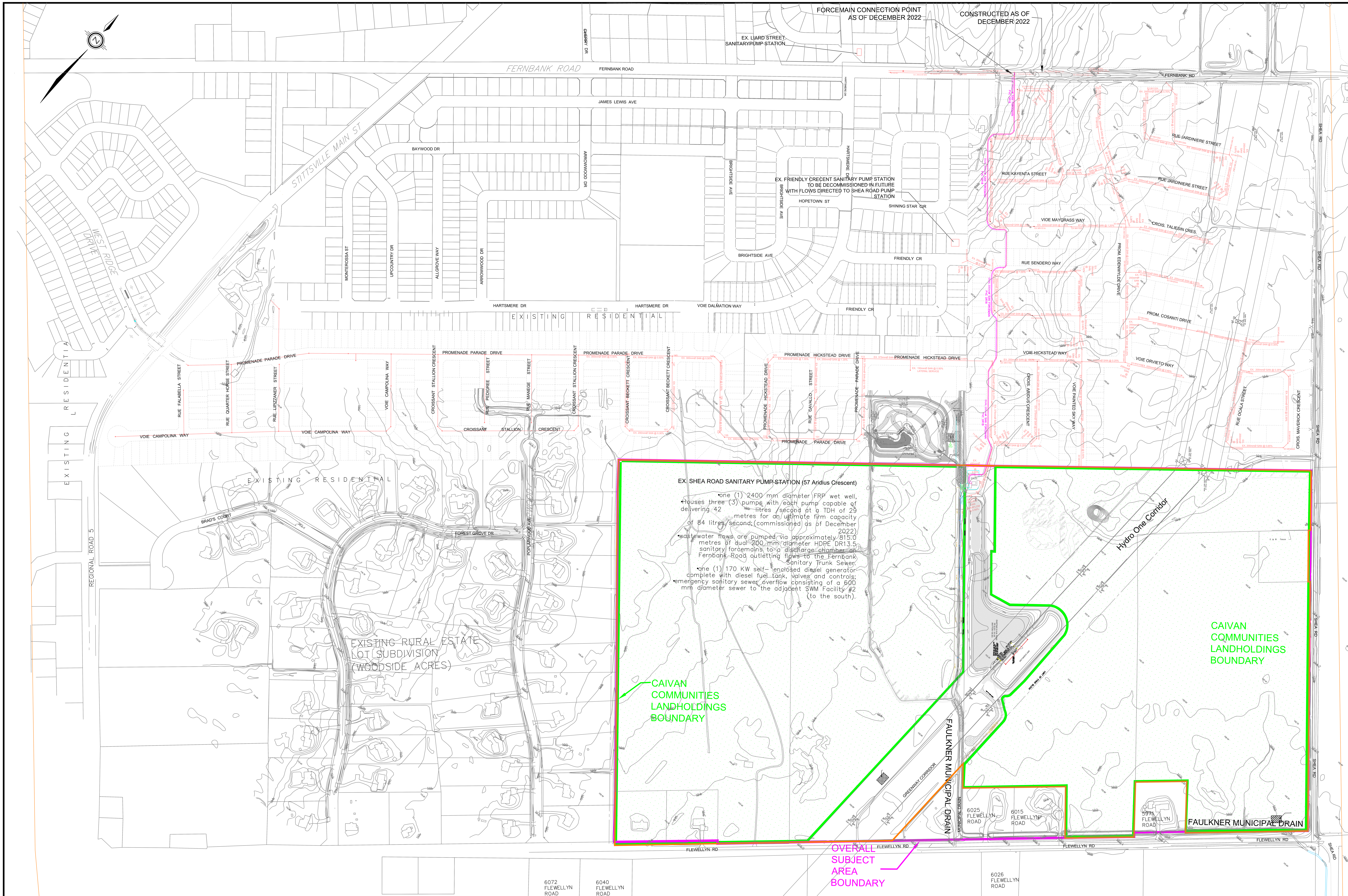
120 Iber Road, Unit 103
Stittsville, ON K2S 1E9
TEL: (613) 836-0856
FAX: (613) 836-7183
www.DSEL.ca

STITTSVILLE SOUTH URBAN EXPANSION AREA
WATERMAIN SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	1:4000
DATE:	SEPT 2023
FIGURE:	3

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

APPENDIX C



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

DSEL

STITTSVILLE SOUTH URBAN EXPANSION AREA

SANITARY EX. CONDITIONS

CITY OF OTTAWA

LEGEND

- EX. SANITARY MANHOLE
- EX. SANITARY SEWER
- EX. SANITARY FORCEMAIN
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

PROJECT No.:	21-1247
DATE:	OCT 2025
SCALE:	1:2000
DRAWING:	2

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
STREET 20																											
	205A	204A	0.22	10	27	0.22	27	3.7	0.32		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.40	45.0	200	0.65	26.44	0.01	0.84	0.30
	204A	203A	0.75	37	99	0.97	126	3.6	1.46		0.00		0.00		0.00	0.00	0.75	0.97	0.32	1.78	123.0	200	0.35	19.40	0.09	0.62	0.38
	203A	234A	0.10	3	8	1.07	134	3.6	1.55		0.00		0.00		0.00	0.00	0.10	1.07	0.35	1.90	10.5	200	0.35	19.40	0.10	0.62	0.39
	234A	235A	0.20	7	19	1.27	153	3.6	1.76		0.00		0.00		0.00	0.00	0.20	1.27	0.42	2.18	52.5	200	0.35	19.40	0.11	0.62	0.41
To STREET 18, Pipe 235A - 236A						1.27	153				0.00		0.00		0.00			1.27									
STREET 18																											
Contribution From STREET 17, Pipe 205A - 208A						0.23	24				0.00		0.00		0.00		0.23	0.23									
	208A	207A	0.23	10	27	0.46	51	3.7	0.60		0.00		0.00		0.00	0.00	0.23	0.46	0.15	0.76	45.5	200	0.35	19.40	0.04	0.62	0.29
	207A	235A	0.77	38	103	1.23	154	3.5	1.77		0.00		0.00		0.00	0.00	0.77	1.23	0.41	2.18	130.5	200	0.35	19.40	0.11	0.62	0.41
Contribution From STREET 20, Pipe 234A - 235A						1.27	153				0.00		0.00		0.00		1.27	2.50									
	235A	236A	0.20	7	19	2.70	326	3.5	3.65		0.00		0.00		0.00	0.00	0.20	2.70	0.89	4.54	64.0	200	0.35	19.40	0.23	0.62	0.50
To STREET 16, Pipe 236A - 238A						2.70	326				0.00		0.00		0.00			2.70									
STREET 14																											
	229A	230A	0.11	2	5	0.11	5	3.8	0.06		0.00		0.00		0.00	0.00	0.11	0.11	0.04	0.10	16.0	200	0.90	31.12	0.00	0.99	0.22
	230A	231A	0.17	7	19	0.28	24	3.7	0.29		0.00		0.00		0.00	0.00	0.17	0.28	0.09	0.38	35.0	200	0.90	31.12	0.01	0.99	0.33
	231A	232A	0.57	27	73	0.85	97	3.6	1.13		0.00		0.00		0.00	0.00	0.57	0.85	0.28	1.41	87.5	200	0.35	19.40	0.07	0.62	0.36
	232A	233A	0.43	20	54	1.28	151	3.6	1.74		0.00		0.00		0.00	0.00	0.43	1.28	0.42	2.16	86.0	200	0.35	19.40	0.11	0.62	0.41
To STREET 16, Pipe 233A - 236A						1.28	151				0.00		0.00		0.00			1.28									
STREET 17																											
	200A	213A	0.16	5	14	0.16	14	3.7	0.17		0.00		0.00		0.00	0.00	0.16	0.16	0.05	0.22	55.0	200	0.65	26.44	0.01	0.84	0.24
To STREET 19, Pipe 213A - 214A						0.16	14				0.00		0.00		0.00			0.16									
	205A	208A	0.23	9	24	0.23	24	3.7	0.29		0.00		0.00		0.00	0.00	0.23	0.23	0.08	0.36	59.0	200	0.65	26.44	0.01	0.84	0.29
To STREET 18, Pipe 208A - 207A						0.23	24				0.00		0.00		0.00			0.23									
	237A	202A	0.20	7	19	0.20	19	3.7	0.23		0.00		0.00		0.00	0.00	0.20	0.20	0.07	0.29	55.0	200	0.65	26.44	0.01	0.84	0.27
To STREET 19, Pipe 202A - 290A						0.20	19				0.00		0.00		0.00			0.20									
	215A	216A	0.37	6	20	0.37	20	3.7	0.24		0.00		0.00	0.41	0.41	0.04	0.78	0.78	0.26	0.54	70.0	200	0.65	26.44	0.02	0.84	0.33
			0.49	12	41	0.86	61				0.00		0.00		0.41		0.49	1.27									
	216A	217A	0.68		79	1.54	140	3.6	1.62		0.00		0.00		0.41	0.04	0.68	1.95	0.64	2.30	93.0	200	0.35	19.40	0.12	0.62	0.41
	217A	218A	0.14	2	7	1.68	147	3.6	1.69		0.00		0.00		0.41	0.04	0.14	2.09	0.69	2.43	11.5	200	0.35	19.40	0.13	0.62	0.42
	218A	219A	0.17	3	10	1.85	157	3.5	1.81		0.00		0.00		0.41	0.04	0.17	2.26	0.75	2.59	52.0	250	0.25	29.73	0.09	0.61	0.37
To STREET 19, Pipe 219A - 233A						1.85	157				0.00		0.00		0.41			2.26									
STREET 19																											
	212A	213A	0.17	6	16	0.17	16	3.7	0.19		0.00		0.00		0.00	0.00	0.17	0.17	0.06	0.25	52.5	200	0.65	26.44	0.01	0.84	0.26
Contribution From STREET 17, Pipe 200A - 213A						0.16	14				0.00		0.00		0.00		0.16	0.33									
	213A	214A	0.50	24	65	0.83	95	3.6	1.11		0.00		0.00		0.00	0.00	0.50	0.83	0.27	1.38	93.5	200	0.35	19.40	0.07	0.62	0.36
	214A	219A	0.50	25	68	1.33	163	3.5	1.87		0.00		0.00		0.00	0.00	0.50	1.33	0.44	2.31	83.5	200	0.35	19.40	0.12	0.62	0.41
Contribution From STREET 17, Pipe 218A - 219A						1.85	157				0.00		0.00		0.41		2.26	3.59									
	219A	233A	0.20	7	19	3.38	339	3.4	3.78		0.00		0.00		0.41	0.04	0.20	3.79	1.25	5.08	64.0	250	0.25	29.73	0.17	0.61	0.45
To STREET 16, Pipe 233A - 236A						3.38	339				0.00		0.00		0.41			3.79									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha					
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph				
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4		

Designed: M.S.	PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025	Sheet No. 1 of 8

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
	211A	2110A	0.28	12	32	0.28	32	3.7	0.38		0.00		0.00		0.00	0.00	0.28	0.28	0.09	0.47	43.0	200	0.65	26.44	0.02	0.84	0.32
	2110A	210A	0.23	12	32	0.51	64	3.6	0.75		0.00		0.00		0.00	0.00	0.23	0.51	0.17	0.92	39.5	200	0.35	19.40	0.05	0.62	0.31
	210A	209A	0.51	25	68	1.02	132	3.6	1.53		0.00		0.00		0.00	0.00	0.51	1.02	0.34	1.86	82.5	200	0.35	19.40	0.10	0.62	0.39
	209A	201A	0.11	3	8	1.13	140	3.6	1.62		0.00		0.00		0.00	0.00	0.11	1.13	0.37	1.99	11.0	200	0.35	19.40	0.10	0.62	0.40
	201A	202A	0.21	8	22	1.34	162	3.5	1.86		0.00		0.00		0.00	0.00	0.21	1.34	0.44	2.30	52.0	200	0.35	19.40	0.12	0.62	0.41
Contribution From STREET 17, Pipe 237A - 202A						0.20	19				0.00		0.00		0.00		0.20	1.54									
	202A	290A	0.69	33	89	2.23	270	3.5	3.04		0.00		0.00		0.00	0.00	0.69	2.23	0.74	3.78	119.0	250	0.25	29.73	0.13	0.61	0.41
	290A	238A	0.59	28	76	2.82	346	3.4	3.86		0.00		0.00		0.00	0.00	0.59	2.82	0.93	4.79	119.0	250	0.25	29.73	0.16	0.61	0.44
To STREET 16, Pipe 238A - 239A						2.82	346				0.00		0.00		0.00			2.82									
STREET 15																											
			0.16	3	10	0.16	10				0.00		0.00		0.00		0.16	0.16									
	223A	224A	1.17		135	1.33	145	3.6	1.67		0.00		0.00		0.00	0.00	1.17	1.33	0.44	2.11	22.5	200	0.65	26.44	0.08	0.84	0.50
	224A	225A	0.31	6	20	1.64	165	3.5	1.89		0.00		0.00		0.00	0.00	0.31	1.64	0.54	2.44	77.5	200	0.35	19.40	0.13	0.62	0.42
To STREET 13, Pipe 225A - 228A						1.64	165				0.00		0.00		0.00			1.64									
STREET 13																											
			0.08	3	8	0.08	8				0.00		0.00		0.00		0.08	0.08									
			0.17	3	10	0.25	18				0.00		0.00		0.00		0.17	0.25									
	220A	221A	0.18		0	0.43	18	3.7	0.22		0.00		0.00		0.00	0.00	0.18	0.43	0.14	0.36	22.5	200	1.00	32.80	0.01	1.04	0.33
			0.04	1	3	0.47	21				0.00		0.00		0.00		0.04	0.47									
	221A	222A	0.08	2	7	0.55	28	3.7	0.33		0.00		0.00		0.00	0.00	0.08	0.55	0.18	0.52	24.0	200	0.35	19.40	0.03	0.62	0.26
			0.46	19	51	1.01	79				0.00		0.00		0.00		0.46	1.01									
	222A	225A	0.47	12	41	1.48	120	3.6	1.39		0.00		0.00		0.00	0.00	0.47	1.48	0.49	1.88	144.0	200	0.35	19.40	0.10	0.62	0.39
Contribution From STREET 15, Pipe 224A - 225A						1.64	165				0.00		0.00		0.00		1.64	3.12									
	225A	228A	0.26	7	19	3.38	304	3.5	3.41		0.00		0.00		0.00	0.00	0.26	3.38	1.12	4.52	64.0	200	0.35	19.40	0.23	0.62	0.50
To STREET 16, Pipe 228A - 233A						3.38	304				0.00		0.00		0.00			3.38									
STREET 16																											
	226A	227A	0.41	9	31	0.41	31	3.7	0.37		0.00		0.00		0.00	0.00	0.41	0.41	0.14	0.51	55.0	200	0.65	26.44	0.02	0.84	0.33
	227A	228A	0.26	6	20	0.67	51	3.7	0.60		0.00		0.00		0.00	0.00	0.26	0.67	0.22	0.82	38.5	200	0.35	19.40	0.04	0.62	0.31
Contribution From STREET 13, Pipe 225A - 228A						3.38	304				0.00		0.00		0.00		3.38	4.05									
	228A	233A	0.27	5	17	4.32	372	3.4	4.13		0.00		0.00		0.00	0.00	0.27	4.32	1.43	5.56	63.0	300	0.20	43.25	0.13	0.61	0.42
Contribution From STREET 19, Pipe 219A - 233A						3.38	339				0.00		0.00		0.41		3.79	8.11									
Contribution From STREET 14, Pipe 232A - 233A						1.28	151				0.00		0.00		0.00		1.28	9.39									
			0.14		0	9.12	862				0.00		0.00		0.41		0.14	9.53									
	233A	236A	1.70	178	409	10.82	1271	3.2	13.12		0.00		0.00		0.41	0.04	1.70	11.23	3.71	16.87	59.0	300	0.20	43.25	0.39	0.61	0.57
Contribution From STREET 18, Pipe 235A - 236A						2.70	326				0.00		0.00		0.00		2.70	13.93									
	236A	238A	0.52	16	43	14.04	1640	3.1	16.59		0.00		0.00		0.41	0.04	0.52	14.45	4.77	21.40	120.0	300	0.20	43.25	0.49	0.61	0.61
Contribution From STREET 19, Pipe 290A - 238A						2.82	346				0.00		0.00		0.00		2.82	17.27									
	238A	239A	0.08		0	16.94	1986	3.1	19.76		0.00		0.00		0.41	0.04	0.08	17.35	5.73	25.53	17.5	300	0.20	43.25	0.59	0.61	0.64
	239A	261A	0.16		0	17.10	1986	3.1	19.76		0.00		0.00		0.41	0.04	0.16	17.51	5.78	25.58	51.5	300	0.20	43.25	0.59	0.61	0.64
To STREET 21, Pipe 261A - 262A						17.10	1986				0.00		0.00		0.41			17.51									
STREET 23																											
	246A	247A	0.22	4	14	0.22	14	3.7	0.17		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.24	59.0	200	0.65	26.44	0.01	0.84	0.26
To STREET 22, Pipe 247A - 249A						0.22	14				0.00		0.00		0.00			0.22									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4	

Designed: M.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: 25 Sep 2025

Sheet No. 2 of 8

1247_san_designsheets.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
	255A	256A	0.04	1	3	0.04	3	3.8	0.04		0.00		0.00		0.00	0.00	0.04	0.04	0.01	0.05	14.0	200	0.65	26.44	0.00	0.84	0.15
	256A	257A				0.04	3	3.8	0.04		0.00		0.00		0.00	0.00	0.00	0.04	0.01	0.05	9.5	200	0.35	19.40	0.00	0.62	0.13
	240A	241A	0.59	14	48	0.59	48	3.7	0.57		0.00		0.00		0.00	0.00	0.59	0.59	0.19	0.76	98.5	200	0.65	26.44	0.03	0.84	0.37
	241A	242A	0.14	2	7	0.73	55	3.6	0.65		0.00		0.00		0.00	0.00	0.14	0.73	0.24	0.89	11.0	200	0.35	19.40	0.05	0.62	0.31
	242A	247A	0.52	13	44	1.25	99	3.6	1.15		0.00		0.00		0.00	0.00	0.52	1.25	0.41	1.57	99.0	200	0.35	19.40	0.08	0.62	0.37
To STREET 22, Pipe 247A - 249A						1.25	99				0.00		0.00		0.00			1.25									
	251A	243A	0.30	6	20	0.30	20	3.7	0.24		0.00		0.00		0.00	0.00	0.30	0.30	0.10	0.34	52.5	200	0.65	26.44	0.01	0.84	0.28
	243A	252A	0.10	2	7	0.40	27	3.7	0.32		0.00		0.00		0.00	0.00	0.10	0.40	0.13	0.45	28.0	200	0.35	19.40	0.02	0.62	0.26
	252A	253A	0.49	13	44	0.89	71	3.6	0.83		0.00		0.00		0.00	0.00	0.49	0.89	0.29	1.13	75.5	200	0.35	19.40	0.06	0.62	0.33
	253A	257A	0.39	9	31	1.28	102	3.6	1.19		0.00		0.00		0.00	0.00	0.39	1.28	0.42	1.61	76.0	200	0.35	19.40	0.08	0.62	0.37
	257A	258A	0.28	6	20	1.60	125	3.6	1.45		0.00		0.00		0.00	0.00	0.28	1.60	0.53	1.98	51.5	200	0.35	19.40	0.10	0.62	0.40
	258A	259A	0.04		0	1.64	125	3.6	1.45		0.00		0.00		0.00	0.00	0.04	1.64	0.54	1.99	33.0	200	0.35	19.40	0.10	0.62	0.40
To STREET 21, Pipe 259A - 260A						1.64	125				0.00		0.00		0.00			1.64									
STREET 26																											
	2430A	244A	0.27	6	20	0.27	20	3.7	0.24		0.00		0.00		0.00	0.00	0.27	0.27	0.09	0.33	53.0	200	0.65	26.44	0.01	0.84	0.28
	244A	245A	0.37	7	24	0.64	44	3.7	0.52		0.00		0.00		0.00	0.00	0.37	0.64	0.21	0.73	69.5	200	0.35	19.40	0.04	0.62	0.29
To STREET 22, Pipe 245A - 247A						0.64	44				0.00		0.00		0.00			0.64									
STREET 22																											
Contribution From STREET 26, Pipe 244A - 245A						0.64	44				0.00		0.00		0.00		0.64	0.64									
	245A	247A				0.64	44	3.7	0.52		0.00		0.00		0.00	0.00	0.00	0.64	0.21	0.73	7.0	200	0.35	19.40	0.04	0.62	0.29
Contribution From STREET 23, Pipe 242A - 247A						1.25	99				0.00		0.00		0.00		1.25	1.89									
Contribution From STREET 23, Pipe 246A - 247A						0.22	14				0.00		0.00		0.00		0.22	2.11									
	247A	249A	0.09		0	2.20	157	3.5	1.81		0.00		0.00		0.00	0.00	0.09	2.20	0.73	2.53	64.0	200	0.90	31.12	0.08	0.99	0.59
To STREET 21, Pipe 249A - 250A						2.20	157				0.00		0.00		0.00			2.20									
STREET 21																											
	248A	2480A	0.41	10	34	0.41	34	3.7	0.41		0.00		0.00		0.00	0.00	0.41	0.41	0.14	0.54	49.5	200	0.65	26.44	0.02	0.84	0.33
	2480A	249A	0.49	11	37	0.90	71	3.6	0.83		0.00		0.00		0.00	0.00	0.49	0.90	0.30	1.13	75.5	200	0.35	19.40	0.06	0.62	0.33
Contribution From STREET 22, Pipe 247A - 249A						2.20	157				0.00		0.00		0.00		2.20	3.10									
	249A	250A	0.56	12	41	3.66	269	3.5	3.03		0.00		0.00		0.00	0.00	0.56	3.66	1.21	4.24	84.5	200	0.35	19.40	0.22	0.62	0.49
	250A	259A	0.19	4	14	3.85	283	3.5	3.18		0.00		0.00		0.00	0.00	0.19	3.85	1.27	4.45	34.0	200	0.35	19.40	0.23	0.62	0.50
Contribution From STREET 23, Pipe 258A - 259A						1.64	125				0.00		0.00		0.00		1.64	5.49									
	259A	260A	0.22	4	14	5.71	422	3.4	4.66		0.00		0.00		0.00	0.00	0.22	5.71	1.88	6.55	41.5	200	0.35	19.40	0.34	0.62	0.56
	260A	261A	0.12	3	10	5.83	432	3.4	4.77		0.00		0.00		0.00	0.00	0.12	5.83	1.92	6.69	17.5	200	0.35	19.40	0.34	0.62	0.56
Contribution From STREET 16, Pipe 239A - 261A						17.10	1986				0.00		0.00		0.41		17.51	23.34									
	261A	262A	0.05		0	22.98	2418	3.0	23.64		0.00		0.00		0.41	0.04	0.05	23.39	7.72	31.40	29.0	300	0.20	43.25	0.73	0.61	0.67
	262A	263A	0.16		0	23.14	2418	3.0	23.64		0.00		0.00		0.41	0.04	0.16	23.55	7.77	31.45	89.0	300	0.20	43.25	0.73	0.61	0.67
	263A	264A	0.16	2	7	23.30	2425	3.0	23.70		0.00		0.00		0.41	0.04	0.16	23.71	7.82	31.57	20.0	300	0.20	43.25	0.73	0.61	0.67
	264A	267A	0.32	5	17	23.62	2442	3.0	23.85		0.00		0.00		0.41	0.04	0.32	24.03	7.93	31.82	79.5	300	0.20	43.25	0.74	0.61	0.67
To STREET 21, Pipe 267A - 268A						23.62	2442				0.00		0.00		0.41			24.03									
STREET 21																											
	269A	270A	0.19	4	14	0.19	14	3.7	0.17		0.00		0.00		0.00	0.00	0.19	0.19	0.06	0.23	38.5	200	0.65	26.44	0.01	0.84	0.26

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha					
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph				
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha	
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s	
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7		
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4		

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025	Sheet No. 3 of 8

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
	270A	271A	0.14	2	7	0.33	21	3.7	0.25		0.00		0.00		0.00	0.00	0.14	0.33	0.11	0.36	11.0	200	2.15	48.09	0.01	1.53	0.44
	271A	272A	0.60	14	48	0.93	69	3.6	0.81		0.00		0.00		0.00	0.00	0.60	0.93	0.31	1.12	109.5	200	0.35	19.40	0.06	0.62	0.33
	272A	273A	0.03		0	0.96	69	3.6	0.81		0.00		0.00		0.00	0.00	0.03	0.96	0.32	1.13	11.0	200	0.35	19.40	0.06	0.62	0.33
	273A	274A	0.16	3	10	1.12	79	3.6	0.93		0.00		0.00		0.00	0.00	0.16	1.12	0.37	1.30	44.5	200	0.35	19.40	0.07	0.62	0.35
	274A	275A	0.05	1	3	1.17	82	3.6	0.96		0.00		0.00		0.00	0.00	0.05	1.17	0.39	1.35	11.0	200	0.35	19.40	0.07	0.62	0.35
	275A	276A	0.57	13	44	1.74	126	3.6	1.46		0.00		0.00		0.00	0.00	0.57	1.74	0.57	2.03	83.5	200	0.35	19.40	0.10	0.62	0.40
	276A	277A	0.50	14	48	2.24	174	3.5	1.99		0.00		0.00		0.00	0.00	0.50	2.24	0.74	2.73	83.5	200	0.35	19.40	0.14	0.62	0.43
To PUMP STATION INLET 2, Pipe 277A - 285A						2.24	174				0.00		0.00		0.00			2.24									
	265A	266A	0.54	7	24	0.54	24	3.7	0.29		0.00		0.00		0.00	0.00	0.54	0.54	0.18	0.47	31.5	200	0.65	26.44	0.02	0.84	0.32
	266A	267A	0.05	1	3	0.59	27	3.7	0.32		0.00		0.00		0.00	0.00	0.05	0.59	0.19	0.52	19.5	200	4.50	69.58	0.01	2.21	0.64
Contribution From STREET 21, Pipe 264A - 267A						23.62	2442				0.00		0.00		0.41		24.03	24.62									
			0.05		0	24.26	2469				0.00		0.00		0.41		0.05	24.67									
	267A	268A	0.59	14	48	24.85	2517	3.0	24.51		0.00		0.00		0.41	0.04	0.59	25.26	8.34	32.89	113.5	300	0.20	43.25	0.76	0.61	0.67
	268A	277A	0.17	2	7	25.02	2524	3.0	24.57		0.00		0.00		0.41	0.04	0.17	25.43	8.39	33.01	13.0	300	0.20	43.25	0.76	0.61	0.67
To PUMP STATION INLET 2, Pipe 277A - 285A						25.02	2524				0.00		0.00		0.41			25.43									
PUMP STATION INLET 2																											
Contribution From STREET 21, Pipe 268A - 277A						25.02	2524				0.00		0.00		0.41		25.43	25.43									
Contribution From STREET 21, Pipe 276A - 277A						2.24	174				0.00		0.00		0.00		2.24	27.67									
	277A	285A				27.26	2698	3.0	26.10		0.00		0.00		0.41	0.04	0.00	27.67	9.13	35.27	31.0	300	0.20	43.25	0.82	0.61	0.68
	285A	286A				27.26	2698	3.0	26.10		0.00		0.00		0.41	0.04	0.00	27.67	9.13	35.27	22.5	300	0.20	43.25	0.82	0.61	0.68
	286A	287A				27.26	2698	3.0	26.10		0.00		0.00		0.41	0.04	0.00	27.67	9.13	35.27	2.5	450	2.50	450.79	0.08	2.83	1.66
To PUMP STATION INLET 1, Pipe 287A - 288A						27.26	2698				0.00		0.00		0.41			27.67									
STREET 2																											
	155A	156A	0.20	7	19	0.20	19	3.7	0.23		0.00		0.00		0.00	0.00	0.20	0.20	0.07	0.29	52.5	200	0.65	26.44	0.01	0.84	0.27
To STREET 1, Pipe 156A - 157A						0.20	19				0.00		0.00		0.00			0.20									
	159A	160A	0.57	26	70	0.57	70	3.6	0.82		0.00		0.00		0.00	0.00	0.57	0.57	0.19	1.01	81.5	200	0.65	26.44	0.04	0.84	0.40
	160A	161A	0.48	24	65	1.05	135	3.6	1.56		0.00		0.00		0.00	0.00	0.48	1.05	0.35	1.91	81.5	200	0.35	19.40	0.10	0.62	0.39
To STREET 3, Pipe 161A - 164A						1.05	135				0.00		0.00		0.00			1.05									
STREET 1																											
			0.30	14	38	0.30	38				0.00		0.00		0.00		0.30	0.30									
	162A	163A	0.44	11	37	0.74	75	3.6	0.88		0.00		0.00		0.00	0.00	0.44	0.74	0.24	1.12	111.5	200	0.65	26.44	0.04	0.84	0.42
			0.30	8	27	1.04	102				0.00		0.00		0.00		0.30	1.04									
	163A	164A	0.30	15	41	1.34	143	3.6	1.65		0.00		0.00		0.00	0.00	0.30	1.34	0.44	2.09	111.0	200	0.35	19.40	0.11	0.62	0.40
To STREET 4, Pipe 164A - 165A						1.34	143				0.00		0.00		0.00			1.34									
	152A	153A	0.67	17	58	0.67	58	3.6	0.68		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.91	106.0	200	0.65	26.44	0.03	0.84	0.39
	153A	154A	0.14	2	7	0.81	65	3.6	0.77		0.00		0.00		0.00	0.00	0.14	0.81	0.27	1.03	10.0	200	0.35	19.40	0.05	0.62	0.33
	154A	156A	0.20	4	14	1.01	79	3.6	0.93		0.00		0.00		0.00	0.00	0.20	1.01	0.33	1.26	53.0	200	0.35	19.40	0.06	0.62	0.34
Contribution From STREET 2, Pipe 155A - 156A						0.20	19				0.00		0.00		0.00		0.20	1.21									
			0.23	11	30	1.44	128				0.00		0.00		0.00		0.23	1.44									
	156A	157A	0.26	7	24	1.70	152	3.6	1.75		0.00		0.00		0.00	0.00	0.26	1.70	0.56	2.31	85.5	200	2.15	48.09	0.05	1.53	0.77

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4	

Designed: M.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: 25 Sep 2025

Sheet No. 4 of 8

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
			0.24	12	32	1.94	184				0.00		0.00		0.00		0.24	1.94									
	157A	158A	0.25	7	24	2.19	208	3.5	2.37		0.00		0.00		0.00	0.00	0.25	2.19	0.72	3.09	85.5	200	0.35	19.40	0.16	0.62	0.45
To STREET 3, Pipe 158A - 161A						2.19	208				0.00		0.00		0.00			2.19									
STREET 8																											
Contribution From STREET 5, Pipe 141A - 143A						0.27	17				0.00		0.00		0.00		0.27	0.27									
Contribution From STREET 5, Pipe 142A - 143A						0.26	20				0.00		0.00		0.00		0.26	0.53									
	143A	144A	0.58	28	76	1.11	113	3.6	1.31		0.00		0.00		0.00	0.00	0.58	1.11	0.37	1.68	103.0	200	0.35	19.40	0.09	0.62	0.37
	144A	148A	0.57	28	76	1.68	189	3.5	2.16		0.00		0.00		0.00	0.00	0.57	1.68	0.55	2.71	103.0	200	0.35	19.40	0.14	0.62	0.43
Contribution From STREET 4, Pipe 140A - 148A						3.15	286				0.00		0.00		0.00		3.15	4.83									
Contribution From STREET 9, Pipe 147A - 148A						2.18	236				0.00		0.00		0.00		2.18	7.01									
	148A	151A	0.09		0	7.10	711	3.3	7.63		0.00		0.00		0.00	0.00	0.09	7.10	2.34	9.98	60.0	200	0.35	19.40	0.51	0.62	0.62
To STREET 3, Pipe 151A - 158A						7.10	711				0.00		0.00		0.00			7.10									
STREET 3																											
	127A	128A	0.25	5	17	0.25	17	3.7	0.20		0.00		0.00		0.00	0.00	0.25	0.25	0.08	0.29	52.0	200	0.65	26.44	0.01	0.84	0.27
To STREET 6, Pipe 128A - 129A						0.25	17				0.00		0.00		0.00			0.25									
	131A	132A	0.57	13	44	0.57	44	3.7	0.52		0.00		0.00		0.00	0.00	0.57	0.57	0.19	0.71	81.5	200	0.65	26.44	0.03	0.84	0.36
	132A	133A	0.43	12	41	1.00	85	3.6	0.99		0.00		0.00		0.00	0.00	0.43	1.00	0.33	1.32	81.0	200	0.35	19.40	0.07	0.62	0.35
To STREET 3, Pipe 133A - 151A						1.00	85				0.00		0.00		0.00			1.00									
STREET 6																											
	149A	150A	0.70	17	58	0.70	58	3.6	0.68		0.00		0.00		0.00	0.00	0.70	0.70	0.23	0.92	111.5	200	0.65	26.44	0.03	0.84	0.39
	150A	151A	0.64	17	58	1.34	116	3.6	1.35		0.00		0.00		0.00	0.00	0.64	1.34	0.44	1.79	111.5	200	0.35	19.40	0.09	0.62	0.39
To STREET 3, Pipe 151A - 158A						1.34	116				0.00		0.00		0.00			1.34									
	124A	125A	0.67	15	51	0.67	51	3.7	0.60		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.82	104.5	200	0.75	28.40	0.03	0.90	0.40
	125A	126A	0.14	2	7	0.81	58	3.6	0.68		0.00		0.00		0.00	0.00	0.14	0.81	0.27	0.95	11.0	200	1.05	33.61	0.03	1.07	0.47
	126A	128A	0.20	4	14	1.01	72	3.6	0.85		0.00		0.00		0.00	0.00	0.20	1.01	0.33	1.18	52.5	200	2.60	52.89	0.02	1.68	0.68
Contribution From STREET 3, Pipe 127A - 128A						0.25	17				0.00		0.00		0.00		0.25	1.26									
	128A	129A	0.51	13	44	1.77	133	3.6	1.54		0.00		0.00		0.00	0.00	0.51	1.77	0.58	2.12	85.0	200	0.35	19.40	0.11	0.62	0.40
	129A	130A	0.45	12	41	2.22	174	3.5	1.99		0.00		0.00		0.00	0.00	0.45	2.22	0.73	2.73	85.0	200	0.35	19.40	0.14	0.62	0.43
To STREET 3, Pipe 130A - 133A						2.22	174				0.00		0.00		0.00			2.22									
STREET 9																											
	112A	115A	0.22	10	27	0.22	27	3.7	0.32		0.00		0.00		0.00	0.00	0.22	0.22	0.07	0.40	49.5	200	0.65	26.44	0.01	0.84	0.30
To STREET 10, Pipe 115A - 120A						0.22	27				0.00		0.00		0.00			0.22									
	112A	1470A	0.20	10	27	0.20	27	3.7	0.32		0.00		0.00		0.00	0.00	0.20	0.20	0.07	0.39	33.0	200	0.65	26.44	0.01	0.84	0.29
	1470A	147A	0.60	30	81	0.80	108	3.6	1.26		0.00		0.00		0.00	0.00	0.60	0.80	0.26	1.52	101.5	200	0.35	19.40	0.08	0.62	0.36
Contribution From STREET 5, Pipe 146A - 147A						1.18	109				0.00		0.00		0.00		1.18	1.98									
	147A	148A	0.20	7	19	2.18	236	3.5	2.67		0.00		0.00		0.00	0.00	0.20	2.18	0.72	3.39	60.0	200	0.35	19.40	0.17	0.62	0.46
To STREET 8, Pipe 148A - 151A						2.18	236				0.00		0.00		0.00			2.18									
STREET 10																											
	102A	103A	0.26	6	20	0.26	20	3.7	0.24		0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.33	52.0	200	0.65	26.44	0.01	0.84	0.28
To STREET 10, Pipe 103A - 108A						0.26	20				0.00		0.00		0.00			0.26									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha				
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =		0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =		0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n =	(Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=		2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=		3.4	

Designed: M.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: 25 Sep 2025

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
			0.20	3	10	0.20	10				0.00		0.00		0.00		0.20	0.20									
	121A	122A	0.56	28	76	0.76	86	3.6	1.01		0.00		0.00		0.00	0.00	0.56	0.76	0.25	1.26	111.0	200	0.65	26.44	0.05	0.84	0.43
	122A	123A	0.62	31	84	1.38	170	3.5	1.95		0.00		0.00		0.00	0.00	0.62	1.38	0.46	2.40	111.0	200	0.35	19.40	0.12	0.62	0.42
To STREET 3, Pipe 123A - 130A						1.38	170				0.00		0.00		0.00			1.38									
	100A	1010A	0.37	11	37	0.37	37	3.7	0.44		0.00		0.00		0.00	0.00	0.37	0.37	0.12	0.56	46.0	200	0.65	26.44	0.02	0.84	0.34
	1010A	101A	0.29	8	27	0.66	64	3.6	0.75		0.00		0.00		0.00	0.00	0.29	0.66	0.22	0.97	44.5	200	0.35	19.40	0.05	0.62	0.32
	101A	103A	0.51	14	48	1.17	112	3.6	1.30		0.00		0.00		0.00	0.00	0.51	1.17	0.39	1.69	90.5	200	0.35	19.40	0.09	0.62	0.37
To STREET 10, Pipe 103A - 108A						1.17	112				0.00		0.00		0.00			1.17									
	104A	105A	0.27	9	24	0.27	24	3.7	0.29		0.00		0.00		0.00	0.00	0.27	0.27	0.09	0.38	44.5	200	0.65	26.44	0.01	0.84	0.29
	105A	106A	0.09	3	8	0.36	32	3.7	0.38		0.00		0.00		0.00	0.00	0.09	0.36	0.12	0.50	11.0	200	0.35	19.40	0.03	0.62	0.26
	106A	107A	0.56	28	76	0.92	108	3.6	1.26		0.00		0.00		0.00	0.00	0.56	0.92	0.30	1.56	90.5	200	0.35	19.40	0.08	0.62	0.37
	107A	108A	0.45	21	57	1.37	165	3.5	1.89		0.00		0.00		0.00	0.00	0.45	1.37	0.45	2.35	90.0	200	0.35	19.40	0.12	0.62	0.41
To STREET 10, Pipe 108A - 109A						1.37	165				0.00		0.00		0.00			1.37									
STREET 10																											
			0.11		0	0.11	0				0.00		0.00		0.00		0.11	0.11									
	113A	114A	0.22	3	10	0.33	10	3.7	0.12		0.00		0.00		0.00	0.00	0.22	0.33	0.11	0.23	36.5	200	0.65	26.44	0.01	0.84	0.26
	114A	115A	0.66	13	44	0.99	54	3.6	0.64		0.00		0.00	3.00	3.00	0.32	3.66	3.99	1.32	2.28	141.5	200	0.35	19.40	0.12	0.62	0.41
Contribution From STREET 9, Pipe 112A - 115A						0.22	27				0.00		0.00		0.00		0.22	4.21									
	115A	120A	0.23	4	14	1.44	95	3.6	1.11		0.00		0.00		3.00	0.32	0.23	4.44	1.47	2.90	59.0	200	0.35	19.40	0.15	0.62	0.44
To STREET 3, Pipe 120A - 123A						1.44	95				0.00		0.00		3.00			4.44									
Contribution From STREET 10, Pipe 101A - 103A						1.17	112				0.00		0.00		0.00		1.17	1.17									
Contribution From STREET 10, Pipe 102A - 103A						0.26	20				0.00		0.00		0.00		0.26	1.43									
	103A	108A	0.20	7	19	1.63	151	3.6	1.74		0.00		0.00		0.00	0.00	0.20	1.63	0.54	2.28	60.0	200	0.35	19.40	0.12	0.62	0.41
Contribution From STREET 10, Pipe 107A - 108A						1.37	165				0.00		0.00		0.00		1.37	3.00									
	108A	109A	0.47	23	62	3.47	378	3.4	4.20		0.00		0.00		0.00	0.00	0.47	3.47	1.15	5.34	79.5	200	0.35	19.40	0.28	0.62	0.52
	109A	110A				3.47	378	3.4	4.20		0.00		0.00		0.00	0.00	0.00	3.47	1.15	5.34	79.5	200	0.35	19.40	0.28	0.62	0.52
	110A	120A	0.48	23	62	3.95	440	3.4	4.85		0.00		0.00		0.00	0.00	0.48	3.95	1.30	6.15	12.0	200	0.35	19.40	0.32	0.62	0.55
To STREET 3, Pipe 120A - 123A						3.95	440				0.00		0.00		0.00			3.95									
WEST POND INLET 2																											
			0.18		0	0.18	0				0.00		0.00		0.00		0.18	0.18									
	117A	118A	2.40	264	607	2.58	607	3.3	6.58		0.00		0.00		0.00	0.00	2.40	2.58	0.85	7.43	14.5	200	0.75	28.40	0.26	0.90	0.76
To STREET 3, Pipe 118A - 119A						2.58	607				0.00		0.00		0.00			2.58									
STREET 3																											
Contribution From WEST POND INLET 2, Pipe 117A - 118A						2.58	607				0.00		0.00		0.00		2.58	2.58									
	118A	119A	0.36	5	17	2.94	624	3.3	6.75		0.00		0.00		0.00	0.00	0.36	2.94	0.97	7.72	77.5	200	0.35	19.40	0.40	0.62	0.58
	119A	120A	0.28	3	10	3.22	634	3.3	6.85		0.00		0.00		0.00	0.00	0.28	3.22	1.06	7.92	74.5	300	0.20	43.25	0.18	0.61	0.46
Contribution From STREET 10, Pipe 110A - 120A						3.95	440				0.00		0.00		0.00		3.95	7.17									
Contribution From STREET 10, Pipe 115A - 120A						1.44	95				0.00		0.00		3.00		4.44	11.61									
	120A	123A	0.21	8	22	8.82	1191	3.2	12.35		0.00		0.00		3.00	0.32	0.21	11.82	3.90	16.57	62.0	300	0.20	43.25	0.38	0.61	0.57
Contribution From STREET 10, Pipe 122A - 123A						1.38	170				0.00		0.00		0.00		1.38	13.20									
	123A	130A	0.21	8	22	10.41	1383	3.2	14.18		0.00		0.00		3.00	0.32	0.21	13.41	4.43	18.93	60.0	300	0.20	43.25	0.44	0.61	0.59

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013 (Pvc)	0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed: M.S.	PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles	File Ref: **21-1247**	Date: **25 Sep 2025**	Sheet No. 6 of 8

1247_san_designsheets.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION: STREET	FROM M.H.	TO M.H.	RESIDENTIAL AREA AND POPULATION: AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	COMM: AREA (ha)	COMM: ACCU. AREA (ha)	INSTIT: AREA (ha)	INSTIT: ACCU. AREA (ha)	PARK: AREA (ha)	PARK: ACCU. AREA (ha)	C+I+I: PEAK FLOW (l/s)	INFILTRATION: TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	PIPE: DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
Contribution From STREET 6, Pipe 129A - 130A						2.22	174				0.00		0.00		0.00		2.22	15.63									
	130A	133A	0.24	10	27	12.87	1584	3.1	16.07		0.00		0.00		3.00	0.32	0.24	15.87	5.24	21.63	60.0	300	0.20	43.25	0.50	0.61	0.61
Contribution From STREET 3, Pipe 132A - 133A						1.00	85				0.00		0.00		0.00		1.00	16.87									
	133A	151A	0.20	7	19	14.07	1688	3.1	17.03		0.00		0.00		3.00	0.32	0.20	17.07	5.63	22.99	60.0	300	0.20	43.25	0.53	0.61	0.62
Contribution From STREET 8, Pipe 148A - 151A						7.10	711				0.00		0.00		0.00		7.10	24.17									
Contribution From STREET 6, Pipe 150A - 151A						1.34	116				0.00		0.00		0.00		1.34	25.51									
	151A	158A	0.21	8	22	22.72	2537	3.0	24.69		0.00		0.00		3.00	0.32	0.21	25.72	8.49	33.50	60.0	300	0.20	43.25	0.77	0.61	0.68
Contribution From STREET 1, Pipe 157A - 158A						2.19	208				0.00		0.00		0.00		2.19	27.91									
	158A	161A	0.21	8	22	25.12	2767	3.0	26.70		0.00		0.00		3.00	0.32	0.21	28.12	9.28	36.30	60.0	375	0.20	78.41	0.46	0.71	0.69
Contribution From STREET 2, Pipe 160A - 161A						1.05	135				0.00		0.00		0.00		1.05	29.17									
	161A	164A	0.21	8	22	26.38	2924	3.0	28.06		0.00		0.00		3.00	0.32	0.21	29.38	9.70	38.08	60.0	375	0.20	78.41	0.49	0.71	0.70
To STREET 4, Pipe 164A - 165A						26.38	2924				0.00		0.00		3.00			29.38									
STREET 5																											
	141A	143A	0.27	5	17	0.27	17	3.7	0.20		0.00		0.00		0.00	0.00	0.27	0.27	0.09	0.29	52.5	200	0.65	26.44	0.01	0.84	0.27
To STREET 8, Pipe 143A - 144A						0.27	17				0.00		0.00		0.00			0.27									
	142A	143A	0.26	6	20	0.26	20	3.7	0.24		0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.33	52.0	200	0.65	26.44	0.01	0.84	0.28
To STREET 8, Pipe 143A - 144A						0.26	20				0.00		0.00		0.00			0.26									
	138A	139A	0.66	18	61	0.66	61	3.6	0.72		0.00		0.00		0.00	0.00	0.66	0.66	0.22	0.94	99.5	200	0.65	26.44	0.04	0.84	0.39
	139A	140A	0.55	16	54	1.21	115	3.6	1.33		0.00		0.00		0.00	0.00	0.55	1.21	0.40	1.73	99.0	200	0.35	19.40	0.09	0.62	0.38
To STREET 4, Pipe 140A - 148A						1.21	115				0.00		0.00		0.00			1.21									
	145A	146A	0.67	18	61	0.67	61	3.6	0.72		0.00		0.00		0.00	0.00	0.67	0.67	0.22	0.94	99.5	200	0.65	26.44	0.04	0.84	0.39
	146A	147A	0.51	14	48	1.18	109	3.6	1.27		0.00		0.00		0.00	0.00	0.51	1.18	0.39	1.66	99.0	200	0.35	19.40	0.09	0.62	0.37
To STREET 9, Pipe 147A - 148A						1.18	109				0.00		0.00		0.00			1.18									
STREET 4																											
			0.06		0	0.06	0				0.00		0.00		0.00		0.06	0.06									
	134A	135A	0.68	20	68	0.74	68	3.6	0.80		0.00		0.00		0.00	0.00	0.68	0.74	0.24	1.04	106.5	200	0.65	26.44	0.04	0.84	0.41
	135A	136A	0.66	20	68	1.40	136	3.6	1.57		0.00		0.00		0.00	0.00	0.66	1.40	0.46	2.03	106.5	200	0.35	19.40	0.10	0.62	0.40
	136A	137A	0.14	2	7	1.54	143	3.6	1.65		0.00		0.00		0.00	0.00	0.14	1.54	0.51	2.16	11.5	200	0.35	19.40	0.11	0.62	0.41
	137A	140A	0.20	4	14	1.74	157	3.5	1.81		0.00		0.00		0.00	0.00	0.20	1.74	0.57	2.38	51.5	200	0.35	19.40	0.12	0.62	0.42
Contribution From STREET 5, Pipe 139A - 140A						1.21	115				0.00		0.00		0.00		1.21	2.95									
	140A	148A	0.20	4	14	3.15	286	3.5	3.22		0.00		0.00		0.00	0.00	0.20	3.15	1.04	4.26	60.0	200	0.35	19.40	0.22	0.62	0.49
To STREET 8, Pipe 148A - 151A						3.15	286				0.00		0.00		0.00			3.15									
Contribution From STREET 3, Pipe 161A - 164A						26.38	2924				0.00		0.00		3.00		29.38	29.38									
Contribution From STREET 1, Pipe 163A - 164A						1.34	143				0.00		0.00		0.00		1.34	30.72									
			0.05		0	27.77	3067				0.00		0.00		3.00		0.05	30.77									
	164A	165A	0.77	22	75	28.54	3142	2.9	29.94		0.00		0.00		3.00	0.32	0.77	31.54	10.41	40.67	140.5	375	0.20	78.41	0.52	0.71	0.72
	165A	166A	0.83	23	78	29.37	3220	2.9	30.61		0.00		0.00		3.00	0.32	0.83	32.37	10.68	41.61	141.0	375	0.20	78.41	0.53	0.71	0.72
	166A	167A	0.04	1	3	29.41	3223	2.9	30.63		0.00		0.00		3.00	0.32	0.04	32.41	10.70	41.65	10.0	375	0.20	78.41	0.53	0.71	0.72
	167A	169A	0.01		0	29.42	3223	2.9	30.63		0.00		0.00		3.00	0.32	0.01	32.42	10.70	41.65	8.0	375	0.20	78.41	0.53	0.71	0.72
To PUMP STATION INLET 1, Pipe 169A - 175A						29.42	3223				0.00		0.00		3.00			32.42									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha			
Average Daily Flow =	280	l/p/day			Industrial Peak Factor = as per MOE Graph		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha	Extraneous Flow =	0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha	Minimum Velocity =	0.600	m/s
Max Res. Peak Factor =	4.00				Manning's n = (Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00				Townhouse coeff=	2.7	
Institutional =	0.32	l/s/Ha			Single house coeff=	3.4	

Designed: M.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: 25 Sep 2025

Sheet No. 7 of 8

1247_san_designsheets.xlsx

SANITARY SEWER CALCULATION SHEET

Manning's n=0.013

LOCATION			RESIDENTIAL AREA AND POPULATION							COMM		INSTIT		PARK		C+I+I	INFILTRATION				PIPE						
STREET	FROM M.H.	TO M.H.	AREA (ha)	UNITS	POP.	CUMULATIVE AREA (ha)	CUMULATIVE POP.	PEAK FACT.	PEAK FLOW (l/s)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	AREA (ha)	ACCU. AREA (ha)	PEAK FLOW (l/s)	TOTAL AREA (ha)	ACCU. AREA (ha)	INFILT. FLOW (l/s)	TOTAL FLOW (l/s)	DIST (m)	DIA (mm)	SLOPE (%)	CAP. (FULL) (l/s)	RATIO Q act/Q cap	VEL. (FULL) (m/s)	VEL. (ACT.) (m/s)
PUMP STATION INLET 1																											
Contribution From STREET 4, Pipe 167A - 169A						29.42	3223				0.00		0.00		3.00		32.42	32.42									
	169A	175A				29.42	3223	2.9	30.63		0.00		0.00		3.00	0.32	0.00	32.42	10.70	41.65	42.5	375	0.20	78.41	0.53	0.71	0.72
	175A	176A				29.42	3223	2.9	30.63		0.00		0.00		3.00	0.32	0.00	32.42	10.70	41.65	40.0	375	0.20	78.41	0.53	0.71	0.72
	176A	287A				29.42	3223	2.9	30.63		0.00		0.00		3.00	0.32	0.00	32.42	10.70	41.65	11.0	375	0.20	78.41	0.53	0.71	0.72
Contribution From PUMP STATION INLET 2, Pipe 286A - 287A						27.26	2698				0.00		0.00		0.41		27.67	60.09									
	287A	288A				56.68	5921	2.7	52.59		0.00		0.00		3.41	0.37	0.00	60.09	19.83	72.79	2.3	450	2.50	450.79	0.16	2.83	2.07

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764 l/s/Ha				
Average Daily Flow =	280	l/p/day		Industrial Peak Factor = as per MOE Graph			
Comm/Inst Flow =	28000	L/ha/da	0.3241 l/s/Ha	Extraneous Flow =		0.330	L/s/ha
Industrial Flow =	35000	L/ha/da	0.40509 l/s/Ha	Minimum Velocity =		0.600	m/s
Max Res. Peak Factor =	4.00			Manning's n =	(Conc)	0.013	(Pvc) 0.013
Commercial/Inst./Park Peak Factor =	1.00			Townhouse coeff=		2.7	
Institutional =	0.32	l/s/Ha		Single house coeff=		3.4	

Designed: M.S.	PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Servicing Plan, Servicing Profiles	File Ref: **21-1247**	Date: **25 Sep 2025**	Sheet No. 8 of 8

Project Name:	Stittsville
Project Number:	1247
Designed By:	VM
Checked By:	VM
Date	Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

PRELIMINARY SANITARY HGL ANALYSIS

SAN RARE			
Name	Rim Elev. (m)	Max. HGL (m)	Rim- HGL
SAN-288A	105.15	98.6	6.55
SAN-287A	105.05	98.77	6.28
SAN-286A	104.98	98.81	6.17
SAN-285A	104.53	99.11	5.42
SAN-277A	105.7	99.21	6.49
SAN-268A	105.739	99.28	6.46
SAN-267A	106.71	99.6	7.11
SAN-264A	106.629	99.82	6.81
SAN-263A	106.667	99.87	6.8
SAN-262A	105.854	100.08	5.77
SAN-261A	105.79	100.16	5.63
SAN-239A	105.69	100.32	5.37
SAN-238A	105.65	100.36	5.29
SAN-236A	105.41	100.67	4.74
SAN-233A	105.29	100.78	4.51
SAN-228A	105.42	100.87	4.55
SAN-219A	105.17	100.88	4.29
SAN-218A	105.066	101.07	4
SAN-217A	105.042	101.17	3.87
SAN-216A	104.858	101.56	3.3
SAN-176A	104.8	99.29	5.51
SAN-175A	104.65	99.46	5.19
SAN-169A	107.44	99.56	7.88
SAN-167A	107.451	99.66	7.79
SAN-166A	107.469	99.69	7.78
SAN-165A	107.749	100.02	7.73
SAN-164A	108.95	100.31	8.64
SAN-161A	108.65	100.5	8.15
SAN-158A	106.72	100.61	6.11
SAN-151A	106.59	100.82	5.77
SAN-133A	106.47	100.92	5.55
SAN-130A	106.35	101.06	5.29
SAN-123A	106.23	101.19	5.04
SAN-120A	106.11	101.33	4.78
SAN-119A	106.05	101.45	4.6
SAN_97	105.34	103.01	2.33

SAN ANNUAL			
Name	Rim Elev. (m)	Max. HGL (m)	Rim- HGL
SAN-288A	105.15	103.3	1.85
SAN-287A	105.05	103.3	1.75
SAN-286A	104.98	103.3	1.68
SAN-285A	104.53	103.32	1.21
SAN-277A	105.7	103.3	2.4
SAN-268A	105.739	103.3	2.44
SAN-267A	106.71	103.3	3.41
SAN-264A	106.629	103.3	3.33
SAN-263A	106.667	103.3	3.37
SAN-262A	105.854	103.31	2.54
SAN-261A	105.79	103.31	2.48
SAN-239A	105.69	103.31	2.38
SAN-238A	105.65	103.31	2.34
SAN-236A	105.41	103.29	2.12
SAN-233A	105.29	103.28	2.01
SAN-228A	105.42	103.29	2.13
SAN-219A	105.17	103.17	2
SAN-218A	105.066	103.08	1.99
SAN-217A	105.042	103.01	2.03
SAN-216A	104.858	102.5	2.36
SAN-176A	104.8	103.3	1.5
SAN-175A	104.65	103.32	1.33
SAN-169A	107.44	103.33	4.11
SAN-167A	107.451	103.33	4.12
SAN-166A	107.469	103.34	4.13
SAN-165A	107.749	103.38	4.37
SAN-164A	108.95	103.43	5.52
SAN-161A	108.65	103.44	5.21
SAN-158A	106.72	103.46	3.26
SAN-151A	106.59	103.5	3.09
SAN-133A	106.47	103.51	2.96
SAN-130A	106.35	103.53	2.82
SAN-123A	106.23	103.54	2.69
SAN-120A	106.11	103.54	2.57
SAN-119A	106.05	103.55	2.5
SAN_97	105.34	103.37	1.97

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: MAY 26, 2023

TO: KEVIN MURPHY

FROM: SAM BAHIA, BEN SWEET

RE: SHEA ROAD PUMP STATION & FERNBANK TRUNK CAPACITY REVIEW
NOVATECH FILE NO.: 122163

CC: CARL SCIUK

Introduction

Under the New Official Plan two expansion areas were introduced to West Stittsville: W3 and W4 West Stittsville. Wastewater flows from these expansion areas were not previously considered as part of the Shea Road Pump Station (Shea PS) and Fernbank Trunk Sanitary (FTS) Sewer original designs.

As per David Schaeffer Engineering Limited's (DSEL) request, this memorandum summarizes the findings from the Shea PS and FTS Sewer capacity review, for both the current and future wastewater flows within the respective sewer sheds. The capacity review considers the introduction of the New Official Plan expansion areas – W4 West Stittsville (Subject Site), and an allowance for W3 West Stittsville, which would introduce additional flows to the FTS Sewer. Drawing 122163-SAN illustrates W3 and W4 West Stittsville.

The Subject Site is located at the North-West corner of Flewellyn Road and Shea Road, South of the Area 6 lands. As W4 West Stittsville is directly adjacent to the Shea PS, wastewater flows could be directed to the Shea PS through sanitary sewers, and ultimately to the FTS Sewer.

Background and Infrastructure Status

Upgrades to the Shea PS were completed in August 2022, which included the installation of a third pump. These upgrades increased the Shea PS firm capacity from 42 L/s to 84 L/s, accommodating further development of the Area 6 lands as well as the decommissioning of the Friendly Crescent Pump Station (Friendly PS). Currently, it is anticipated that full buildout of the Area 6 lands will be completed within the next five years (assumed to be prior to the development of W3 and W4 West Stittsville) and the decommissioning of the Friendly PS will be completed by July 2023.

Extension of the FTS Sewer from Goldhawk Drive to Edenwylde Drive was completed in December 2022, accommodating the above-mentioned increase in the Shea PS firm capacity as well as further development North of Fernbank Road. In the future, it is planned that the FTS Sewer will be extended to Liard Street to allow for the decommissioning of the Liard Street Pump Station (Liard PS). The future FTS Sewer extension and the Liard PS decommissioning will be completed by others.

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 www.novatech-eng.com

Although this work is being completed by others, it is anticipated that this work will be completed within the next five years.

It is important to note that the decommissioning of the Friendly and Liard PS were both considered as part of the Shea PS and FTS Sewer original designs. The wastewater flows from the Shea PS and FTS Sewer ultimately outlet to the Hazeldean Road Pump Station (Hazeldean PS).

Subject Site Development Potential

High-level development potential of the Subject Site has been provided to Novatech by DSEL, which comprises of a population potential and effective extraneous area of 5,490 persons and 64.2 ha (excluding HONI corridor and ponds), respectively, which would be developed in 2 stages (East and West of the Faulkner MD).

Shea Road Pump Station Capacity Review

As mentioned previously, the Shea PS current firm capacity is 84 L/s.

For the purposes of the Shea PS capacity review, the development buildout has been broken down into four scenarios for construction staging. The stages are as follows:

- Stage 1 & 2 – Area 6 lands full buildout including MD blocks, Bell lands, and commercial lands
- Stage 3 – Friendly PS decommissioned with flows diverted to the Shea PS
- Stage 4 – W4 West Stittsville partial buildout (Maguire & Faulkner lands only)
- Stage 5 – W4 West Stittsville full buildout (Davidson & Eder lands added)

Tables 1 to 4 have been prepared to compare the Shea PS staged flow under different loading parameters. The different loading parameters are as follows:

- Condition 1 – Design Parameters for Occupied & Unoccupied
- Condition 2 – Annual Parameters for Occupied & Design Parameters for Unoccupied
- Condition 3 – Annual Parameters for Occupied & Unoccupied
- Condition 4 – Rare Parameters for Occupied & Unoccupied

The following table summarizes the Shea PS staged flows under different loading parameters.

Shea PS Staged Flow Summary

Scenario	Condition 1 (Design)	Condition 2 (Annual/Design)	Condition 3 (Annual)	Condition 4 (Rare)
Stage 1 & 2	64.13 L/s	47.47 L/s	44.50 L/s	60.08 L/s
Stage 3	67.45 L/s	49.80 L/s	46.85 L/s	63.60 L/s
Stage 4	100.34 L/s	82.96 L/s	68.71 L/s	94.06 L/s
Stage 5	126.68 L/s	109.64 L/s	86.50 L/s	119.30 L/s

Given the wastewater flows for the Stage 5 (full buildout) under each different loading parameter are all greater than the Shea PS current firm capacity, future upgrades to the pump station will be required if these lands are all to be directed to the Shea PS. If the future upgrades are based on the peaked design flows, the Shea PS proposed firm capacity would need to be upgraded to 128 L/s.

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Shea Road Pump Station Potential Future Upgrades

Novatech had previously reviewed potential component upgrades to the Shea PS based on 140 L/s, which should accommodate the above.

The following outlines the potential future upgrades:

- **Certain Upgrades:** Higher HP pumps, starters, power to pumps.
- **More than Likely Upgrades:** New generator.
- **Possible Upgrades**: Primary power supply & 600V wiring, upsize 150mm piping between wet well and valve chamber and within basement.
- **Probably OK**: Controls, 200mm forcemain, wet well (as long as new pumps fit), control room and bypass chamber.

Once DSEL has reviewed the sanitary servicing approach for W4 West Stittsville, the Shea PS future upgrades can be reviewed further.

Monitoring of the existing wastewater flows to the Shea PS will also need to be reviewed further during the Master Servicing Study / Draft Plan stage, prior to detailed design, to determine residual capacity and future upgrades. This will be completed under separate cover.

Fernbank Trunk Sanitary Sewer Capacity Review

For the purposes of the FTS Sewer capacity review, we have updated sanitary sewer design sheets of the downstream trunks which include the anticipated future growth to determine the impacts on the sewer system.

On a reach-by-reach basis, the sanitary sewer design sheets include the relevant population and areas based on the existing and anticipated future growth being directed to the respective sewers as well as the fixed wastewater flow allowances for the Shea PS (Areas 6 lands and W4 West Stittsville) and W3 West Stittsville. The existing and anticipated future growth includes the development lands owned by CRT Developments Inc., 1384341 Ontario Ltd. (Cavanagh-Fernbank), 2087875 Ontario Ltd. (Tartan-Fernbank) as well as the Liard PS sewer shed under the assumption that it will be decommissioned.

Sanitary Sewer Design Sheet 1 includes the sewers upstream of EX FT24 (MHSA72815). Sanitary Sewer Design Sheet 2 includes the sewers downstream of EX FT24 (MHSA72815).

The updates are as follows:

- Added fixed wastewater flow allowance to the relevant sections of the downstream trunk for the Shea PS Stage 5 (full buildout) = 128 L/s (as outlined above);
- Added fixed wastewater flow allowance to the relevant sections of the downstream trunk for W3 West Stittsville = 40 L/s (based on 45 ha of developable land at 0.9 L/s/ha); and
- Assumed the Liard PS decommissioning has been completed, thus, the Liard PS sewer shed and W3 West Stittsville are directed to the FTS Sewer.

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Based on the foregoing and review of the impacts on the sewer system, it should be noted that there are minor surcharges. However, due to the depth of the trunk sewer and the isolated sections of trunk sewer surcharging under the peaked design flows, impact would be negligible.

Attachments

1. Table 1 – Shea PS Staged Flow Summary (Design Parameters for Occupied & Unoccupied)
2. Table 2 – Shea PS Staged Flow Summary (Annual Parameters for Occupied & Design Parameters for Unoccupied)
3. Table 3 – Shea PS Staged Flow Summary (Annual Parameters for Occupied & Unoccupied)
4. Table 4 – Shea PS Staged Flow Summary (Rare Parameters for Occupied & Unoccupied)
5. Sanitary Sewer Design Sheet 1 - Upstream of EX FT24
6. Sanitary Sewer Design Sheet 2 - Downstream of EX FT24
7. Drawing 122163-SAN
8. Drawing 108180-FT5

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TABLE 1 - SHEA PUMP STATION STAGED FLOW SUMMARY (DESIGN PARAMETERS FOR OCCUPIED AND UNOCCUPIED)

AREA	SCENARIO	TOTAL POPULATION OCCUPIED P	TOTAL POPULATION UNOCCUPIED P	TOTAL POPULATION P	ICI AREA CA (ha)	DRAINAGE AREA BUILT A (ha)	DRAINAGE AREA PROPOSED A (ha)	PRO-RATED POP. FLOW Q(A) (L/s)	PRO-RATED HARMON PEAKING FACTOR HP x k	PEAK POP. FLOW Q(pR) (L/s)	PEAK ICI FLOW Q(pC) (L/s)	EXTRANEOUS FLOW (I/I WET) Q(E) (L/s)	GROUND WATER INFILTRATION (I/I DRY) (L/s)	TOTAL FLOW Q(D) (L/s)	NOTES
Shea Pump Station Sewer Shed	**Stage 1 & 2 Full Buildout Incl. MD, Bell & ICI**	**3583.3**	**820.4**	**4403.7**	**2.6**	**57.73**	**4.60**	**14.27**	**2.64**	**37.63**	**0.73**	**20.05**	**5.72**	**64.13**	**84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.**
	Stage 3 Friendly PS Decommissioned	**3821.3**	**820.4**	**4641.7**	**2.6**	**62.39**	**4.60**	**15.04**	**2.62**	**39.41**	**0.73**	**21.36**	**5.95**	**67.45**	
	Stage 4 W4 Partial Buildout (Maguire & Faulkner only)	3821.3	3841.1	7662.4	2.6	62.39	38.99	24.83	2.45	60.96	0.73	30.99	7.67	100.34	**128 L/s SHEA PUMP STATION PROPOSED FIRM CAPACITY**
	Stage 5 W4 Full Buildout (Davidson & Eder added)	3821.3	6309.3	10130.6	2.6	62.39	68.81	32.83	2.36	77.46	0.73	39.34	9.16	126.68	

UNIT	AVG. CAPITA FLOW q (L/person/d)	HARMON CORRECTION FACTOR K	ICI FLOW PARAMETER ICI (L/s/ha)	I/I WET E (L/s/ha)	I/I DRY (L/s/ha)	I/I TOTAL (L/s/ha)
OCCUPIED (Design)	280	0.8	0.28	0.28	0.05	0.33
UNOCCUPIED (Design)	280	0.8	0.28	0.28	0.05	0.33

EQUATIONs:

1) Q(A) = (P x q /86,400)
2) Q(pR) = Q(A) x HP x K
3) Q(C) = (CA x c /86,400)
4) Q(pC) = Q(C) x CP
5) Q(E) = (A x E)
6) Q(D) = Q(pR) + Q(pC) + Q(E)

DEFINITIONS/NOTES:

Q(A) = Average Residential Flow (L/sec)
Q(pR) = Peak Residential Flow (L/sec)
Q(C) = Average ICI Flow (L/sec)
Q(pC) = Peak ICI Flow (L/sec)
Q(E) = Extraneous Flow (L/sec)
Q(D) = Peak Design Flow (L/sec)

A = Residential Area
CA = ICI Area
P = Population
q = Avg. Residential Capita Flow Parameter
HP = Harmon Residential Peaking Factor
CP = ICI Peaking Factor
K = Harmon Correction Factor
E = Extraneous Flow Parameter

POPULATION:

Singles	**3.4**	
Semis/Towns	**2.7**	
Institutional eq	**14**	persons/ha

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TABLE 2 - SHEA PUMP STATION STAGED FLOW SUMMARY (ANNUAL PARAMETERS FOR OCCUPIED AND DESIGN PARAMETERS FOR UNOCCUPIED)

AREA	SCENARIO	TOTAL POPULATION OCCUPIED P	TOTAL POPULATION UNOCCUPIED P	TOTAL POPULATION P	ICI AREA CA (ha)	DRAINAGE AREA BUILT A (ha)	DRAINAGE AREA PROPOSED A (ha)	PRO-RATED POP. FLOW Q(A) (L/s)	PRO-RATED HARMON PEAKING FACTOR HP x k	PEAK POP. FLOW Q(pR) (L/s)	PEAK ICI FLOW Q(pC) (L/s)	EXTRANEOUS FLOW (I/I WET) Q(E) (L/s)	GROUND WATER INFILTRATION (I/I DRY) (L/s)	TOTAL FLOW Q(D) (L/s)	NOTES
Shea Pump Station Sewer Shed	**Stage 1 & 2 Full Buildout Incl. MD, Bell & ICI**	**3583.3**	**820.4**	**4403.7**	**2.6**	**58.30**	**4.03**	**10.95**	**2.10**	**23.00**	**0.44**	**20.05**	**3.97**	**47.47**	**84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.**
	Stage 3 Friendly PS Decommissioned	**3821.3**	**820.4**	**4641.7**	**2.6**	**62.96**	**4.03**	**11.50**	**2.08**	**23.94**	**0.44**	**21.36**	**4.06**	**49.80**	
	Stage 4 W4 Partial Buildout (Maguire & Faulkner only)	3821.3	3841.1	7662.4	2.6	62.96	38.42	21.29	2.15	45.75	0.44	30.99	5.78	82.96	
	Stage 5 W4 Full Buildout (Davidson & Eder added)	3821.3	6309.3	10130.6	2.6	62.96	68.24	29.29	2.14	62.59	0.44	39.34	7.27	109.64	**128 L/s SHEA PUMP STATION PROPOSED FIRM CAPACITY**

UNIT	AVG. CAPITA FLOW q (L/person/d)	HARMON CORRECTION FACTOR K	ICI FLOW PARAMETER ICI (L/s/ha)	I/I WET E (L/s/ha)	I/I DRY (L/s/ha)	I/I TOTAL (L/s/ha)
OCCUPIED (Annual)	200	0.6	0.17	0.28	0.02	0.30
UNOCCUPIED (Design)	280	0.8	0.28	0.28	0.05	0.33

EQUATIONs:
1) Q(A) = (P x q /86,400)
2) Q(pR) = Q(A) x HP x K
3) Q(C) = (CA x c /86,400)
4) Q(pC) = Q(C) x CP
5) Q(E) = (A x E)
6) Q(D) = Q(pR) + Q(pC) + Q(E)

DEFINITIONS/NOTES:
Q(A) = Average Residential Flow (L/sec)
Q(pR) = Peak Residential Flow (L/sec)
Q(C) = Average ICI Flow (L/sec)
Q(pC) = Peak ICI Flow (L/sec)
Q(E) = Extraneous Flow (L/sec)
Q(D) = Peak Design Flow (L/sec)

A = Residential Area
CA = ICI Area
P = Population
q = Avg. Residential Capita Flow Parameter
HP = Harmon Residential Peaking Factor
CP = ICI Peaking Factor
K = Harmon Correction Factor
E = Extraneous Flow Parameter

POPULATION:

Singles	**3.4**	
Semis/Towns	**2.7**	
Institutional eq	**14**	persons/ha

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TABLE 3 - SHEA PUMP STATION STAGED FLOW SUMMARY (ANNUAL PARAMETERS FOR OCCUPIED AND UNOCCUPIED)

AREA	SCENARIO	TOTAL POPULATION OCCUPIED P	TOTAL POPULATION UNOCCUPIED P	TOTAL POPULATION P	ICI AREA CA (ha)	DRAINAGE AREA BUILT A (ha)	DRAINAGE AREA PROPOSED A (ha)	PRO-RATED POP. FLOW Q(A) (L/s)	PRO-RATED HARMON PEAKING FACTOR HP x k	PEAK POP. FLOW Q(pR) (L/s)	PEAK ICI FLOW Q(pC) (L/s)	EXTRANEOUS FLOW (I/I WET) Q(E) (L/s)	GROUND WATER INFILTRATION (I/I DRY) (L/s)	TOTAL FLOW Q(D) (L/s)	NOTES
Shea Pump Station Sewer Shed	**Stage 1 & 2 Full Buildout Incl. MD, Bell & ICI**	**3583.3**	**820.4**	**4403.7**	**2.6**	**58.30**	**4.03**	**10.19**	**1.98**	**20.16**	**0.44**	**20.05**	**3.85**	**44.50**	**84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.**
	Stage 3 Friendly PS Decommissioned	**3821.3**	**820.4**	**4641.7**	**2.6**	**62.96**	**4.03**	**10.74**	**1.96**	**21.11**	**0.44**	**21.36**	**3.94**	**46.85**	**71L/s SHEA PUMP STATION REDUCED OPERATIONAL CAPACITY (15% REDUCTION OF FIRM).**
	Stage 4 W4 Partial Buildout (Maguire & Faulkner only)	3821.3	3841.1	7662.4	2.6	62.96	38.42	17.74	1.84	32.66	0.44	30.99	4.63	68.71	
	Stage 5 W4 Full Buildout (Davidson & Eder added)	3821.3	6309.3	10130.6	2.6	62.96	68.24	23.45	1.77	41.49	0.44	39.34	5.22	86.50	**128 L/s SHEA PUMP STATION PROPOSED FIRM CAPACITY**

UNIT	AVG. CAPITA FLOW q (L/person/d)	HARMON CORRECTION FACTOR K	ICI FLOW PARAMETER ICI (L/s/ha)	I/I WET E (L/s/ha)	I/I DRY (L/s/ha)	I/I TOTAL (L/s/ha)
OCCUPIED (Annual)	200	0.6	0.17	0.28	0.02	0.30
UNOCCUPIED (Annual)	200	0.6	0.17	0.28	0.02	0.30

EQUATIONs:

1) Q(A) = (P x q /86,400)
2) Q(pR) = Q(A) x HP x K
3) Q(C) = (CA x c /86,400)
4) Q(pC) = Q(C) x CP
5) Q(E) = (A x E)
6) Q(D) = Q(pR) + Q(pC) + Q(E)

DEFINITIONS/NOTES:

Q(A) = Average Residential Flow (L/sec)
Q(pR) = Peak Residential Flow (L/sec)
Q(C) = Average ICI Flow (L/sec)
Q(pC) = Peak ICI Flow (L/sec)
Q(E) = Extraneous Flow (L/sec)
Q(D) = Peak Design Flow (L/sec)

A = Residential Area
CA = ICI Area
P = Population
q = Avg. Residential Capita Flow Parameter
HP = Harmon Residential Peaking Factor
CP = ICI Peaking Factor
K = Harmon Correction Factor
E = Extraneous Flow Parameter

POPULATION:

Singles	**3.4**	
Semis/Towns	**2.7**	
Institutional eq	**14**	persons/ha

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TABLE 4 - SHEA PUMP STATION STAGED FLOW SUMMARY (RARE PARAMETERS FOR OCCUPIED AND UNOCCUPIED)

AREA	SCENARIO	TOTAL POPULATION OCCUPIED P	TOTAL POPULATION UNOCCUPIED P	TOTAL POPULATION P	ICI AREA CA (ha)	DRAINAGE AREA BUILT A (ha)	DRAINAGE AREA PROPOSED A (ha)	PRO-RATED POP. FLOW Q(A) (L/s)	PRO-RATED HARMON PEAKING FACTOR HP x k	PEAK POP. FLOW Q(pR) (L/s)	PEAK ICI FLOW Q(pC) (L/s)	EXTRANEOUS FLOW (I/I WET) Q(E) (L/s)	GROUND WATER INFILTRATION (I/I DRY) (L/s)	TOTAL FLOW Q(D) (L/s)	NOTES (L/s)
Shea Pump Station Sewer Shed	**Stage 1 & 2 Full Buildout Incl. MD, Bell & ICI**	**3583.3**	**820.4**	**4403.7**	**2.6**	**58.30**	**4.03**	**10.19**	**1.98**	**20.16**	**0.44**	**35.64**	**3.85**	**60.08**	**84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.**
	Stage 3 Friendly PS Decommissioned	**3821.3**	**820.4**	**4641.7**	**2.6**	**62.96**	**4.03**	**10.74**	**1.96**	**21.11**	**0.44**	**38.11**	**3.94**	**63.60**	
	Stage 4 W4 Partial Buildout (Maguire & Faulkner only)	3821.3	3841.1	7662.4	2.6	62.96	38.42	17.74	1.84	32.66	0.44	56.33	4.63	94.06	**128 L/s SHEA PUMP STATION PROPOSED FIRM CAPACITY**
	Stage 5 W4 Full Buildout (Davidson & Eder added)	3821.3	6309.3	10130.6	2.6	62.96	68.24	23.45	1.77	41.49	0.44	72.14	5.22	119.30	

UNIT	AVG. CAPITA FLOW q (L/person/d)	HARMON CORRECTION FACTOR K	ICI FLOW PARAMETER ICI (L/s/ha)	I/I WET E (L/s/ha)	I/I DRY (L/s/ha)	I/I TOTAL (L/s/ha)
OCCUPIED (Rare)	200	0.6	0.17	0.53	0.02	0.55
UNOCCUPIED (Rare)	200	0.6	0.17	0.53	0.02	0.55

EQUATIONs:

1) Q(A) = (P x q /86,400)
2) Q(pR) = Q(A) x HP x K
3) Q(C) = (CA x c /86,400)
4) Q(pC) = Q(C) x CP
5) Q(E) = (A x E)
6) Q(D) = Q(pR) + Q(pC) + Q(E)

DEFINITIONS/NOTES:

Q(A) = Average Residential Flow (L/sec)
Q(pR) = Peak Residential Flow (L/sec)
Q(C) = Average ICI Flow (L/sec)
Q(pC) = Peak ICI Flow (L/sec)
Q(E) = Extraneous Flow (L/sec)
Q(D) = Peak Design Flow (L/sec)

A = Residential Area
CA = ICI Area
P = Population
q = Avg. Residential Capita Flow Parameter
HP = Harmon Residential Peaking Factor
CP = ICI Peaking Factor
K = Harmon Correction Factor
E = Extraneous Flow Parameter

POPULATION:

Singles	**3.4**	
Semis/Towns	**2.7**	
Institutional eq	**14**	persons/ha

SANITARY SEWER DESIGN SHEET 1

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Novatech Project #:	122163	Legend:	PROJECT SPECIFIC INFO
Project Name:	Fernbank Trunk Sanitary Sewer		USER DESIGN INPUT
Date Prepared:	5/26/2020		CUMILATIVE CELL
Date Revised:	5/17/2022		CALCULATED DESIGN CELL OUTPUT
Input By:	Ben Sweet		CALCULATED ANNUAL CELL OUTPUT
Reviewed By:	Sam Bahia		CALCULATED RARE CELL OUTPUT
Drawing Reference:	122163-SAN		USER AS-BUILT INPUT

LOCATION / DEMAND – RESIDENTIAL FLOW and INDUSTRIAL / COMMERICAL / INSTITUTIONAL FLOW

STREET	AREA	FROM MH	TO MH	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW Q(q) (L/s)	PEAKED DESIGN POP FLOW Q(p) (L/s)	PEAK ANNUAL/RARE FACTOR M	PEAKED ANNUAL/RARE POP FLOW Q(AR - Res) (L/s)	RESIDENTIAL DRAINAGE AREA (ha.)	CUMULATIVE RES DRAINAGE AREA (ha.)	COMMERICAL / INSTITUTIONAL AREA (ha.)	CUMULATIVE COMMERICAL / INSTITUTIONAL AREA (ha.)	AVG DESIGN COMMERICAL / INSTITUTIONAL FLOW Q (ci) (L/s)	COMMERICAL / INSTITUTIONAL PEAK FACTOR	CUMULATIVE ICI DRAINAGE AREA (ha.)	PEAKED DESIGN ICI FLOW Q (CI) (L/s)	PEAKED ANNUAL/RARE POP FLOW Q(AR - ICI) (L/s)
Future (By Others)																			
Fernbank Rd	A1 & A2, E1	24	23	4.339	4.339	2.84	14.06	39.95	2.38	23.91	143.270	143.270	5.000	5.000	1.62	1.00	5.000	1.62	0.98
Fernbank Rd		23	22	0.000	4.339	2.84	14.06	39.95	2.38	23.91	0.000	143.270		5.000	1.62	1.00	5.000	1.62	0.98
Fernbank Rd		22	21	0.000	4.339	2.84	14.06	39.95	2.38	23.91	0.000	143.270		5.000	1.62	1.00	5.000	1.62	0.98
Fernbank Rd		21	20	0.000	4.339	2.84	14.06	39.95	2.38	23.91	0.000	143.270		5.000	1.62	1.00	5.000	1.62	0.98
Novatech																			
Fernbank Rd	A3 & A4, D1-8	20	19	0.000	4.339	2.84	14.06	39.95	2.38	23.91	0.000	143.270		5.000	1.62	1.00	5.000	1.62	0.98
Stantec																			
Future Cope Dr	B1	19	18	0.000	4.339	2.84	14.06	39.95	2.38	23.91	0.000	143.270		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		18	17	0.248	4.587	2.82	14.87	41.97	2.37	25.14	3.280	146.550		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr	B2	17	16	0.853	5.440	2.77	17.63	48.81	2.33	29.30	11.320	157.870		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		16	15	0.000	5.440	2.77	17.63	48.81	2.33	29.30	0.000	157.870		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr	B3	15	14	1.285	6.725	2.70	21.79	58.82	2.27	35.40	18.800	176.670		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		14	13	0.000	6.725	2.70	21.79	58.82	2.27	35.40	0.000	176.670		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		13	12	0.000	6.725	2.70	21.79	58.82	2.27	35.40	0.000	176.670		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		12	11	0.000	6.725	2.70	21.79	58.82	2.27	35.40	0.000	176.670		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr	B4	11	10	0.373	7.098	2.68	23.00	61.66	2.26	37.14	6.020	182.690		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		10	9	0.000	7.098	2.68	23.00	61.66	2.26	37.14	0.000	182.690		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		9	8	0.000	7.098	2.68	23.00	61.66	2.26	37.14	0.000	182.690		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr		8	7	0.000	7.098	2.68	23.00	61.66	2.26	37.14	0.000	182.690		5.000	1.62	1.00	5.000	1.62	0.98
Future Cope Dr	B5, B6	7	6	0.265	7.363	2.67	23.86	63.67	2.25	38.37	3.720	186.410	2.950	7.950	2.58	1.00	7.950	2.58	1.56
Novatech																			
Future Cope Dr		6	5	0.000	7.363	2.67	23.86	63.67	2.25	38.37	0.000	186.410		7.950	2.58	1.00	7.950	2.58	1.56
Future Cope Dr	B7	5	4	0.381	7.744	2.65	25.10	66.54	2.24	40.13	6.950	193.360	0.900	8.850	2.87	1.00	8.850	2.87	1.74
Future Cope Dr		4	3	0.000	7.744	2.65	25.10	66.54	2.24	40.13	0.000	193.360		8.850	2.87	1.00	8.850	2.87	1.74
Future Cope Dr	B10, C2	3	2	1.204	8.948	2.60	29.00	75.45	2.20	45.60	26.340	219.700		8.850	2.87	1.00	8.850	2.87	1.74
Future Cope Dr		2	1	0.000	8.948	2.60	29.00	75.45	2.20	45.60	0.000	219.700		8.850	2.87	1.00	8.850	2.87	1.74
Future Cope Dr		1	EX 110A	0.000	8.948	2.60	29.00	75.45	2.20	45.60	0.000	219.700		8.850	2.87	1.00	8.850	2.87	1.74
IBI																			
Goldhawk Dr		*EX 110A*	*EX 109A*	*0.000*	*12.330*	*2.49*	*39.96*	*99.54*	*2.12*	*60.46*	*0.000*	*277.420*	*3.130*	*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 109A*	*EX 108A*	*0.003*	*12.333*	*2.49*	*39.97*	*99.56*	*2.12*	*60.47*	*0.180*	*277.600*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 108A*	*EX 107A*	*0.017*	*12.349*	*2.49*	*40.02*	*99.67*	*2.12*	*60.54*	*0.320*	*277.920*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 107A*	*EX 106A*	*0.013*	*12.363*	*2.49*	*40.06*	*99.77*	*2.12*	*60.60*	*0.300*	*278.220*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 106A*	*EX 105A*	*0.023*	*12.386*	*2.49*	*40.14*	*99.93*	*2.12*	*60.70*	*0.310*	*278.530*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 105A*	*EX 104A*	*0.007*	*13.108*	*2.47*	*42.48*	*104.91*	*2.10*	*63.79*	*0.240*	*291.300*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 104A*	*EX 103A*	*0.023*	*13.131*	*2.47*	*42.56*	*105.07*	*2.10*	*63.89*	*0.450*	*291.750*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 103A*	*EX 102A*	*0.030*	*13.161*	*2.47*	*42.65*	*105.28*	*2.10*	*64.02*	*0.470*	*292.220*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*
Goldhawk Dr		*EX 102A*	*EX FT24*	*0.020*	*13.181*	*2.47*	*42.72*	*105.41*	*2.10*	*64.10*	*2.130*	*294.350*		*18.260*	*5.92*	*1.00*	*18.260*	*5.92*	*3.59*

DEMAND – EXTRANOUS FLOW (AREA METHOD) and TOTAL DESIGN FLOW / AS-BUILT CAPACITY – AS-BUILT SEWER PIPE SIZING / DESIGN VERIFICATION

STREET	FROM MH	TO MH	CUMULATIVE EXTRANOUS DRAINAGE AREA (ha.)	DESIGN EXTRAN. FLOW Q(e) (L/s)	ANNUAL EXTRAN. FLOW Q(e) (L/s)	RARE EXTRAN. FLOW Q(e) (L/s)	TOTAL DESIGN FLOW Q(D) (L/s)	TOTAL ANNUAL FLOW Q(A) (L/s)	TOTAL RARE FLOW Q(R) (L/s)	AS-BUILT LENGTH (m)	AS-BUILT PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	AS-BUILT GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
Future (By Others)																	
Fernbank Rd	24	23	148.270	48.93	44.48	81.55	130.50	97.38	143.446	31.3	450 PVC	0.457	0.013	0.25	148.7	0.91	87.8%
Fernbank Rd	23	22	148.270	48.93	44.48	81.55	130.50	97.38	143.446	97.1	450 PVC	0.457	0.013	0.25	148.7	0.91	87.8%
Fernbank Rd	22	21	148.270	48.93	44.48	81.55	130.50	97.38	143.446	97.1	450 PVC	0.457	0.013	0.25	148.7	0.91	87.8%
Fernbank Rd	21	20	148.270	48.93	44.48	81.55	130.50	97.38	143.446	93.5	450 PVC	0.457	0.013	0.25	148.7	0.91	87.8%
Novatech																	
Fernbank Rd	20	19	148.270	48.93	44.48	81.55	258.50	184.38	263.446	139.52	600 CONC	0.610	0.013	0.26	326.6	1.12	79.1%
Stantec																	
Future Cope Dr	19	18	148.270	48.93	44.48	81.55	258.50	184.38	263.446	103.25	600 CONC	0.610	0.013	0.25	320.3	1.10	80.7%
Future Cope Dr	18	17	151.550	50.01	45.47	83.35	261.61	186.59	266.477	79.60	600 CONC	0.610	0.013	0.26	326.6	1.12	80.1%
Future Cope Dr	17	16	162.870	53.75	48.86	89.58	272.18	194.14	276.859	115.78	600 CONC	0.610	0.013	0.25	320.3	1.10	85.0%
Future Cope Dr	16	15	162.870	53.75	48.86	89.58	272.18	194.14	276.859	118.77	600 CONC	0.610	0.013	0.24	313.8	1.08	86.7%
Future Cope Dr	15	14	181.670	59.95	54.50	99.92	288.39	205.88	293.302	94.32	600 CONC	0.610	0.013	0.23	307.2	1.05	93.9%
Future Cope Dr	14	13	181.670	59.95	54.50	99.92	288.39	205.88	293.302	86.87	600 CONC	0.610	0.013	0.25	320.3	1.10	90.0%
Future Cope Dr	13	12	181.670	59.95	54.50	99.92	288.39	205.88	293.302	103.39	600 CONC	0.610	0.013	0.23	307.2	1.05	93.9%
Future Cope Dr	12	11	181.670	59.95	54.50	99.92	288.39	205.88	293.302	36.69	600 CONC	0.610	0.013	0.29	345.0	1.18	83.6%
Future Cope Dr	11	10	187.690	61.94	56.31	103.23	293.22	209.43	298.354	44.62	600 CONC	0.610	0.013	0.22	300.4	1.03	97.6%
Future Cope Dr	10	9	187.690	61.94	56.31	103.23	293.22	209.43	298.354	33.62	600 CONC	0.610	0.013	0.24	313.8	1.08	93.4%
Future Cope Dr	9	8	187.690	61.94	56.31	103.23	293.22	209.43	298.354	41.40	600 CONC	0.610	0.013	0.24	313.8	1.08	93.4%
Future Cope Dr	8	7	187.690	61.94	56.31	103.23	293.22	209.43	298.354	78.56	600 CONC	0.610	0.013	0.25	320.3	1.10	91.6%
Future Cope Dr	7	6	194.360	64.14	58.31	106.90	298.38	213.24	303.832	139.72	600 CONC	0.610	0.013	0.25	320.3	1.10	93.2%
Novatech																	
Future Cope Dr	6	5	194.360	64.14	58.31	106.90	298.38	213.24	303.832	102.50	600 CONC	0.610	0.013	0.22	300.4	1.03	99.3%
Future Cope Dr	5	4	202.210	66.73	60.66	111.22	304.13	217.53	310.083	115.13	600 CONC	0.610	0.013	0.27	332.8	1.14	91.4%
Future Cope Dr	4	3	202.210	66.73	60.66	111.22	304.13	217.53	310.083	118.86	600 CONC	0.610	0.013	0.23	307.2	1.05	99.0%
Future Cope Dr	3	2	228.550	75.42	68.57	125.70	321.74	230.90	330.042	40.06	600 CONC	0.610	0.013	0.37	389.6	1.33	82.6%
Future Cope Dr	2	1	228.550	75.42	68.57	125.70	321.74	230.90	330.042	122.40	600 CONC	0.610	0.013	0.22	300.4	1.03	107.1%
Future Cope Dr	1	EX 110A	228.550	75.42	68.57	125.70	321.74	230.90	330.042	81.40	600 CONC	0.610	0.013	0.29	345.0	1.18	93.3%
IBI																	
Goldhawk Dr	*EX 110A*	*EX 109A*	*295.680*	*97.57*	*88.70*	*162.62*	*371.03*	*267.75*	*383.675*	*61.28*	*600 CONC*	*0.610*	*0.013*	*0.35*	*379.0*	*1.30*	*97.9%*
Goldhawk Dr	*EX 109A*	*EX 108A*	*295.860*	*97.63*	*88.76*	*162.72*	*371.11*	*267.82*	*383.788*	*57.50*	*600 CONC*	*0.610*	*0.013*	*0.35*	*379.0*	*1.30*	*97.9%*
Goldhawk Dr	*EX 108A*	*EX 107A*	*296.180*	*97.74*	*88.85*	*162.90*	*371.33*	*267.99*	*384.035*	*53.32*	*600 CONC*	*0.610*	*0.013*	*0.35*	*379.0*	*1.30*	*98.0%*
Goldhawk Dr	*EX 107A*	*EX 106A*	*296.480*	*97.84*	*88.94*	*163.06*	*371.52*	*268.14*	*384.257*	*62.94*	*600 CONC*	*0.610*	*0.013*	*0.35*	*379.0*	*1.30*	*98.0%*
Goldhawk Dr	*EX 106A*	*EX 105A*	*296.790*	*97.94*	*89.04*	*163.23*	*371.78*	*268.33*	*384.526*	*60.09*	*600 CONC*	*0.610*	*0.013*	*0.35*	*379.0*	*1.30*	*98.1%*
Goldhawk Dr	*EX 105A*	*EX 104A*	*309.560*	*102.15*	*92.87*	*170.26*	*380.99*	*275.25*	*394.641*	*72.85*	*600 CONC*	*0.610*	*0.013*	*0.37*	*389.6*	*1.33*	*97.8%*
Goldhawk Dr	*EX 104A*	*EX 103A*	*310.010*	*102.30*	*93.00*	*170.51*	*381.29*	*275.48*	*394.987*	*48.77*	*600 CONC*	*0.610*	*0.013*	*0.37*	*389.6*	*1.33*	*97.9%*
Goldhawk Dr	*EX 103A*	*EX 102A*	*310.480*	*102.46*	*93.14*	*170.76*	*381.65*	*275.75*	*395.372*	*45.00*	*600 CONC*	*0.610*	*0.013*	*0.37*	*389.6*	*1.33*	*98.0%*
Goldhawk Dr	*EX 102A*	*EX FT24*	*312.610*	*103.16*	*93.78*	*171.94*	*382.49*	*276.48*	*396.628*	*102.59*	*600 CONC*	*0.610*	*0.013*	*0.37*	*389.6*	*1.33*	*98.2%*

ALLOWANCES (L/S)	Area E-1	W3 West Stittsville	40	28	37
	Areas D1-D8	Shea PS Current Capacity + Upgrade (Area 6 - 84L/s; W4 West Stittsville- 44L/s)	128	87	120

DEMAND EQUATION

Design Parameters:

1. Q(D), Q(A), Q(R) = Q(p) + Q(fd) + Q(ici) + Q(e)
2. Q(p) = (P x q x M x K / 86,400)
3. q Avg capita flow (L/per/day)= 280 L/per/day (design); 200 L/per/day (annual and rare)
4. M = Harmon Formula (maximum of 4.0)
5. K = 0.8 (design); 0.6 (annual and rare)
6. Park flow is considered equivalent to a single unit / ha
   Park Demand = 1 Single Unit Equivalent / Park ha
7. Foundation Drains 0.45 L/s/unit
8. Q(ici) = ICI Area x ICI Flow x ICI Peak
9 Q(e) = 0.33 L/sec/ha (design); 0.30 L/sec/ha (annual); 0.55 L/sec/ha (rare)

Definitions:

Q(D) = Peak Design Flow (L/sec) — Q(A) = Peak Annual Flow (L/sec)
Q(e) = Extraneous Flow (L/sec) — Q(R) = Peak Rare Flow (L/sec)
Q(p) = Population Flow (L/sec)
K = Harmon Correction Factor

	Singles	Semis/Towns	Apts (2-BR)
P = Residential Population	3.4	2.7	2.1
Typ Service Diameter (mm)	135		
Typ Service Length (m)	15	15	
I/I Pipe Rate (L/mm dia/m/hr) =	0.007		

Q(fd) = Foundation Flow (L/sec)
Q(ici) = Industrial / Commercial / Institutional Flow (L/sec)

Institutional / Commercial / Industrial			Industrial	Commercial / Institutional	
	Design =		35000	28000	L/gHa/d
	Annual / Rare =		10000	17000	L/gHa/d
ICI Peak *	Design =	Std ICI -->	1.0	1.5	* ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only)
	Annual / Rare =		1.0		

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)
Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

NOTE(S)

Future (by others) sewer sections included for conceptual design purposes only - design and construction by others.
Novatech and Stantec sewer sections based on asbuilts.
IBI sewer sections based on design.
Red text depicts fixed allowances for the above areas within the design sheet.
Residential flows for the sewers downstream of MH6 updated based on the conceptual sanitary servicing approach outlined within CRT Lands Phase 4, Adequacy of Public Servicing Report (May 2022).
Refer to Sanitary Sewer Design Sheet 2, prepared by Novatech, dated May 17, 2023, for analysis of sewers downstream of EX FT24.

SANITARY SEWER DESIGN SHEET 2

AREA			RESIDENTIAL												MIXED USE		COMMERCIAL		INSTITUTIONAL		C+I	INFILTRATION				PIPE							
			LOW DENSITY		MEDIUM DENSITY		HIGH DENSITY		MIXED USE		TOTAL																						
ID	From	To	Area (ha)	Pop.	Area (ha)	Pop.	Area (ha)	Pop.	Area (ha)	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accum. Area (ha)	Area (ha)	Accum. Area (ha)	Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	Total Flow (l/s)	Size (mm)	Type	Slope (%)	Length (m)	Capacity (l/s)	Full Flow Vel. (m/s)	Q/Q$_{full}$ (%)	Actual Vel. (m/s)
Shea PS Current Capacity + Upgrade (Area 6 - 84 L/s; W 4 West Stittsville - 44 L/s), W3 West Stittsville (40 L/s)																									168.0								
F1											13181	13181	2.5	105.4	0.0	0.00	18.26	18.26		0.00	8.9	312.61	312.61	103.2	217.5								
	FT24	FT23									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.34	108.9	373.5	1.28	103.2%	1.49
	FT23	FT22									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.39	106.2	400.0	1.37	96.4%	1.59
	FT22	FT21									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.36	108.6	384.3	1.32	100.3%	1.53
	FT21	FT20									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.45	106.3	429.7	1.47	89.7%	1.68
	FT20	FT19									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.45	103.6	429.7	1.47	89.7%	1.68
	FT19	FT18									0	13181	2.5	105.4		0.00		18.26		0.00	8.9		312.61	103.2	385.5	600	C 100-D	0.91	124.5	611.1	2.09	63.1%	2.22
F2			2.90	268	1.80	270	0.00	0	0.00	0	538	538	3.4	5.9	0.00	0.00	0.00	0.00	0.40	0.40	0.2	13.19	13.19	4.4	10.4								
F3			15.95	1474	14.90	2235	0.00	0	10.57	856	4565	4565	2.8	41.8	10.57	10.57	0.60	0.60	11.57	11.57	8.5	77.57	77.57	25.6	75.9								
	FT18	FT17									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.20	88.5	519.4	1.14	88.2%	1.30
	FT17	FT16									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.23	126.4	557.0	1.22	82.2%	1.37
	FT16	FT15									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.25	110.6	580.7	1.27	78.9%	1.42
	FT15	FT14									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.18	118.1	492.7	1.08	93.0%	1.24
	FT14	FT13									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.17	115.3	478.9	1.05	95.7%	1.21
	FT13	FT12									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.22	129.2	544.8	1.19	84.1%	1.35
	FT12	FT11									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.18	108.6	492.7	1.08	93.0%	1.24
	FT11	FT10									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	458.1	750	C 100-D	0.18	100.8	492.7	1.08	93.0%	1.24
Stittsville Trunk																									379.0								
	FT10	FT09									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	837.1	750	C 100-D	0.45	84.1	779.1	1.71	107.4%	1.97
	FT09	FT08									0	18284	2.4	139.4		10.57		18.86		11.97	17.6		403.37	133.1	837.1	750	C 100-D	0.56	40.9	869.1	1.91	96.3%	2.21
F4			60.08	5551	16.71	2506	0.00	0	5.62	455	8512	8512	2.6	72.3	5.62	5.62	0.00	0.00	19.62	19.62	10.9	164.76	164.76	54.4	137.5								
F5			7.70	711	2.90	435	0.00	0	6.70	543	1689	1689	3.1	17.0	6.70	6.70	0.00	0.00	0.79	0.79	2.0	22.81	22.81	7.5	26.6								
F6			29.70	2744	9.95	1493	5.04	680	0.00	0	4917	4917	2.8	44.6	0.00	0.00	0.00	0.00	16.15	16.15	7.9	89.34	89.34	29.5	82.0								
	FT08	FT07									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.22	77.5	1907.7	1.63	54.6%	1.67
	FT07	FT06									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.13	83.5	1466.5	1.26	71.1%	1.37
	FT06	FT05									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.20	24.6	1819.0	1.56	57.3%	1.60
	FT05	FT04									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.16	89.0	1626.9	1.39	64.0%	1.49
	FT04	FT03									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.19	95.0	1772.9	1.52	58.8%	1.58
	FT03	FT02									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.25	107.5	2033.7	1.74	51.2%	1.74
	FT02	FT01									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.17	107.5	1677.0	1.44	62.1%	1.52
	FT01	OTT1									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.22	61.4	1907.7	1.63	54.6%	1.67
	OTT1	GC									0	33403	2.1	232.2		22.89		18.86		48.53	38.3		680.28	224.5	1042.0	1200	C 100-D	0.20	19.1	1819.0	1.56	57.3%	1.60

Design Parameters:

Avg Flow/Person = 280 l/day
Comm./Inst. Flow = 28,000 l/ha/day
Infiltration = 0.33 l/s/ha

Pipe Friction n = 0.013
Residential Peaking Factor = Harmon Equation (max 4, min 2)
Peaking Factor Comm./Inst. = 1.5

	Units/Net ha	Pop/Unit	
Low Density Residential =	28	3.30	
Medium Density Residential =	60	2.50	(Multi Family Residential)
High Density Residential =	75	1.80	
Mixed Use =	90	1.80	(50% of mixed use area is residential)

Project: Fernbank Trunk Sanitary Sewer
Designed: KJM
Checked: MAB
Revised: BCS/BHB
Dwg. Reference: 108180-FT5
Date: February 3, 2015
Revised: May 17, 2023

Note(s):
Sewer sections based on asbuilts.
Red text depicts fixed allowances for the above areas within the design sheet.
Refer to Sanitary Sewer Design Sheet 1, prepared by Novatech, dated May 17, 2023, for analysis of sewers upstream of FT24.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED IN SUPPORT OF MEMORANDUM	MAY 11/23	BCS

SCALE 1:5000

DESIGN DJC
CHECKED BCS
DRAWN DJC
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

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LOCATION
CITY OF OTTAWA
SHEA PUMP STATION UPGRADES FOR UEA

DRAWING NAME
SANITARY DRAINAGE AREA PLAN

PROJECT No. 122163
REV REV # 1
DRAWING No. 122163-SAN

M:\2008\108180\CAD\design\Sanitary Trunk\(20110916) Sanitary Areas.dwg, PLANS-A1, Jan 27, 2012 - 8:47am, hwilson

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
5.	ISSUED FOR TENDER	JAN 26/12	MAB
4.	ISSUED FOR MOE APPROVAL	JAN 27/11	MAB
3.	MINOR DESIGN REVISION	NOV 14/11	MAB
2.	REVISED PER CITY AND LANDOWNER COMMENTS	OCT 20/11	MAB
1.	ISSUED WITH SANITARY TRUNK SEWER REPORT	SEPT 16/11	MAB

SCALE 1:6000
0 60 120 180 240

DESIGN	KJM
CHECKED	MAB
DRAWN	KJM
CHECKED	MAB
APPROVED	JGR

FOR REVIEW ONLY

LICENSED PROFESSIONAL ENGINEER
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LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
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LOCATION
CITY of OTTAWA
FERNBANK COMMUNITY

DRAWING NAME
SANITARY TRUNK SEWER
DRAINAGE AREA PLAN

PROJECT No.
108180-08
REV
REV # 5
DRAWING No.
108180-FT5

PLAN-A1.DWG - 841mmx594mm

NOVATECH
Engineers, Planners & Landscape Architects

M E M O R A N D U M

DATE: **DECEMBER 19, 2024**

TO: **MARC PICHETTE, PETER MOTT**

FROM: **SAM BAHIA, BEN SWEET**

RE: **SHEA ROAD PUMP STATION UPGRADE OPTIONS**
NOVATECH FILE NO.: 122163

CC: **CARL SCIUK, BRONWYN ANDERSON**

Introduction

This memorandum outlines and evaluates the Shea Road Pump Station (Shea PS) upgrade options that have been considered to accommodate wastewater flows from the Area W4 lands (Subject Site).

This memorandum should be read in conjunction with the *Shea Road Pump Station & Fernbank Capacity Review Memorandum* (Novatech, May 2023). The abovementioned memorandum outlined the following:

- Background and infrastructure status.
- Subject Site development potential.
- Shea PS capacity review.
- Shea PS potential future upgrades.
- Fernbank Trunk Sanitary Sewer capacity review.

The following documents were also utilized in the preparation of this memorandum:

- *Shea Road Sanitary Pump Station Design Brief* (Novatech, May 2016).
- As-builts of Shea PS facility and forcemain (December 2018).
- As-builts of Shea PS third pump upgrade (May 2023).

As outlined in the May 2023 Memorandum, upgrades to the Shea PS were completed in August 2022, which included the installation of a third pump. The existing three 40HP pumps have a firm capacity of 84L/s (42L/s per pump x two pumps in operation).

DSEL and Novatech met with City Staff on May 23, 2024, to discuss additional upgrades that would be required to the Shea PS to accommodate wastewater flows from the Subject Site. The following Operational feedback was provided so that it can be considered within the Shea PS upgrade options during functional design.

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1. Review and add valves on swab launcher.

   Novatech: Acknowledged. Can be reviewed during functional design.

2. Why are check valves noisy after pump runs? Is it a vacuum being created on the flow surge? This issue started after the last upgrade of the outfall chamber. The noisy check valve is from a pounding ball inside the check valve. This will cause premature wear on the check valve. Is the forcemain missing an air reducing valve to break vacuum?

   Novatech: Acknowledged. Please review the transient analysis report for the ramp down period to ensure that Shea PS operation is consistent with the recommendations.

3. Rag basket in the wet well needs to be cleaned every week, creating a labor demand. Should look at a bigger basket or alternate rag removal process.

   Novatech: Acknowledged. Can be reviewed during functional design.

4. Review pump controls with operations. Pump and level controls were designed with outfall limitation. Outfall is no longer restricted, control PCN needs to be changed.

   Novatech: Shea PS operation should be per original design (100% VFD). A revised PCN was provided to City Staff in June 2022 following the Shea PS third pump upgrade.

5. Is the existing chemical large enough? Review chemical demand.

   Novatech: Acknowledged. Can be reviewed during functional design.

6. Many of our stations with >100L/s inflows seem to have a wet well with >100m^3 capacity according to the tables in the combined ECA. Shea PS seems to be a much smaller capacity wet well (49m^3) for that amount of inflow. It would be worthwhile to review the wet well capacity and proposed pump setpoints compared to the sewer design guidelines.

   Novatech: Acknowledged. Can be reviewed during functional design. There is residual storage in the upstream sewers that elevate the storage to approximately 100m^3.

7. Since it is a smaller wet well, how many pump starts per hour would be anticipated with the increased flow? This should be within the sewer design guidelines and the pump manufacturer's recommendations.

   Novatech: The Sewer Design Guidelines only covers basic operation and does not account for two pump operation and VFD pace control. We believe with proper sequencing and pacing the VFD speeds to control wet well levels, the wet well should be adequate to keep the number of starts to an acceptable level. However, the City may object to a strategy that relies on pump sequencing and VFD adjustments to pace with flows. If the City rejects stepped pump operation and pace control, a larger wet well would be required.

8. What would be the retention time of the wet well before an overflow occurred in a worst-case scenario (max inflow, power failure at the pump start elevation)? Is there enough time for the generator to start and for the automatic transfer switch to transfer over?

   Novatech: Acknowledged. Can be reviewed during functional design. Further to the response to comment 6, the residual storage of approximately 100m^3 allows for 1-2 minutes for the genset to turn over prior to an emergency spill.

9. Is the current overflow design sufficient for a higher flow station?

   Novatech: The emergency overflow will have to be relocated to lower ground at a new pond. The emergency overflow will be reviewed and sized at that time.

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10. The Shea PS does not have much available wall space inside, this may be challenging if new equipment is required without first removing the existing.

    Novatech: Acknowledged. Can be reviewed during functional design and is considered for the options below.

Shea Road Pump Station Upgrade Options

Upon further review, the following three options have been considered:

- **Option 1:** Major pump station upgrades to building components, mechanical and electrical. Existing forcemains to be utilized. New 60HP pumps with a firm capacity of 120L/s.
- **Option 2:** Abandon and upsize existing dual 200mm dia. forcemains to dual 300mm dia. forcemains. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Similar HP pumps with a firm capacity of 130L/s.
- **Option 3:** New 300mm dia. forcemain, discharge chamber and gravity outlet. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Existing forcemains to be utilized. Similar HP pumps with a firm capacity of 130L/s.

Refer to attached Alternative Sanitary Forcemain Option Plan (Drawing 122163-FM1) showing Options 2 and 3.

Shea Road Pump Station Capacity Review

As outlined in the May 2023 Memorandum, high-level development potential of the Subject Site has been provided to Novatech by DSEL. The development potential comprises of a population potential and effective extraneous area of 5,760 persons and 64.2ha (excluding HONI corridor and ponds), which would be developed in two stages, East and West of the Faulkner Municipal Drain. The theoretical peaked flow for the Subject Site, not considering peaking factors from external areas, is approximately 70L/s.

The May 2023 Memorandum also summarized the Shea PS staged flows under different loading parameters. Below is a summary of the ultimate flows for full buildout under the different loading parameters:

- Condition 1 (design parameters for occupied & unoccupied) – 130L/s.
- Condition 2 (annual parameters for occupied & design parameters for unoccupied) – 112L/s.
- Condition 3 (annual parameters for occupied & unoccupied) – 88L/s.
- Condition 4 (rare parameters for occupied & unoccupied) – 121L/s.
- Condition 5 (operational flows, peak domestic flows + GWI) – 50L/s.

It is important to note that for Option 1 the Shea PS ultimate flow would be limited to 120L/s, which would be under the requirements for Condition 1 and Condition 4. For Options 2 and 3 the Shea PS ultimate flow would accommodate 130L/s. Option 2 has significant challenges/impacts which is discussed further in the following sections of this memorandum.

Further, Arcadis was engaged to complete a transient analysis of Options 1 and 3. Refer to attached *Transient Analysis Report* (Arcadis, October 2024) for conclusions and recommendations.

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Description of Criteria

In order to select the preferred upgrade option, a set of criteria were developed to comparatively assess feasibility and impacts of each option. The criteria used to assess the above options are based on the categories listed below:

- **Design and Constructability (30%)**
  - Ease of Design and Approvals (15%)
  - Ease and Flexibility of Construction (15%)
- **Operation and Maintenance (30%)**
  - Ease and Flexibility of Operation and Maintenance (15%)
  - Cost of Operation and Maintenance (15%)
- **Public and Natural Environment Affects (20%)**
  - Impact of Community (10%)
  - Impact of Natural Features, Surface water and Aquatics (5%)
  - Level of Service (5%)
- **Capital Costs (20%)**
  - Capital Costs (20%)

Evaluation of Criteria

As the above categories do not equivalently measure against each other, the rating system for the criterion shall be as tabulated below:

Evaluation Criteria	
Category	Weight (%)
Design and Constructability	30
Operation and Maintenance	30
Natural Environment and Public Affects	20
Capital Costs	20

Each sub-category shall be rated on the following system:

- Major Positive Impact (10)
- Moderate Positive Impact (8)
- Minor Positive Impact (6)
- Minor Negative Impact (4)
- Moderate Negative Impact (2)
- Major Negative Impact (0)

The attached evaluation matrix summarizes a comparison of the options based on the corresponding criteria listed above.

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Preferred Upgrade Option

Based on the evaluation matrix, Option 3 is the most practical, feasible, and cost-effective option to accommodate wastewater flows from the Subject Site.

Option 3 is the best option with respect to ease of design and approvals, ease and flexibility of construction, ease and flexibility of operation and maintenance, level of service, and capital costs. Option 2 is the most undesirable option largely due to the significant challenges related to ease and flexibility of construction, impact to community, and capital costs.

Attachments

1. Alternative Sanitary Forcemain Option Plan (Drawing 122163-FM1).
2. *Transient Analysis Report* (Arcadis, October 2024).
3. Evaluation Matrix.
4. Class ‘C’ Cost Estimate.

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No.	REVISION	DATE	BY
1.	NEW FORCEMAIN POSSIBLE PROFILE	JUNE 17/24	BHB

SCALE 1 : 1000

1:1000 0 10 20 30 40

DESIGN GJM/BHB

CHECKED GJM

DRAWN BSm

CHECKED BRN

APPROVED BHB

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LOCATION
CITY OF OTTAWA
SHEA PUMP STATION UPGRADES FOR UEA

DRAWING NAME
ALTERNATE SANITARY FORCEMAIN OPTION PLAN VIEW

PROJECT No. 122163-00

REV REV # 1

DRAWING No. 122163-FM1

Click here to enter text.

Transient Analysis Report

Shea Road and Forcemain System Upgrades
City of Ottawa, ON

Prepared for NOVATECH Engineers, Planners & Landscape Architects
by Arcadis Professional Services (Canada) Inc.
8133 Warden Ave, Unit 300 | Markham | ON | L6G 1B3 | Canada | T (905) 763-2322 | F (905) 763-9983
October 2024

Document Control Page

CLIENT:	NOVATECH
PROJECT NAME:	Shea Road and Forcemain System Upgrades
REPORT TITLE:	Transient Analysis Report
ARCADIS REFERENCE:	147554
VERSION:	V2
DIGITAL MASTER:	\147554 Novatech SPS Transient Report_V3.docx
ORIGINATOR:	Shelley Kuan, Associate, Hydraulic & Modelling
REVIEWER:	Phil Gray, Principal - Sr. Practice Lead - Infrastructure Planning
AUTHORIZATION:	Shelley Kuan, Associate, Hydraulic & Modelling
CIRCULATION LIST:	NOVATECH
HISTORY:	
1	August 07, 2024 – Submitted to NOVATECH for Review
2	October 31, 2024 – for submission

Table of Contents

List of Attachments

Table of Contents (continued)

Appendices

1 Introduction

Arcadis Professional Services (Canada) Inc (Arcadis) was retained by Novatech Engineers, Planners & Landscape Architects (Novatech, the "Client") to conduct a hydraulic transient analysis in support of the proposed Shea Road Sanitary Pumping Station (SPS) and the associated proposed forcemain system, in the City of Ottawa (the "City").

Novatech previously retained Cole Engineering (Arcadis/IBI Group Acquisition) to undertake a transient analysis for the above project in 2016. The analysis was completed in March 2016 based on the maximum design of 84 L/s and a dual 200 mm forcemains (HDPE DR13.5). The existing Shea SPS and the dual forcemains were constructed and have been in service.

The Shea SPS is to be upgraded due the potential increasing ultimate design flow 130 L/s (from the original design flow 84 L/s). An updated transient analysis is to check if additional forcemain is required. **Appendix A** shows the locations of the proposed Shea Road SPS and the associated forcemain alignments.

2 Background

The existing Shea Road SPS is located at the southwest corner of the Davidson property, as shown in **Appendix A**. The proposed SPS will service the Stittsville South Area 6 lands in two phases (Phase 1 and Phase 2). The ultimate condition will consist of the full build-out of the site (Phases 1 and 2). The proposed dual 200 mm diameter forcemains were constructed from the SPS through the Davidson lands along local road northerly to the Fernbank Road.

Currently, the forcemains discharge at the existing sanitary manhole (SANMH 5), and outlets to the existing Fernbank gravity sewer.

The following documents and reports have been reviewed for this study:

- Shea Road SPS and Forcemain System Hydraulic Transient Analysis Prepared by Cole Engineering (now Arcadis Professional Services (Canada) Inc.), dated March 2016; and,
- Proposed Shea Road SPS Manufacturer Pump Performance Curves - See **Appendix B** for details.

3 Methodology

The objective of the transient analysis is to complete an assessment of the SPS and forcemain system and provide recommendations regarding surge protection devices (if required) at the SPS and/or along the forcemain system.

The review of suction system hydraulics, including wet well storage volume and forcemain (including discharge header) design flow velocity and/or pump sizing/selection, was not within the scope of the transient assessment. It has been assumed that flow to be pumped is available in the wet well and the pump selection and forcemain design velocity have been reviewed by others. Additionally, it has been assumed the system is under full flow conditions and outlets at the discharge manhole (SAN MH-5). Only this full flow operational condition is simulated and presented in the report.

Based on the background documents and available design information, the following assumptions for the SPS and forcemain system transient analysis were made:

- There are two (2) pumps (1 duty and 1 standby) each with a rated flow of 65 L/s. Each pump unit is equipped with a Variable Frequency Drive (VFD). Design flow rate is approximately 130 L/s.
- Two pumps are initially in operation.
- The existing dual forcemains are 200 mm (ID=185 mm) diameter HDPE (DR13.5) pipe with a C-factor of 140.
- The proposed forcemain is 300 mm diameter (ID=273 mm) HDPE (DR13.5) pipe with a C-factor of 140.
- There is a 150 mm diameter Stainless Steel (SS) header with a C-factor of 120.
- The pipeline pressure wave speed is 1200 m/s for Stainless Steel (SS), and 350 m/s for HDPE.
- The forcemain high pressure resistance for the SS header include:
  - Working pressure (assumed):110 psi (or 760 kPa); and,
  - Maximum pressure (short-term): 154 psi, or 987 kPa (assumed 140% working pressure).
- The pipe high pressure resistance for the HDPE (DR13.5) forcemain include:
  - Working pressure:110 psi (or 760 kPa);
  - Maximum pressure (short-term): 154 psi or 987 kPa (assumed 140% working pressure);
- Existing dual 200 mm diameter forcemains being discharged into the existing sanitary manhole (SAN MH-5, invert 110.3 m).
- Proposed 300 mm forcemain is to be discharged into an existing sanitary manhole (invert, 106.8 m), which is at a lower elevation and downstream of the discharge manhole (SAN MH-5) for the existing dual forcemains.
- A water level (low water level in wet well) of 97.1 m.
- There is a check valve on each of the pump discharge header.
- There is a 75 mm Surge Relief Valve (SRV) at the pump discharge header to provide surge protection.
- The following scenarios for three (3) proposed pumps under both normal and pump emergency shutdown are performed and presented in the report:
  - Scenario 1 - Pumping Station Upgrades and Two Existing Forcemains
  - Scenario 2 - Existing Pumping Station with Two Existing Forcemains plus One Proposed Forcemain

To complete the transient analysis Bentley HAMMER was used. The approach and findings of the transient analysis for the SPS and forcemain system are presented in the following sections.

4 Transient Analysis

4.1 Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains

Scenario 1: Larger pumps are proposed at the Shea SPS and the existing dual forcemains will be used. New forcemains will not be proposed. The findings for the transient analysis under Scenario 1 are presented below.

4.1.1 Pump Emergency Shutdown without Surge Protection

Except for check valve protection at each of the pumps, no other surge devices were assumed to be on-line, to provide surge protection at the Shea Road SPS, and/or along the forcemains.

Attachments 1 and **1A** represent the transient HGL profile along the existing dual 200 mm forcemain and the transient histories at the Shea Road SPS, upon pump trip. The plan view of the route is shown in **Appendix A.**

Attachment 1 represents the transient HGL and elevation profile along the forcemain from Shea Road SPS to the existing discharge manhole (SAN MH-5). The steady-state HGL at the discharge side of the SPS is approximately 136 m (corresponding to a pressure of 373 kPa, or 54 psi). The key findings are summarized as follows:

- The maximum transient HGL reaches 165 m (corresponding to a pressure of 656 kPa, or 95 psi) near the discharge side of the SPS and 145 m (corresponding to a pressure of 412 kPa, or 60 psi) along the existing dual forcemains;
- Short-lived full-vacuum or sub-atmospheric pressure occurs along virtually the entire length of the existing dual forcemains; and,
- Up to 5 L vapour pocket was observed at a local high point in the forcemain profile, approximately 600 m from the SPS.

Attachment 1A represents the transient history upon power failure at the discharge header of the Shea Road SPS. Following a power trip at 2 s, the maximum transient HGL after 20 s (18 s after the pump shutdown) reaches 155m, and 50% higher than the steady-state HGL. The existing SRV at the SPS discharge header may trip to open, if the relief pressure set point is set at approximately 20% higher than the steady-state HGL/pressure (or it opens when the pressure at the SPS discharge header reaches 70 psi, or HGL at 147m).

4.1.2 Pump Normal Operation

Attachment 2 shows the transient head profile along the forcemain from the Shea Road SPS to the existing discharge manhole (SAN MH-5) upon normal pump shutdown and restart.

The maximum transient head is slightly higher the steady-state head. The key findings are summarized as follows:

- When comparing **Attachments 1** and **2**, the pressure for the entire forcemain has improved. No significant negative pressure is observed along the entire forcemain system with the proposed VFD pumps in operation; and,
- **Attachment 2A** shows the transient history at the discharge header of the SPS during normal pump shutdown and restart operations. The first pump ramp-down is at 2 s with the pump fully closing at 47 s (pump ramp-down time = 45 s) and the second pump ramp-down is at 47 s with the pump fully closing at 92 s (pump ramp-down time = 45 s). There is a delay for approximately 10 s. The second pump starts to ramp-up

at 102 s and is fully opened at 147 s (pump ramp-up time = 45 s) and the first pump starts to ramp-up at147 s and is fully opened at 192 s (pump ramp-up time = 45 s).

4.2 Scenario 2 – Existing Pumping Station with Existing Dual Forcemains plus One Proposed Forcemain

Scenario 2: A new 300 mm forcemain is proposed and the existing Shea SPS will be used. SPS upgrades will not be proposed. The findings for the transient analysis for Scenario 2 are presented below.

4.2.1 Pump Emergency Shutdown without Surge Protection

Except for check valve protection at each of the pumps, no other surge devices were assumed to be on-line, to provide surge protection at the Shea Road SPS, and/or along the forcemains.

Attachments 3 represents the transient HGL profile along the existing dual 200 mm forcemain and the transient histories at the Shea Road SPS, upon pump trip. The plan view of the route is shown in **Appendix A.**

Attachment 3 represents the transient HGL and elevation profile along the forcemain from the Shea Road SPS to the proposed discharge manhole (SAN MH-5). The steady-state HGL at the discharge side of the SPS is approximately 115 m. The key findings are summarized as follows:

- The maximum transient HGL reaches 130 m (corresponding to a pressure of 332 kPa, or 48 psi) near the discharge side of the SPS and/or along the proposed forcemain;
- Short-lived full-vacuum or sub-atmospheric pressure occurs along virtually the entire length of the forcemain; and,
- Up to 2 L vapour pocket was observed at a local high point, approximately 600 m from the SPS.

Attachment 4 represents the transient HGL and elevation profile along the forcemain from the Shea Road SPS to the existing discharge manhole that is located downstream of SAN MH-5. The steady-state HGL at the discharge side of the SPS is approximately 122 m. The key findings are summarized as follows:

- The maximum transient HGL reaches 130 m (corresponding to a pressure of 332 kPa, or 48 psi) near the discharge side of the SPS and/or along the proposed forcemain;
- Short-lived full-vacuum or sub-atmospheric pressure occurs along virtually the entire length of the new/proposed forcemain; and,
- No signature vapour pocket was observed the new/proposed forcemain.

Attachment 3A represents the transient history upon power failure at the discharge header of the Shea Road SPS. Following a power trip at 2 s, the maximum transient HGL after 65 s (63 s after the pump shutdown) reaches 125 m, slightly higher than the steady-state HGL.

4.2.2 Pump Normal Operation

Attachment 5 shows the transient head profile along the existing dual forcemains from the Shea Road SPS to the existing discharge manhole (SAN MH-5) upon normal pump shutdown and restart.

The maximum transient head is slightly higher the steady-state head. The key findings are summarized as follows:

- When comparing **Attachments 3** and **5**, the pressure for the entire forcemain has improved. No significant negative pressure is observed along the entire forcemain system with the proposed VFD pumps in operation; and,

Attachment 5A shows the transient history at the discharge header of the SPS during normal pump shutdown and restart operations. The first pump ramp-down is at 2 s with the pump fully closing at 32 s (pump ramp-down time = 30 s) and the second pump ramp-down is at 32 s with the pump fully closing at 62 s (pump ramp-down time = 30 s). There is a delay for approximately 10 s. The second pump starts to ramp-up at 72 s and is fully opened at 102 s (pump ramp-up time = 30 s) and the first pump starts to ramp-up at 102 s and is fully opened at 132 s (pump ramp-up time = 30 s).

Attachment 6 shows the transient head profile along the new/proposed forcemain from the Shea Road SPS to the existing discharge manhole upon normal pump shutdown and restart.

The maximum transient head is slightly higher the steady-state head. The key findings are summarized as follows:

- When comparing **Attachments 4** and **6**, the pressure for the entire forcemain has improved. No significant negative pressure is observed along the entire forcemain system with the proposed VFD pumps in operation.

5 Conclusions and Recommendations

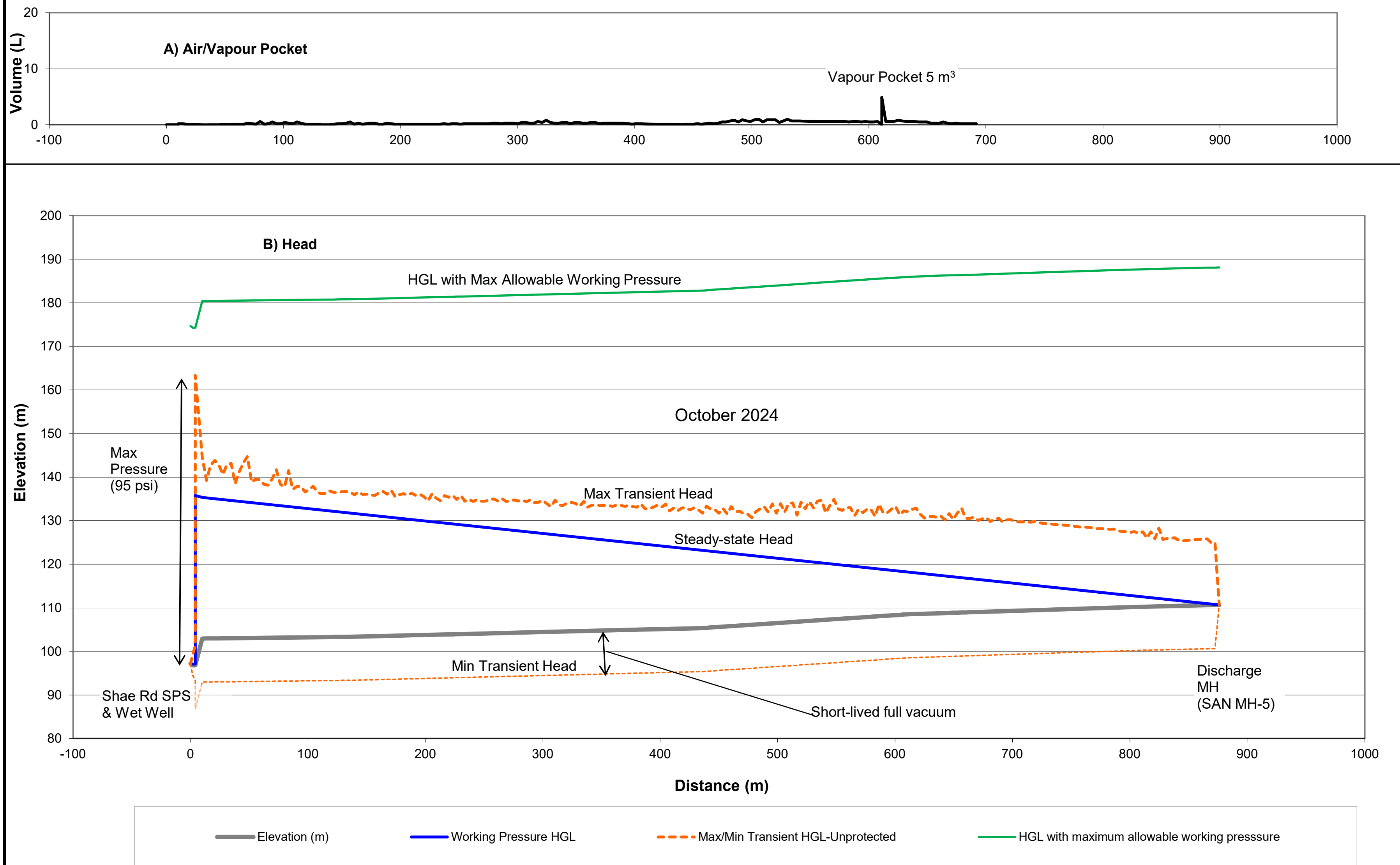
Based on the HAMMER model simulation results, the following conclusions and recommendations can be drawn:

- The Shea Road SPS and forcemain system are capable of withstanding short-lived full vacuum (negative) pressure, and the transient high pressure (working plus surge pressure) of 656 kPa (or 95 psi) upon pump emergency shutdown (or power failure conditions) for the critical Scenario 1 – Shea SPS upgrades and flow via existing dual (200 mm) forcemains.
- Forcemain pressure class HDPE DR13.5, with a pressure rating of greater than 760 kPa (110 psi) was installed for the existing dual 200 mm diameter forcemains and it is recommended for the proposed/new 300 mm forcemain. The anticipated maximum transient pressure of 656 kPa (or 95 psi) is within the working pressure rating of 760 kPa (or 110 psi) without surge protection upon pump emergency shutdown (or power failure conditions). The existing PRV at the SPS may trip to open when the high pressure reaches the pre-set pressure (e.g., pressure reaches 70 psi or 20% higher than the steady-state pressure) at the SPS.
- Based on the model results, short-lived full-vacuum or sub-atmospheric pressure occurs along the existing and proposed forcemains for a duration of 100 seconds per each pump emergency shutdown. The estimated duration of external load (around 22 psi) to the proposed forcemain (with soil cover of approximately 3 m) is around 100 hours assuming one emergency pump shutdown per week for the service life of 70 years. As per the manufactured design information for HDPE DR13.5, the pipeline can withstand external pressure resistance of 27 psi (including a safety factor of 2) for a duration of 100 hours at temperatures of 22^{o}C (73 ^{o}F). Therefore, HDPE DR13.5 is recommended to ensure a sufficient safety factor for long-term resistance to collapse.
- To minimize the negative pressure (or surge pressure) along the forcemain and allow sufficient time for air expulsion from the system, the recommended time for the pump normal operation is as follows:

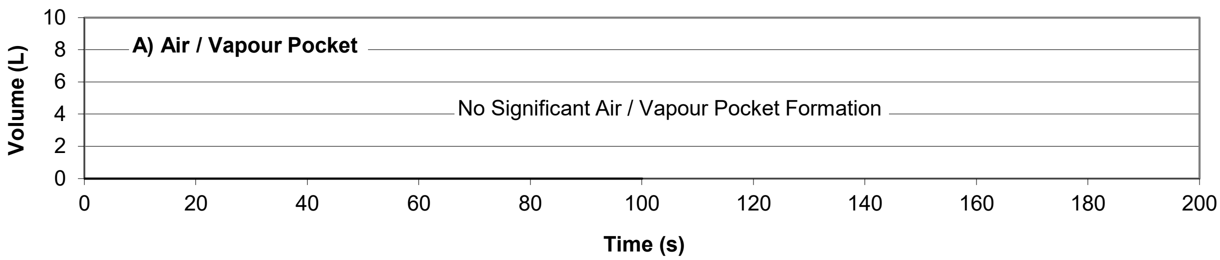
- Scenario 1 (Shea SPS upgrades and flow via existing dual (200 mm) forcemains): Normal pump shutdown and restart is at least 45 s and the time delay between pump operation is at least 10 s; and,
- Scenario 2 (Existing pump units with existing dual forcemains plus one new forcemain): Normal pump shutdown and restart is at least 30 s and the time delay between pump operation is at least 10 s.

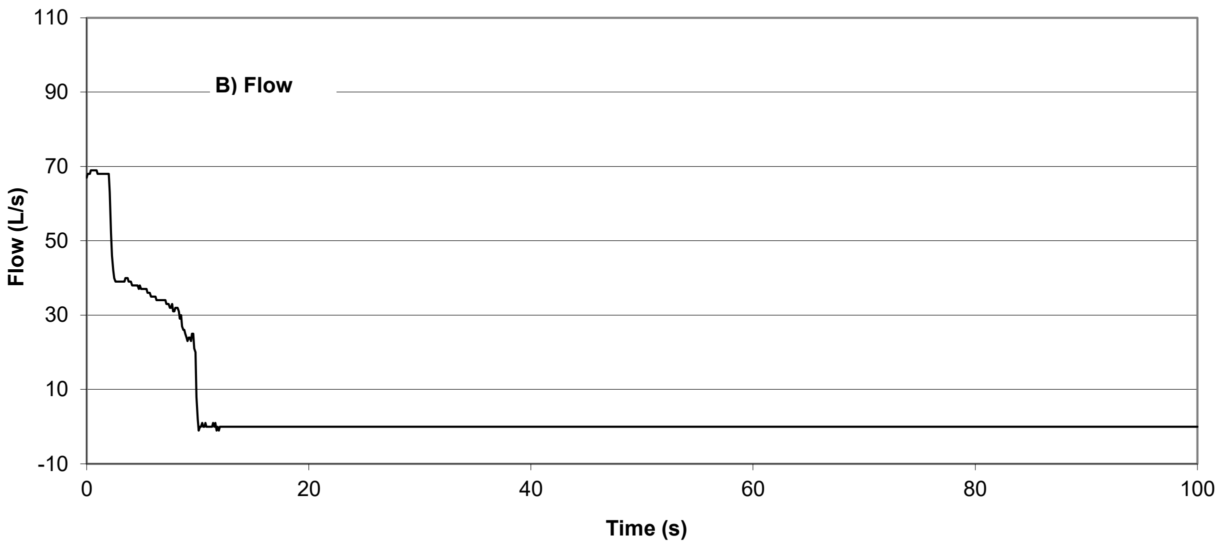
- Other considerations for Scenario 2 conditions (Existing pump units with existing dual forcemains plus one new forcemain): The discharge manhole (SAN MH-5) and a portion of the existing forcemains is located at a higher elevation which is above the invert of the new/proposed forcemain outlet for Scenario 2. As such, reversal flow from the existing dual forcemains will occur and continue discharging at the discharge manhole of the new/proposed 300 mm forcemain after each pump cycle, until the HGL at the dual forcemains approaches 106.8 m (invert elevation of the new/proposed forcemain outlet). Because of this, half of the dual forcemains may be empty. Initially, the flow fills the empty pipe section along the existing dual forcemains during each pump cycle. The pipe filling may be considered for sizing the wet well storage volume and/or pump selection by others.

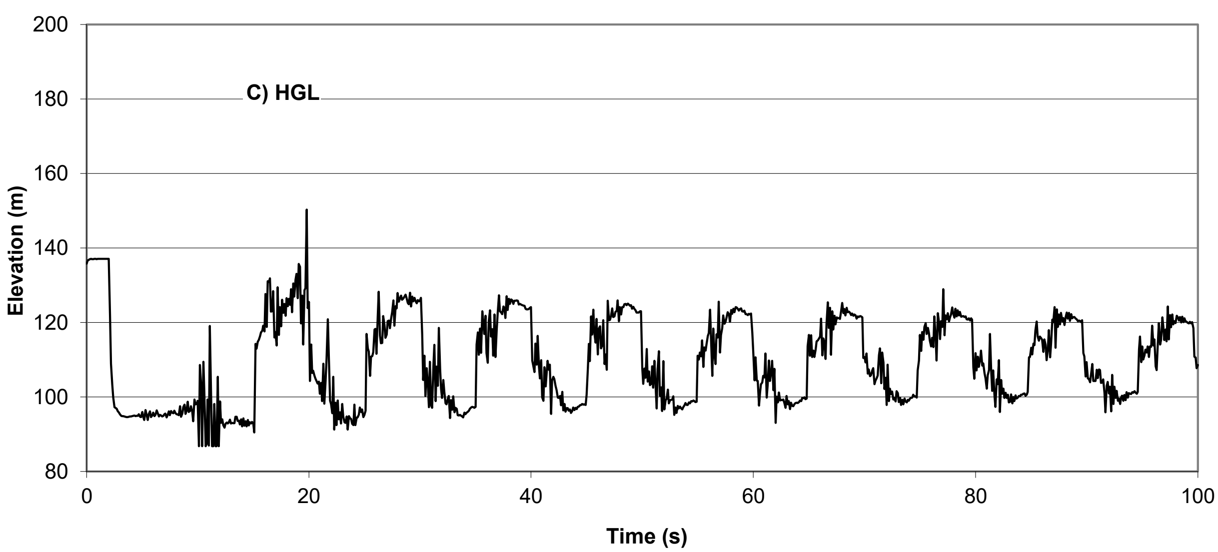
ATTACHMENTS



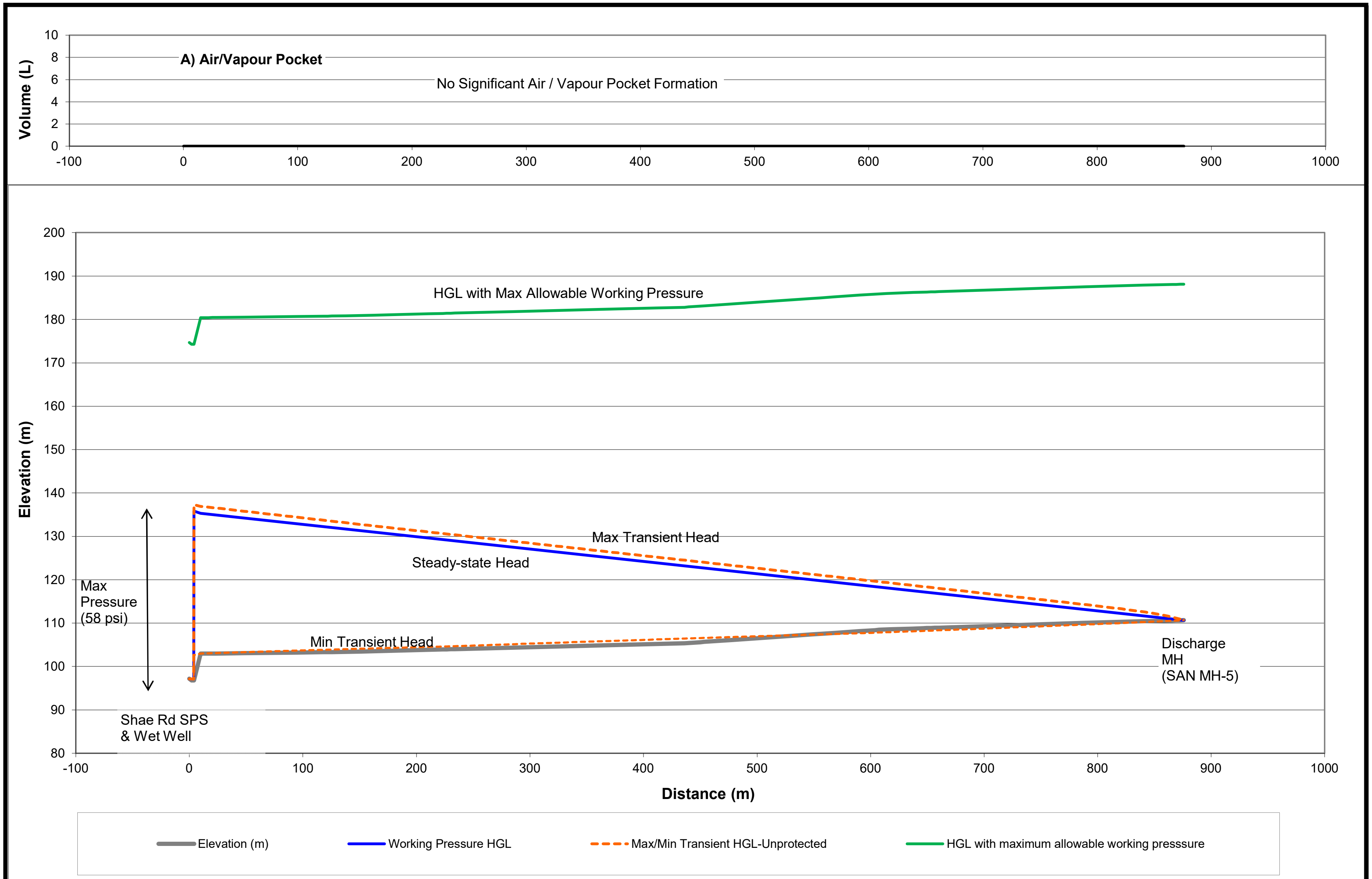
	Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
	ARCADIS	Attachment 1	Transient Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Emergency Pump Shutdown** without Surge Protection



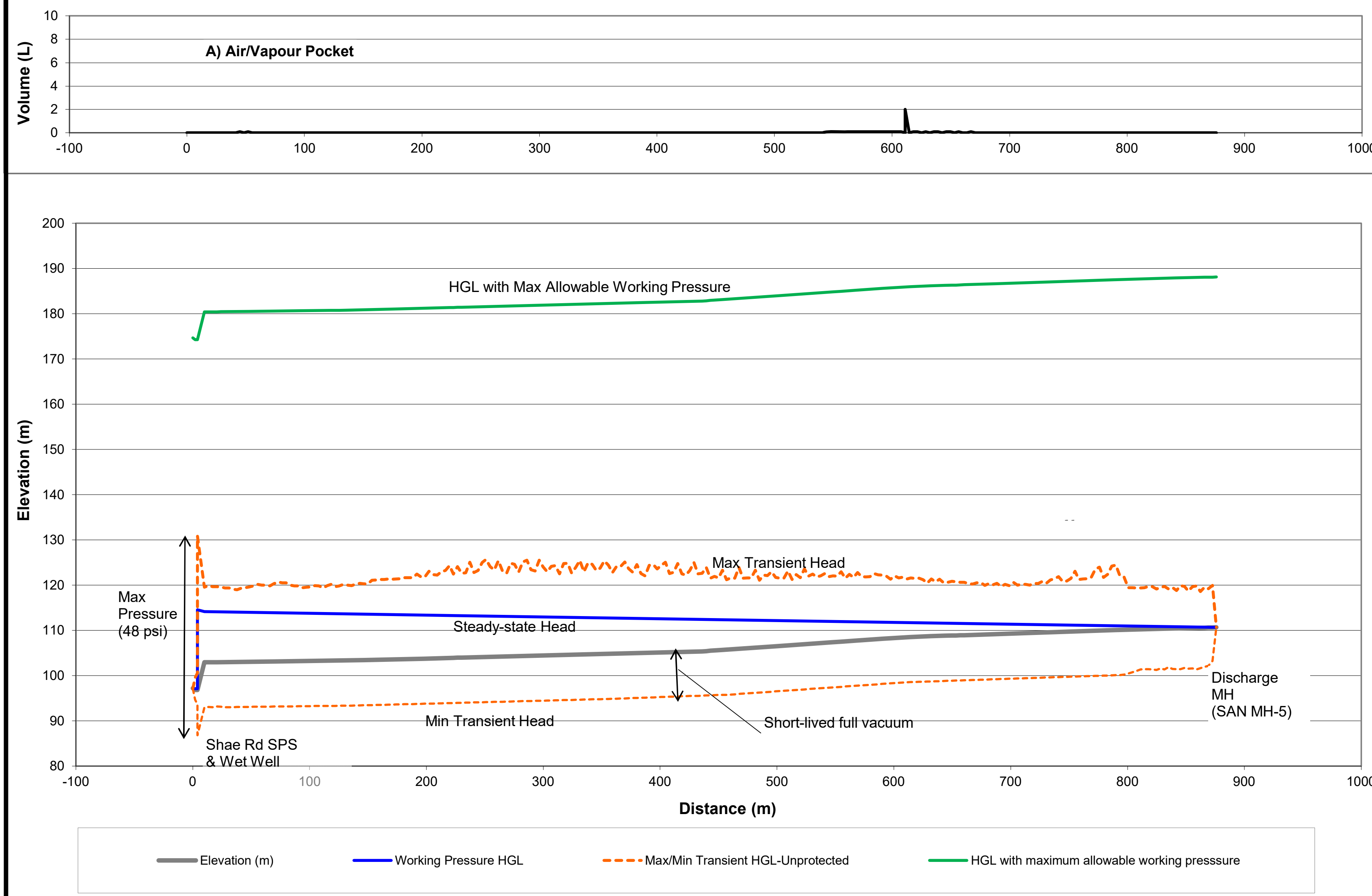




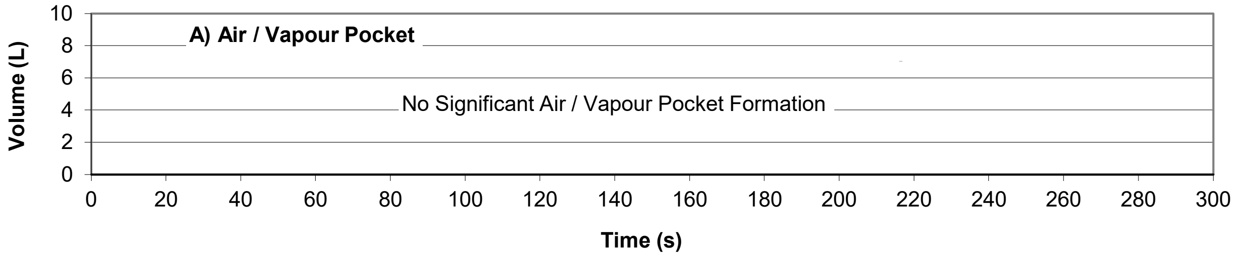
	Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
	ARCADIS	Attachment 1A	Transient History at the Proposed Shea SPS upon Emergency Pump Shutdown without Surge Protection

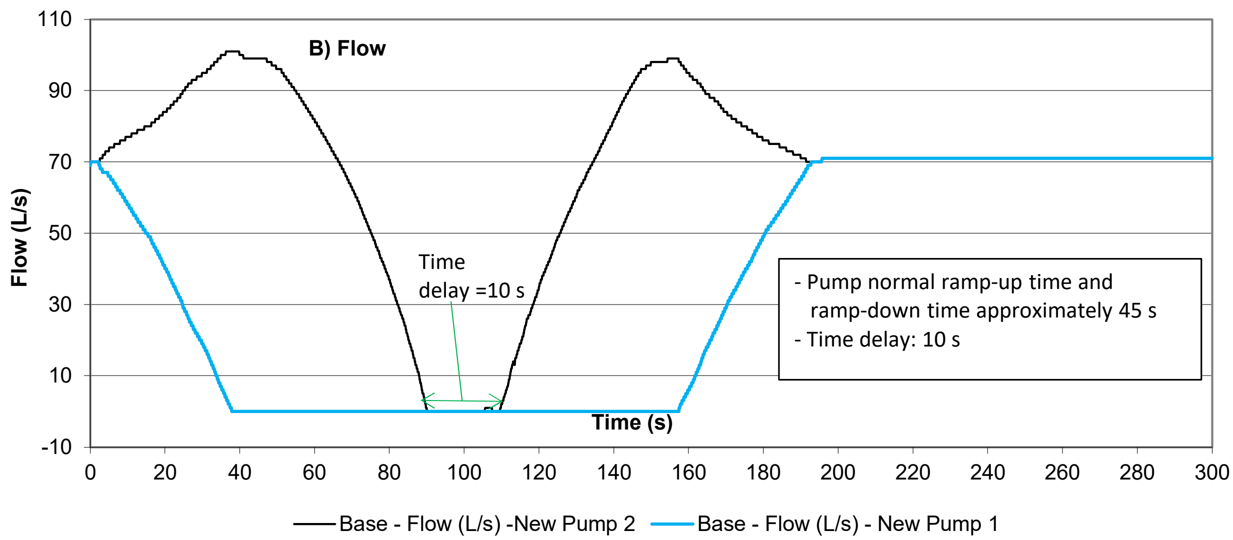


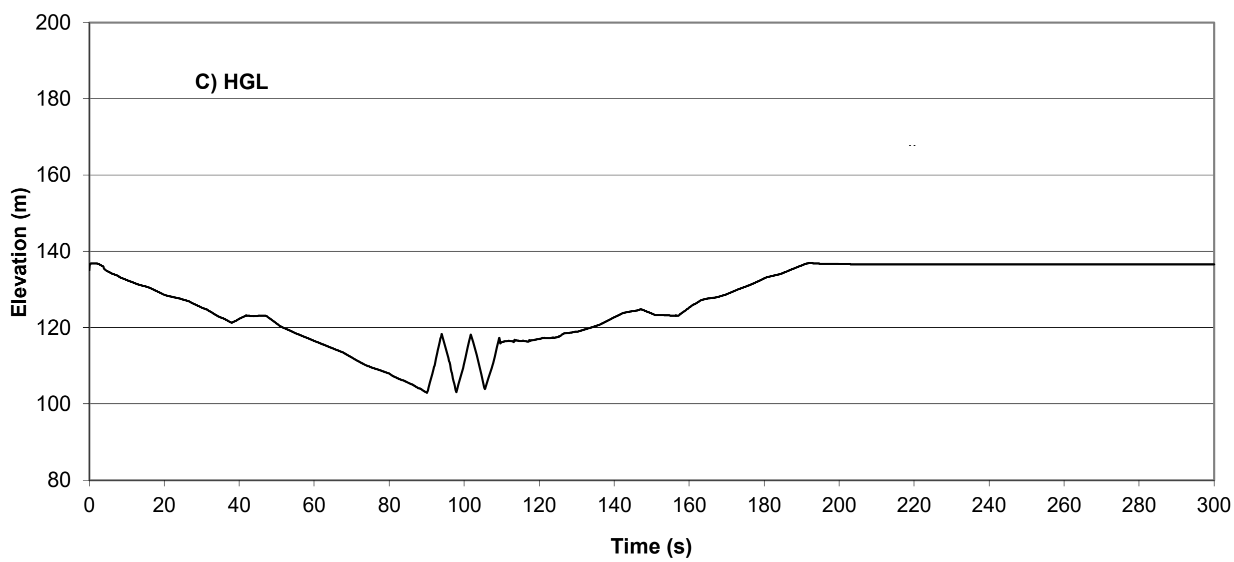
Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
ARCADIS	Attachment 2	Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Normal Pump Shutdown and Re-start** without Surge Protection



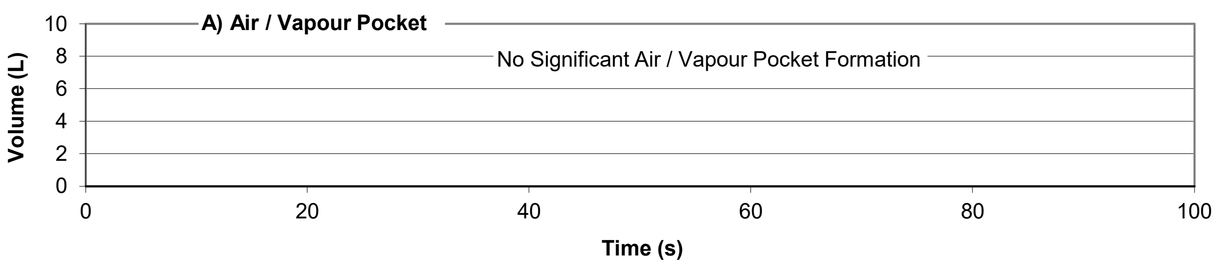
	Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 3	Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Emergency Pump Shutdown** without Surge Protection

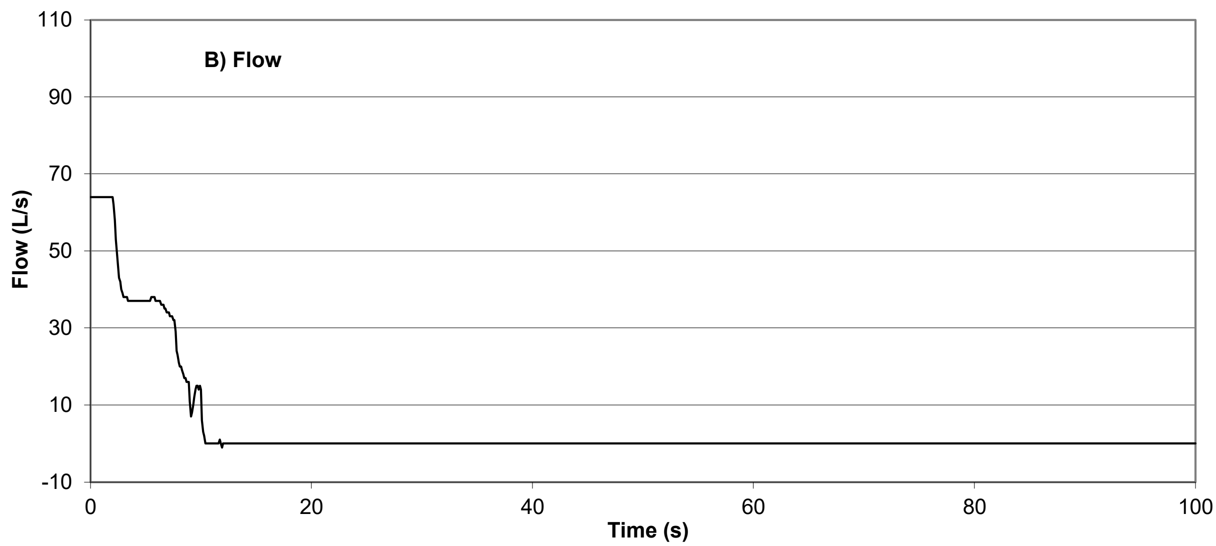


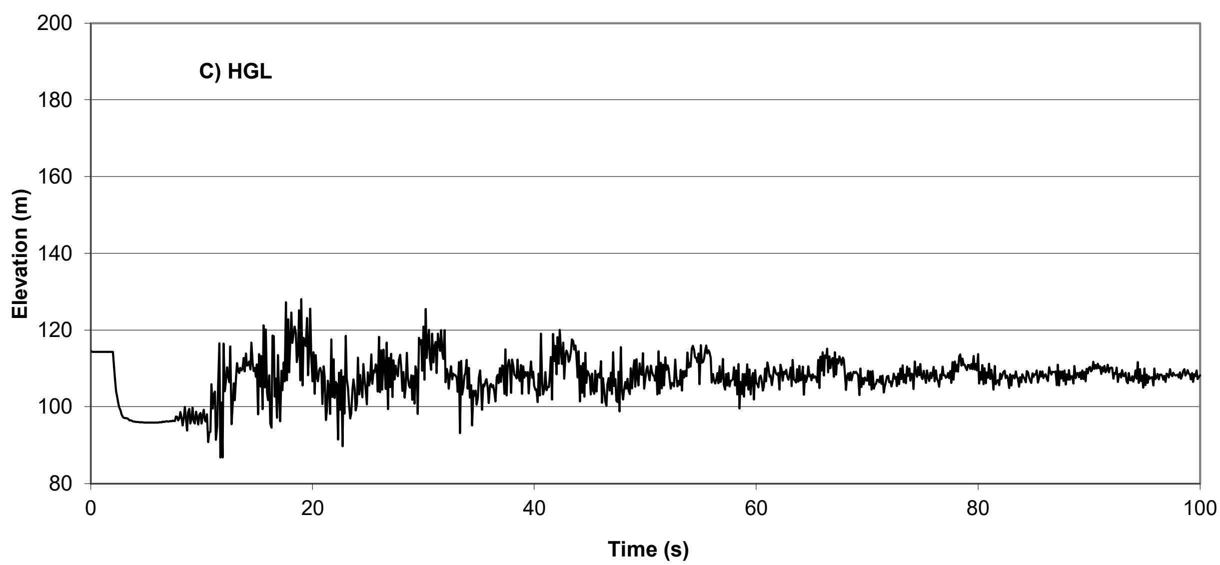




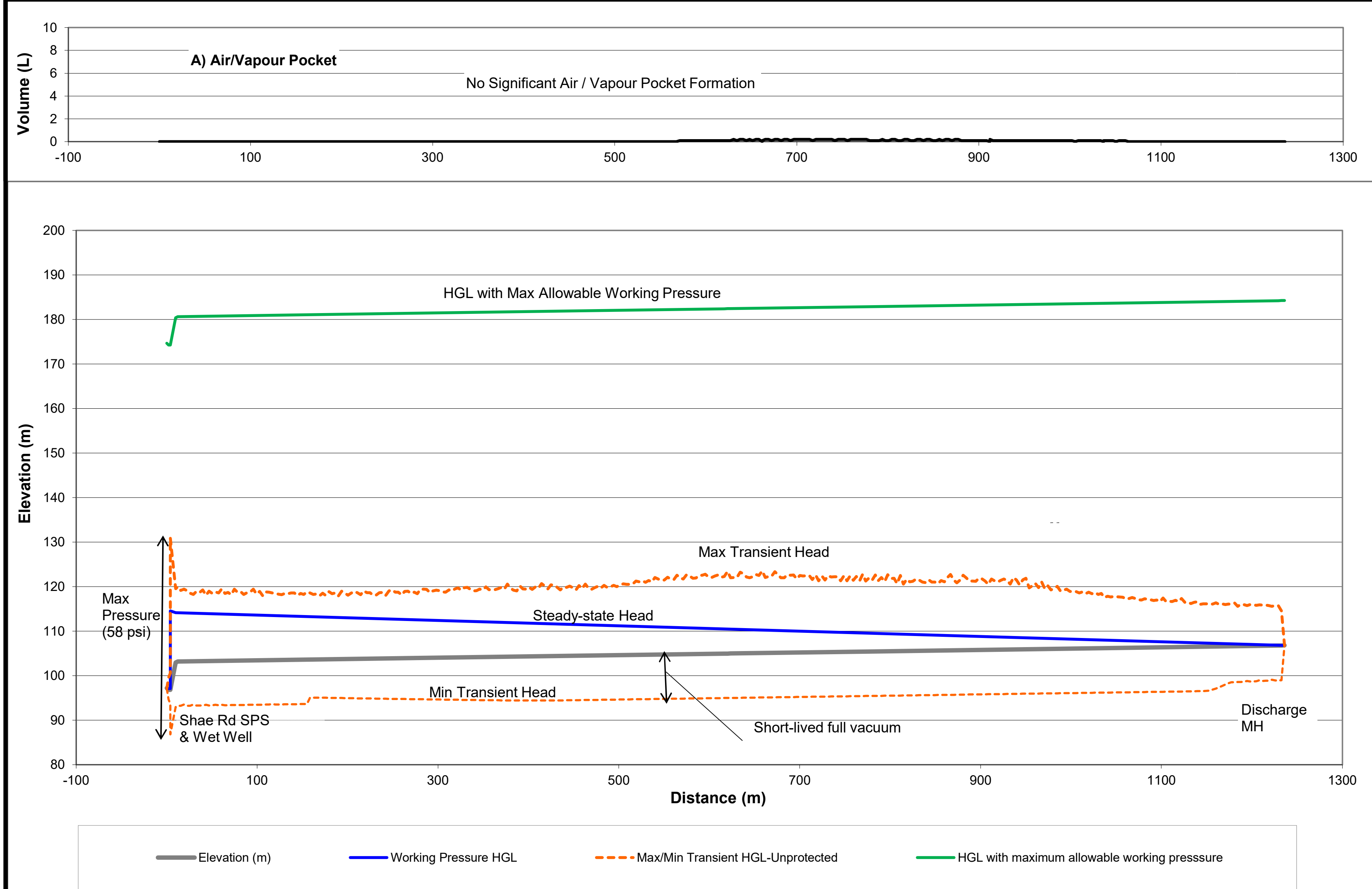
Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
ARCADIS	Attachment 2A	Transient History at the Proposed Shea SPS under Normal Pump Shutdown and Re-start without Surge Protection







	Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 3A	Transient History at the Existing Shea SPS upon Emergency Pump Shutdown without Surge Protection



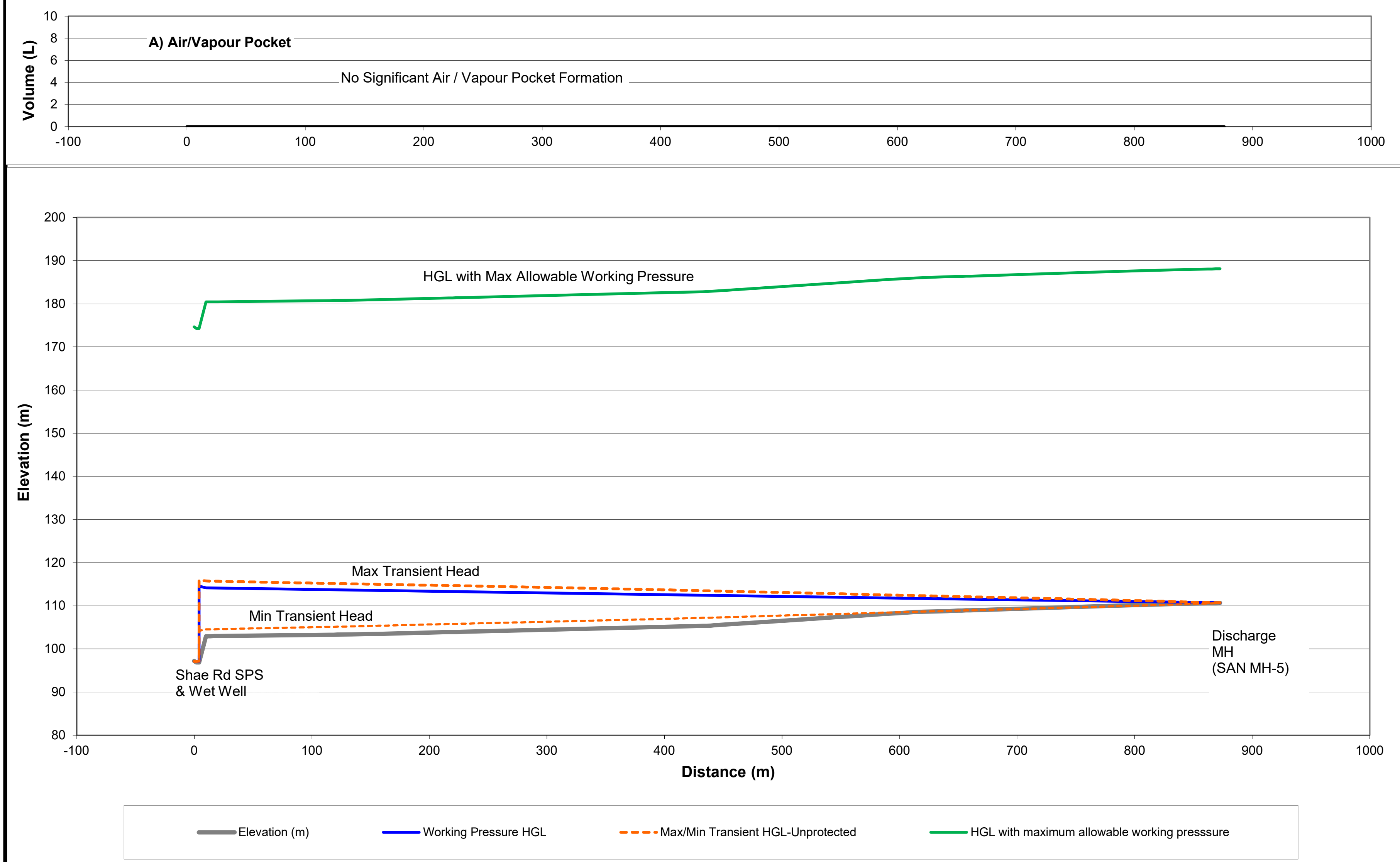
Project : 147554

ARCADIS

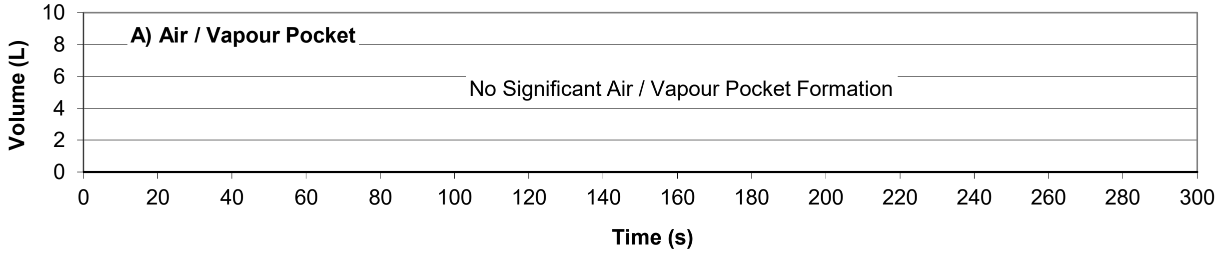
Attachment 4

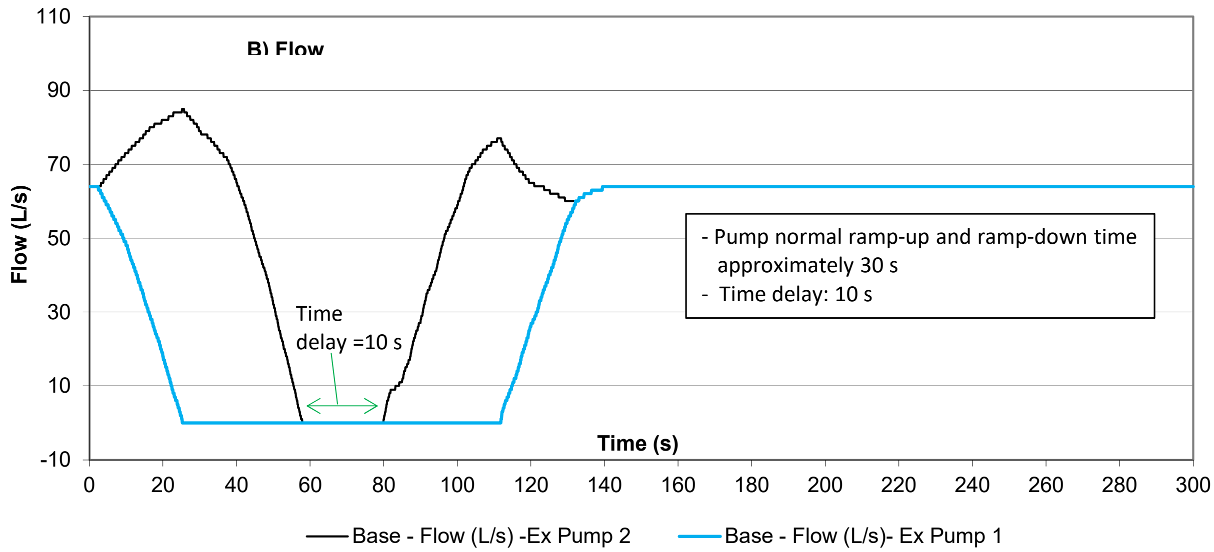
Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain

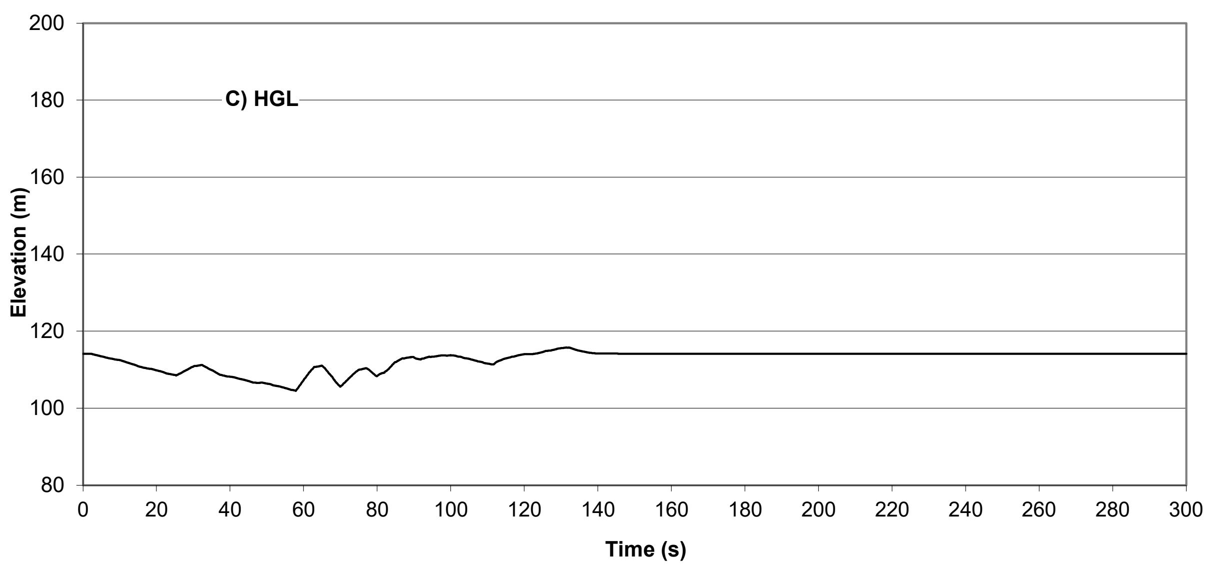
Envelopes for the New Forcemain from Shae Road SPS to Discharge MH upon **Emergency Pump Shutdown** without Surge Protection



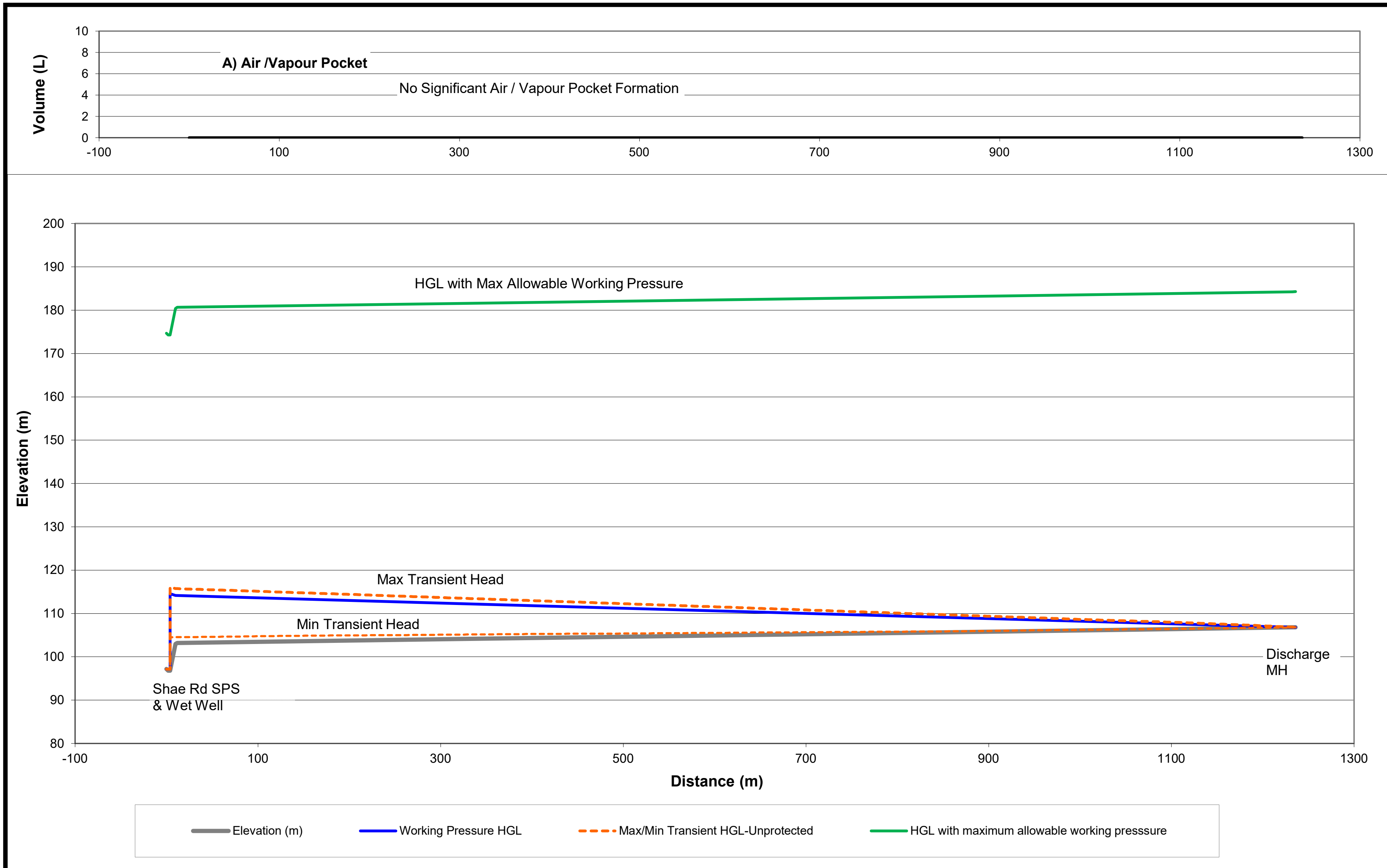
Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
ARCADIS	Attachment 5	Envelopes for the Existing Forcemain from the Existing Shae Road SPS to Discharge MH (SAN MH-5) **under Normal Pump Shutdown and Re-start** without Surge Protection





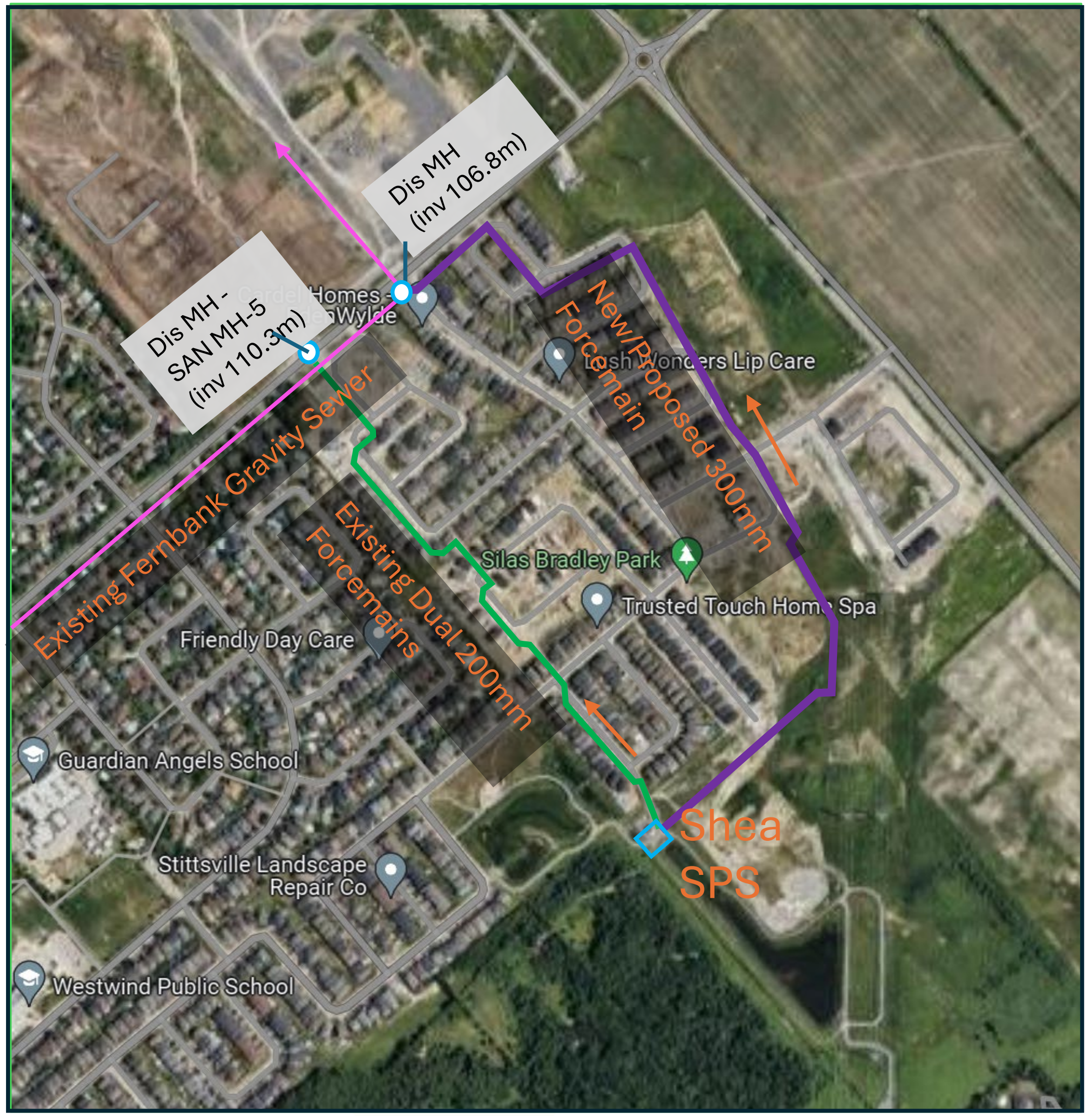


	Project:147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 5A	Transient History at the Existing Shea SPS under Normal Pump Shutdown and Re-start without Surge Protection

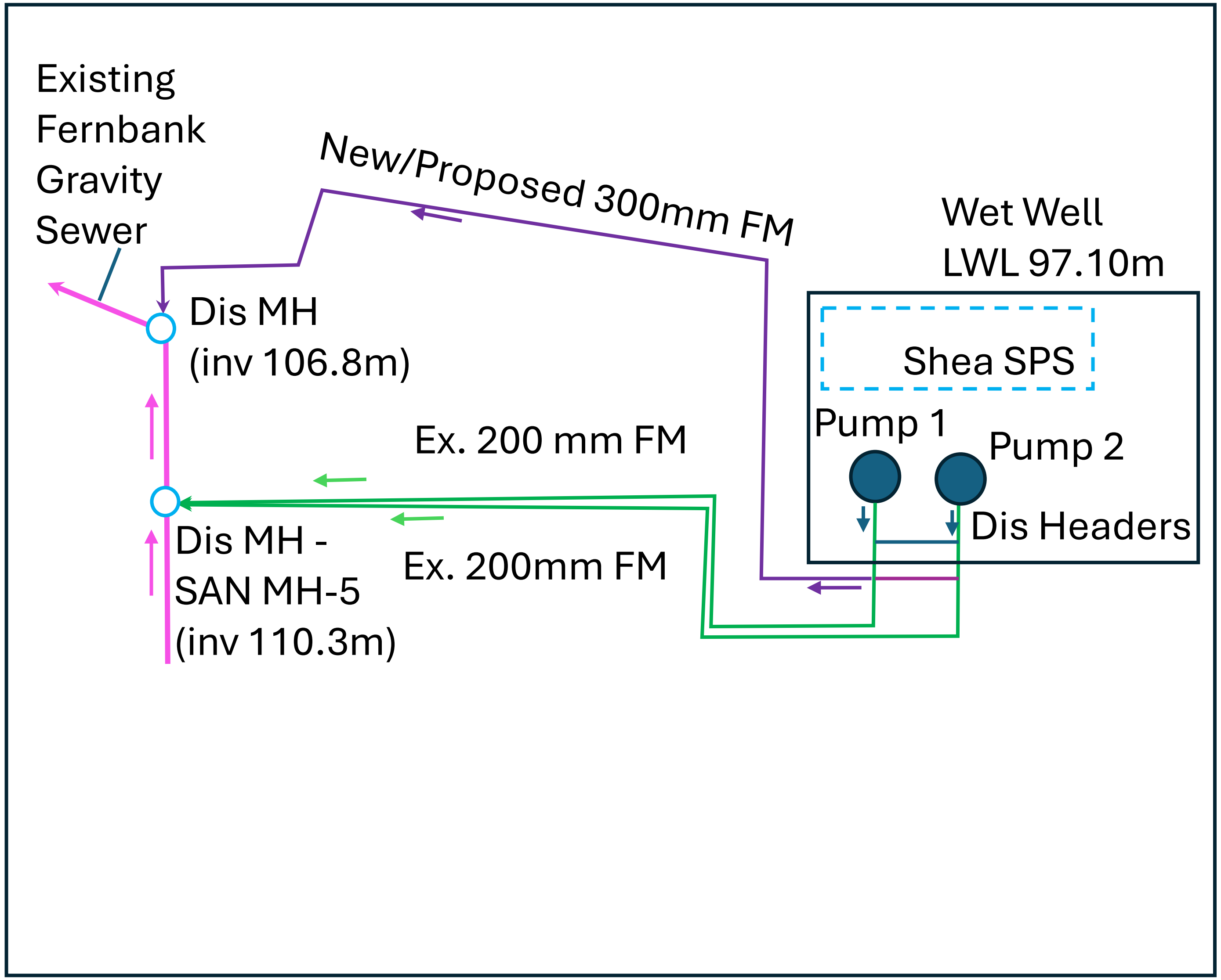


Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
ARCADIS	Attachment 6	Envelopes for the New Forcemain from the Existing Shae Road SPS to Discharge MH under **Normal Pump Shutdown and Re-start** without Surge Protection

APPENDIX A
Location Map



Plan View of Shea SPS and Forcemain System



Schematic of Shea SPS and Forcemain System

APPENDIX B
Background Information

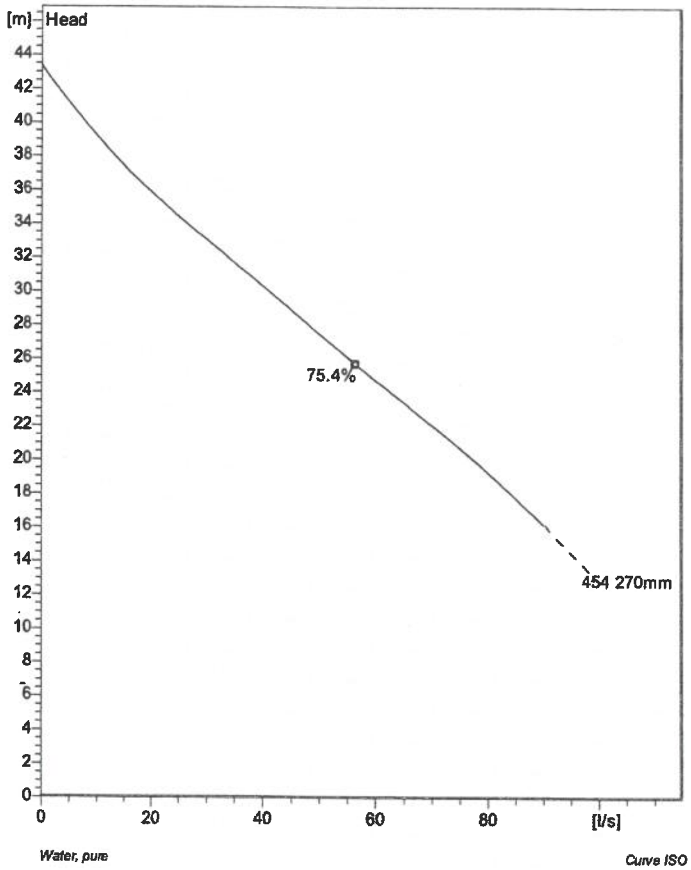
xylem

Existing pumps at Shea SPS

NP 3171 HT 3~ 454

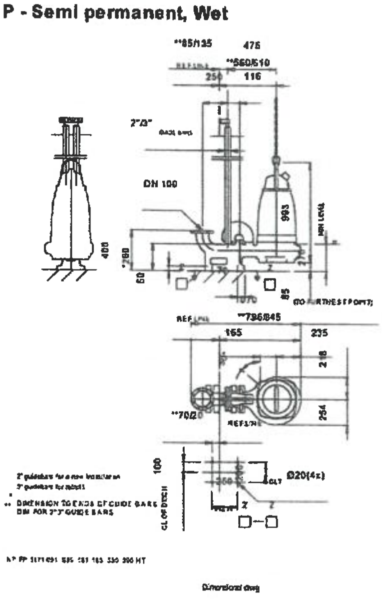
Technical specification

FLYGT



Note: Picture might not correspond to the current configuration.

Installation: P - Semi permanent, Wet



General

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

Impeller material	Grey cast iron
Discharge Flange Diameter	100 mm
Inlet diameter	100 mm
Impeller diameter	270 mm
Number of blades	2

Motor

Motor #	N3171.181 25-17-4AA-W 30hp
Stator variant	6
Frequency	60 Hz
Rated voltage	600 V
Number of poles	4
Phases	3~
Rated power	30 hp
Rated current	29 A
Starting current	194 A
Rated speed	1760 1/min
Power factor	
1/1 Load	0.84
3/4 Load	0.79
1/2 Load	0.67
Efficiency	
1/1 Load	89.0 %
3/4 Load	90.0 %
1/2 Load	90.0 %

Configuration

FLYGT MODEL NP-3171 SUBMERSIBLE PUMP
600 VOLT 3/60 30HP/22KW 1760 RPM HT IMP 454
VOL 4" 20M 4G10+S(2X0.5) 20M S24X1.5MM2
MAS READY FLUSH VALVE READY EPOXY INT/
EXT
OPTIONS:
- PT-100 IN LOWER BEARING
- PT-100 IN ONE STATOR WINDING
- EXTRA FLS IN JUNCTION BOX
- PUMP MEMORY
- VIBRATION SENSOR VIS-10

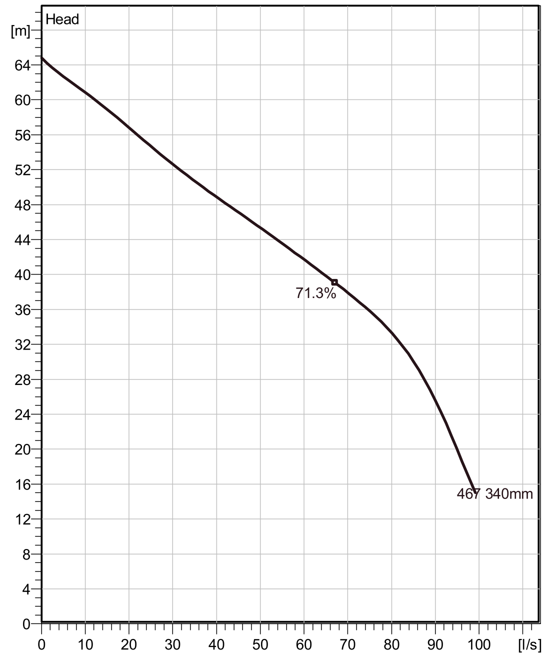
Project	Project ID	Created by	Created on	Last update
			2016-03-10 20:34:53	

NP 3202 HT 3~ 467

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],277 K,999.9 kg/m³,1.5692 mm²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3202.185 30-24-4AA-W
60hp

Installation type
P - Semi permanent, Wet

Impeller diameter
340 mm

Discharge diameter
100 mm

Pump information

Impeller diameter
340 mm

Discharge diameter
100 mm

Inlet diameter
200 mm

Maximum operating speed
1775 1/min

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	Xylect-20308627	**Created by**	Eric Mondoux		
Block		**Created on**	7/11/2024	**Last update**	7/11/2024

proposed/New Pumps for Shea SPS

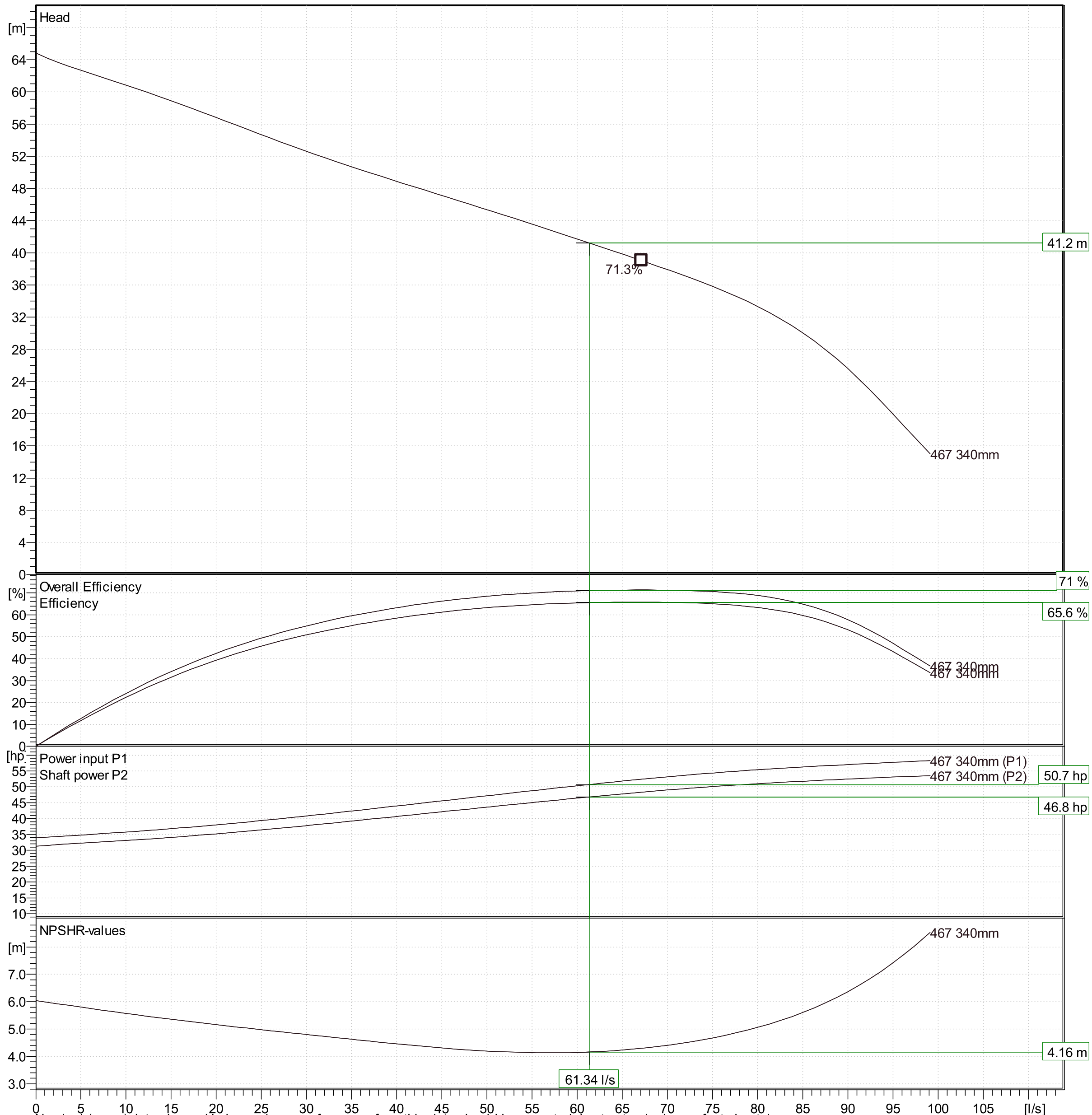
NP 3202 HT 3~ 467

Performance curve

Duty point

Flow	Head
61.3 l/s	41.2 m

Curves according to: Water, pure Water, pure [100%],277 K,999.9 kg/m³,1.5692 mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

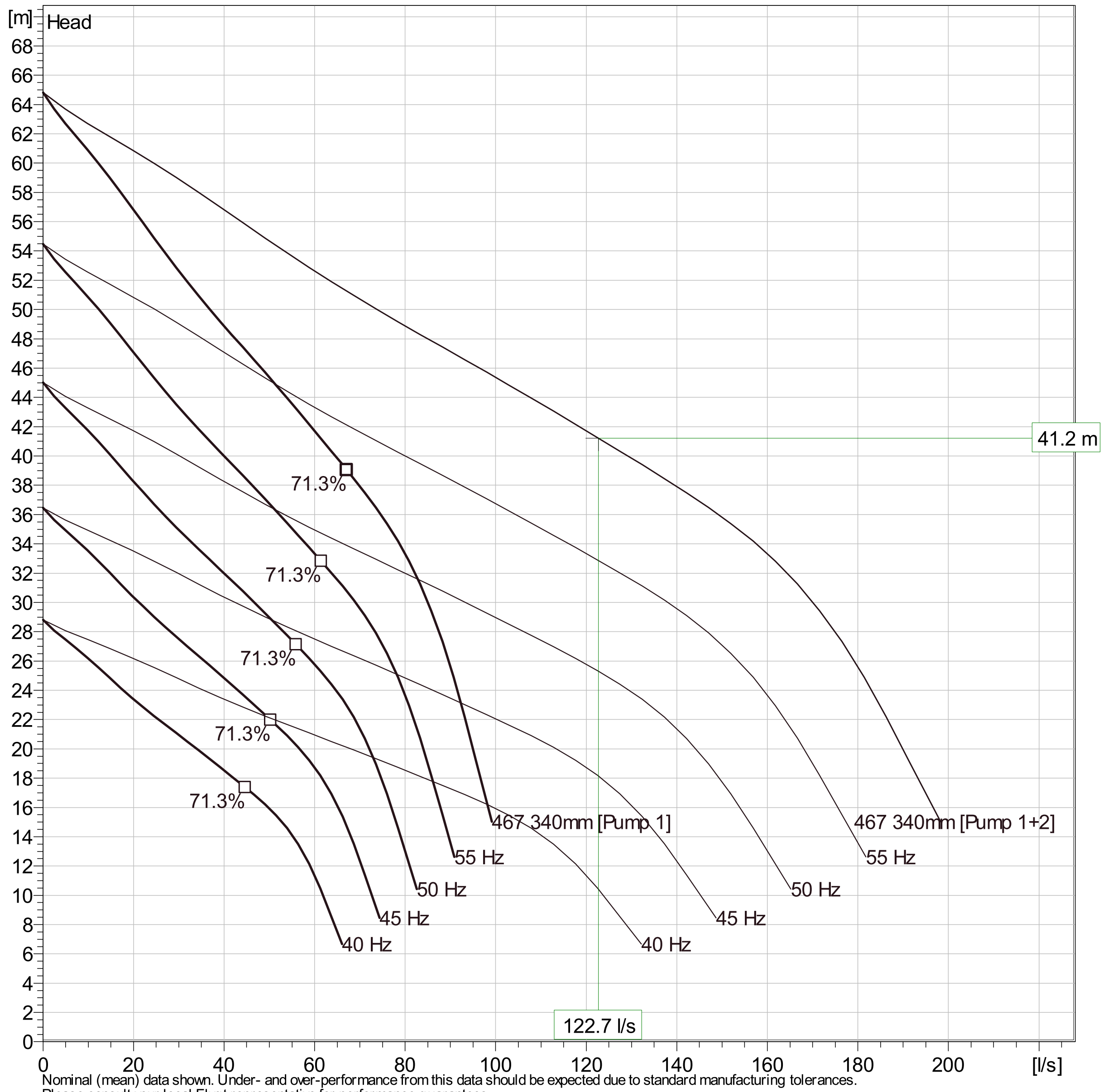
Curve: ISO 9906

Xylect-20308627		Eric Mondoux		
	Created on	7/11/2024	**Last update**	7/11/2024

NP 3202 HT 3~ 467

Duty Analysis

Curves according to: Water, pure [100%] ; 277K; 999.9kg/m³; 1.5692mm²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	l/s	m	hp	l/s	m	hp		kWh/m³	m
2 / 1	61.3	41.2	46.8	123	41.2	93.6	71 %	0.171	4.16
1 / 1	88	27.5	52.2	88	27.5	52.2	61.1 %	0.133	6.03

Project		**Created by**	Eric Mondoux		
Block	Xylect-20308627	**Created on**	7/11/2024	**Last update**	7/11/2024

MODERN NIAGARA | Design. Build. Service.

09/23/2016 9:00 AM

Submittal

Project: Shea Road Pumping Station

Project #: o-16-2604

Address: Shea Road

Description: Shea Road Pumping Station Install

Reference: 13

Date: September 23rd, 2016

Transmitted to: Mr. Scott Shepard

Transmitted By: Bryce Lemoine

CC:

Distribution List:

SHOP DRAWING REVIEW

This review is for the sole purpose of ascertaining conformance with general design concept. It shall not mean that NOVATECH ENGINEERING CONSULTANTS LTD. approves the detail design inherent in the shop drawings, responsibility for which shall remain with the contractor submitting same, and shall not relieve the contractor of his responsibility for meeting all requirements of the contract documents.

Received

Project No. Drawing No.

☒ Reviewed ☐ Reviewed as Modified

☐ Revise and Resubmit ☐ Not Reviewed

Reviewed By.... Date OCT 21, 2016

NOVATECH ENGINEERING CONSULTANTS LTD.

Attached Item:

SPEC: Surge Relief Valve

Revision	QTY	Description	Status
0	1	Shop Drawings for Surge Relief Valve	

Remarks:

FLOVAL EQUIPMENT LTD.
250 RAYETTE ROAD UNIT 1, CONCORD, ON, L4K 2G6
TEL. (905)669-4500, 1-800-387-3784,
FAX (905)669-4905,
QMS Registered to ISO 9001-2008

DRAWINGS SUBMITTAL

PROJECT	SHEA RD. SPS
CONTRACTOR	MODERN NIAGARA
P.O.	O-16-2604-009
FLOVAL#	160858
FLOVAL OUTSIDE SALES CONTACT	TODD MCLAREN
FLOVAL INSIDE SALES CONTACT	MARIUS GROZA

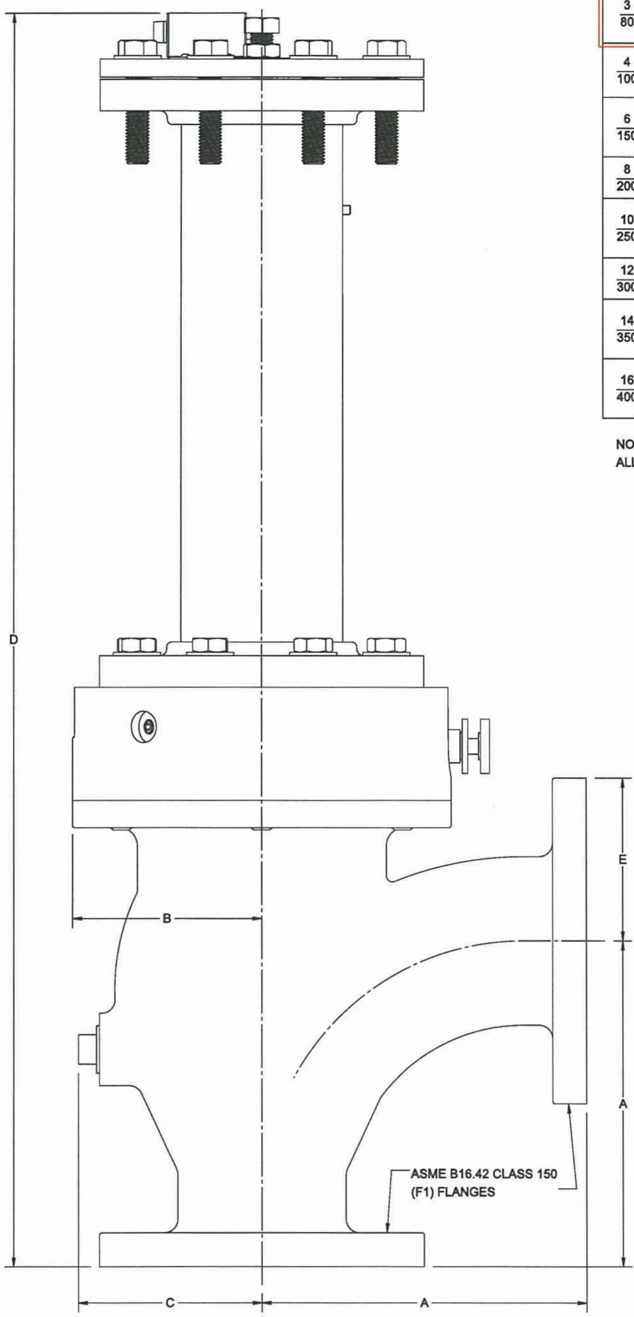
SECTION: 11160 2.11	DEZURIK SURGE RELIEF VALVE
VALVE MODEL	SRA,3,3000A,F1,DI,200P,S2,S2,NBR,S40SD0
SRA	APCO SEWAGE SURGE RELIEF VALVE
3	75 MM (3 INCH) SIZE
3000A	VALVE STYLE
F1	ANSI 125# FLANGED END CONNECTIONS
DI	DUCTILE IRON BODY MATERIAL
200P	TO 200 PSI PRESSURE RELIEF RANGE
S2	316 STAINLESS STEEL DISCCOMBINATION
S2	316 STAINLESS STEEL BODY SEAT MATERIAL
NBR	ACRYLONITRILE-BUTADIENE DISC SEAT MATERIAL
S40SD0	12 MILS INT/EXT EPOXY COATING

TAG/ITEM	Qty	Order Code	DRAWINGS
I	1	SRA,3,3000A,F1,DI,200P,S2,S2,NBR,S40SD0	SEE ATTACHED
	SIZE	75 MM (3 INCH) SIZE	

NOTE: SET PRESSURE TO BE ADVISED AT RELEASE TIME

VALVE SIZE	A	B	C	RELIEF PRESSURE SET-POINT (PSI)	D	E
2 / 50	6.50 / 165	4.50 / 114	3.50 / 89	30-135	26.94 / 684	3.00 / 76
				140-200	31.81 / 808	
3 / 80	7.75 / 197	5.25 / 133	4.25 / 108	30-60	29.44 / 748	3.75 / 95
				65-180	34.31 / 872	
				185-200	41.13 / 1045	
4 / 100	9.00 / 229	5.25 / 133	5.13 / 130	30 ONLY	29.81 / 757	4.50 / 114
				35-95	34.69 / 881	
				100-200	41.50 / 1054	
6 / 150	11.50 / 292	6.75 / 171	6.38 / 162	30-35	38.06 / 967	5.50 / 140
				40-110	44.88 / 1140	
				115-200	54.00 / 1372	
8 / 200	14.00 / 356	8.63 / 219	7.63 / 194	30-60	49.13 / 1248	6.75 / 171
				65-200	58.25 / 1480	
10 / 250	16.50 / 419	9.50 / 241	9.94 / 252	30-35	53.38 / 1356	8.00 / 203
				40-120	62.50 / 1588	
				125-200	75.06 / 1907	
12 / 300	19.00 / 483	10.50 / 267	10.94 / 278	30-55, 75-80	66.25 / 1683	9.50 / 241
				60-70, 85-200	78.81 / 2002	
14 / 350	21.50 / 546	11.75 / 298	13.94 / 354	30-50	70.00 / 1778	10.50 / 267
				55-150	82.56 / 2097	
				155-200	83.31 / 2116	
16 / 400	24.00 / 610	11.75 / 298	14.44 / 367	30-40	75.25 / 1911	11.75 / 298
				45-110	87.81 / 2230	
				115-200	88.56 / 2249	

NOTE:
ALL DIMENSIONS ARE SHOWN IN INCHES/MILLIMETERS.

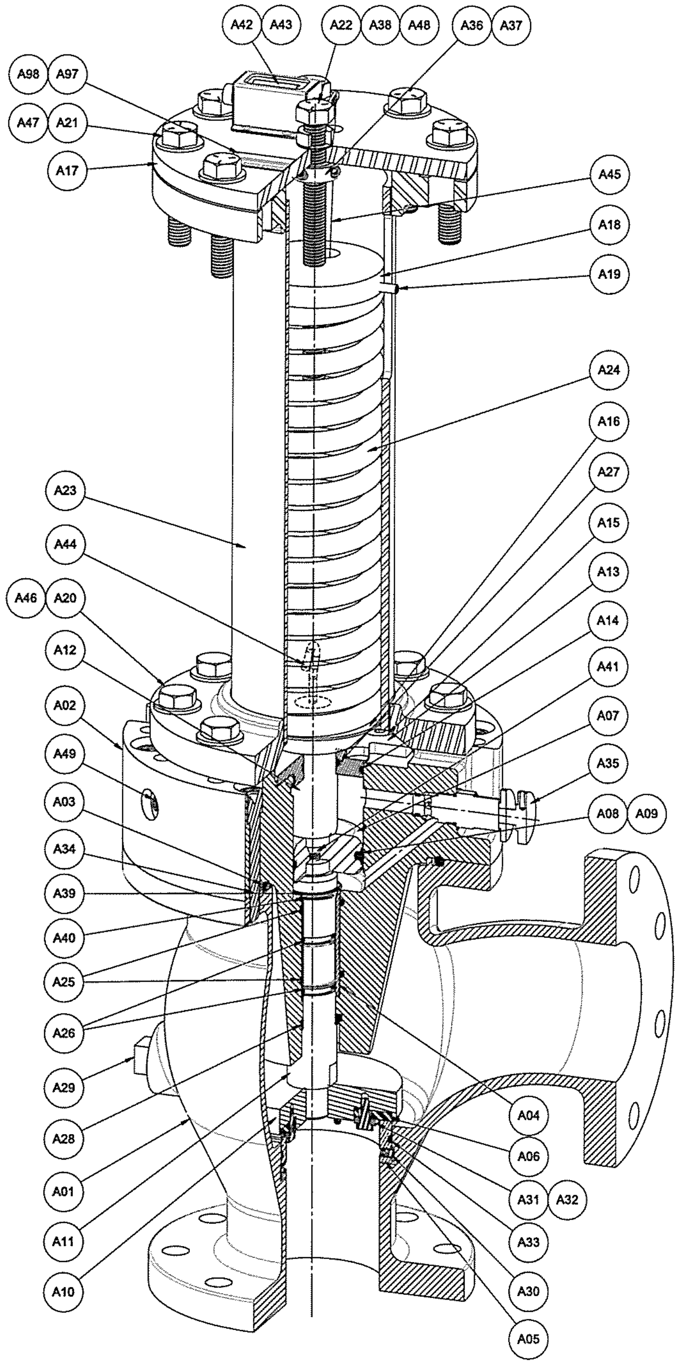


DeZURIK
APCO | HILTON

APCO SRA - SURGE RELIEF ANGLE VALVE, SERIES 3000A,
2-16" INSTALLATION DRAWING

DOC'T CODE	DRAWN	APPROVED	
C1	JPD	TMO	A70148
	CHECKED TMO	DATE 11/05/2015	

A 50312 3/8/16
B C D E F G



DET	DESCRIPTION	QTY
A1	BODY	1
A2	COVER	1
A3	COVER O-RING	1
A4	LOWER SHAFT BUSHING	1
A5	BODY SEAT	1
A6	DISC SEAT	1
A7	PISTON	1
A8	PISTON SEAL	1
A9	PISTON SEAL ENERGIZING O-RING	1
A10	DISC	1
A11	LOWER SHAFT	1
A12	UPPER SHAFT	1
A13	CYLINDER CHAMBER CAP	1
A14	CYLINDER CHAMBER CAP O-RING	1
A15	CYLINDER CHAMBER CAP SCREWS	-
A16	SPRING PRESSURE PLATE GUIDE	1
A17	SPRING COMPRESSION TOP FLANGE	1
A18	SPRING COMPRESSION GUIDE	1
A19	ANTI-ROTATION SET SCREW	1
A20	PIPE ASSEMBLY LOWER SCREWS	-
A21	PIPE ASSEMBLY UPPER SCREWS	-
A22	SPRING COMPRESSION SCREW	1
A23	SPRING COMPRESSION PIPE ASSEMBLY	1
A24	COMPRESSION SPRING[1]	-
A25	BUSHING O-RING	2
A26	LOWER SHAFT O-RING	2
A27	UPPER SHAFT O-RING	1
A28	ROD WIPER	1
A29	INSPECTION HOLE PIPE PLUG	1
A30	BODY SEAT RETAINING SCREW	-
A31	DISC SEAT RETAINING RING[2]	1
A32	DISC SEAT RETAINING SCREW	-
A33	BODY SEAT O-RING	1
A34	COVER SCREWS	-
A35	FLOW CONTROL VALVE	1
A36	SHAFT COLLAR	1
A37	NEEDLE THRUST BEARING (6"-16")[3]	1
A38	LOCK NUT	1
A39	LOWER SHAFT RETAINING RING	1
A40	BUSHING RETAINING RING	1
A41	PISTON ASSEMBLY SCREW	1
A42	MECHANICAL COUNTER	1
A43	MECHANICAL COUNTER MOUNTING SCREWS	4
A44	MECHANICAL COUNTER HOOK (WITH LOCK NUT)	1
A45	MECHANICAL COUNTER WIRE	1
A46	PIPE ASSEMBLY LOWER SCREW WASHER	-
A47	PIPE ASSEMBLY UPPER SCREW WASHER	-
A48	SPRING COMPRESSION SCREW WASHER	-
A49	OIL FILL PIPE PLUG	3
A97	DATA PLATE	1
A98	DRIVE SCREW	2

NOTE:

1. MULTIPLE SPRINGS ARE NESTED INSIDE EACH OTHER FOR CERTAIN RELIEF PRESSURE SET-POINTS FOR SIZES 8"-16".
2. A TWO PIECE DISC SEAT RETAINING RING IS FURNISHED FOR SIZE 3"
3. PART NOT INCLUDED FOR CERTAIN RELIEF PRESSURE SET-POINTS FOR SIZES 6"-10".
4. RECOMMENDED SPARES ARE ITEMS A3, A6, A8, A9, A14, A25, A26, A27, A28, & A33.

G	F	E	D	C	B	A
						50312 3/28/16

DeZURIK

APCO | HILTON

APCO SRA - SURGE RELIEF ANGLE VALVE, SERIES 3000A
BASE VALVE ASSEMBLY

DOC'T. CODE	DRAWN	APPROVED	
C1	JPD	TMO	A70149
	CHECKED TMO	DATE 11/02/2015	

Shea Road Pump Station
Evaluation Matrix of Upgrade Options

Novatech File No.: 122163
Date: 2024/12/19

Evaluation Criteria	Weight	Indicators	Discussion of Options	Score		
				Option 1	**Option 2**	**Option 3**
				Major pump station upgrades to building components, mechanical and electrical. Existing forcemains to be utilized. New 60HP pumps with a firm capacity of 120L/s.	**Abandon and upsize existing dual 200mm dia. forcemains to dual 300mm dia. forcemains. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Similar HP pumps with a firm capacity of 130L/s.**	**New 300mm dia. forcemain, discharge chamber and gravity outlet. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Existing forcemains to be utilized. Similar HP pumps with a firm capacity of 130L/s.**
Design and Constructability	**30%**					
Ease of Design and Approvals	15%	- Flexibility of design to accommodate wastewater flows, and/or changes to phasing/buildout. - Design reliability (ie. emergency scenarios). - Difficulty of obtaining necessary approvals.	- Option 1 would have limited flexibility for future upgrades. Upgrades would be capped out at 120L/s. Major electrical upgrades would be required. Operations staff would need to accept higher velocities within the existing forcemains. - Option 2 would have flexibility for future upgrades. Upgrades could achieve 130L/s. Designing around existing utilities and service laterals could be challenging. - Option 3 would have flexibility for future upgrades. Upgrades could achieve 130L/s. Designing around existing utilities could be challenging. - All options require similar approvals. However, public consultation will be required for Options 2 and 3 due to impact to community (see below) and coordination with utilities would be required.	6/10	2/10	8/10
Ease and Flexibility of Construction	15%	- Difficulty of construction. - Potential for encountering utility conflict. - Potential for encountering poor soils/rock conditions. - Potential for encountering elevated groundwater conditions.	- Options 1 could present some challenges in the form of sewer flow management as one of the exising forcemains would need to remain operational at all times. The upgrades to Shea PS building components, mechanical, and electrical would need to be staged. An emergency response plan would be needed in the event the Shea PS goes 'down' while upgrades are being completed. - Option 2 would present significant challenges in the form of sewer flow management as one of the existing forcemains would need to remain operational at all times. The abandonment of the existing forcemains and installation of two new forcemains would need to be staged. An emergency response plan would be needed in the event the operational forcemain breaks and neither forcemain can be used. - Option 3 would allow for continued operation of the existing forcemains while the installation of a new forcemain is being completed. - Potential for encountering utility conflicts low risk for Option 1. - Potential for encountering utility conflicts medium risk for Option 2, as new forcemains utilizing existing forcemains routing. - Potential for encountering utility conflicts high risk for Option 3, as new forcemain using new routing. - Based on Geotech, potential for encountering poor soils is not likely. Rock could be encountered. - Based on Geotech, some dewatering may be required due to groundwater conditions, but nothing significant anticipated.	6/10	2/10	8/10
Operation and Maintenance	**30%**					
Ease and Flexibility of Operation and Maintenance	15%	- Ease and flexibility of operation and maintenance. - Amount of maintenance intensive infrastructure required.	- Option 1 and 2 would have similar flexibilty of operation and maintenance due to the two forcemains. - Option 3 would have the best flexibility of operation and maintenance due to the three forcemains. - All options would include the options for swabs to be launched at the City's discretion for maintenance purposes.	6/10	6/10	8/10
Cost of Operation and Maintenance	15%	- Cost of operation and maintenance, upkeep of intended design.	- All options would have similar operational costs in the form of energy consumption costs associated with pumping. Option 1 would likely have marginally higher operational costs due to the higher HP pumps and electrical demand. - Option 1 and 2 would have similar maintenance costs due to the two forcemains. - Option 3 would have marginally higher maintenance costs due to the three forcemains. Although, a second 300mm dia. forcemain could be added to the new routing to abandon the existing forcemains.	4/10	8/10	6/10

Shea Road Pump Station
Evaluation Matrix of Upgrade Options

Novatech File No.: 122163
Date: 2024/12/19

Evaluation Criteria	Weight	Indicators	Discussion of Options	Score: Option 1	Score: Option 2	Score: Option 3
				Major pump station upgrades to building components, mechanical and electrical. Existing forcemains to be utilized. New 60HP pumps with a firm capacity of 120L/s.	Abandon and upsize existing dual 200mm dia. forcemains to dual 300mm dia. forcemains. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Similar HP pumps with a firm capacity of 130L/s.	New 300mm dia. forcemain, discharge chamber and gravity outlet. Minor pump station upgrades to mechanical (valve chamber and bypass manhole piping) and electrical. Existing forcemains to be utilized. Similar HP pumps with a firm capacity of 130L/s.
Natural Environment and Public Affects	**15%**					
Impact of Community	10%	- Potential impact on community (i.e. reinstatements).	- Option 1 would have the least impact on the community as the upgrades and reinstatements would be confined to the Shea PS facility. - Option 2 would have the most impact on the community as it would require abandonment of the existing forcemains and installation of two new forcemains. The existing forcemains routing is located within the existing road allowance and would require extensive reinstatements to existing driveways, roadways, and boulevards. - Option 3 would have the second most impact on the community as it would require installation of a new forcemain. The new forcemain routing would be located within undeveloped lands and the existing road allowance. It would require some reinstatements to existing roadways and boulevards, but no driveway reinstatements would be required.	8/10	2/10	6/10
Impact of Natural Features, Surface Water and Acquatics	5%	- Potential impact on fish/wildlife habitat. - Potential of excessive noise, vibration, and air pollution, caused by construction operations.	- All options would have minimal impact on fish/wildlife habitat. - Option 1 would have the least potential of excessive noise, vibration, and air pollution, caused by construction operations as the upgrades and reinstatements would be confined to the Shea PS facility. - Option 2 would have the most potential of excessive noise, vibration, and air pollution, caused by construction operations of the abandonment of the existing forcemains, installation of two new forcemains, and reinstatements. - Option 3 would have the second most potential of excessive noise, vibration, and air pollution, caused by construction operations of the installation of a new forcemain, and reinstatements.	8/10	4/10	6/10
Level of Service	5%	- Impact on existing infrastructure. - Impact on future infrastructure. - Potential for loss of service.	- The existing Fernbank Trunk Sanitary Sewer has capacity to accomodate the Shea PS upgrades ultimate flows. As such, there will be maginal impact to existing infrastructure. - The intent is that the Shea PS upgrades will accomodate future intrastructure and the ultimate buildout of the Subject Site. As such, there will be no impact to future infrastructure. - Option 1 and 2 would have a similar level of service/redundancy as there will be two forcemains. - Option 3 would have the best level of service/redundancy as there will be three forcemains.	6/10	6/10	8/10
Capital Costs	**20%**					
Capital Costs	20%	- Hard costs. - Soft costs. - Potential of unforeseen costs.	- Refer to the Class 'C' Cost Estimate. - Option 1 is marginally above the lowest capital costs of Option 3. - Option 2 has the highest capital costs. - Option 3 has the lowest capital costs.	6/10	2/10	8/10
Total Score	**95%**			**56%**	**36%**	**71%**
Ranking				**2**	**3**	**1**

SHEA ROAD PS CAPACITY UPGRADE
CLASS 'C' COST ESTIMATE
OPTION 1

ITEM NO.	ITEM	UNIT		EST. QUANTITY	UNIT RATE	TOTAL AMOUNT
SECTION A - Site Preparation & General						
1	Mobilization / Demobilization	LS		1.0	$50,000.00	$50,000.00
2	Pre-Construction Inspection / Vibration Monitoring	LS			$25,000.00	$0.00
3	Flow Management	LS		1.0	$505,000.00	$505,000.00
4	Commissioning	LS		1.0	$100,000.00	$100,000.00
				SUBTOTAL - SECTION A		**$655,000.00**
SECTION B - Shea Road PS Siteworks						
1	Building Component Upgrades	LS		1.0	$500,000.00	$500,000.00
2	Process Mechanical Upgrades					
	a) Pumps	ea		3.0	$125,000.00	$375,000.00
	b) Mechanical Upgrades	LS		1.0	$200,000.00	$200,000.00
3	Electrical Upgrades					
	a) 60HP Panel Fabrication	ea		3.0	$60,000.00	$180,000.00
	b) 60 HP Panel Installation	LS		1.0	$85,000.00	$85,000.00
	c) Electrical Integration	LS		1.0	$75,000.00	$75,000.00
4	50mm Water Service Realignment	LS		1.0	$25,000.00	$25,000.00
5	Hydro Ottawa/Electrical Upgrades	LS		1.0	$100,000.00	$100,000.00
				SUBTOTAL - SECTION B		**$1,540,000.00**
SECTION C - Removals & Reinstatement						
1	Pump Station Blk 219 (All Inclusive)	m^2		70.0	$145.00	$10,150.00
2	Yard Reinstatement	LS		1.0	$45,000.00	$45,000.00
				SUBTOTAL - SECTION C		**$10,150.00**
				SUBTOTAL 1A		**$2,205,150.00**
				Engineering Services (20%)		**$441,030.00**
				Property Acquisition (0%)		**$0.00**
				Utilities (15%)		**$330,772.50**
				City Internal Costs (8.5%)		**$187,437.75**
				Miscellaneous (5%)		**$110,257.50**
				Geotech Issues (0%)		**$0.00**
				Change in Design Standards (2%)		**$44,103.00**
				Construction Contract Duration (4%)		**$88,206.00**
				Planning, Design and Land Use Approvals (5%)		**$110,257.50**
				SUBTOTAL 1B		**$3,517,214.25**
				Class 'C' Contingency (40%)		**$1,406,885.70**
				TOTAL OPTION 1		**$4,924,099.95**

SHEA ROAD PS CAPACITY UPGRADE
CLASS 'C' COST ESTIMATE
OPTION 2

ITEM NO.	ITEM	UNIT	EST. QUANTITY	UNIT RATE	TOTAL AMOUNT
SECTION A - Site Preparation & General					
1	Mobilization / Demobilization	LS	1.0	$50,000.00	$50,000.00
2	Traffic Management	LS	1.0	$50,000.00	$50,000.00
3	Erosion and Sediment Control: Implementation, Maintenance and Monitoring	LS	1.0	$10,000.00	$10,000.00
4	Erosion and Sediment Control Items				
	a) Light Duty Silt Fence	m	1000.0	$25.00	$25,000.00
	b) Straw Bales	ea	10.0	$650.00	$6,500.00
5	Pre-Construction Inspection / Vibration Monitoring	LS	1.0	$25,000.00	$25,000.00
6	Flow Management	LS	1.0	$505,000.00	$505,000.00
7	Commissioning	LS	1.0	$50,000.00	$50,000.00
8	Excess Material Offsite Removal	m^3	1200.0	$65.00	$78,000.00
			SUBTOTAL - SECTION A		**$799,500.00**
SECTION B - Sanitary Forcemain					
1	Removal of Existing Sanitary Forcemain				
	a) 200mm dia (HDPE DR 13.5)	m	1677.0	$450.00	$754,650.00
2	Sanitary Forcemain				
	a) 300mm dia (HDPE DR 13.5)	m	1677.0	$900.00	$1,509,300.00
3	Connection to Existing Control Building (at Shea PS)	LS	1.0	$25,000.00	$25,000.00
4	Connection to Existing Discharge Chamber (at Fernbank Road)	LS	1.0	$25,000.00	$25,000.00
			SUBTOTAL - SECTION B		**$2,313,950.00**
SECTION C - Shea Road PS Site Works					
1	Valve Chamber Upgrade	LS	1.0	$70,000.00	$70,000.00
2	Bypass Upgrade	LS	1.0	$50,000.00	$50,000.00
3	Process Mechanical Upgrades	LS	1.0	$100,000.00	$100,000.00
			SUBTOTAL - SECTION C		**$220,000.00**
SECTION D - Removals & Reinstatement					
1	Local Roadway (All Inclusive)	m^2	75.0	$200.00	$15,000.00
2	Collector Roadway (All Inclusive)	m^2	50.0	$240.00	$12,000.00
3	Pathway Blk 216, 218 & 219 (All Inclusive)	m^2	1,300.0	$150.00	$195,000.00
4	Curb Removal and Reinstatement with SOD Stripping	m	527.0	$250.00	$131,750.00
5	Driveway	ea	48.0	$6,500.00	$312,000.00
6	Concrete Sidewalk incl. TWSI	m^2	215.0	$275.00	$59,125.00
7	Shea Road PS Parking Lot (All Inclusive)	m^2	143.0	$165.00	$23,595.00
			SUBTOTAL - SECTION D		**$748,470.00**
SECTION E - Landscaping					
1	Topsoil and Sod Reinstatement	m^2	1434.0	$35.00	$50,190.00
			SUBTOTAL - SECTION E		**$50,190.00**
			SUBTOTAL 2A		**$4,132,110.00**
			Engineering Services (20%)		**$826,422.00**
			Property Acquisition (0%)		**$0.00**
			Utilities (15%)		**$619,816.50**
			City Internal Costs (8.5%)		**$351,229.35**
			Miscellaneous (5%)		**$206,605.50**
			Geotech Issues (5%)		**$206,605.50**
			Change in Design Standards (1%)		**$41,321.10**
			Construction Contract Duration (4%)		**$165,284.40**
			Planning, Design and Land Use Approvals (5%)		**$206,605.50**
			SUBTOTAL 2B		**$6,755,999.85**
			Class 'C' Contingency (40%)		**$2,702,399.94**
			TOTAL OPTION 2		**$9,458,399.79**

SHEA ROAD PS CAPACITY UPGRADE
CLASS 'C' COST ESTIMATE
OPTION 3

ITEM NO.	ITEM	UNIT		EST. QUANTITY	UNIT RATE	TOTAL AMOUNT
SECTION A - Site Preparation & General						
1	Mobilization / Demobilization	LS		1.0	$50,000.00	$50,000.00
2	Traffic Management	LS		1.0	$30,000.00	$30,000.00
3	Erosion and Sediment Control: Implementation, Maintenance and Monitoring	LS		1.0	$10,000.00	$10,000.00
4	Erosion and Sediment Control Items					
	a) Light Duty Silt Fence	m		1000.0	$25.00	$25,000.00
	b) Straw Bales	ea		10.0	$650.00	$6,500.00
5	Pre-Construction Inspection / Vibration Monitoring	LS		1.0	$15,000.00	$15,000.00
6	Flow Management	LS		1.0	$25,000.00	$25,000.00
7	Commissioning	LS		1.0	$15,000.00	$15,000.00
8	Excess Material Offsite Removal	m^3		1200.0	$50.00	$60,000.00
9	Rock Excavation	m^3		1000.0	$125.00	$125,000.00
				SUBTOTAL - SECTION A		**$361,500.00**
SECTION B - Sanitary Forcemain						
1	Removal of Existing Sanitary Forcemain					
	a) 200mm dia (HDPE DR 13.5)	m		60.0	$450.00	$27,000.00
2	Sanitary Forcemain					
	a) 300mm dia (HDPE DR 13.5)	m		1225.0	$750.00	$918,750.00
3	Gravity Outlet Pipe					
	a) 600mm dia (CONC-50)	m		25.0	$1,200.00	$30,000.00
4	1800mmx2400mm Box MH (Discharge Chamber)	ea		1.0	$150,000.00	$150,000.00
5	Connection to Existing Control Building (at Shea PS)	LS		1.0	$25,000.00	$25,000.00
6	Connect to Existing MH 77860 (at Fernbank Road)	LS		1.0	$25,000.00	$25,000.00
7	CCTV Inspection (x2)	m		25.0	$20.00	$500.00
				SUBTOTAL - SECTION B		**$1,176,250.00**
SECTION C - Shea Road PS Site Works						
1	Valve Chamber Replacement	LS		1.0	$100,000.00	$100,000.00
2	Bypass Upgrade	LS		1.0	$50,000.00	$50,000.00
3	Mechanical Upgrades	LS		1.0	$150,000.00	$150,000.00
				SUBTOTAL - SECTION C		**$300,000.00**
SECTION D - Removals & Reinstatement						
1	Local Roadway (All Inclusive)	m^2		115.0	$165.00	$18,975.00
2	Collector Roadway (All Inclusive)	m^2		20.0	$185.00	$3,700.00
3	Pathway Blk 219 (All Inclusive)	m^2		52.0	$145.00	$7,540.00
4	Curb	m		77.0	$225.00	$17,325.00
5	Concrete Sidewalk incl. TWSI	m^2		25.0	$245.00	$6,125.00
6	Shea Road PS Parking Lot (All Inclusive)	m^2		143.0	$165.00	$23,595.00
				SUBTOTAL - SECTION D		**$77,260.00**
SECTION E - Landscaping						
1	Topsoil and Seed Reinstatement	m^2		1850.0	$15.00	$27,750.00
2	Topsoil and Sod Reinstatement	m^2		745.0	$35.00	$26,075.00
				SUBTOTAL - SECTION E		**$53,825.00**
				SUBTOTAL 3A		**$1,968,835.00**
				Engineering Services (20%)		**$393,767.00**
				Property Acquisition (10%)		**$196,883.50**
				Utilities (5%)		**$98,441.75**
				City Internal Costs (8.5%)		**$167,350.98**
				Miscellaneous (5%)		**$98,441.75**
				Geotech Issues (5%)		**$98,441.75**
				Change in Design Standards (1%)		**$19,688.35**
				Construction Contract Duration (4%)		**$78,753.40**
				Planning, Design and Land Use Approvals (5%)		**$98,441.75**
				SUBTOTAL 3B		**$3,219,045.23**
				Class 'C' Contingency (40%)		**$1,287,618.09**
				TOTAL OPTION 3		**$4,506,663.32**

Peter Mott

From: Ben Sweet <b.sweet@novatech-eng.com>
Sent: March 28, 2025 9:52 AM
To: Peter Mott; Sam Bahia; Carl Sciuk
Cc: Marc Pichette; Adam Fobert
Subject: RE: 1247 - Shea Rd. SAN PS Upgrades
Attachments: 113004-PS1_MKUP.pdf

EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hi Peter,

Please find outline of the Shea Road pump station upgrades for the preferred option 3 below. Markup attached for reference.

Shea Road Pump Station Upgrades (Preferred Option 3)

Certain Upgrades:

- New forcemain – 300mm dia. HDPE DR13.5, +/- 1225m in length.
- New discharge chamber – 1800mm x 2400mm box manhole complete with odour control valve with rain shield, HDPE liner (interior), Blueskin liner (exterior), aluminum access hatch, FRP ladder and landing, and SS swab catcher.
- New surge relief valve – replace existing surge relief valve.
- Existing bypass chamber – Complete retrofit of existing 2400mm x 2400mm box manhole required; or partial retrofit of existing 2400mm x 2400mm box manhole and addition of new 2400mm x 2400mm box manhole required. Retrofit would require additional valving to accommodate new forcemain, and 300mm dia. swab launcher.

Possible Upgrades:

- Existing pumps/ power/ controls – Preliminary calculations show that the existing pumps will satisfy 130L/s with the new forcemain. The existing pumps are rated for 30HP, so no upgrade to electrical capacity is anticipated. Possible upgrades to the VFDs may be required since two VFDs are currently in one panel. Possible upgrades to power/ controls may be required depending on whether the City would accept the current setup or want to modify (for reasons other than need for increased power).
- Existing wet well – The existing wet well can work with proper control logic, which stages pump starts and VFD speeds. A secondary wet well may be required to provide additional volume if the City wants to operate without this logic and use the traditional maximum pump start per hour criteria. In addition, a secondary wet well would provide an opportunity to isolate the wet well for operations/ maintenance purposes which would adhere to the City's guideline for pump stations with flows over 100L/s.
- Existing forcemains between existing pumps and bypass chamber – Preliminary calculations show that the existing forcemains between the existing pumps and bypass chamber would operate above the City's guideline velocities during rare high flow events. Possible upgrades to these forcemains may be required if the City does not accept the velocities even though the transient analysis shows it is acceptable.

Ben Sweet, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 250

1
PROCESS FLOW DIAGRAM
N.T.S.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
7.	AS BUILT	SEP 07/18	CJS
6.	ADDENDUM 4	JULY 5/16	CJS
5.	ISSUED FOR TENDER	MAY 25/16	CJS
4.	ISSUED FOR ENVIRONMENTAL COMPLIANCE APPROVAL	APR 26/16	CJS
3.	ISSUED FOR 75% REVIEW	MAR 14/16	CJS
2.	50% DESIGN	DEC 22/15	CJS
1.	ISSUED WITH PUMP STATION PRE-DESIGN REPORT	JUN 24/15	CJS

SCALE: AS SHOWN

DESIGN: CJS
CHECKED: CJS
DRAWN: LLW
CHECKED: BHB
APPROVED: GJM

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

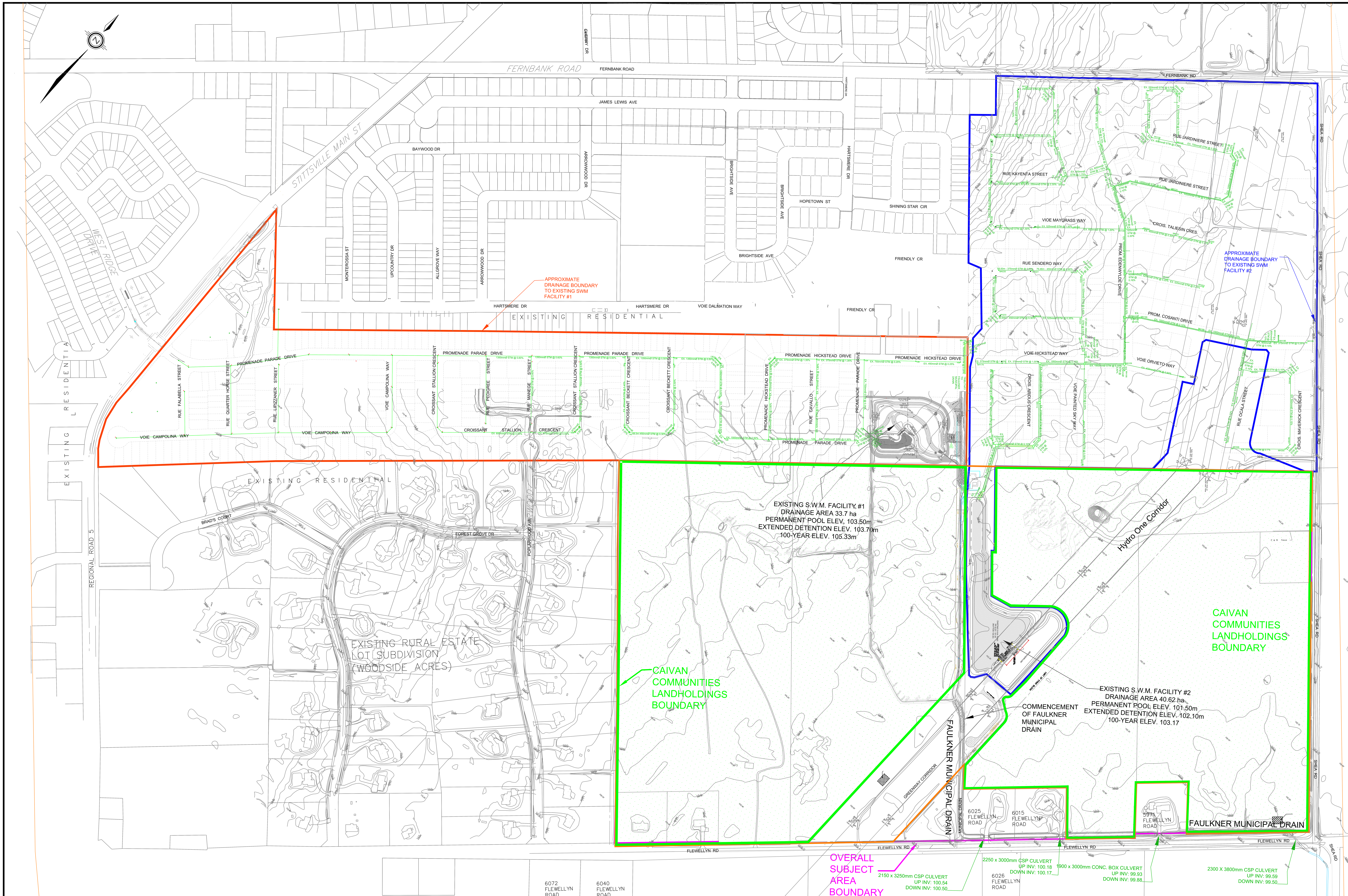
LOCATION
CITY OF OTTAWA
SHEA ROAD SANITARY PUMP STATION

DRAWING NAME
PROCESS SCHEMATICS
NOVATECH MARKUP
CJS, MAR 26/25

PROJECT No. 113004-00
REV: REV # 7
DRAWING No. 113004-PS1

David Schaeffer Engineering Ltd.
120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

APPENDIX D



DSEL

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Stittsville, Ontario, K2S 1E9
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Fax. (613) 836-7183
www.DSEL.ca

STITTSVILLE SOUTH URBAN EXPANSION AREA

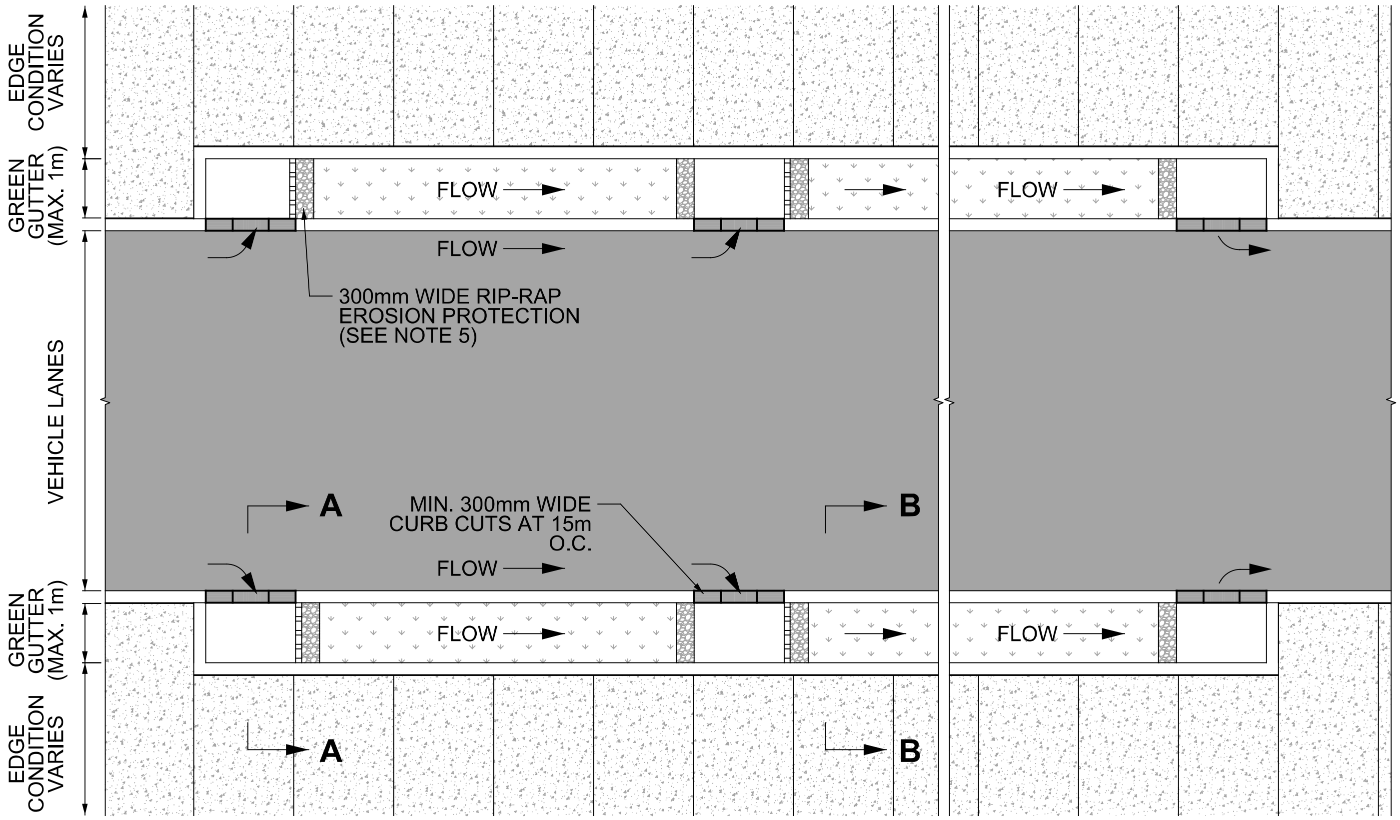
STORM SERVICING EXISTING CONDITIONS

CITY OF OTTAWA

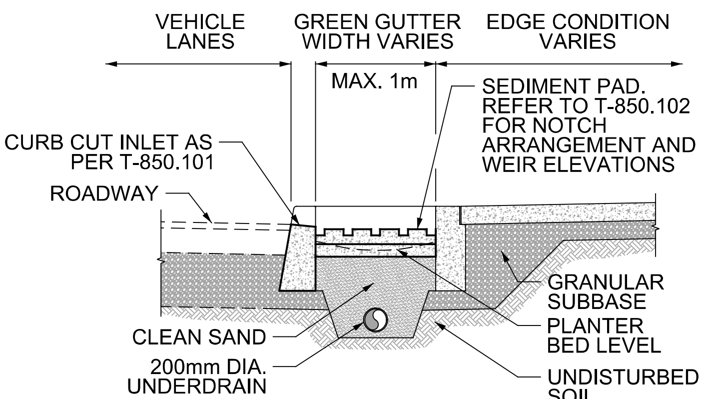
LEGEND

- EXISTING STORM MANHOLE
- EXISTING STORM SEWER
- OVERALL SUBJECT AREA BOUNDARY
- CAIVAN LANDHOLDINGS

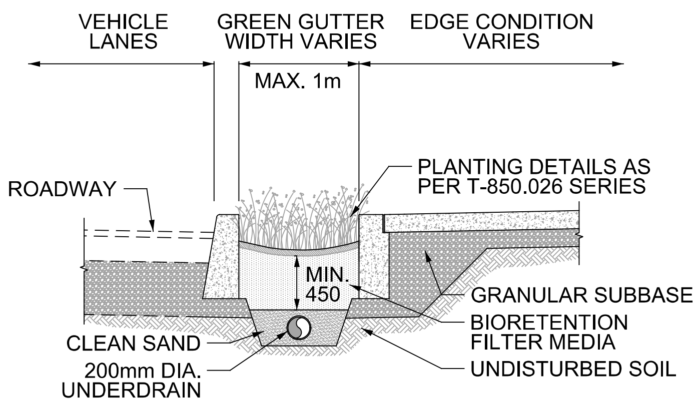
PROJECT No.:	21-1247
DATE:	OCT 2025
SCALE:	1:2000
DRAWING:	1



PLAN



SECTION A-A



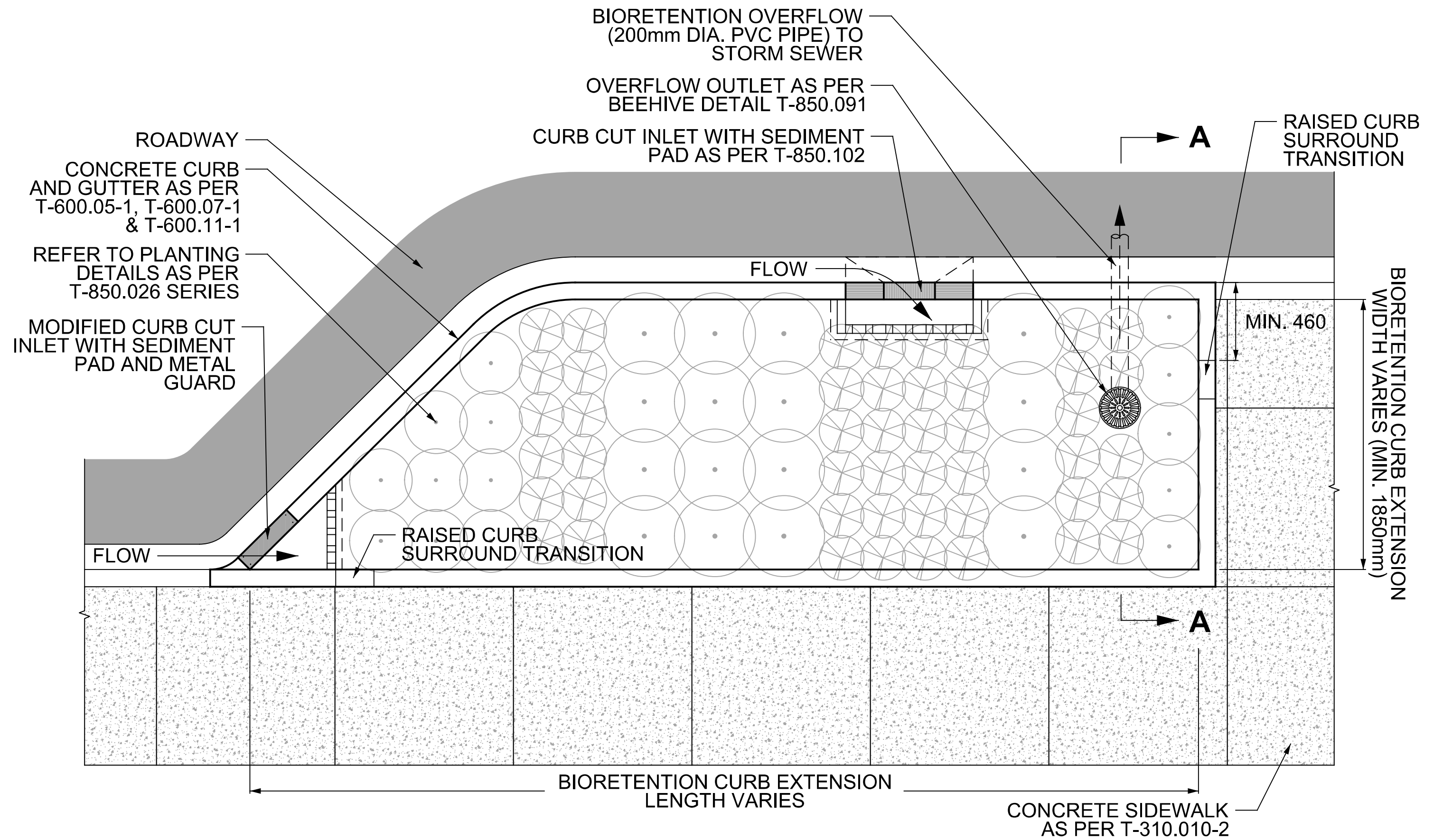
SECTION B-B

NOTES:

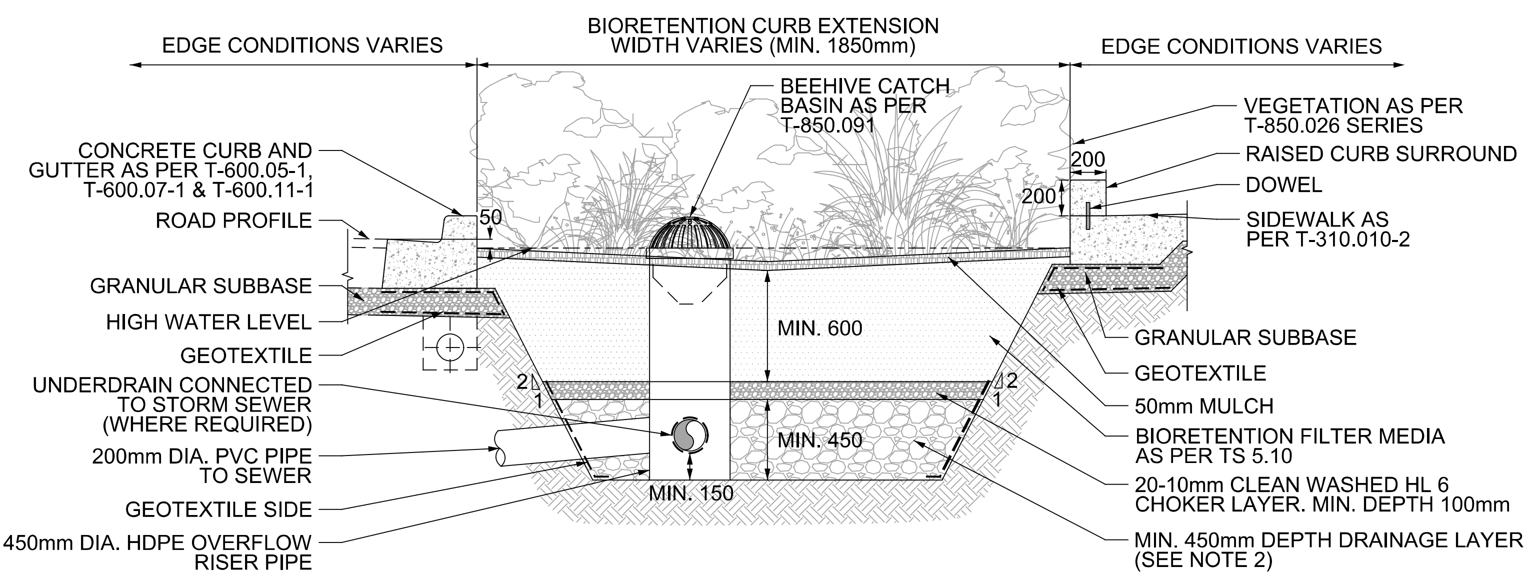
1. GREEN GUTTER WIDTH VARIES BASED ON AVAILABLE SPACE WITHIN RIGHT-OF-WAY. MAXIMUM 1m WIDTH.
2. ALL INLETS MUST HAVE SEDIMENT PAD AS PER T-850.102 FOR SEDIMENT AND EROSION PROTECTION.
3. LONGITUDINAL SLOPE TO MATCH ADJACENT FEATURE (ROADWAY, SIDEWALK, STREETCAR TRACK).
4. UNDERDRAIN IS REQUIRED WHERE NATIVE SOIL INFILTRATION RATES ARE LESS THAN 15mm/hr, OR IF GREEN GREEN GUTTER IS MEMBRANE LINED. UNDERDRAIN TO BE 200mm DIA. SMOOTH INTERIOR WALLED PERFORATED PIPE, MIN. INSTALLED 50mm ABOVE THE BOTTOM OF THE DRAINAGE LAYER.
5. RIP-RAP EROSION PROTECTION TO BE 300mm WIDE AND PLACED DOWNSTREAM OF SEDIMENT PADS AND UPSTREAM OF ANY INTERMEDIATE INLETS AND OUTLETS.

All dimensions are in millimetres unless otherwise shown.

TORONTO	ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING	REV 0	SEP 2021
	GREEN GUTTER LAYOUT AND SECTIONS	**T-850.141**	
		NTS	SHEET 1



PLAN



SECTION A-A

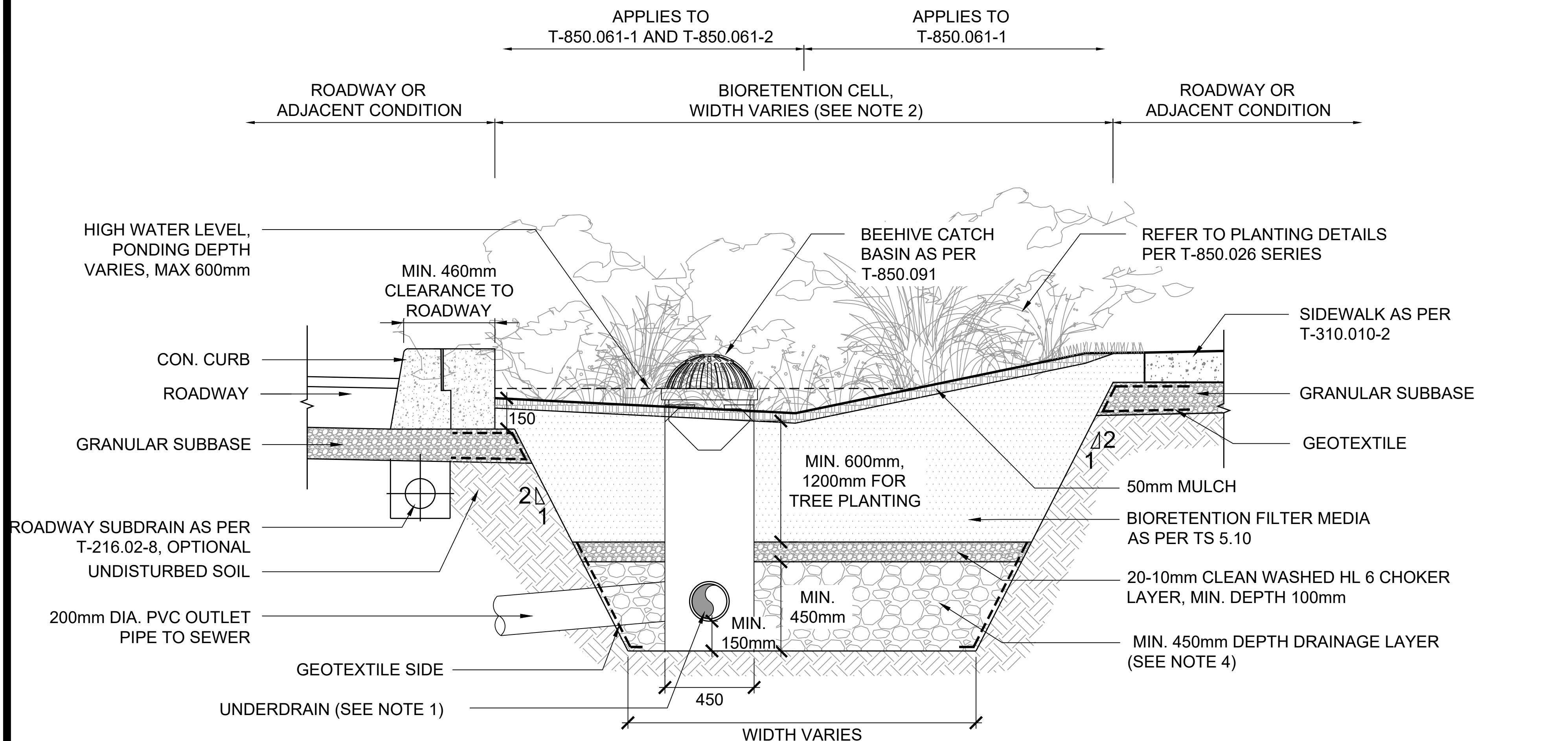
NOTES:

1. UNDERDRAIN IS REQUIRED WHERE NATIVE SOIL INFILTRATION RATES ARE LESS THAN 15mm/hr, WHEN TREES PLANTINGS ARE PRESENT, OR WHEN CURB EXTENSION IS MEMBRANE LINED. UNDERDRAIN TO BE 200mm DIA. SMOOTH INTERIOR WALLED PERFORATED PIPE, INSTALLED MIN. 150mm ABOVE THE BOTTOM OF THE DRAINAGE LAYER.

2. GRAVEL USED FOR DRAINAGE LAYER TO BE 20 TO 50mm, UNIFORMLY-GRADED, CLEAN (MAXIMUM WASH LOSS OF 0.5%), CRUSHED ANGULAR STONE THAT HAS A POROSITY OF 0.4.

All dimensions are in millimetres unless otherwise shown.

TORONTO	ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING	REV 0	SEP 2021
	BIORETENTION CURB EXTENSION	T-850.072	
	LAYOUT AND SECTION	NTS	SHEET 2



SECTION A-A

NOTES:

1. UNDERDRAIN IS REQUIRED WHERE NATIVE SOIL INFILTRATION RATES ARE LESS THAN 15mm/hr, WHEN TREE PLANTINGS ARE PRESENT, OR WHEN GREEN INFRASTRUCTURE SYSTEM IS MEMBRANE LINED. UNDERDRAIN TO BE 200mm DIA. SMOOTH INTERIOR WALLED PERFORATED PIPE WRAPPED IN GEOTEXTILE FABRIC, INSTALLED 150mm MIN. ABOVE BASE OF GREEN INFRASTRUCTURE SYSTEM.
2. BIORETENTION CELL WIDTH TO BE MIN. 3500mm WHERE TREES ARE PROPOSED AND MIN. 1850mm WITHOUT TREES.
3. FOR TREE HEALTH, LOCATE INLETS AWAY FROM ROOT BALLS TO MINIMIZE POTENTIAL DAMAGE.
4. GRAVEL USED FOR DRAINAGE LAYER TO BE 20 OR 50mm UNIFORMLY GRADED, CLEAN (MAXIMUM WASH LOSS OF 0.5%), CRUSHED ANGULAR STONE THAT HAS A POROSITY OF 0.4.

All dimensions are in millimetres unless otherwise shown.

TORONTO	ENGINEERING & CONSTRUCTION SERVICES STANDARD DRAWING	REV 0	SEP 2021
	BIORETENTION CELL IN BOULEVARD OR MEDIAN TYPICAL SECTION	**T-850.061-3**	
		1:30	SHEET 1

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

	LOCATION		AREA (Ha)																FLOW							SEWER DATA										
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year							UPS	UPS	UPS				
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	LOW (min	Q/Q full
STREET 8																																				
	213	214	0.53	0.68	1.00	1.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	77	450	450	CONC	0.20	88.5	103.964	104.414	106.914	127.5033	0.8017	1.8399	0.604
	214	215	0.62	0.68	1.17	2.17			0.00	0.00			0.00	0.00			0.00	0.00	11.84	70.40	95.38	111.77	163.32	153	600	600	CONC	0.15	112.5	103.637	104.237	106.890	237.8056	0.8411	2.2293	0.644
To STREET 9, Pipe 215 - 221						2.17				0.00				0.00				0.00	14.07																	
STREET 5																																				
	210	211	0.72	0.68	1.36	1.36			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	105	600	600	CONC	0.15	101.0	103.922	104.522	107.023	237.8056	0.8411	2.0014	0.440
	211	212	0.55	0.68	1.04	2.40			0.00	0.00			0.00	0.00			0.00	0.00	12.00	69.89	94.69	110.95	162.12	168	600	600	CONC	0.15	100.5	103.750	104.350	106.986	237.8056	0.8411	1.9915	0.706
To STREET 4, Pipe 212 - 215						2.40				0.00				0.00				0.00	13.99																	
	216	217	0.26	0.68	0.49	0.49			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	38	300	300	PVC	0.35	51.0	104.259	104.559	107.001	57.2089	0.8093	1.0502	0.660
	217	218	0.24	0.68	0.45	0.95			0.00	0.00			0.00	0.00			0.00	0.00	11.05	72.99	98.95	115.97	169.50	69	375	375	PVC	0.30	55.5	104.005	104.380	106.905	96.0323	0.8695	1.0638	0.718
	218	219	0.15	0.68	0.28	1.23			0.00	0.00			0.00	0.00			0.00	0.00	12.11	69.54	94.21	110.39	161.30	85	375	375	PVC	0.40	13.0	103.808	104.183	106.798	110.8885	1.0040	0.2158	0.771
	219	220	0.60	0.68	1.13	2.36			0.00	0.00			0.00	0.00			0.00	0.00	12.33	68.88	93.31	109.33	159.74	163	600	600	CONC	0.15	101.0	103.531	104.131	106.772	237.8056	0.8411	2.0014	0.684
	220	221	0.50	0.68	0.95	3.31			0.00	0.00			0.00	0.00			0.00	0.00	14.33	63.39	85.78	100.47	146.73	210	675	675	CONC	0.15	101.0	103.304	103.979	106.575	325.5584	0.9098	1.8503	0.644
To STREET 9, Pipe 221 - 222						3.31				0.00				0.00				0.00	16.18																	
STREET 4																																				
	200	201	0.46	0.68	0.87	0.87			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	67	375	375	PVC	0.30	79.0	105.154	105.529	108.732	96.0323	0.8695	1.5143	0.695
	201	202	0.56	0.68	1.06	1.93			0.00	0.00			0.00	0.00			0.00	0.00	11.51	71.44	96.82	113.46	165.81	138	525	525	CONC	0.20	94.0	104.767	105.292	107.847	192.3297	0.8885	1.7634	0.716
	202	203	0.58	0.68	1.10	3.02			0.00	0.00			0.00	0.00			0.00	0.00	13.28	66.16	89.57	104.92	153.27	200	600	600	CONC	0.20	94.0	104.504	105.104	107.659	274.5943	0.9712	1.6132	0.729
	203	204	0.07	0.68	0.13	3.16			0.00	0.00			0.00	0.00			0.00	0.00	14.89	62.03	83.91	98.27	143.51	196	600	600	CONC	0.20	9.0	104.286	104.886	107.470	274.5943	0.9712	0.1545	0.713
	204	205	0.09	0.68	0.17	3.33			0.00	0.00			0.00	0.00			0.00	0.00	15.05	61.66	83.41	97.68	142.64	205	600	600	CONC	0.20	42.5	104.238	104.838	107.450	274.5943	0.9712	0.7294	0.747
	205	206	0.08	0.68	0.15	3.48			0.00	0.00			0.00	0.00			0.00	0.00	15.77	60.00	81.14	95.00	138.71	209	600	600	CONC	0.20	9.0	104.123	104.723	107.360	274.5943	0.9712	0.1545	0.760
	206	207	0.65	0.68	1.23	4.71			0.00	0.00			0.00	0.00			0.00	0.00	15.93	59.66	80.67	94.46	137.91	281	750	750	CONC	0.11	106.0	103.955	104.705	107.340	369.2322	0.8358	2.1138	0.761
	207	208	0.63	0.68	1.19	5.90			0.00	0.00			0.00	0.00			0.00	0.00	18.04	55.41	74.86	87.63	127.90	327	750	750	CONC	0.15	106.0	103.818	104.568	107.126	431.1703	0.9760	1.8102	0.758
	208	209	0.14	0.68	0.26	6.16			0.00	0.00			0.00	0.00			0.00	0.00	19.85	52.27	70.58	82.59	120.51	322	750	750	CONC	0.15	13.5	103.629	104.379	106.918	431.1703	0.9760	0.2305	0.747
	209	212	0.19	0.68	0.36	6.52			0.00	0.00			0.00	0.00			0.00	0.00	20.08	51.90	70.07	82.00	119.64	338	750	750	CONC	0.20	50.5	103.579	104.329	106.893	497.8726	1.1270	0.7469	0.680
Contribution From STREET 5, Pipe 211 - 212						2.40				0.00				0.00				0.00	13.99																	
	212	215	0.21	0.68	0.40	9.32			0.00	0.00			0.00	0.00			0.00	0.00	20.83	50.73	68.48	80.13	116.90	473	900	900	CONC	0.15	60.0	103.299	104.199	106.794	701.1305	1.1021	0.9074	0.674
To STREET 9, Pipe 215 - 221						9.32				0.00				0.00				0.00	21.74																	
STREET 9																																				
Contribution From STREET 4, Pipe 212 - 215						9.32				0.00				0.00				0.00	21.74																	
Contribution From STREET 8, Pipe 214 - 215						2.17				0.00				0.00				0.00	14.07																	
			0.09	0.68	0.17	11.66			0.00	0.00			0.00	0.00			0.00	0.00																		
	215	221	0.21	0.68	0.40	12.06			0.00	0.00			0.00	0.00			0.00	0.00	21.74	49.39	66.65	77.98	113.76	596	975	975	CONC	0.15	65.0	102.998	103.973	106.670	867.9562	1.1625	0.9319	0.686
Contribution From STREET 5, Pipe 220 - 221						3.31				0.00				0.00				0.00	16.18																	
	221	222	0.53	0.68	1.00	16.37			0.00	0.00			0.00	0.00			0.00	0.00	22.67	48.10	64.89	75.91	110.72	787	1050	1050	CONC	0.15	92.0	102.777	103.827	106.376	1057.6053	1.2214	1.2554	0.745
	222	226	0.47	0.68	0.89	17.26			0.00	0.00			0.00	0.00			0.00	0.00	23.93	46.47	62.67	73.30	106.89	802	1050	1050	CONC	0.15	92.0	102.594	103.644	106.189	1057.6053	1.2214	1.2554	0.758
To WEST POND INLET 1, Pipe 226 - 227						17.26				0.00				0.00				0.00	25.18																	
STREET 3																																				
	122	123	0.21	0.68	0.40	0.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	30	450	450	CONC	0.20	55.5	103.840	104.290	106.795	127.5033	0.8017	1.1538	0.239
To STREET 6, Pipe 123 - 124						0.40				0.00				0.00				0.00	11.15																	
	116	117	0.58	0.68	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	84	450	450	CONC	0.20	80.5	103.846	104.296	106.800	127.5033	0.8017	1.6735	0.660
	117	118	0.45	0.68	0.85	1.95			0.00	0.00			0.00	0.00			0.00	0.00	11.67	70.93	96.11	112.63	164.58	138	525	525	CONC	0.20	85.5	103.610	104.135	106.637	192.3297	0.8885	1.6039	0.718
To STREET 3, Pipe 118 - 125						1.95				0.00				0.00				0.00	13.28																	
STREET 6																																				
			0.03	0.68	0.06	0.06			0.00	0.00			0.00	0.00			0.00	0.00																		
	113	114	0.67	0.68	1.27	1.32			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	102	450	450	CONC	0.55	111.0	104.378	104.828	108.542	211.4404	1.3295	1.3915	0.481
	114	115	0.64	0.68	1.21	2.53			0.00	0.00			0.00	0.00			0.00	0.00	11.39	71.85	97.38	114.11	166.77	182	750	750	CONC	0.11	115.5	103.464	104.214	106.817	369.2322	0.8358	2.3033	0.493
To STREET 3, Pipe 115 - 118						2.53				0.00				0.00				0.00	13.69																	
	119	120	0.70	0.68	1.32	1.32			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	102	375	375	PVC	0.70	106.5	105.638	106.013	108.514	146.6917	1.3282	1.3364	0.693

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

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

Designed: M.S.	PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**			
Checked: W.L.	LOCATION: **City of Ottawa**			
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247		Date: 25 Sep 2025	Sheet No. SHEET 1 OF 7

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA											
Location	From Node	To Node	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
	120	121	0.13	0.68	0.25	1.57			0.00	0.00			0.00	0.00			0.00	0.00	11.34	72.03	97.63	114.41	167.20	113	375	375	PVC	1.20	13.0	104.862	105.237	107.768	192.0645	1.7390	0.1246	0.588
	121	123	0.20	0.68	0.38	1.95			0.00	0.00			0.00	0.00			0.00	0.00	11.46	71.62	97.06	113.74	166.22	139	375	375	PVC	1.70	51.0	104.676	105.051	107.583	228.6025	2.0698	0.4107	0.610
Contribution From STREET 3, Pipe 122 - 123						0.40				0.00				0.00				0.00	11.15																	
	123	124	0.48	0.68	0.91	3.25			0.00	0.00			0.00	0.00			0.00	0.00	11.87	70.30	95.25	111.61	163.09	229	675	675	CONC	0.15	85.0	103.477	104.152	106.711	325.5584	0.9098	1.5572	0.702
	124	125	0.48	0.68	0.91	4.16			0.00	0.00			0.00	0.00			0.00	0.00	13.43	65.74	89.00	104.26	152.30	273	750	750	CONC	0.15	90.0	103.231	103.981	106.525	431.1703	0.9760	1.5369	0.634
To STREET 3, Pipe 125 - 128						4.16				0.00				0.00				0.00	14.97																	
STREET 2																																				
	109	110	0.21	0.68	0.40	0.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	30	300	300	PVC	0.35	51.0	106.196	106.496	108.997	57.2089	0.8093	1.0502	0.533
To STREET 1, Pipe 110 - 111						0.40				0.00				0.00				0.00	11.05																	
	103	104	0.58	0.68	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	84	450	450	CONC	0.20	81.0	106.026	106.476	108.979	127.5033	0.8017	1.6839	0.660
	104	105	0.45	0.68	0.85	1.95			0.00	0.00			0.00	0.00			0.00	0.00	11.68	70.89	96.07	112.57	164.50	138	525	525	CONC	0.20	85.5	105.789	106.314	108.816	192.3297	0.8885	1.6039	0.718
To STREET 3, Pipe 105 - 112						1.95				0.00				0.00				0.00	13.29																	
STREET 1																																				
	100	101	0.69	0.68	1.30	1.30			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	100	450	450	CONC	0.25	109.5	106.355	106.805	109.305	142.5531	0.8963	2.0361	0.703
	101	102	0.63	0.68	1.19	2.50			0.00	0.00			0.00	0.00			0.00	0.00	12.04	69.78	94.54	110.78	161.87	174	600	600	CONC	0.15	114.0	105.931	106.531	109.174	237.8056	0.8411	2.2590	0.732
To STREET 3, Pipe 102 - 105						2.50				0.00				0.00				0.00	14.30																	
	106	107	0.69	0.68	1.30	1.30			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	100	450	450	CONC	0.25	102.5	106.331	106.781	109.282	142.5531	0.8963	1.9059	0.703
	107	108	0.15	0.68	0.28	1.59			0.00	0.00			0.00	0.00			0.00	0.00	11.91	70.19	95.10	111.43	162.83	111	450	450	CONC	0.30	9.0	106.045	106.495	109.070	156.1591	0.9819	0.1528	0.714
	108	110	0.18	0.68	0.34	1.93			0.00	0.00			0.00	0.00			0.00	0.00	12.06	69.71	94.45	110.66	161.70	134	525	525	CONC	0.20	48.5	105.943	106.468	109.050	192.3297	0.8885	0.9098	0.699
Contribution From STREET 2, Pipe 109 - 110						0.40				0.00				0.00				0.00	11.05																	
	110	111	0.49	0.68	0.93	3.25			0.00	0.00			0.00	0.00			0.00	0.00	12.97	67.02	90.75	106.32	155.32	218	525	525	CONC	1.25	85.5	105.774	106.299	108.955	480.8242	2.2211	0.6416	0.453
	111	112	0.49	0.68	0.93	4.18			0.00	0.00			0.00	0.00			0.00	0.00	13.61	65.26	88.33	103.47	151.14	273	750	750	CONC	0.15	90.5	103.602	104.352	107.731	431.1703	0.9760	1.5455	0.632
To STREET 3, Pipe 112 - 115						4.18				0.00				0.00				0.00	15.16																	
STREET 10																																				
	131	132	0.28	0.68	0.53	0.53			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	450	450	CONC	0.20	55.5	103.719	104.169	106.670	127.5033	0.8017	1.1538	0.319
To STREET 10, Pipe 132 - 137						0.53				0.00				0.00				0.00	11.15																	
	126	127	0.73	0.68	1.38	1.38			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	106	450	450	CONC	0.25	110.5	103.725	104.175	106.675	142.5531	0.8963	2.0547	0.744
	127	128	0.63	0.68	1.19	2.57			0.00	0.00			0.00	0.00			0.00	0.00	12.05	69.72	94.46	110.68	161.73	179	600	600	CONC	0.15	115.0	103.299	103.899	106.456	237.8056	0.8411	2.2789	0.754
To STREET 3, Pipe 128 - 142						2.57				0.00				0.00				0.00	14.33																	
	129	130	0.58	0.68	1.10	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	84	450	450	CONC	0.20	90.0	103.977	104.427	106.927	127.5033	0.8017	1.8710	0.660
	130	132	0.53	0.68	1.00	2.10			0.00	0.00			0.00	0.00			0.00	0.00	11.87	70.30	95.25	111.61	163.09	148	525	525	CONC	0.20	89.5	103.722	104.247	106.753	192.3297	0.8885	1.6789	0.767
To STREET 10, Pipe 132 - 137						2.10				0.00				0.00				0.00	13.55																	
	133	134	0.31	0.68	0.59	0.59			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	45	300	300	PVC	0.40	46.5	104.117	104.417	106.918	61.1589	0.8652	0.8957	0.736
	134	135	0.13	0.68	0.25	0.83			0.00	0.00			0.00	0.00			0.00	0.00	10.90	73.53	99.69	116.84	170.77	61	375	375	PVC	0.30	13.0	103.856	104.231	106.830	96.0323	0.8695	0.2492	0.637
	135	136	0.54	0.68	1.02	1.85			0.00	0.00			0.00	0.00			0.00	0.00	11.14	72.67	98.51	115.45	168.73	135	525	525	CONC	0.20	89.5	103.667	104.192	106.810	192.3297	0.8885	1.6789	0.700
	136	137	0.46	0.68	0.87	2.72			0.00	0.00			0.00	0.00			0.00	0.00	12.82	67.43	91.32	106.98	156.30	184	750	750	CONC	0.11	89.5	103.263	104.013	106.634	369.2322	0.8358	1.7848	0.497
To STREET 10, Pipe 137 - 138						2.72				0.00				0.00				0.00	14.61																	
STREET 10																																				
					0.00	0.00	0.10	0.68	0.19	0.19			0.00	0.00			0.00	0.00																		
	223	224			0.00	0.00	0.22	0.68	0.42	0.60			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	63	375	375	PVC	0.30	41.5	103.505	103.880	106.381	96.0323	0.8695	0.7955	0.656
					0.00	0.00	0.32	0.68	0.60	1.21			0.00	0.00			0.00	0.00																		
	224	225			0.00	0.00	3.00	0.40	3.34	4.55			0.00	0.00			0.00	0.00	10.80	73.88	100.17	117.40	171.60	455	825	825	CONC	0.20	68.5	102.930	103.755	106.290	641.9463	1.2009	0.9507	0.709
	225	226			0.00	0.00	0.35	0.68	0.66	5.21			0.00	0.00			0.00	0.00	11.75	70.69	95.79	112.25	164.03	499	900	900	CONC	0.15	75.5	102.657	103.557	106.156	701.1305	1.1021	1.1418	0.711
To WEST POND INLET 1, Pipe 226 - 227						0.00				5.21				0.00				0.00	12.89																	
Contribution From STREET 10, Pipe 130 - 132						2.10				0.00				0.00				0.00	13.55																	
Contribution From STREET 10, Pipe 131 - 132						0.53				0.00				0.00				0.00	11.15																	
	132	137	0.22	0.68	0.42	3.04			0.00	0.00			0.00	0.00			0.00	0.00	13.55	65.42	88.55	103.73	151.52	199	675	675	CONC	0.15	65.0	103.368	104.043	106.570	325.5584	0.9098	1.1908	0.612

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025	Sheet No. SHEET 2 OF 7

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Location (LOCATION)	From Node	To Node	AREA (Ha) 2 YEAR AREA (Ha)	2 YEAR R	2 YEAR Indiv. 2.78 AC	2 YEAR Accum. 2.78 AC	5 YEAR AREA (Ha)	5 YEAR R	5 YEAR Indiv. 2.78 AC	5 YEAR Accum. 2.78 AC	10 YEAR AREA (Ha)	10 YEAR R	10 YEAR Indiv. 2.78 AC	10 YEAR Accum. 2.78 AC	100 YEAR AREA (Ha)	100 YEAR R	100 YEAR Indiv. 2.78 AC	100 YEAR Accum. 2.78 AC	FLOW Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
Contribution From STREET 10, Pipe 136 - 137						2.72				0.00				0.00				0.00	14.61																	
	137	138	0.48	0.68	0.91	6.67			0.00	0.00			0.00	0.00			0.00	0.00	14.74	62.39	84.40	98.85	144.36	416	825	825	CONC	0.15	83.0	103.078	103.903	106.446	555.9418	1.0400	1.3301	0.749
	138	139			0.00	6.67			0.00	0.00			0.00	0.00			0.00	0.00	16.07	59.35	80.25	93.96	137.19	396	825	825	CONC	0.15	73.0	102.914	103.739	106.279	555.9418	1.0400	1.1699	0.712
	139	142	0.46	0.68	0.87	7.54			0.00	0.00			0.00	0.00			0.00	0.00	17.24	56.94	76.95	90.09	131.50	429	825	825	CONC	0.15	15.0	102.774	103.599	106.130	555.9418	1.0400	0.2404	0.773
Contribution From STREET 3, Pipe 128 - 142						22.72				0.00				0.00				0.00	19.37																	
					0.00	30.27	0.10	0.68	0.19	0.19			0.00	0.00			0.00	0.00																		
	142	143			0.00	30.27	0.21	0.68	0.40	0.59			0.00	0.00			0.00	0.00	19.37	53.06	71.65	83.86	122.37	1648	1200	1200	CONC	0.35	12.0	102.370	103.570	106.105	2306.5199	2.0394	0.0981	0.714
	143	226			0.00	30.27			0.00	0.59			0.00	0.00			0.00	0.00	19.47	52.90	71.43	83.60	121.98	1643	1350	1350	CONC	0.20	42.0	102.178	103.528	106.080	2386.9588	1.6676	0.4198	0.688
To WEST POND INLET 1, Pipe 226 - 227						30.27				0.59				0.00				0.00	19.89																	
WEST POND INLET 1																																				
Contribution From STREET 10, Pipe 143 - 226						30.27				0.59				0.00				0.00	19.89																	
Contribution From STREET 9, Pipe 222 - 226						17.26				0.00				0.00				0.00	25.18																	
Contribution From STREET 10, Pipe 225 - 226						0.00				5.21				0.00				0.00	12.89																	
	226	227			0.00	47.52			0.00	5.79			0.00	0.00			0.00	0.00	25.18	44.96	60.61	70.89	103.35	2488	1500	1500	CONC	0.25	36.5	101.944	103.444	106.000	3534.4342	2.0001	0.3042	0.704
	227	HW2			0.00	47.52			0.00	5.79			0.00	0.00			0.00	0.00	25.48	44.61	60.13	70.33	102.54	2468	1500	1500	CONC	0.25	9.0	101.823	103.323	106.000	3534.4342	2.0001	0.0750	0.698
STREET 3																																				
	601	603			0.00	0.00	0.19	0.68	0.36	0.36			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	37	300	300	PVC	0.35	23.0	102.545	102.845	104.137	57.2089	0.8093	0.4736	0.654
To WEST POND INLET 2, Pipe 603 - 605						0.00				0.36				0.00				0.00	10.47																	
	600	604			0.00	0.00	0.53	0.68	1.00	1.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	104	450	450	CONC	0.25	113.5	103.239	103.689	106.190	142.5531	0.8963	2.1105	0.732
Contribution From WEST POND INLET 2, Pipe 602 - 604						5.34				0.00				0.00				0.00	10.21																	
	604	603			0.00	5.34			0.00	1.00			0.00	0.00			0.00	0.00	12.11	69.55	94.23	110.41	161.32	466	750	750	CONC	0.30	9.5	102.043	102.793	105.906	609.7669	1.3802	0.1147	0.764
To WEST POND INLET 2, Pipe 603 - 605						5.34				1.00				0.00				0.00	12.23																	
Contribution From STREET 1, Pipe 101 - 102						2.50				0.00				0.00				0.00	14.30																	
			0.05	0.68	0.09	2.59			0.00	0.00			0.00	0.00			0.00	0.00																		
	102	105	0.19	0.68	0.36	2.95			0.00	0.00			0.00	0.00			0.00	0.00	14.30	63.48	85.91	100.61	146.95	187	600	600	CONC	0.25	55.0	105.700	106.300	108.937	307.0058	1.0858	0.8442	0.610
Contribution From STREET 2, Pipe 104 - 105						1.95				0.00				0.00				0.00	13.29																	
	105	112	0.22	0.68	0.42	5.31			0.00	0.00			0.00	0.00			0.00	0.00	15.14	61.44	83.11	97.33	142.12	326	600	600	CONC	1.90	60.0	104.809	105.409	108.663	846.3565	2.9934	0.3341	0.386
Contribution From STREET 1, Pipe 111 - 112						4.18				0.00				0.00				0.00	15.16																	
	112	115	0.21	0.68	0.40	9.89			0.00	0.00			0.00	0.00			0.00	0.00	15.47	60.67	82.06	96.09	140.31	600	975	975	CONC	0.15	60.0	103.209	104.184	106.770	867.9562	1.1625	0.8602	0.691
Contribution From STREET 6, Pipe 114 - 115						2.53				0.00				0.00				0.00	13.69																	
	115	118	0.20	0.68	0.38	12.80			0.00	0.00			0.00	0.00			0.00	0.00	16.33	58.79	79.48	93.06	135.86	752	1050	1050	CONC	0.15	60.0	103.013	104.063	106.595	1057.6053	1.2214	0.8187	0.711
Contribution From STREET 3, Pipe 117 - 118						1.95				0.00				0.00				0.00	13.28																	
	118	125	0.24	0.68	0.45	15.20			0.00	0.00			0.00	0.00			0.00	0.00	17.15	57.11	77.19	90.37	131.91	868	1200	1200	CONC	0.15	65.0	102.743	103.943	106.474	1509.9717	1.3351	0.8114	0.575
Contribution From STREET 6, Pipe 124 - 125						4.16				0.00				0.00				0.00	14.97																	
	125	128	0.21	0.68	0.40	19.75			0.00	0.00			0.00	0.00			0.00	0.00	17.96	55.56	75.06	87.86	128.24	1097	1200	1200	CONC	0.15	55.0	102.617	103.817	106.346	1509.9717	1.3351	0.6866	0.727
Contribution From STREET 10, Pipe 127 - 128						2.57				0.00				0.00				0.00	14.33																	
	128	142	0.21	0.68	0.40	22.72			0.00	0.00			0.00	0.00			0.00	0.00	18.65	54.31	73.36	85.86	125.31	1234	1200	1200	CONC	0.20	67.0	102.504	103.704	106.235	1743.5652	1.5417	0.7243	0.708
To STREET 10, Pipe 142 - 143						22.72				0.00				0.00				0.00	19.37																	
WEST POND INLET 2																																				
	602	604	2.40	0.80	5.34	5.34			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	410	675	675	CONC	0.40	18.5	102.192	102.867	105.440	531.6346	1.4856	0.2075	0.771
To STREET 3, Pipe 604 - 603						5.34				0.00				0.00				0.00	10.21																	
Contribution From STREET 3, Pipe 601 - 603						0.00				0.36				0.00				0.00	10.47																	
Contribution From STREET 3, Pipe 604 - 603						5.34				1.00				0.00				0.00	12.23																	
	603	605			0.00	5.34			0.00	1.36			0.00	0.00			0.00	0.00	12.23	69.20	93.74	109.84	160.49	497	825	825	CONC	0.20	36.0	101.939	102.764	105.365	641.9463	1.2009	0.4996	0.774
	605	HW6			0.00	5.34			0.00	1.36			0.00	0.00			0.00	0.00	12.72	67.72	91.71	107.44	156.97	486	825	825	CONC	0.20	18.5	101.837	102.662	105.090	641.9463	1.2009	0.2568	0.757
STREET 21																																				
	311	312	0.50	0.68	0.95	0.95			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	73	375	375	PVC	0.30	30.5	103.985	104.360	106.860	96.0323	0.8695	0.5846	0.756
	312	313	0.04	0.68	0.08	1.02			0.00	0.00			0.00	0.00			0.00	0.00	10.58	74.63	101.20	118.62	173.39	76	375	375	PVC	0.35	17.5	103.863	104.238	106.825	103.7267	0.9392	0.3106	0.734
Contribution From STREET 21, Pipe 310 - 313						1.02				0.00				0.00				0.00	12.11																	
			0.04	0.68	0.08	2.12			0.00	0.00			0.00	0.00			0.00	0.00																		
	313	314	0.60	0.68	1.13	3.25			0.00	0.00			0.00	0.00			0.00	0.00	12.11	69.54	94.21	110.39	161.30	226	600	600	CONC	0.25	117.0	102.892	103.492	106.724	307.0058	1.0858	1.7959	0.737
	314	315	0.14	0.68	0.26	3.52			0.00	0.00			0.00	0.00			0.00	0.00	13.91	64.47	87.26	102.20	149.28	227	600	600	CONC	0.25	13.0	102.569	103.169	105.739	307.0058	1.0858	0.1995	0.738

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA	
Checked: W.L.	LOCATION: City of Ottawa	
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025
		Sheet No. SHEET 3 OF 7

1247_stm_designsheets.xlsx

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Location	LOCATION From Node	To Node	AREA (Ha) 2 YEAR AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	5 YEAR AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	10 YEAR AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	100 YEAR AREA (Ha)	R	Indiv. 2.78 AC	Accum. 2.78 AC	FLOW Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
	315	316			0.00	3.52			0.00	0.00			0.00	0.00			0.00	0.00	14.11	63.95	86.55	101.37	148.06	225	600	600	CONC	0.25	7.0	102.506	103.106	105.711	307.0058	1.0858	0.1074	0.732
To DAVIDSON POND INLET, Pipe 316 - 317						3.52				0.00				0.00				0.00	14.22																	
	300	301	0.18	0.68	0.34	0.34			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	26	300	300	PVC	0.35	35.0	103.690	103.990	106.504	57.2089	0.8093	0.7208	0.457
	301	302	0.15	0.68	0.28	0.62			0.00	0.00			0.00	0.00			0.00	0.00	10.72	74.14	100.53	117.83	172.23	46	300	300	PVC	0.40	9.0	103.537	103.837	106.403	61.1589	0.8652	0.1734	0.756
	302	303	0.60	0.68	1.13	1.76			0.00	0.00			0.00	0.00			0.00	0.00	10.89	73.53	99.70	116.85	170.78	129	525	525	CONC	0.20	109.5	103.276	103.801	106.381	192.3297	0.8885	2.0541	0.672
	303	304	0.02	0.68	0.04	1.80			0.00	0.00			0.00	0.00			0.00	0.00	12.95	67.08	90.83	106.41	155.45	120	525	525	CONC	0.20	13.0	103.027	103.552	106.167	192.3297	0.8885	0.2439	0.626
	304	305	0.14	0.68	0.26	2.06			0.00	0.00			0.00	0.00			0.00	0.00	13.19	66.39	89.89	105.31	153.83	137	525	525	CONC	0.20	46.5	102.971	103.496	106.142	192.3297	0.8885	0.8723	0.711
	305	306	0.12	0.68	0.23	2.29			0.00	0.00			0.00	0.00			0.00	0.00	14.06	64.07	86.71	101.56	148.33	147	525	525	CONC	0.20	13.0	102.848	103.373	106.060	192.3297	0.8885	0.2439	0.762
	306	307	0.48	0.68	0.91	3.19			0.00	0.00			0.00	0.00			0.00	0.00	14.31	63.45	85.86	100.56	146.87	203	600	600	CONC	0.20	74.5	102.747	103.347	106.040	274.5943	0.9712	1.2785	0.738
	307	316	0.56	0.68	1.06	4.25			0.00	0.00			0.00	0.00			0.00	0.00	15.59	60.42	81.71	95.68	139.70	257	750	750	CONC	0.11	90.0	102.448	103.198	105.889	369.2322	0.8358	1.7948	0.696
To DAVIDSON POND INLET, Pipe 316 - 317						4.25				0.00				0.00				0.00	17.38																	
DAVIDSON POND INLET																																				
Contribution From STREET 21, Pipe 307 - 316						4.25				0.00				0.00				0.00	17.38																	
Contribution From STREET 21, Pipe 315 - 316						3.52				0.00				0.00				0.00	14.22																	
	316	317	0.02	0.68	0.04	7.81			0.00	0.00			0.00	0.00			0.00	0.00	17.38	56.66	76.58	89.64	130.85	442	825	825	CONC	0.20	45.0	101.685	102.510	105.740	641.9463	1.2009	0.6245	0.689
	317	HW3			0.00	7.81			0.00	0.00			0.00	0.00			0.00	0.00	18.01	55.48	74.95	87.74	128.06	433	825	825	CONC	0.20	17.5	101.535	102.360	103.890	641.9463	1.2009	0.2429	0.675
STREET 14																																				
	425	426	0.18	0.68	0.34	0.34			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	26	300	300	PVC	0.35	13.0	102.936	103.236	105.736	57.2089	0.8093	0.2677	0.457
	426	427	0.21	0.68	0.40	0.74			0.00	0.00			0.00	0.00			0.00	0.00	10.27	75.79	102.80	120.50	176.15	56	375	375	PVC	0.30	33.5	102.815	103.190	105.715	96.0323	0.8695	0.6421	0.582
	427	428	0.52	0.68	0.98	1.72			0.00	0.00			0.00	0.00			0.00	0.00	10.91	73.48	99.62	116.76	170.65	126	525	525	CONC	0.20	86.5	102.564	103.089	105.635	192.3297	0.8885	1.6227	0.657
	428	429	0.44	0.68	0.83	2.55			0.00	0.00			0.00	0.00			0.00	0.00	12.53	68.28	92.48	108.35	158.31	174	600	600	CONC	0.15	83.5	102.316	102.916	105.460	237.8056	0.8411	1.6546	0.733
To STREET 19, Pipe 429 - 431						2.55				0.00				0.00				0.00	14.19																	
STREET 15																																				
			0.16	0.68	0.30	0.30			0.00	0.00			0.00	0.00			0.00	0.00																		
	420	421	1.29	0.68	2.44	2.74			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	211	525	525	CONC	0.40	21.0	102.720	103.245	105.745	271.9953	1.2565	0.2786	0.774
	421	422	0.31	0.68	0.59	3.33			0.00	0.00			0.00	0.00			0.00	0.00	10.28	75.75	102.74	120.44	176.05	252	675	675	CONC	0.15	75.5	102.486	103.161	105.705	325.5584	0.9098	1.3831	0.774
To STREET 13, Pipe 422 - 424						3.33				0.00				0.00				0.00	11.66																	
STREET 13																																				
					0.00	0.00	0.17	0.68	0.32	0.32			0.00	0.00			0.00	0.00																		
	416	417			0.00	0.00	0.19	0.68	0.36	0.68			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	71	375	375	PVC	0.30	27.5	103.028	103.403	105.904	96.0323	0.8695	0.5271	0.738
	417	418			0.00	0.00	0.13	0.68	0.25	0.93			0.00	0.00			0.00	0.00	10.53	74.84	101.49	118.96	173.88	94	450	450	CONC	0.20	27.0	102.870	103.320	105.853	127.5033	0.8017	0.5613	0.737
	418	419			0.00	0.00	0.45	0.68	0.85	1.78			0.00	0.00			0.00	0.00	11.09	72.86	98.77	115.76	169.19	176	600	600	CONC	0.15	69.5	102.666	103.266	105.800	237.8056	0.8411	1.3772	0.738
	419	422			0.00	0.00	0.45	0.68	0.85	2.63			0.00	0.00			0.00	0.00	12.47	68.48	92.75	108.67	158.78	244	675	675	CONC	0.15	74.5	102.483	103.158	105.694	325.5584	0.9098	1.3648	0.749
Contribution From STREET 15, Pipe 421 - 422						3.33				0.00				0.00				0.00	11.66																	
	422	424			0.00	3.33	0.26	0.68	0.49	3.12			0.00	0.00			0.00	0.00	13.83	64.67	87.54	102.53	149.76	488	900	900	CONC	0.15	59.0	102.114	103.014	105.546	701.1305	1.1021	0.8922	0.696
To STREET 16, Pipe 424 - 429						3.33				3.12				0.00				0.00	14.72																	
STREET 16																																				
	499	423			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	11.0	101.952	102.252	103.302	57.2089	0.8093	0.2265	0.000
	423	424			0.00	0.00	0.74	0.68	1.40	1.40			0.00	0.00			0.00	0.00	10.23	75.95	103.01	120.75	176.51	144	600	600	CONC	0.15	77.0	101.763	102.363	103.962	237.8056	0.8411	1.5258	0.606
Contribution From STREET 13, Pipe 422 - 424						3.33				3.12				0.00				0.00	14.72																	
	424	429			0.00	3.33	0.27	0.68	0.51	5.03			0.00	0.00			0.00	0.00	14.72	62.43	84.46	98.92	144.46	632	1050	1050	CONC	0.11	63.0	101.422	102.472	105.425	905.6791	1.0459	1.0039	0.698
To STREET 19, Pipe 429 - 431						3.33				5.03				0.00				0.00	15.73																	
Contribution From STREET 21, Pipe 408 - 409						2.42				1.44				0.00				0.00	15.34																	
					0.00	2.42	0.16	0.68	0.30	1.74			0.00	0.00			0.00	0.00																		
	409	410			0.00	2.42	0.18	0.68	0.34	2.08			0.00	0.00			0.00	0.00	15.34	60.98	82.47	96.58	141.02	319	750	750	CONC	0.15	55.0	102.496	103.246	105.790	431.1703	0.9760	0.9392	0.740
	410	412			0.00	2.42	0.07	0.68	0.13	2.21			0.00	0.00			0.00	0.00	16.28	58.90	79.64	93.24	136.13	319	825	825	CONC	0.15	15.5	102.338	103.163	105.690	555.9418	1.0400	0.2484	0.573
Contribution From STREET 19, Pipe 411 - 412						0.60				0.00				0.00				0.00	11.47																	
	412	415			0.00	3.02	0.53	0.68	1.00	3.21			0.00	0.00			0.00	0.00	16.53	58.38	78.92	92.40	134.90	430	900	900	CONC	0.15	125.0	102.193	103.093	105.661	701.1305	1.1021	1.8903	0.614

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA		
Checked: W.L.	LOCATION: City of Ottawa		
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025	Sheet No. SHEET 4 OF 7

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

Location	From Node	To Node	2 YEAR AREA (Ha)	2 YEAR R	2 YEAR Indiv. 2.78 AC	2 YEAR Accum. 2.78 AC	5 YEAR AREA (Ha)	5 YEAR R	5 YEAR Indiv. 2.78 AC	5 YEAR Accum. 2.78 AC	10 YEAR AREA (Ha)	10 YEAR R	10 YEAR Indiv. 2.78 AC	10 YEAR Accum. 2.78 AC	100 YEAR AREA (Ha)	100 YEAR R	100 YEAR Indiv. 2.78 AC	100 YEAR Accum. 2.78 AC	Time of Conc. (min)	Intensity 2 Year (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)	Peak Flow Q (l/s)	DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	INV UPS	OBV UPS	T/G UPS	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min)	RATIO Q/Q full
Contribution From STREET 18, Pipe 414 - 415						0.91				0.00				0.00				0.00	12.44																	
					0.00	3.93	0.14	0.68	0.26	3.48			0.00	0.00			0.00	0.00																		
	415	429	1.70	0.80	3.78	7.71			0.00	3.48			0.00	0.00			0.00	0.00	18.42	54.72	73.93	86.53	126.28	679	975	975	CONC	0.15	59.0	101.900	102.875	105.406	867.9562	1.1625	0.8459	0.783
To STREET 19, Pipe 429 - 431						7.71				3.48				0.00				0.00	19.26																	
STREET 18																																				
	523	524	0.51	0.68	0.96	0.96			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	74	450	450	CONC	0.20	85.5	102.594	103.044	105.545	127.5033	0.8017	1.7775	0.581
	524	525	0.49	0.68	0.93	1.89			0.00	0.00			0.00	0.00			0.00	0.00	11.78	70.59	95.66	112.09	163.79	133	525	525	CONC	0.20	90.5	102.348	102.873	105.406	192.3297	0.8885	1.6977	0.694
To STREET 17, Pipe 525 - 531						1.89				0.00				0.00				0.00	13.48																	
Contribution From STREET 20, Pipe 413 - 414						0.53				0.00				0.00				0.00	11.17																	
	414	415	0.20	0.68	0.38	0.91			0.00	0.00			0.00	0.00			0.00	0.00	11.17	72.57	98.37	115.29	168.49	66	600	600	CONC	0.15	64.0	102.402	103.002	105.536	237.8056	0.8411	1.2682	0.277
To STREET 16, Pipe 415 - 429						0.91				0.00				0.00				0.00	12.44																	
STREET 20																																				
	413	414	0.28	0.68	0.53	0.53			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	450	450	CONC	0.20	56.5	102.690	103.140	105.644	127.5033	0.8017	1.1746	0.319
To STREET 18, Pipe 414 - 415						0.53				0.00				0.00				0.00	11.17																	
	520	521	0.54	0.68	1.02	1.02			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	78	450	450	CONC	0.20	85.5	102.711	103.161	105.662	127.5033	0.8017	1.7775	0.615
	521	522	0.45	0.68	0.85	1.87			0.00	0.00			0.00	0.00			0.00	0.00	11.78	70.59	95.66	112.09	163.79	132	525	525	CONC	0.20	85.5	102.286	102.811	105.516	192.3297	0.8885	1.6039	0.687
To STREET 17, Pipe 522 - 525						1.87				0.00				0.00				0.00	13.38																	
STREET 21																																				
	512	513			0.00	0.00	0.34	0.68	0.64	0.64			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	67	375	375	PVC	0.30	54.0	103.143	103.518	106.048	96.0323	0.8695	1.0351	0.697
To STREET 22, Pipe 513 - 514						0.00				0.64				0.00				0.00	11.04																	
	510	511			0.00	0.00	0.44	0.68	0.83	0.83			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	87	450	450	CONC	0.20	48.0	102.437	102.887	104.245	127.5033	0.8017	0.9979	0.680
	511	513			0.00	0.00	0.47	0.68	0.89	1.72			0.00	0.00			0.00	0.00	11.00	73.17	99.20	116.26	169.92	171	675	675	CONC	0.15	71.0	102.116	102.791	106.088	325.5584	0.9098	1.3007	0.524
To STREET 22, Pipe 513 - 514						0.00				1.72				0.00				0.00	12.30																	
	308	309	0.19	0.68	0.36	0.36			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	28	300	300	PVC	0.35	20.0	103.870	104.170	106.670	57.2089	0.8093	0.4119	0.482
	309	310	0.06	0.68	0.11	0.47			0.00	0.00			0.00	0.00			0.00	0.00	10.41	75.26	102.07	119.64	174.88	36	300	300	PVC	0.35	17.0	103.770	104.070	106.630	57.2089	0.8093	0.3501	0.622
	310	313	0.29	0.68	0.55	1.02			0.00	0.00			0.00	0.00			0.00	0.00	10.76	74.00	100.33	117.60	171.88	76	450	450	CONC	0.20	65.0	103.560	104.010	106.595	127.5033	0.8017	1.3513	0.592
To STREET 21, Pipe 313 - 314						1.02				0.00				0.00				0.00	12.11																	
	406	407			0.00	0.00	0.43	0.68	0.81	0.81			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	85	450	450	CONC	0.20	64.5	103.077	103.527	106.036	127.5033	0.8017	1.3409	0.664
Contribution From STREET 23, Pipe 405 - 407						2.42				0.00				0.00				0.00	14.42																	
	407	408			0.00	2.42	0.25	0.68	0.47	1.29			0.00	0.00			0.00	0.00	14.42	63.17	85.48	100.11	146.21	263	675	675	CONC	0.20	39.0	102.717	103.392	105.900	375.9224	1.0505	0.6187	0.699
	408	409			0.00	2.42	0.08	0.68	0.15	1.44			0.00	0.00			0.00	0.00	15.04	61.68	83.43	97.70	142.68	269	675	675	CONC	0.20	19.0	102.609	103.284	105.820	375.9224	1.0505	0.3014	0.716
To STREET 16, Pipe 409 - 410						2.42				1.44				0.00				0.00	15.34																	
STREET 23																																				
	503	505	0.23	0.68	0.43	0.43			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	33	450	450	CONC	0.20	51.0	103.420	103.870	106.372	127.5033	0.8017	1.0603	0.262
To STREET 26, Pipe 505 - 506						0.43				0.00				0.00				0.00	11.06																	
	504	505	0.12	0.68	0.23	0.23			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	17	450	450	CONC	0.20	25.5	103.360	103.810	106.313	127.5033	0.8017	0.5301	0.137
To STREET 26, Pipe 505 - 506						0.23				0.00				0.00				0.00	10.53																	
	508	509	0.23	0.68	0.43	0.43			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	33	450	450	CONC	0.20	60.5	103.166	103.616	106.125	127.5033	0.8017	1.2578	0.262
To STREET 22, Pipe 509 - 513						0.43				0.00				0.00				0.00	11.26																	
	402	403			0.00	0.00			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	0	300	300	PVC	0.35	14.0	103.369	103.669	106.124	57.2089	0.8093	0.2883	0.000
	403	404	0.09	0.68	0.17	0.17			0.00	0.00			0.00	0.00			0.00	0.00	10.29	75.72	102.69	120.38	175.97	13	300	300	PVC	0.35	13.0	103.290	103.590	106.090	57.2089	0.8093	0.2677	0.225
	500	501	0.70	0.68	1.32	1.32			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	102	450	450	CONC	0.25	100.5	103.491	103.941	106.397	142.5531	0.8963	1.8688	0.713
	501	502	0.14	0.68	0.26	1.59			0.00	0.00			0.00	0.00			0.00	0.00	11.87	70.30	95.26	111.62	163.11	112	450	450	CONC	0.30	13.0	103.210	103.660	106.220	156.1591	0.9819	0.2207	0.715
	502	509	0.51	0.68	0.96	2.55			0.00	0.00			0.00	0.00			0.00	0.00	12.09	69.62	94.32	110.51	161.48	178	600	600	CONC	0.15	97.5	103.021	103.621	106.200	237.8056	0.8411	1.9321	0.747
To STREET 22, Pipe 509 - 513						2.55				0.00				0.00				0.00	14.02																	

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA	
Checked: W.L.	LOCATION: City of Ottawa	
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247	Date: 25 Sep 2025 / Sheet No. SHEET 5 OF 7

1247_stm_designsheets.xlsx

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

LOCATION			AREA (Ha) 2 YEAR				5 YEAR				10 YEAR				100 YEAR				FLOW						SEWER DATA											
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Time of Conc.	Intensity 2 Year	Intensity 5 Year	Intensity 10 Year	Intensity 100 Year	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	INV UPS	OBV UPS	T/G UPS	CAPACITY	VELOCITY	TIME OF FLOW	RATIO
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	(min)	Q/Q full
	400	401	0.50	0.68	0.95	0.95			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	73	375	375	PVC	0.30	70.5	103.536	103.911	106.337	96.0323	0.8695	1.3514	0.756
	401	404	0.41	0.68	0.78	1.72			0.00	0.00			0.00	0.00			0.00	0.00	11.35	71.98	97.56	114.33	167.08	124	525	525	CONC	0.20	77.5	103.174	103.699	106.229	192.3297	0.8885	1.4538	0.644
	404	405	0.24	0.68	0.45	2.34			0.00	0.00			0.00	0.00			0.00	0.00	12.81	67.48	91.39	107.07	156.42	158	600	600	CONC	0.15	50.0	102.944	103.544	106.072	237.8056	0.8411	0.9908	0.665
	405	407	0.04	0.68	0.08	2.42			0.00	0.00			0.00	0.00			0.00	0.00	13.80	64.76	87.66	102.68	149.98	157	600	600	CONC	0.15	31.5	102.839	103.439	105.970	237.8056	0.8411	0.6242	0.659
To STREET 21, Pipe 407 - 408						2.42				0.00				0.00				0.00	14.42																	
STREET 26																																				
Contribution From STREET 23, Pipe 503 - 505						0.43				0.00				0.00				0.00	11.06																	
Contribution From STREET 23, Pipe 504 - 505						0.23				0.00				0.00				0.00	10.53																	
	505	506	0.23	0.68	0.43	1.10			0.00	0.00			0.00	0.00			0.00	0.00	11.06	72.96	98.91	115.92	169.41	80	600	600	CONC	0.15	61.5	103.144	103.744	106.270	237.8056	0.8411	1.2187	0.336
	506	507	0.36	0.68	0.68	1.78			0.00	0.00			0.00	0.00			0.00	0.00	12.28	69.04	93.52	109.58	160.10	123	600	600	CONC	0.15	69.5	103.022	103.622	106.155	237.8056	0.8411	1.3772	0.516
To STREET 22, Pipe 507 - 509						1.78				0.00				0.00				0.00	13.66																	
STREET 22																																				
Contribution From STREET 26, Pipe 506 - 507						1.78				0.00				0.00				0.00	13.66																	
	507	509			0.00	1.78			0.00	0.00			0.00	0.00			0.00	0.00	13.66	65.13	88.17	103.27	150.85	116	600	600	CONC	0.15	8.5	102.888	103.488	106.010	237.8056	0.8411	0.1684	0.487
Contribution From STREET 23, Pipe 502 - 509						2.55				0.00				0.00				0.00	14.02																	
Contribution From STREET 23, Pipe 508 - 509						0.43				0.00				0.00				0.00	11.26																	
	509	513	0.09	0.68	0.17	4.93			0.00	0.00			0.00	0.00			0.00	0.00	14.02	64.18	86.86	101.73	148.59	317	675	675	CONC	0.25	59.0	102.800	103.475	105.996	420.2941	1.1745	0.8372	0.753
Contribution From STREET 21, Pipe 511 - 513						0.00				1.72				0.00				0.00	12.30																	
Contribution From STREET 21, Pipe 512 - 513						0.00				0.64				0.00				0.00	11.04																	
	513	514	0.03	0.68	0.06	4.99			0.00	2.36			0.00	0.00			0.00	0.00	14.86	62.10	84.02	98.39	143.69	508	750	750	CONC	0.35	8.0	101.934	102.684	105.885	658.6236	1.4908	0.0894	0.772
	514	515			0.00	4.99			0.00	2.36			0.00	0.00			0.00	0.00	14.95	61.89	83.73	98.05	143.18	507	825	825	CONC	0.25	3.5	101.831	102.656	105.853	717.7178	1.3426	0.0434	0.706
To STREET 22, Pipe 515 - 517						4.99				2.36				0.00				0.00	14.99																	
STREET 22																																				
Contribution From STREET 22, Pipe 514 - 515						4.99				2.36				0.00				0.00	14.99																	
	515	517			0.00	4.99			0.00	2.36			0.00	0.00			0.00	0.00	14.99	61.79	83.58	97.88	142.94	506	900	900	CONC	0.15	53.5	101.747	102.647	105.840	701.1305	1.1021	0.8091	0.722
To STREET 19, Pipe 517 - 519						4.99				2.36				0.00				0.00	15.80																	
STREET 19																																				
	411	412	0.32	0.68	0.60	0.60			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	46	450	450	CONC	0.20	70.5	102.836	103.286	105.789	127.5033	0.8017	1.4657	0.364
To STREET 16, Pipe 412 - 415						0.60				0.00				0.00				0.00	11.47																	
	430	431	0.44	0.68	0.83	0.83			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	64	375	375	PVC	0.30	74.5	102.430	102.805	105.305	96.0323	0.8695	1.4280	0.665
To STREET 17, Pipe 431 - 432						0.83				0.00				0.00				0.00	11.43																	
	518	519	0.26	0.68	0.49	0.49			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	38	300	300	PVC	0.35	50.5	102.773	103.073	105.573	57.2089	0.8093	1.0399	0.660
To STREET 17, Pipe 519 - 522						0.49				0.00				0.00				0.00	11.04																	
	530	531	0.57	0.68	1.08	1.08			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	83	450	450	CONC	0.20	103.0	102.355	102.805	105.306	127.5033	0.8017	2.1413	0.649
To STREET 17, Pipe 531 - 532						1.08				0.00				0.00				0.00	12.14																	
	526	527	0.61	0.68	1.15	1.15			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	89	450	450	CONC	0.20	83.5	102.409	102.859	105.560	127.5033	0.8017	1.7359	0.695
	527	528	0.48	0.68	0.91	2.06			0.00	0.00			0.00	0.00			0.00	0.00	11.74	70.73	95.84	112.30	164.11	146	525	525	CONC	0.20	83.5	102.167	102.692	105.396	192.3297	0.8885	1.5664	0.758
	528	529	0.06	0.68	0.11	2.17			0.00	0.00			0.00	0.00			0.00	0.00	13.30	66.09	89.48	104.81	153.11	144	525	525	CONC	0.20	13.0	101.970	102.495	105.230	192.3297	0.8885	0.2439	0.747
	529	531	0.17	0.68	0.32	2.50			0.00	0.00			0.00	0.00			0.00	0.00	13.55	65.43	88.57	103.75	151.55	163	600	600	CONC	0.15	51.0	101.869	102.469	105.210	237.8056	0.8411	1.0106	0.687
To STREET 17, Pipe 531 - 532						2.50				0.00				0.00				0.00	14.56																	
	516	517	0.73	0.68	1.38	1.38			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	106	450	450	CONC	0.25	116.5	102.838	103.288	105.789	142.5531	0.8963	2.1663	0.744
Contribution From STREET 22, Pipe 515 - 517						4.99				2.36				0.00				0.00	15.80																	
	517	519	0.23	0.68	0.43	6.81			0.00	2.36			0.00	0.00			0.00	0.00	15.80	59.94	81.06	94.91	138.58	599	975	975	CONC	0.15	46.0	101.592	102.567	105.560	867.9562	1.1625	0.6595	0.691
To STREET 17, Pipe 519 - 522						6.81				2.36				0.00				0.00	16.46																	

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA			
Checked: W.L.	LOCATION: City of Ottawa			
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247		Date: 25 Sep 2025	Sheet No. SHEET 6 OF 7

STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

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

	LOCATION		AREA (Ha)																FLOW						SEWER DATA											
			2 YEAR				5 YEAR				10 YEAR				100 YEAR				Time of	Intensity	Intensity	Intensity	Intensity	Peak Flow	DIA. (mm)	DIA. (mm)	TYPE	SLOPE	LENGTH	INV	OBV	T/G	CAPACITY	VELOCITY	TIME OF	RATIO
			AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	AREA	R	Indiv.	Accum.	Conc.	2 Year	5 Year	10 Year	100 Year							UPS	UPS	UPS				
Location	From Node	To Node	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(Ha)		2.78 AC	2.78 AC	(min)	(mm/h)	(mm/h)	(mm/h)	(mm/h)	Q (l/s)	(actual)	(nominal)		(%)	(m)				(l/s)	(m/s)	LOW (min	Q/Q full
Contribution From STREET 16, Pipe 415 - 429						7.71				3.48				0.00				0.00	19.26																	
Contribution From STREET 16, Pipe 424 - 429						3.33				5.03				0.00				0.00	15.73																	
Contribution From STREET 14, Pipe 428 - 429						2.55				0.00				0.00				0.00	14.19																	
	429	431	0.19	0.68	0.36	13.95			0.00	8.51			0.00	0.00			0.00	0.00	19.26	53.25	71.91	84.16	122.81	1355	1350	1350	CONC	0.11	64.0	101.303	102.653	105.290	1770.2160	1.2367	0.8625	0.765
To STREET 17, Pipe 431 - 432						13.95				8.51				0.00				0.00	20.13																	
STREET 17																																				
Contribution From STREET 19, Pipe 429 - 431						13.95				8.51				0.00				0.00	20.13																	
Contribution From STREET 19, Pipe 430 - 431						0.83				0.00				0.00				0.00	11.43																	
	431	432	0.18	0.68	0.34	15.12			0.00	8.51			0.00	0.00			0.00	0.00	20.13	51.83	69.97	81.89	119.47	1379	1350	1350	CONC	0.11	50.5	100.892	102.242	105.161	1770.2160	1.2367	0.6806	0.779
	432	433	0.14	0.68	0.26	15.39			0.00	8.51			0.00	0.00			0.00	0.00	20.81	50.77	68.53	80.19	116.98	1364	1350	1350	CONC	0.11	13.5	100.776	102.126	105.066	1770.2160	1.2367	0.1819	0.771
			0.48	0.68	0.91	16.30			0.00	8.51			0.00	0.00			0.00	0.00																		
	433	434	0.68	0.68	1.29	17.58			0.00	8.51			0.00	0.00			0.00	0.00	20.99	50.49	68.15	79.74	116.34	1467	1350	1350	CONC	0.11	97.0	100.701	102.051	105.042	1770.2160	1.2367	1.3072	0.829
To EAST POND INLET, Pipe 434 - HW4						17.58				8.51				0.00				0.00	22.30																	
Contribution From STREET 19, Pipe 517 - 519						6.81				2.36				0.00				0.00	16.46																	
Contribution From STREET 19, Pipe 518 - 519						0.49				0.00				0.00				0.00	11.04																	
	519	522	0.20	0.68	0.38	7.68			0.00	2.36			0.00	0.00			0.00	0.00	16.46	58.52	79.12	92.63	135.24	636	1050	1050	CONC	0.15	60.0	101.448	102.498	105.470	1057.6053	1.2214	0.8187	0.601
Contribution From STREET 20, Pipe 521 - 522						1.87				0.00				0.00				0.00	13.38																	
	522	525	0.24	0.68	0.45	10.00			0.00	2.36			0.00	0.00			0.00	0.00	17.28	56.86	76.85	89.97	131.33	750	1050	1050	CONC	0.15	65.0	101.207	102.257	105.355	1057.6053	1.2214	0.8870	0.709
Contribution From STREET 18, Pipe 524 - 525						1.89				0.00				0.00				0.00	13.48																	
	525	531	0.15	0.68	0.28	12.17			0.00	2.36			0.00	0.00			0.00	0.00	18.17	55.18	74.55	87.26	127.36	848	1200	1200	CONC	0.15	60.0	100.959	102.159	105.226	1509.9717	1.3351	0.7490	0.562
Contribution From STREET 19, Pipe 529 - 531						2.50				0.00				0.00				0.00	14.56																	
Contribution From STREET 19, Pipe 530 - 531						1.08				0.00				0.00				0.00	12.14																	
			0.08	0.68	0.15	15.90			0.00	2.36			0.00	0.00			0.00	0.00																		
	531	532			0.00	15.90	0.43	0.40	0.48	2.84			0.00	0.00			0.00	0.00	18.91	53.84	72.73	85.12	124.22	1063	1200	1200	CONC	0.15	51.0	100.849	102.049	105.106	1509.9717	1.3351	0.6367	0.704
	532	533	0.02	0.68	0.04	15.94			0.00	2.84			0.00	0.00			0.00	0.00	19.55	52.76	71.25	83.39	121.67	1043	1200	1200	CONC	0.15	13.0	100.742	101.942	105.000	1509.9717	1.3351	0.1623	0.691
	533	534	0.26	0.68	0.49	16.43			0.00	2.84			0.00	0.00			0.00	0.00	19.71	52.50	70.89	82.96	121.04	1064	1200	1200	CONC	0.15	65.0	100.692	101.892	104.980	1509.9717	1.3351	0.8114	0.705
To EAST POND INLET, Pipe 534 - HW5						16.43				2.84				0.00				0.00	20.53																	
EAST POND INLET																																				
Contribution From STREET 17, Pipe 433 - 434						17.58				8.51				0.00				0.00	22.30																	
	434	HW4			0.00	17.58			0.00	8.51			0.00	0.00			0.00	0.00	22.30	48.61	65.58	76.73	111.91	1412	1350	1350	CONC	0.15	22.5	100.534	101.884	104.894	2067.1669	1.4442	0.2597	0.683
Contribution From STREET 17, Pipe 533 - 534						16.43				2.84				0.00				0.00	20.53																	
	534	HW5			0.00	16.43			0.00	2.84			0.00	0.00			0.00	0.00	20.53	51.20	69.12	80.88	118.00	1037	1200	1200	CONC	0.15	22.5	100.534	101.734	104.894	1509.9717	1.3351	0.2809	0.687

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

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

Designed: M.S.	PROJECT: STITTSVILLE SOUTH URBAN EXPANSION AREA			
Checked: W.L.	LOCATION: City of Ottawa			
Dwg. Reference: Storm Servicing Plan, Servicing Profiles	File Ref: 21-1247		Date: 25 Sep 2025	Sheet No. SHEET 7 OF 7

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

Orifice 1		Orifice 2		Orifice 3	
Dia. (mm)	160	Height (m)	0.3	Height (m)	0.6
Cross Sect. Area (m^2)	0.0201	Length (m)	0.25	Length (m)	0.6
Orifice Coeff.	0.62	Cross Sect. Area (m^2)	0.075	Cross Sect. Area (m^2)	0.36
Inv. Elev. (m)	101.80	Orifice Coeff.	0.62	Orifice Coeff.	0.62
		Inv. Elev. (m)	102.45	Inv. Elev. (m)	103.35

SWM FACILITY DISCHARGE CALCULATIONS - West Pond Normal Conditions

Pond Characteristic	Elevation	Orifice 1		Orifice 2		Orifice 3		Total Discharge From Pond
		Head	Discharge	Head	Discharge	Head	Discharge	
	(m)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)
Permanent Pool = 101.8	101.80	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.85	0.05	0.002	0.00	0.000	0.00	0.000	0.002
	101.90	0.10	0.008	0.00	0.000	0.00	0.000	0.008
	101.95	0.15	0.015	0.00	0.000	0.00	0.000	0.015
	102.00	0.20	0.019	0.00	0.000	0.00	0.000	0.019
	102.05	0.25	0.023	0.00	0.000	0.00	0.000	0.023
	102.10	0.30	0.026	0.00	0.000	0.00	0.000	0.026
	102.15	0.35	0.029	0.00	0.000	0.00	0.000	0.029
	102.20	0.40	0.031	0.00	0.000	0.00	0.000	0.031
	102.25	0.45	0.034	0.00	0.000	0.00	0.000	0.034
	102.30	0.50	0.036	0.00	0.000	0.00	0.000	0.036
	102.35	0.55	0.038	0.00	0.000	0.00	0.000	0.038
	102.40	0.60	0.040	0.00	0.000	0.00	0.000	0.040
Erosion Control Water Level = 102.45	102.45	0.65	0.042	0.00	0.000	0.00	0.000	0.042
	102.50	0.70	0.043	0.05	0.005	0.00	0.000	0.048
	102.55	0.75	0.045	0.10	0.013	0.00	0.000	0.059
	102.60	0.80	0.047	0.15	0.024	0.00	0.000	0.070
	102.65	0.85	0.048	0.20	0.035	0.00	0.000	0.083
2-Year Storm Water Level = 102.67	102.70	0.90	0.050	0.25	0.046	0.00	0.000	0.096
	102.75	0.95	0.052	0.30	0.057	0.00	0.000	0.109
	102.80	1.00	0.053	0.35	0.092	0.00	0.000	0.145
	102.85	1.05	0.054	0.40	0.103	0.00	0.000	0.157
5-Year Storm Water Level = 102.9	102.90	1.10	0.056	0.45	0.113	0.00	0.000	0.169
	102.95	1.15	0.057	0.50	0.122	0.00	0.000	0.179
	103.00	1.20	0.058	0.55	0.130	0.00	0.000	0.189
	103.05	1.25	0.060	0.60	0.138	0.00	0.000	0.198
10-Year Storm Water Level = 103.08	103.10	1.30	0.061	0.65	0.146	0.00	0.000	0.207
	103.15	1.35	0.062	0.70	0.153	0.00	0.000	0.215
	103.20	1.40	0.063	0.75	0.160	0.00	0.000	0.223
	103.25	1.45	0.065	0.80	0.166	0.00	0.000	0.231
25-Year Storm Water Level = 103.3	103.30	1.50	0.066	0.85	0.172	0.00	0.000	0.238
	103.35	1.55	0.067	0.90	0.178	0.00	0.000	0.245
	103.40	1.60	0.068	0.95	0.184	0.05	0.012	0.264
	103.45	1.65	0.069	1.00	0.190	0.10	0.034	0.293
50-Year Storm Water Level = 103.46	103.50	1.70	0.070	1.05	0.195	0.15	0.061	0.327
	103.55	1.75	0.071	1.10	0.201	0.20	0.092	0.364
100-Year Storm Water Level = 103.6	103.60	1.80	0.072	1.15	0.206	0.25	0.127	0.405
	103.65	1.85	0.073	1.20	0.211	0.30	0.163	0.448
	103.70	1.90	0.074	1.25	0.216	0.35	0.202	0.492
	103.75	1.95	0.076	1.30	0.221	0.40	0.242	0.538
	103.80	2.00	0.077	1.35	0.226	0.45	0.283	0.585
	103.85	2.05	0.078	1.40	0.230	0.50	0.325	0.633
	103.90	2.10	0.078	1.45	0.235	0.55	0.368	0.681
	103.95	2.15	0.079	1.50	0.239	0.60	0.410	0.729
	104.00	2.20	0.080	1.55	0.244	0.65	0.585	0.909
	104.05	2.25	0.081	1.60	0.248	0.70	0.625	0.955
	104.10	2.30	0.082	1.65	0.252	0.75	0.663	0.998
	104.15	2.35	0.083	1.70	0.256	0.80	0.699	1.039
	104.20	2.40	0.084	1.75	0.261	0.85	0.733	1.078
	104.25	2.45	0.085	1.80	0.265	0.90	0.766	1.115
	104.30	2.50	0.086	1.85	0.269	0.95	0.797	1.152
	104.35	2.55	0.087	1.90	0.272	1.00	0.827	1.186
Top of Pond Berm = 104.4	104.40	2.60	0.088	1.95	0.276	1.05	0.856	1.220

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

SWM FACILITY STORAGE CALCULATIONS - Stittsville West Pond Normal Conditions

Permanent Pool Volume Required:	6351 m^3	
Permanent Pool Volume Provided:	7010 m^3	**110% of Required Permanent Pool**
Extended Detention/Erosion Control Volume Required:	5690 m^3	
Extended Detention/Erosion Control Volume Provided:	5915 m^3	**104% of Required Extended Detention**
Bottom of Pond:	99.80 m	
Permanent Pool:	101.80 m	
Incremental Depth:	0.05 m	

Pond Characteristic	Elevation (m)	Stage (m)	Area (m2)	Average Area (m^2)	Incremental Storage (m^3)	Cumulative Storage (m^3)	Cumulative Storage above Permanent Pool (m^3)
Bottom of Pond = 99.8	99.80	0.00	1498.38		0	**0**	**0**
	99.85	0.05	1533.76	1516	76	**76**	**0**
	99.90	0.10	1571.53	1553	78	**153**	**0**
	99.95	0.15	1609.50	1591	80	**233**	**0**
	100.00	0.20	1647.66	1629	81	**314**	**0**
	100.05	0.25	1686.19	1667	83	**398**	**0**
	100.10	0.30	1724.71	1705	85	**483**	**0**
	100.15	0.35	1763.38	1744	87	**570**	**0**
	100.20	0.40	1802.26	1783	89	**659**	**0**
	100.25	0.45	1841.92	1822	91	**750**	**0**
	100.30	0.50	1881.20	1862	93	**844**	**0**
	100.35	0.55	1921.04	1901	95	**939**	**0**
	100.40	0.60	1961.12	1941	97	**1036**	**0**
	100.45	0.65	2001.16	1981	99	**1135**	**0**
	100.50	0.70	2041.52	2021	101	**1236**	**0**
	100.55	0.75	2082.51	2062	103	**1339**	**0**
	100.60	0.80	2123.31	2103	105	**1444**	**0**
	100.65	0.85	2164.29	2144	107	**1551**	**0**
	100.70	0.90	2205.71	2185	109	**1660**	**0**
	100.75	0.95	2247.35	2227	111	**1772**	**0**
	100.80	1.00	2291.18	2269	113	**1885**	**0**
	100.85	1.05	3348.12	2820	141	**2026**	**0**
	100.90	1.10	3435.28	3392	170	**2196**	**0**
	100.95	1.15	3522.16	3479	174	**2370**	**0**
	101.00	1.20	3610.27	3566	178	**2548**	**0**
	101.05	1.25	3698.29	3654	183	**2731**	**0**
	101.10	1.30	3787.12	3743	187	**2918**	**0**
	101.15	1.35	3876.46	3832	192	**3109**	**0**
	101.20	1.40	3966.06	3921	196	**3306**	**0**
	101.25	1.45	4056.26	4011	201	**3506**	**0**
	101.30	1.50	4146.81	4102	205	**3711**	**0**
	101.35	1.55	4237.84	4192	210	**3921**	**0**
	101.40	1.60	4329.29	4284	214	**4135**	**0**
	101.45	1.65	4421.06	4375	219	**4354**	**0**
	101.50	1.70	7489.01	5955	298	**4652**	**0**
	101.55	1.75	7609.49	7549	377	**5029**	**0**
	101.60	1.80	7735.23	7672	384	**5413**	**0**
	101.65	1.85	7861.09	7798	390	**5802**	**0**
	101.70	1.90	7986.71	7924	396	**6199**	**0**
	101.75	1.95	8113.16	8050	402	**6601**	**0**
Permanent Pool = 101.8	101.80	2.00	8243.45	8178	409	**7010**	**0**
	101.85	2.05	8368.93	8306	415	**7425**	**415**
	101.90	2.10	8499.79	8434	422	**7847**	**837**
	101.95	2.15	8631.14	8565	428	**8275**	**1265**
	102.00	2.20	8762.99	8697	435	**8710**	**1700**
	102.05	2.25	8895.34	8829	441	**9152**	**2142**
	102.10	2.30	9028.82	8962	448	**9600**	**2590**
	102.15	2.35	9162.59	9096	455	**10055**	**3045**
	102.20	2.40	9297.39	9230	461	**10516**	**3506**
	102.25	2.45	9432.99	9365	468	**10984**	**3974**
	102.30	2.50	9568.67	9501	475	**11459**	**4449**
	102.35	2.55	9705.12	9637	482	**11941**	**4931**
	102.40	2.60	9843.51	9774	489	**12430**	**5420**
Erosion Control Water Level = 102.45	102.45	2.65	9981.37	9912	496	**12926**	**5915**

	102.50	2.70	10120.58	10051	503	**13428**	**6418**
	102.55	2.75	10259.82	10190	510	**13938**	**6928**
	102.60	2.80	10400.01	10330	516	**14454**	**7444**
	102.65	2.85	10540.97	10470	524	**14978**	**7968**
2-Year Storm Water Level = 102.67	102.70	2.90	10682.70	10612	531	**15508**	**8498**
	102.75	2.95	10825.15	10754	538	**16046**	**9036**
	102.80	3.00	10971.97	10899	545	**16591**	**9581**
	102.85	3.05	11742.72	11357	568	**17159**	**10149**
5-Year Storm Water Level = 102.9	102.90	3.10	11844.04	11793	590	**17748**	**10738**
	102.95	3.15	11946.71	11895	595	**18343**	**11333**
	103.00	3.20	12049.49	11998	600	**18943**	**11933**
	103.05	3.25	12153.49	12101	605	**19548**	**12538**
10-Year Storm Water Level = 103.08	103.10	3.30	12258.17	12206	610	**20158**	**13148**
	103.15	3.35	12363.49	12311	616	**20774**	**13764**
	103.20	3.40	12469.19	12416	621	**21395**	**14385**
	103.25	3.45	12575.94	12523	626	**22021**	**15011**
25-Year Storm Water Level = 103.3	103.30	3.50	12682.81	12629	631	**22652**	**15642**
	103.35	3.55	12791.22	12737	637	**23289**	**16279**
	103.40	3.60	12899.55	12845	642	**23932**	**16921**
	103.45	3.65	13009.11	12954	648	**24579**	**17569**
50-Year Storm Water Level = 103.46	103.50	3.70	13118.90	13064	653	**25232**	**18222**
	103.55	3.75	13229.99	13174	659	**25891**	**18881**
100-Year Storm Water Level = 103.6	103.60	3.80	13341.52	13286	664	**26555**	**19545**
	103.65	3.85	13454.06	13398	670	**27225**	**20215**
	103.70	3.90	13566.52	13510	676	**27901**	**20891**
	103.75	3.95	13680.26	13623	681	**28582**	**21572**
	103.80	4.00	13794.42	13737	687	**29269**	**22259**
	103.85	4.05	13909.42	13852	693	**29961**	**22951**
	103.90	4.10	14024.87	13967	698	**30660**	**23650**
	103.95	4.15	14141.32	14083	704	**31364**	**24354**
	104.00	4.20	14258.46	14200	710	**32074**	**25064**
	104.05	4.25	14376.29	14317	716	**32790**	**25780**
	104.10	4.30	14495.01	14436	722	**33512**	**26502**
	104.15	4.35	14614.19	14555	728	**34239**	**27229**
	104.20	4.40	14734.29	14674	734	**34973**	**27963**
	104.25	4.45	14854.57	14794	740	**35713**	**28703**
	104.30	4.50	15107.72	14981	749	**36462**	**29452**
	104.35	4.55	16437.25	15772	789	**37250**	**30240**
Top of Pond Berm = 104.4	104.40	4.60	17806.66	17122	856	38107	31096

Project Name: Stittsville
Project Number: 1247
Designed By: JC
Checked By: VM
Date Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

PERMANENT POOL AND EXTENDED DETENTION - West Pond

Pond Drainage Catchment & Design

Area
34.77 ha

Treatment Level :	Enhanced	
Treatment Percentage:	80%	
SWM Facility :	Wet Pond	
Imperviousness :	69	%

Permanent Pool Requirements

MOE 2003 Table 3.2 Interpolated Water Quality Volume :	223	m^3/ha
Unitary Permanent Pool (Less 40 m^3/ha for active storage) :	183	m^3/ha

Extended Detention and Erosion Control Requirements

Maximum of :	**MOE 2003 Active Storage =**	40	m^3/ha
	25mm Storm Runoff Volume =	5.69	ML
	OR		
	Unitary Erosion Control Volume =	0	m^3/imp-ha

Quality Control Summary

	Volume (m^3)
Required Permanent Pool Volume	6351
Provided Permanent Pool Volume	7010
Required Extended Detention/Erosion Control	
MOE 2003 Active Storage	*1391*
25mm Storm Runoff Volume	*5690*
Unitary Erosion Control Volume	*0*
Maximum Required ED/Erosion Control	5690
Provided ED/Erosion Control	5915

Project Name:	Stittsville
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DSEL
David Schaeffer Engineering Limited
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Orifice 1		Orifice 2		Orifice 3	
Dia. (mm)	160	Height (m)	0.3	Height (m)	0.6
Cross Sect. Area (m^2)	0.0201	Length (m)	0.25	Length (m)	0.6
Orifice Coeff.	0.62	Cross Sect. Area (m^2)	0.075	Cross Sect. Area (m^2)	0.36
Inv. Elev. (m)	102.77	Orifice Coeff.	0.62	Orifice Coeff.	0.62
		Inv. Elev. (m)	102.77	Inv. Elev. (m)	103.35

SWM FACILITY DISCHARGE CALCULATIONS - West Pond Restrictive Conditions

Pond Characteristic	Elevation	Orifice 1		Orifice 2		Orifice 3		Total Discharge From Pond
		Head	Discharge	Head	Discharge	Head	Discharge	
	(m)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)
Permanent Pool = 101.8	101.80	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.85	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.90	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.95	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.00	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.05	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.10	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.15	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.20	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.25	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.30	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.35	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.40	0.00	0.000	0.00	0.000	0.00	0.000	0.000
Erosion Control Water Level = 102.45	102.45	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.50	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.55	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.60	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.65	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.70	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.75	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	102.80	0.03	0.001	0.03	0.002	0.00	0.000	0.003
	102.85	0.08	0.004	0.08	0.010	0.00	0.000	0.014
2-Year Storm Water Level = 102.89	102.90	0.13	0.012	0.13	0.019	0.00	0.000	0.032
	102.95	0.18	0.017	0.18	0.030	0.00	0.000	0.048
	103.00	0.23	0.021	0.23	0.041	0.00	0.000	0.063
5-Year Storm Water Level = 103.04	103.05	0.28	0.025	0.28	0.053	0.00	0.000	0.078
	103.10	0.33	0.028	0.33	0.087	0.00	0.000	0.115
	103.15	0.38	0.030	0.38	0.099	0.00	0.000	0.129
10-Year Storm Water Level = 103.19	103.20	0.43	0.033	0.43	0.109	0.00	0.000	0.142
	103.25	0.48	0.035	0.48	0.118	0.00	0.000	0.153
	103.30	0.53	0.037	0.53	0.127	0.00	0.000	0.164
	103.35	0.58	0.039	0.58	0.135	0.00	0.000	0.174
25-Year Storm Water Level = 103.4	103.40	0.63	0.041	0.63	0.143	0.05	0.012	0.196
	103.45	0.68	0.043	0.68	0.150	0.10	0.034	0.226
	103.50	0.73	0.045	0.73	0.157	0.15	0.061	0.262
50-Year Storm Water Level = 103.53	103.55	0.78	0.046	0.78	0.163	0.20	0.092	0.302
	103.60	0.83	0.048	0.83	0.170	0.25	0.127	0.344
	103.65	0.88	0.049	0.88	0.176	0.30	0.163	0.389
100-Year Storm Water Level = 103.66	103.70	0.93	0.051	0.93	0.182	0.35	0.202	0.435
	103.75	0.98	0.052	0.98	0.188	0.40	0.242	0.482
	103.80	1.03	0.054	1.03	0.193	0.45	0.283	0.530
	103.85	1.08	0.055	1.08	0.199	0.50	0.325	0.579
	103.90	1.13	0.057	1.13	0.204	0.55	0.368	0.628
	103.95	1.18	0.058	1.18	0.209	0.60	0.410	0.677
	104.00	1.23	0.059	1.23	0.214	0.65	0.585	0.858
	104.05	1.28	0.060	1.28	0.219	0.70	0.625	0.905
	104.10	1.33	0.062	1.33	0.224	0.75	0.663	0.949
	104.15	1.38	0.063	1.38	0.228	0.80	0.699	0.990
	104.20	1.43	0.064	1.43	0.233	0.85	0.733	1.030
	104.25	1.48	0.065	1.48	0.238	0.90	0.766	1.069
	104.30	1.53	0.066	1.53	0.242	0.95	0.797	1.106
	104.35	1.58	0.068	1.58	0.246	1.00	0.827	1.141
Top of Pond Berm = 104.4	104.40	1.63	0.069	1.63	0.251	1.05	0.856	1.176

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

SWM FACILITY STORAGE CALCULATIONS - Stittsville West Pond Restrictive Conditions

Permanent Pool Volume Required:	6351 m^3	
Permanent Pool Volume Provided:	7010 m^3	**110% of Required Permanent Pool**
Extended Detention/Erosion Control Volume Required:	5690 m^3	
Extended Detention/Erosion Control Volume Provided:	5915 m^3	**104% of Required Extended Detention**
Bottom of Pond:	99.80 m	
Permanent Pool:	101.80 m	
Incremental Depth:	0.05 m	

Pond Characteristic	**Elevation** (m)	**Stage** (m)	**Area** (m2)	**Average Area** (m^2)	**Incremental Storage** (m^3)	**Cumulative Storage** (m^3)	**Cumulative Storage above Permanent Pool** (m^3)
Bottom of Pond = 99.8	99.80	0.00	1498.38		0	**0**	**0**
	99.85	0.05	1533.76	1516	76	**76**	**0**
	99.90	0.10	1571.53	1553	78	**153**	**0**
	99.95	0.15	1609.50	1591	80	**233**	**0**
	100.00	0.20	1647.66	1629	81	**314**	**0**
	100.05	0.25	1686.19	1667	83	**398**	**0**
	100.10	0.30	1724.71	1705	85	**483**	**0**
	100.15	0.35	1763.38	1744	87	**570**	**0**
	100.20	0.40	1802.26	1783	89	**659**	**0**
	100.25	0.45	1841.92	1822	91	**750**	**0**
	100.30	0.50	1881.20	1862	93	**844**	**0**
	100.35	0.55	1921.04	1901	95	**939**	**0**
	100.40	0.60	1961.12	1941	97	**1036**	**0**
	100.45	0.65	2001.16	1981	99	**1135**	**0**
	100.50	0.70	2041.52	2021	101	**1236**	**0**
	100.55	0.75	2082.51	2062	103	**1339**	**0**
	100.60	0.80	2123.31	2103	105	**1444**	**0**
	100.65	0.85	2164.29	2144	107	**1551**	**0**
	100.70	0.90	2205.71	2185	109	**1660**	**0**
	100.75	0.95	2247.35	2227	111	**1772**	**0**
	100.80	1.00	2291.18	2269	113	**1885**	**0**
	100.85	1.05	3348.12	2820	141	**2026**	**0**
	100.90	1.10	3435.28	3392	170	**2196**	**0**
	100.95	1.15	3522.16	3479	174	**2370**	**0**
	101.00	1.20	3610.27	3566	178	**2548**	**0**
	101.05	1.25	3698.29	3654	183	**2731**	**0**
	101.10	1.30	3787.12	3743	187	**2918**	**0**
	101.15	1.35	3876.46	3832	192	**3109**	**0**
	101.20	1.40	3966.06	3921	196	**3306**	**0**
	101.25	1.45	4056.26	4011	201	**3506**	**0**
	101.30	1.50	4146.81	4102	205	**3711**	**0**
	101.35	1.55	4237.84	4192	210	**3921**	**0**
	101.40	1.60	4329.29	4284	214	**4135**	**0**
	101.45	1.65	4421.06	4375	219	**4354**	**0**
	101.50	1.70	7489.01	5955	298	**4652**	**0**
	101.55	1.75	7609.49	7549	377	**5029**	**0**
	101.60	1.80	7735.23	7672	384	**5413**	**0**
	101.65	1.85	7861.09	7798	390	**5802**	**0**
	101.70	1.90	7986.71	7924	396	**6199**	**0**
	101.75	1.95	8113.16	8050	402	**6601**	**0**
Permanent Pool = 101.8	101.80	2.00	8243.45	8178	409	**7010**	**0**
	101.85	2.05	8368.93	8306	415	**7425**	**415**
	101.90	2.10	8499.79	8434	422	**7847**	**837**
	101.95	2.15	8631.14	8565	428	**8275**	**1265**
	102.00	2.20	8762.99	8697	435	**8710**	**1700**
	102.05	2.25	8895.34	8829	441	**9152**	**2142**
	102.10	2.30	9028.82	8962	448	**9600**	**2590**
	102.15	2.35	9162.59	9096	455	**10055**	**3045**
	102.20	2.40	9297.39	9230	461	**10516**	**3506**
	102.25	2.45	9432.99	9365	468	**10984**	**3974**
	102.30	2.50	9568.67	9501	475	**11459**	**4449**
	102.35	2.55	9705.12	9637	482	**11941**	**4931**
	102.40	2.60	9843.51	9774	489	**12430**	**5420**
Erosion Control Water Level = 102.45	102.45	2.65	9981.37	9912	496	**12926**	**5915**

	102.50	2.70	10120.58	10051	503	**13428**	**6418**
	102.55	2.75	10259.82	10190	510	**13938**	**6928**
	102.60	2.80	10400.01	10330	516	**14454**	**7444**
	102.65	2.85	10540.97	10470	524	**14978**	**7968**
	102.70	2.90	10682.70	10612	531	**15508**	**8498**
	102.75	2.95	10825.15	10754	538	**16046**	**9036**
	102.80	3.00	10971.97	10899	545	**16591**	**9581**
	102.85	3.05	11742.72	11357	568	**17159**	**10149**
2-Year Storm Water Level = 102.89	102.90	3.10	11844.04	11793	590	**17748**	**10738**
	102.95	3.15	11946.71	11895	595	**18343**	**11333**
	103.00	3.20	12049.49	11998	600	**18943**	**11933**
5-Year Storm Water Level = 103.04	103.05	3.25	12153.49	12101	605	**19548**	**12538**
	103.10	3.30	12258.17	12206	610	**20158**	**13148**
	103.15	3.35	12363.49	12311	616	**20774**	**13764**
10-Year Storm Water Level = 103.19	103.20	3.40	12469.19	12416	621	**21395**	**14385**
	103.25	3.45	12575.94	12523	626	**22021**	**15011**
	103.30	3.50	12682.81	12629	631	**22652**	**15642**
	103.35	3.55	12791.22	12737	637	**23289**	**16279**
25-Year Storm Water Level = 103.4	103.40	3.60	12899.55	12845	642	**23932**	**16921**
	103.45	3.65	13009.11	12954	648	**24579**	**17569**
	103.50	3.70	13118.90	13064	653	**25232**	**18222**
50-Year Storm Water Level = 103.53	103.55	3.75	13229.99	13174	659	**25891**	**18881**
	103.60	3.80	13341.52	13286	664	**26555**	**19545**
	103.65	3.85	13454.06	13398	670	**27225**	**20215**
100-Year Storm Water Level = 103.66	103.70	3.90	13566.52	13510	676	**27901**	**20891**
	103.75	3.95	13680.26	13623	681	**28582**	**21572**
	103.80	4.00	13794.42	13737	687	**29269**	**22259**
	103.85	4.05	13909.42	13852	693	**29961**	**22951**
	103.90	4.10	14024.87	13967	698	**30660**	**23650**
	103.95	4.15	14141.32	14083	704	**31364**	**24354**
	104.00	4.20	14258.46	14200	710	**32074**	**25064**
	104.05	4.25	14376.29	14317	716	**32790**	**25780**
	104.10	4.30	14495.01	14436	722	**33512**	**26502**
	104.15	4.35	14614.19	14555	728	**34239**	**27229**
	104.20	4.40	14734.29	14674	734	**34973**	**27963**
	104.25	4.45	14854.57	14794	740	**35713**	**28703**
	104.30	4.50	15107.72	14981	749	**36462**	**29452**
	104.35	4.55	16437.25	15772	789	**37250**	**30240**
Top of Pond Berm = 104.4	104.40	4.60	17806.66	17122	856	**38107**	**31096**

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

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Markham, ON L3R 0E7

ALLOWABLE POND VOLUME AND DISCHARGE RATES - STITTSVILLE WEST POND

Drainage area	34.77	ha
Imp %	69	%
Imp area	24.0	ha

		Normal Conditions			**Restrictive Conditions**		
Pond Component	**Target Outflow**	**Peak Outflow**	**Pond Volume**	**Pond Elevation**	**Peak Outflow**	**Pond Volume**	**Pond Elevation**
	m3/s	m3/s	m3	masl	m3/s	m3	masl
Permanent Pool	N/A	N/A	7010	101.80	N/A	7010	101.80
Erosion Control/Extended Det.	0.061	0.042	12926	102.45	0.000	12926	102.45
2 Year Design Storm	0.140	0.100	15199	102.67	0.029	17588	102.89
5 Year Design Storm	0.177	0.169	17794	102.90	0.093	19456	103.04
10 Year Design Storm	0.206	0.204	19964	103.08	0.139	21280	103.19
25 Year Design Storm	0.321	0.239	22715	103.30	0.195	23898	103.40
50 Year Design Storm	0.430	0.301	24680	103.46	0.295	25621	103.53
100 Year Design Storm	0.590	0.424	26560	103.60	0.432	27411	103.66

[1]Target outflow based on maximum release rate between free and restrictive downstream conditions as per JFSA SWM Pond Report.

[2]Active storage volume plus permanent pool volume.

[3]Erosion Control / Extended Detention based on total runoff volume from Chicago 25mm 3hr storm event.

[4]Restricted outlet based on 102.77m as per JFSA SWM Pond Report.

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DRAWDOWN TIME CALCULATION - West Pond

Ministry of the Environment
Stormwater Management Planning and Design Manual (March 2003)

Equation 4.11: Drawdown Time

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_O} = \textbf{256,796 sec}$$

$$= \textbf{71.3 hr}$$

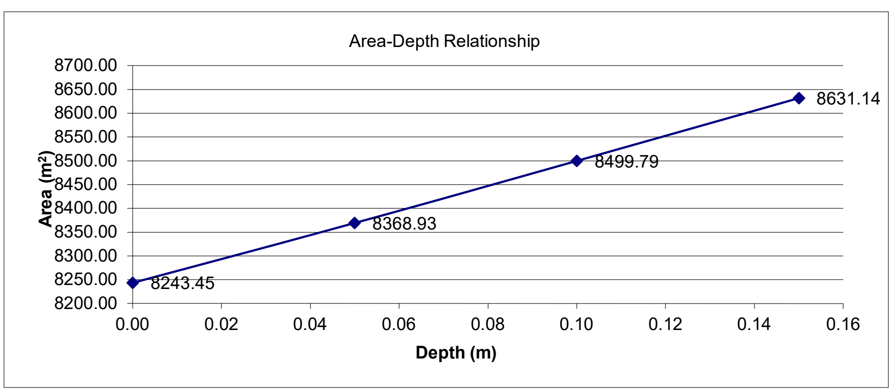
3.0 days

t = drawdown time (sec)
A_O = cross-sectional area of the orifice (m^2)
h = maximum water elevation above the orifice (m)
C_2 = slope coefficient from the area-depth linear regression
C_3 = intercept from the area-depth linear regression

Input Parameters:

Orifice Diameter =	0.160	m
Extended Detention Elevation =	102.45	m
Extended Detention Head, h =	0.65	m
A_O =	0.020	m^2
C_2 =	2678	
C_3 =	8231	

		X - Values	Y - Values
Pond Stage	**Elevation** (m)	**Depth** (m)	**Area** (m^2)
PP	101.80	0.00	8243.45
	101.85	0.05	8368.93
	101.90	0.10	8499.79
	101.95	0.15	8631.14
	102.00	0.20	8762.99
	102.05	0.25	8895.344
	102.1	0.30	9028.819
	102.15	0.35	9162.5885
	102.2	0.40	9297.3935
	102.25	0.45	9432.987
	102.3	0.50	9568.666
	102.35	0.55	9705.124
	102.4	0.60	9843.5105
ED	102.45	0.65	9981.365



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Orifice 1		Orifice 2		Orifice 3	
Dia. (mm)	150	Height (m)	0.6	Height (m)	0.5
Cross Sect. Area (m^2)	0.0177	Length (m)	0.5	Length (m)	0.5
Orifice Coeff.	0.62	Cross Sect. Area (m^2)	0.3	Cross Sect. Area (m^2)	0.25
Inv. Elev. (m)	100.50	Orifice Coeff.	0.62	Orifice Coeff.	0.62
		Inv. Elev. (m)	101.05	Inv. Elev. (m)	101.70

SWM FACILITY DISCHARGE CALCULATIONS - East Pond Normal Conditions

Pond Characteristic	Elevation	Orifice 1		Orifice 2		Orifice 3		Total Discharge From Pond
		Head	Discharge	Head	Discharge	Head	Discharge	
	(m)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)
Permanent Pool = 100.5	100.50	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.55	0.05	0.002	0.00	0.000	0.00	0.000	0.002
	100.60	0.10	0.008	0.00	0.000	0.00	0.000	0.008
	100.65	0.15	0.013	0.00	0.000	0.00	0.000	0.013
	100.70	0.20	0.017	0.00	0.000	0.00	0.000	0.017
	100.75	0.25	0.020	0.00	0.000	0.00	0.000	0.020
	100.80	0.30	0.023	0.00	0.000	0.00	0.000	0.023
	100.85	0.35	0.025	0.00	0.000	0.00	0.000	0.025
	100.90	0.40	0.028	0.00	0.000	0.00	0.000	0.028
	100.95	0.45	0.030	0.00	0.000	0.00	0.000	0.030
	101.00	0.50	0.032	0.00	0.000	0.00	0.000	0.032
Erosion Control Water Level = 101.05	101.05	0.55	0.033	0.00	0.000	0.00	0.000	0.033
	101.10	0.60	0.035	0.05	0.010	0.00	0.000	0.045
	101.15	0.65	0.037	0.10	0.028	0.00	0.000	0.065
	101.20	0.70	0.038	0.15	0.050	0.00	0.000	0.089
2-Year Storm Water Level = 101.21	101.25	0.75	0.040	0.20	0.076	0.00	0.000	0.116
	101.30	0.80	0.041	0.25	0.104	0.00	0.000	0.145
	101.35	0.85	0.043	0.30	0.133	0.00	0.000	0.176
5-Year Storm Water Level = 101.38	101.40	0.90	0.044	0.35	0.164	0.00	0.000	0.208
	101.45	0.95	0.045	0.40	0.196	0.00	0.000	0.241
10-Year Storm Water Level = 101.5	101.50	1.00	0.047	0.45	0.228	0.00	0.000	0.274
	101.55	1.05	0.048	0.50	0.260	0.00	0.000	0.308
	101.60	1.10	0.049	0.55	0.293	0.00	0.000	0.342
25-Year Storm Water Level = 101.64	101.65	1.15	0.050	0.60	0.325	0.00	0.000	0.375
	101.70	1.20	0.051	0.65	0.487	0.00	0.000	0.539
50-Year Storm Water Level = 101.75	101.75	1.25	0.053	0.70	0.521	0.05	0.010	0.584
	101.80	1.30	0.054	0.75	0.553	0.10	0.028	0.634
	101.85	1.35	0.055	0.80	0.583	0.15	0.050	0.688
100-Year Storm Water Level = 101.86	101.90	1.40	0.056	0.85	0.611	0.20	0.076	0.743
	101.95	1.45	0.057	0.90	0.638	0.25	0.104	0.799
	102.00	1.50	0.058	0.95	0.664	0.30	0.133	0.855
	102.05	1.55	0.059	1.00	0.689	0.35	0.164	0.912
	102.10	1.60	0.060	1.05	0.713	0.40	0.196	0.969
	102.15	1.65	0.061	1.10	0.737	0.45	0.228	1.026
	102.20	1.70	0.062	1.15	0.760	0.50	0.260	1.082
	102.25	1.75	0.063	1.20	0.782	0.55	0.376	1.220
	102.30	1.80	0.064	1.25	0.803	0.60	0.406	1.273
	102.35	1.85	0.065	1.30	0.824	0.65	0.434	1.323
	102.40	1.90	0.066	1.35	0.844	0.70	0.461	1.370
	102.45	1.95	0.066	1.40	0.864	0.75	0.485	1.416
	102.50	2.00	0.067	1.45	0.884	0.80	0.509	1.460
	102.55	2.05	0.068	1.50	0.903	0.85	0.532	1.503
	102.60	2.10	0.069	1.55	0.921	0.90	0.554	1.544
	102.65	2.15	0.070	1.60	0.939	0.95	0.574	1.584
	102.70	2.20	0.071	1.65	0.957	1.00	0.595	1.623
	102.75	2.25	0.072	1.70	0.975	1.05	0.614	1.660
	102.80	2.30	0.072	1.75	0.992	1.10	0.633	1.697
	102.85	2.35	0.073	1.80	1.009	1.15	0.651	1.734
	102.90	2.40	0.074	1.85	1.026	1.20	0.669	1.769
	102.95	2.45	0.075	1.90	1.042	1.25	0.687	1.803
	103.00	2.50	0.076	1.95	1.058	1.30	0.704	1.837
	103.05	2.55	0.076	2.00	1.074	1.35	0.720	1.871
Top of Pond Berm = 103.1	103.10	2.60	0.077	2.05	1.090	1.40	0.736	1.903

Project Name:	Stittsville
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SWM FACILITY STORAGE CALCULATIONS - Stittsville East Pond Normal Conditions

Permanent Pool Volume Required:	4889 m^3	
Permanent Pool Volume Provided:	5721 m^3	**117% of Required Permanent Pool**
Extended Detention/Erosion Control Volume Required:	4440 m^3	
Extended Detention/Erosion Control Volume Provided:	4714 m^3	**106% of Required Extended Detention**
Bottom of Pond:	98.50 m	
Permanent Pool:	100.50 m	
Incremental Depth:	0.05 m	

Pond Characteristic	Elevation (m)	Stage (m)	Area (m2)	Average Area (m^2)	Incremental Storage (m^3)	Cumulative Storage (m^3)	Cumulative Storage above Permanent Pool (m^3)
Bottom of Pond = 98.5	98.5	0.00	1376.17		0	**0**	**0**
	98.55	0.05	1420.7915	1398	70	**70**	**0**
	98.6	0.10	1467.7785	1444	72	**142**	**0**
	98.65	0.15	1515.041	1491	75	**217**	**0**
	98.7	0.20	1562.484	1539	77	**294**	**0**
	98.75	0.25	1610.2025	1586	79	**373**	**0**
	98.8	0.30	1658.1015	1634	82	**455**	**0**
	98.85	0.35	1706.2285	1682	84	**539**	**0**
	98.9	0.40	1754.612	1730	87	**625**	**0**
	98.95	0.45	1803.195	1779	89	**714**	**0**
	99	0.50	1852.044	1828	91	**806**	**0**
	99.05	0.55	1901.1875	1877	94	**899**	**0**
	99.1	0.60	1950.4355	1926	96	**996**	**0**
	99.15	0.65	1999.978	1975	99	**1095**	**0**
	99.2	0.70	2049.758	2025	101	**1196**	**0**
	99.25	0.75	2099.69	2075	104	**1299**	**0**
	99.3	0.80	2149.888	2125	106	**1406**	**0**
	99.35	0.85	2200.39	2175	109	**1514**	**0**
	99.4	0.90	2251.1485	2226	111	**1626**	**0**
	99.45	0.95	2302.0685	2277	114	**1740**	**0**
	99.5	1.00	2355.126	2329	116	**1856**	**0**
	99.55	1.05	2707.5285	2531	127	**1983**	**0**
	99.6	1.10	2779.244	2743	137	**2120**	**0**
	99.65	1.15	2851.159	2815	141	**2261**	**0**
	99.7	1.20	2923.815	2887	144	**2405**	**0**
	99.75	1.25	2997.2405	2961	148	**2553**	**0**
	99.8	1.30	3070.9985	3034	152	**2705**	**0**
	99.85	1.35	3145.1745	3108	155	**2860**	**0**
	99.9	1.40	3220.2055	3183	159	**3019**	**0**
	99.95	1.45	3295.398	3258	163	**3182**	**0**
	100	1.50	3371.3695	3333	167	**3349**	**0**
	100.05	1.55	3447.9965	3410	170	**3519**	**0**
	100.1	1.60	3525.108	3487	174	**3694**	**0**
	100.15	1.65	3602.8085	3564	178	**3872**	**0**
	100.2	1.70	3097.2185	3350	168	**4039**	**0**
	100.25	1.75	3706.3205	3402	170	**4209**	**0**
	100.3	1.80	4985.467	4346	217	**4427**	**0**
	100.35	1.85	5688.714	5337	267	**4693**	**0**
	100.4	1.90	6425.7715	6057	303	**4996**	**0**
	100.45	1.95	7196.7535	6811	341	**5337**	**0**
Permanent Pool = 100.5	100.5	2.00	8184.763	7691	385	**5721**	**0**
	100.55	2.05	8280.8935	8233	412	**6133**	**412**
	100.6	2.10	8382.762	8332	417	**6550**	**828**
	100.65	2.15	8484.3455	8434	422	**6971**	**1250**
	100.7	2.20	8587.6485	8536	427	**7398**	**1677**
	100.75	2.25	8691.778	8640	432	**7830**	**2109**
	100.8	2.30	8796.962	8744	437	**8267**	**2546**
	100.85	2.35	8902.716	8850	442	**8710**	**2988**
	100.9	2.40	8055.487	8479	424	**9134**	**3412**
	100.95	2.45	8127.0505	8091	405	**9538**	**3817**
	101	2.50	9215.6365	8671	434	**9972**	**4250**
Erosion Control Water Level = 101.05	101.05	2.55	9319.709	9268	463	**10435**	**4714**
	101.1	2.60	9424.133	9372	469	**10904**	**5182**
	101.15	2.65	9529.355	9477	474	**11378**	**5656**

	101.2	2.70	9635.223	9582	479	**11857**	**6135**
2-Year Storm Water Level = 101.21	101.25	2.75	9741.224	9688	484	**12341**	**6620**
	101.3	2.80	9848.099	9795	490	**12831**	**7110**
	101.35	2.85	9955.791	9902	495	**13326**	**7605**
5-Year Storm Water Level = 101.38	101.4	2.90	10063.863	10010	500	**13827**	**8105**
	101.45	2.95	10172.6095	10118	506	**14333**	**8611**
10-Year Storm Water Level = 101.5	101.5	3.00	10285.6405	10229	511	**14844**	**9123**
	101.55	3.05	10660.767	10473	524	**15368**	**9646**
	101.6	3.10	10752.4515	10707	535	**15903**	**10182**
25-Year Storm Water Level = 101.64	101.65	3.15	10844.63	10799	540	**16443**	**10721**
	101.7	3.20	10936.6945	10891	545	**16987**	**11266**
50-Year Storm Water Level = 101.75	101.75	3.25	11029.386	10983	549	**17537**	**11815**
	101.8	3.30	11122.2865	11076	554	**18090**	**12369**
	101.85	3.35	11215.7095	11169	558	**18649**	**12927**
100-Year Storm Water Level = 101.86	101.9	3.40	11309.161	11262	563	**19212**	**13490**
	101.95	3.45	11403.2205	11356	568	**19780**	**14058**
	102	3.50	11497.641	11450	573	**20352**	**14631**
	102.05	3.55	11592.014	11545	577	**20930**	**15208**
	102.1	3.60	11686.976	11639	582	**21511**	**15790**
	102.15	3.65	11782.1375	11735	587	**22098**	**16377**
	102.2	3.70	11877.679	11830	591	**22690**	**16968**
	102.25	3.75	11973.363	11926	596	**23286**	**17565**
	102.3	3.80	12069.7595	12022	601	**23887**	**18166**
	102.35	3.85	12166.0515	12118	606	**24493**	**18772**
	102.4	3.90	12262.8375	12214	611	**25104**	**19382**
	102.45	3.95	12360.1745	12312	616	**25719**	**19998**
	102.5	4.00	12457.4165	12409	620	**26340**	**20618**
	102.55	4.05	12555.314	12506	625	**26965**	**21244**
	102.6	4.10	12653.3635	12604	630	**27595**	**21874**
	102.65	4.15	12751.8785	12703	635	**28230**	**22509**
	102.7	4.20	12850.2985	12801	640	**28870**	**23149**
	102.75	4.25	12949.393	12900	645	**29515**	**23794**
	102.8	4.30	13048.725	12999	650	**30165**	**24444**
	102.85	4.35	13148.4845	13099	655	**30820**	**25099**
	102.9	4.40	13248.396	13198	660	**31480**	**25759**
	102.95	4.45	13348.716	13299	665	**32145**	**26424**
	103	4.50	13451.4015	13400	670	**32815**	**27094**
	103.05	4.55	14664.561	14058	703	**33518**	**27797**
Top of Pond Berm = 103.1	103.1	4.60	15918.1715	15291	765	34283	28561

Project Name:	Stittsville
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PERMANENT POOL AND EXTENDED DETENTION - East Pond

Pond Drainage Catchment & Design

Area
25.96 ha

Treatment Level :	Enhanced	
Treatment Percentage:	80%	
SWM Facility :	Wet Pond	
Imperviousness :	72	%

Permanent Pool Requirements

MOE 2003 Table 3.2 Interpolated Water Quality Volume :	228	m^3/ha
Unitary Permanent Pool (Less 40 m^3/ha for active storage) :	188	m^3/ha

Extended Detention and Erosion Control Requirements

Maximum of :	**MOE 2003 Active Storage =**	40	m^3/ha
	25mm Storm Runoff Volume =	4.44	ML
	OR		
	Unitary Erosion Control Volume =	0	m^3/imp-ha

Quality Control Summary

	Volume (m^3)
Required Permanent Pool Volume	4889
Provided Permanent Pool Volume	5721
Required Extended Detention/Erosion Control	
MOE 2003 Active Storage	*1038*
25mm Storm Runoff Volume	*4440*
Unitary Erosion Control Volume	*0*
Maximum Required ED/Erosion Control	4440
Provided ED/Erosion Control	4714

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Orifice 1		Orifice 2		Orifice 3	
Dia. (mm)	150	Height (m)	0.6	Height (m)	0.5
Cross Sect. Area (m^2)	0.0177	Length (m)	0.5	Length (m)	0.5
Orifice Coeff.	0.62	Cross Sect. Area (m^2)	0.3	Cross Sect. Area (m^2)	0.25
Inv. Elev. (m)	101.05	Orifice Coeff.	0.62	Orifice Coeff.	0.62
		Inv. Elev. (m)	101.05	Inv. Elev. (m)	101.70

SWM FACILITY DISCHARGE CALCULATIONS - East Pond Restrictive Conditions

Pond Characteristic	Elevation	Orifice 1		Orifice 2		Orifice 3		Total Discharge From Pond
		Head	Discharge	Head	Discharge	Head	Discharge	
	(m)	(m)	(m^3/s)	(m)	(m^3/s)	(m)	(m^3/s)	(m^3/s)
Permanent Pool = 100.5	100.50	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.55	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.60	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.65	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.70	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.75	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.80	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.85	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.90	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	100.95	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.00	0.00	0.000	0.00	0.000	0.00	0.000	0.000
Erosion Control Water Level = 101.05	101.05	0.00	0.000	0.00	0.000	0.00	0.000	0.000
	101.10	0.05	0.002	0.05	0.010	0.00	0.000	0.012
	101.15	0.10	0.008	0.10	0.028	0.00	0.000	0.036
	101.20	0.15	0.013	0.15	0.050	0.00	0.000	0.064
2-Year Storm Water Level = 101.24	101.25	0.20	0.017	0.20	0.076	0.00	0.000	0.093
	101.30	0.25	0.020	0.25	0.104	0.00	0.000	0.124
	101.35	0.30	0.023	0.30	0.133	0.00	0.000	0.156
	101.40	0.35	0.025	0.35	0.164	0.00	0.000	0.189
5-Year Storm Water Level = 101.41	101.45	0.40	0.028	0.40	0.196	0.00	0.000	0.223
	101.50	0.45	0.030	0.45	0.228	0.00	0.000	0.257
10-Year Storm Water Level = 101.53	101.55	0.50	0.032	0.50	0.260	0.00	0.000	0.292
	101.60	0.55	0.033	0.55	0.293	0.00	0.000	0.326
	101.65	0.60	0.035	0.60	0.325	0.00	0.000	0.360
25-Year Storm Water Level = 101.67	101.70	0.65	0.037	0.65	0.487	0.00	0.000	0.524
	101.75	0.70	0.038	0.70	0.521	0.05	0.010	0.570
50-Year Storm Water Level = 101.78	101.80	0.75	0.040	0.75	0.553	0.10	0.028	0.620
	101.85	0.80	0.041	0.80	0.583	0.15	0.050	0.674
100-Year Storm Water Level = 101.89	101.90	0.85	0.043	0.85	0.611	0.20	0.076	0.729
	101.95	0.90	0.044	0.90	0.638	0.25	0.104	0.786
	102.00	0.95	0.045	0.95	0.664	0.30	0.133	0.843
	102.05	1.00	0.047	1.00	0.689	0.35	0.164	0.900
	102.10	1.05	0.048	1.05	0.713	0.40	0.196	0.957
	102.15	1.10	0.049	1.10	0.737	0.45	0.228	1.014
	102.20	1.15	0.050	1.15	0.760	0.50	0.260	1.070
	102.25	1.20	0.051	1.20	0.782	0.55	0.376	1.209
	102.30	1.25	0.053	1.25	0.803	0.60	0.406	1.262
	102.35	1.30	0.054	1.30	0.824	0.65	0.434	1.312
	102.40	1.35	0.055	1.35	0.844	0.70	0.461	1.360
	102.45	1.40	0.056	1.40	0.864	0.75	0.485	1.405
	102.50	1.45	0.057	1.45	0.884	0.80	0.509	1.450
	102.55	1.50	0.058	1.50	0.903	0.85	0.532	1.492
	102.60	1.55	0.059	1.55	0.921	0.90	0.554	1.534
	102.65	1.60	0.060	1.60	0.939	0.95	0.574	1.574
	102.70	1.65	0.061	1.65	0.957	1.00	0.595	1.613
	102.75	1.70	0.062	1.70	0.975	1.05	0.614	1.651
	102.80	1.75	0.063	1.75	0.992	1.10	0.633	1.688
	102.85	1.80	0.064	1.80	1.009	1.15	0.651	1.724
	102.90	1.85	0.065	1.85	1.026	1.20	0.669	1.760
	102.95	1.90	0.066	1.90	1.042	1.25	0.687	1.794
	103.00	1.95	0.066	1.95	1.058	1.30	0.704	1.828
	103.05	2.00	0.067	2.00	1.074	1.35	0.720	1.862
Top of Pond Berm = 103.1	103.10	2.05	0.068	2.05	1.090	1.40	0.736	1.894

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

DSEL
David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

SWM FACILITY STORAGE CALCULATIONS - Stittsville East Pond Restrictive Conditions

Permanent Pool Volume Required:	4889 m^3	
Permanent Pool Volume Provided:	5721 m^3	**117% of Required Permanent Pool**
Extended Detention/Erosion Control Volume Required:	4440 m^3	
Extended Detention/Erosion Control Volume Provided:	4714 m^3	**106% of Required Extended Detention**
Bottom of Pond:	98.50 m	
Permanent Pool:	100.50 m	
Incremental Depth:	0.05 m	

Pond Characteristic	Elevation (m)	Stage (m)	Area (m2)	Average Area (m^2)	Incremental Storage (m^3)	Cumulative Storage (m^3)	Cumulative Storage above Permanent Pool (m^3)
Bottom of Pond = 98.5	98.5	0.00	1376.17		0	**0**	**0**
	98.55	0.05	1420.7915	1398	70	**70**	**0**
	98.6	0.10	1467.7785	1444	72	**142**	**0**
	98.65	0.15	1515.041	1491	75	**217**	**0**
	98.7	0.20	1562.484	1539	77	**294**	**0**
	98.75	0.25	1610.2025	1586	79	**373**	**0**
	98.8	0.30	1658.1015	1634	82	**455**	**0**
	98.85	0.35	1706.2285	1682	84	**539**	**0**
	98.9	0.40	1754.612	1730	87	**625**	**0**
	98.95	0.45	1803.195	1779	89	**714**	**0**
	99	0.50	1852.044	1828	91	**806**	**0**
	99.05	0.55	1901.1875	1877	94	**899**	**0**
	99.1	0.60	1950.4355	1926	96	**996**	**0**
	99.15	0.65	1999.978	1975	99	**1095**	**0**
	99.2	0.70	2049.758	2025	101	**1196**	**0**
	99.25	0.75	2099.69	2075	104	**1299**	**0**
	99.3	0.80	2149.888	2125	106	**1406**	**0**
	99.35	0.85	2200.39	2175	109	**1514**	**0**
	99.4	0.90	2251.1485	2226	111	**1626**	**0**
	99.45	0.95	2302.0685	2277	114	**1740**	**0**
	99.5	1.00	2355.126	2329	116	**1856**	**0**
	99.55	1.05	2707.5285	2531	127	**1983**	**0**
	99.6	1.10	2779.244	2743	137	**2120**	**0**
	99.65	1.15	2851.159	2815	141	**2261**	**0**
	99.7	1.20	2923.815	2887	144	**2405**	**0**
	99.75	1.25	2997.2405	2961	148	**2553**	**0**
	99.8	1.30	3070.9985	3034	152	**2705**	**0**
	99.85	1.35	3145.1745	3108	155	**2860**	**0**
	99.9	1.40	3220.2055	3183	159	**3019**	**0**
	99.95	1.45	3295.398	3258	163	**3182**	**0**
	100	1.50	3371.3695	3333	167	**3349**	**0**
	100.05	1.55	3447.9965	3410	170	**3519**	**0**
	100.1	1.60	3525.108	3487	174	**3694**	**0**
	100.15	1.65	3602.8085	3564	178	**3872**	**0**
	100.2	1.70	3097.2185	3350	168	**4039**	**0**
	100.25	1.75	3706.3205	3402	170	**4209**	**0**
	100.3	1.80	4985.467	4346	217	**4427**	**0**
	100.35	1.85	5688.714	5337	267	**4693**	**0**
	100.4	1.90	6425.7715	6057	303	**4996**	**0**
	100.45	1.95	7196.7535	6811	341	**5337**	**0**
Permanent Pool = 100.5	100.5	2.00	8184.763	7691	385	**5721**	**0**
	100.55	2.05	8280.8935	8233	412	**6133**	**412**
	100.6	2.10	8382.762	8332	417	**6550**	**828**
	100.65	2.15	8484.3455	8434	422	**6971**	**1250**
	100.7	2.20	8587.6485	8536	427	**7398**	**1677**
	100.75	2.25	8691.778	8640	432	**7830**	**2109**
	100.8	2.30	8796.962	8744	437	**8267**	**2546**
	100.85	2.35	8902.716	8850	442	**8710**	**2988**
	100.9	2.40	8055.487	8479	424	**9134**	**3412**
	100.95	2.45	8127.0505	8091	405	**9538**	**3817**
	101	2.50	9215.6365	8671	434	**9972**	**4250**
Erosion Control Water Level = 101.05	101.05	2.55	9319.709	9268	463	**10435**	**4714**
	101.1	2.60	9424.133	9372	469	**10904**	**5182**
	101.15	2.65	9529.355	9477	474	**11378**	**5656**

	101.2	2.70	9635.223	9582	479	**11857**	**6135**
2-Year Storm Water Level = 101.24	101.25	2.75	9741.224	9688	484	**12341**	**6620**
	101.3	2.80	9848.099	9795	490	**12831**	**7110**
	101.35	2.85	9955.791	9902	495	**13326**	**7605**
	101.4	2.90	10063.863	10010	500	**13827**	**8105**
5-Year Storm Water Level = 101.41	101.45	2.95	10172.6095	10118	506	**14333**	**8611**
	101.5	3.00	10285.6405	10229	511	**14844**	**9123**
10-Year Storm Water Level = 101.53	101.55	3.05	10660.767	10473	524	**15368**	**9646**
	101.6	3.10	10752.4515	10707	535	**15903**	**10182**
	101.65	3.15	10844.63	10799	540	**16443**	**10721**
25-Year Storm Water Level = 101.67	101.7	3.20	10936.6945	10891	545	**16987**	**11266**
	101.75	3.25	11029.386	10983	549	**17537**	**11815**
50-Year Storm Water Level = 101.78	101.8	3.30	11122.2865	11076	554	**18090**	**12369**
	101.85	3.35	11215.7095	11169	558	**18649**	**12927**
100-Year Storm Water Level = 101.89	101.9	3.40	11309.161	11262	563	**19212**	**13490**
	101.95	3.45	11403.2205	11356	568	**19780**	**14058**
	102	3.50	11497.641	11450	573	**20352**	**14631**
	102.05	3.55	11592.014	11545	577	**20930**	**15208**
	102.1	3.60	11686.976	11639	582	**21511**	**15790**
	102.15	3.65	11782.1375	11735	587	**22098**	**16377**
	102.2	3.70	11877.679	11830	591	**22690**	**16968**
	102.25	3.75	11973.363	11926	596	**23286**	**17565**
	102.3	3.80	12069.7595	12022	601	**23887**	**18166**
	102.35	3.85	12166.0515	12118	606	**24493**	**18772**
	102.4	3.90	12262.8375	12214	611	**25104**	**19382**
	102.45	3.95	12360.1745	12312	616	**25719**	**19998**
	102.5	4.00	12457.4165	12409	620	**26340**	**20618**
	102.55	4.05	12555.314	12506	625	**26965**	**21244**
	102.6	4.10	12653.3635	12604	630	**27595**	**21874**
	102.65	4.15	12751.8785	12703	635	**28230**	**22509**
	102.7	4.20	12850.2985	12801	640	**28870**	**23149**
	102.75	4.25	12949.393	12900	645	**29515**	**23794**
	102.8	4.30	13048.725	12999	650	**30165**	**24444**
	102.85	4.35	13148.4845	13099	655	**30820**	**25099**
	102.9	4.40	13248.396	13198	660	**31480**	**25759**
	102.95	4.45	13348.716	13299	665	**32145**	**26424**
	103	4.50	13451.4015	13400	670	**32815**	**27094**
	103.05	4.55	14664.561	14058	703	**33518**	**27797**
Top of Pond Berm = 103.1	103.1	4.60	15918.1715	15291	765	**34283**	**28561**

Project Name:	Stittsville
Project Number:	1247
Designed By:	JC
Checked By:	VM
Date	Sept. 29 2025

David Schaeffer Engineering Limited
600 Alden Road, Suite 606
Markham, ON L3R 0E7

ALLOWABLE POND VOLUME AND DISCHARGE RATES - STITTSVILLE EAST POND

Drainage area	25.96	ha
Imp %	72	%
Imp area	18.7	ha

		Normal Conditions			Restrictive Conditions		
Pond Component	**Target Outflow**	**Peak Outflow**	**Pond Volume**	**Pond Elevation**	**Peak Outflow**	**Pond Volume**	**Pond Elevation**
	m3/s	m3/s	m3	masl	m3/s	m3	masl
Permanent Pool	N/A	N/A	5721	100.50	N/A	5721	100.50
Erosion Control/Extended Det.	0.060	0.033	10435	101.05	0.000	10435	101.05
2 Year Design Storm	0.131	0.102	11968	101.21	0.099	12268	101.24
5 Year Design Storm	0.306	0.230	13657	101.38	0.237	13937	101.41
10 Year Design Storm	0.398	0.343	14887	101.50	0.355	15168	101.53
25 Year Design Storm	0.553	0.488	16324	101.64	0.500	16633	101.67
50 Year Design Storm	0.682	0.598	17495	101.75	0.602	17870	101.78
100 Year Design Storm	0.877	0.705	18777	101.86	0.733	19144	101.89

[1]Target outflow based on maximum release rate between free and restrictive downstream conditions as per JFSA SWM Pond Report.

[2]Active storage volume plus permanent pool volume.

[3]Erosion Control / Extended Detention based on total runoff volume from Chicago 25mm 3hr storm event.

[4]Restricted outlet based on 101.05m as per JFSA SWM Pond Report.

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DRAWDOWN TIME CALCULATION - East Pond

Ministry of the Environment
Stormwater Management Planning and Design Manual (March 2003)

Equation 4.11: Drawdown Time

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_O} = \textbf{258,457 sec}$$

$$= \textbf{71.8 hr}$$

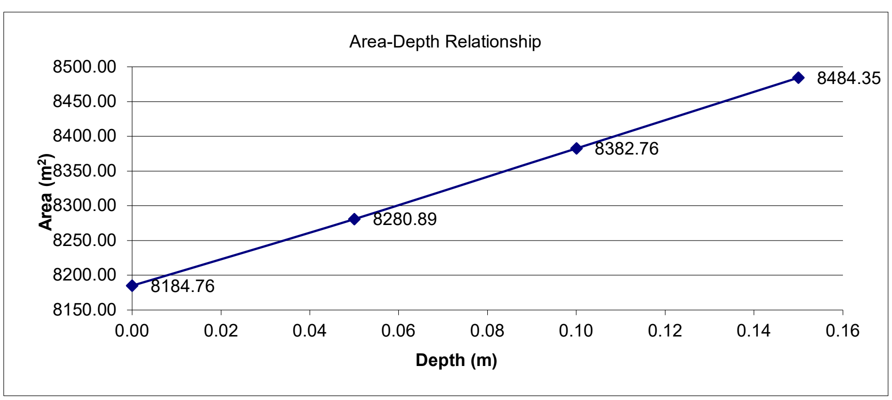
3.0 days

t = drawdown time (sec)
A_O = cross-sectional area of the orifice (m^2)
h = maximum water elevation above the orifice (m)
C_2 = slope coefficient from the area-depth linear regression
C_3 = intercept from the area-depth linear regression

Input Parameters:

Orifice Diameter =	0.150	m
Extended Detention Elevation =	101.05	m
Extended Detention Head, h =	0.55	m
A_O =	0.018	m^2
C_2 =	1260	
C_3 =	8239	

		X - Values	Y - Values
Pond Stage	Elevation (m)	Depth (m)	Area (m^2)
PP	100.50	0.00	8184.76
	100.55	0.05	8280.89
	100.60	0.10	8382.76
	100.65	0.15	8484.35
	100.70	0.20	8587.65
	100.75	0.25	8691.78
	100.80	0.30	8796.96
	100.85	0.35	8902.72
	100.9	0.40	8055.487
	100.95	0.45	8127.0505
	101	0.50	9215.6365
ED	101.05	0.55	9319.709



PATERSON GROUP

memorandum

re: **Stormwater Management Pond Recommendations**
Proposed Residential Development
Magnolia Subdivision – Fallowfield Road – Ottawa

to: Caivan (Stittsville South) Inc and Caivan (Stittsville West) Ltd – **Bronwyn Anderson** – Bronwyn.Anderson@Caivan.com

date: November 4, 2025

file: PG5570-MEMO.01

Further to your request and authorization, Paterson Group (Paterson) reviewed the stormwater management pond requirements relative to the groundwater monitoring program at the aforementioned site. The proposed recommendations are preliminary and provide direction for the detailed site design.

Background Information

Groundwater monitoring was completed across the subject site denoting areas where shallower groundwater was observed. The western stormwater management pond design proposes a design requiring bedrock removal with the preliminary design noted within Daved Schaeffer Engineering Ltd (DSEL) Drawing – Figure 4 – Stittsville South Urban Expansion Area – West SWM Pond and Drawing – Figure 5 – Stittsville South Urban Expansion Area – East SWM Pond.

Due to the elevations from the groundwater monitoring program, the potential for ballast and liner requirements were reviewed for implementation at detailed design.

Recommendations

Stormwater Management Pond

The SWMP is anticipated to require both a liner and a subdrain around the exterior of the liner. The liner is expected to be constructed in a similar manner to the Davidson Pond design with a profile consisting of an impermeable liner followed by an engineered fill profile allowing for a drivable surface for certain areas that will provide ballasting for the liner. The overall profile is expected to be approximately 1 m thick with variation based on detailed design calculations. As a method to reduce the ballast requirements, a subdrain shall be placed around the exterior of the liner at an elevation no higher than the Permanent Pool elevation with the slope and diameter to be determined at detailed design. The drain design and outlet locations are to be provided at detailed design.

To facilitate future pond maintenance, it is recommended that the engineered fill underlying the pond liner contain an underdrain connecting to a manhole to supplement dewatering of the groundwater external to the liner.

The pond liner shall extend to approximately the groundwater elevations observed in the monitoring program and in proximity to the west or east SWMP. The requirements for the east pond are to be determined at a future time, but may require a similar ballasting / subdrain system.

We trust that this information satisfies your requirements.

Best Regards,

Paterson Group Inc.

Michael Killam, P.Eng. Kevin A. Pickard

Project Name:	Stittsville
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PRELIMINARY STORM HGL ANALYSIS

STM			
Name	**Rim Elev. (m)**	**Max. HGL (m)**	**Rim- HGL**
MH-112	106.77	104.33	2.44
MH-115	106.595	104.28	2.32
MH-118	106.474	104.23	2.24
MH-125	106.346	104.19	2.16
MH-128	106.235	104.13	2.11
MH-142	106.105	103.95	2.16
MH-143	106.08	103.92	2.16
MH-212	106.794	104.11	2.68
MH-215	106.675	104.07	2.61
MH-221	106.376	104	2.38
MH-222	106.189	103.89	2.3
MH-226	106.005	103.76	2.24
MH-227	106	103.66	2.34
MH-306	105.85	103.6	2.25
MH-307	105.85	103.5	2.35
MH-316	105.85	103.4	2.45
MH-317	103.89	103.3	0.59
MH-412	105.66	102.83	2.83
MH-415	105.406	102.75	2.66
MH-429	105.29	102.48	2.81
MH-431	105.161	102.29	2.87
MH-432	105.066	102.21	2.86
MH-433	105.042	102.16	2.88
MH-434	104.894	101.92	2.97
MH-515	105.84	102.56	3.28
MH-517	105.573	102.46	3.11
MH-519	105.47	102.36	3.11
MH-522	105.355	102.31	3.05
MH-525	105.226	102.24	2.99
MH-531	105.106	102.19	2.92
MH-532	105	102.12	2.88
MH-533	104.98	102.08	2.9
MH-534	104.856	101.92	2.94
MH-602	105.943	103.96	1.98
MH-603	105.44	103.75	1.69
MH-604	105.906	103.85	2.06
MH-605	105.09	103.69	1.4
		AVERAGE	2.486