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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.: 21-1227

APRIL 2025

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Existing Conditions 2
1.2 Development Layout 3
1.3 Required Permits / Approvals 3

2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS 6
2.1 Existing Studies, Guidelines, and Reports 6

3.0 WATER SUPPLY SERVICING 9
3.1 Existing Water Supply Services 9
3.2 Water Supply Servicing Design 9
3.3 Water Supply Conclusion 11

4.0 WASTEWATER SERVICING 12
4.1 Existing Wastewater Services 12
4.2 Wastewater Design 12
4.3 Sanitary HGL Analysis 13
4.4 SRSPS Anticipated Upgrades 13
4.5 Wastewater Servicing Conclusions 14

5.0 STORMWATER MANAGEMENT 16
5.1 Existing Stormwater Services 16
5.2 Post-Development Stormwater Management Target 16
5.3 Proposed Stormwater Management Strategy 16
The proposed stormwater design layout is shown on *Drawing No. 3*. 16
5.4 Proposed Minor System 16
5.5 Stormwater Management Facilities 18
5.6 Grading and Drainage Design 19
5.7 Stormwater Servicing Conclusions 19

6.0 CONCLUSION AND RECOMMENDATIONS 20

FIGURES

Figure 1 Stittsville South Urban Expansion Area – Key Plan
Figure 2 Subdivision Plan
Figure 3 Watermain Servicing Plan
Figure 4 West SWM Pond
Figure 5 East SWM Pond
Figure 6 Conceptual Park (Block 96 & 97) Grading Plan

DRAWINGS

Drawing No. 1 Conceptual Grading Plan
Drawing No. 2 Conceptual Servicing Plan
Drawing No. 3 Storm Tributary Area Plan
Drawing No. 4 Sanitary Servicing Plan
Drawing No. 5 Storm and Sanitary Servicing Profiles
Drawing No. 6 Storm and Sanitary Servicing Profiles
Drawing No. 7 Storm and Sanitary Servicing Profiles
Drawing No. 8 Storm and Sanitary Servicing Profiles

TABLES

Table 1: Development Statistics for Stittsville South Urban Expansion Area ...3
Table 2: Potential Required Permits/Approvals 4
Table 3: Water Supply Design Criteria 9
Table 4: Wastewater Design Criteria 12
Table 5: Storm Sewer Design Criteria 17
Table 6: Stormwater Management Ponds 19

APPENDICES

Appendix A General
Appendix B Water Supply
Appendix C Wastewater Collection
Appendix D Stormwater Management

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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:

- ~18.8 ha 6115 Flewellyn Rd (Maguire Property);
- ~16.1 ha 6070 Fernbank Rd (Faulkner Property);
- ~17.4 ha 5993 Flewellyn Rd (Davidson Property); and
- ~14.2 ha 6030 Fernbank Road (Eder Property) parcel, which is currently outside the City of Ottawa urban boundary.
- ~8.8 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 ***DSEL Scoped MSS*** for the SSUEA (W-4) (DSEL, 2024) 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 detail to demonstrate that the proposed development area can be supported by municipal services.

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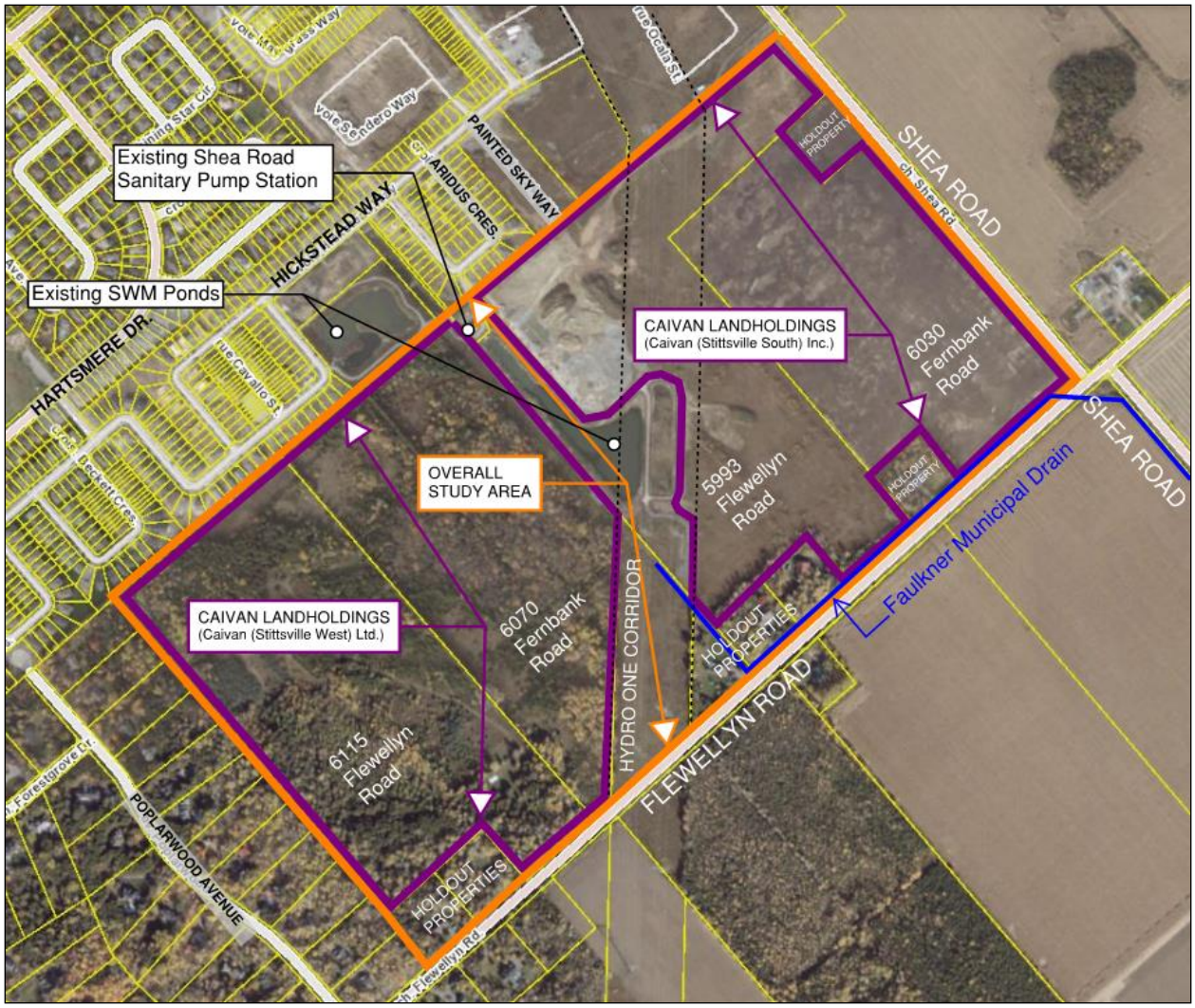

Figure 1: Caivan Stittsville Lands

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 six (6) holdout properties along the south and east boundaries. 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.

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 to Shea Road. The ultimate storm outlet for the development area is

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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 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	434	233	667	2,268
Townhouse	512	325	837	2,260
High Density	372	178	550	990
Park	-	-	-	-
Residential Holdouts	-	-	-	-
Total	***1,318***	***736***	***2,054***	***5,518***

** 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

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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 Sation 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 of Fraser-Clarke Watercourse)	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.

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RVCA	Alteration to Watercourses	As necessary through consultation with the RVCA	Supporting applications and documentation as required through consultation with the RVCA.
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.

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2.0 GUIDELINES, PREVIOUS STUDIES, AND REPORTS

2.1 Existing Studies, Guidelines, and Reports

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

- Ottawa Sewer Design Guidelines
  City of Ottawa, 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)

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- 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)

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- 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), July 5, 202
  (Stittsville South Water Budget)

- Scoped Master Servicing Study for Stittsville South Urban Expansion Area (W-4), DSEL (21-1247), July 2024*. (DSEL Scoped MSS)*

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

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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.

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

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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.

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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.

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.

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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 in excess of the generated flows from the proposed site.

4.2 Wastewater Design

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 5518 persons. The total peak flow of 73.41 L/s generated from the anticipated SSUEA population can be accommodated by the receiving sewer on Fernbank Road which has approximately 130L/s of available capacity. The functional sanitary design sheet is provided in ***Appendix C.2*** for reference.

Table 4 below summarizes the **Design Standards** to be employed in the design of the proposed wastewater sewer system.

Table 4: 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 1.0
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

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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	0.4 to 0.6
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

JFSA provided PCSWMM modelling to analyze the sanitary HGL elevations within the proposed development lands based on the flow details provided in ***Appendix D.3***. From JFSA's analysis, it was found that the proposed existing sanitary sewer infrastructure is sufficiently sized to convey sanitary flows away from the proposed development under various extreme conditions. Please see the JFSA report in ***Appendix D.3*** for additional details.

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.3***.

The current firm capacity of the SRSPS is 84L/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.3***.

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 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 71.4L/s peak inflow.

Per Novatech's ***SRSPS Upgrade Assessment Memo (Appendix C.4)***, the preferred Shea PS upgrade 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.4***). 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 5*** 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.

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Table 5: 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.5***. 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.

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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 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.

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.

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5.0 STORMWATER MANAGEMENT

5.1 Existing Stormwater Services

West of the HydroOne corridor, the site topography generally drains eastward and southward with drainage ultimately being conveyed to the Faulkner Municipal Drain (FMD) which bisects the development area. 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 generally bisects the development area in half. The FMD conveys flows from north to south to the north side of Flewellyn Road (i.e. roadside ditch) then heads eastward and then southwards 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 3.75 ha of land and is partially located under the existing Hydro One tower line.

5.2 Post-Development Stormwater Management Target

In accordance with the Scoped MSS, the subject lands are required to achieve the following stormwater management targets,

- Enhanced quality treatment corresponding to a long-term average Total Suspended Solid removal efficiency of 80%, as defined by the MECP prescribed treatment levels.
- 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 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 stormwater facilities will provide quantity and quality controls before outletting into the Faulkner Municipal Drain (FMD).

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

5.4 Proposed Minor System

Under post-development conditions, approximately 35.34-hectares of the development will drain southeast to the Faulkner Municipal Drain through a proposed SWM facility. The remaining 26.25-hectares of the development will drain southeast to the second proposed SWM facility and outlet to the Faulkner Municipal Drain as well. In addition, 4.1-hectares of

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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. Both areas will be treated by independent SWM facilities to provide both water quality and quantity control for the development. The 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.2*** for reference. **Drawing No. 3** illustrates the contemplated storm sewer collection system. **Drawing No. 5** to **Drawing No. 8** illustrates the preliminary plan and profiles. ***Table 6*** outlines the storm sewer design criteria used in the storm sewer functional design.

Table 6: Storm Sewer Design Criteria

Design Parameter	Value
Minor System Design Return Period	1:2 year (PIEDTB-2016-01) for local roads, without ponding 1:5 year (PIEDTB-2016-01) for collector roads, without ponding 1:100 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

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	the lowest building opening during the stress test event (100-year + 20%) and 15cm vertical clearance is maintained between spill elevation on the street and the ground elevation at the nearest building envelope (PIEDTB-2016-01)
Stormwater Management Model	DDSWMM (release 2.1), SWMHYMO (v. 5.02) and XPSWMM (v. 10)
Model Parameters	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.
Historical Events	July 1st, 1979, August 4th, 1988 and August 8th, 1996
Climate Change Street Test	20% increase in the 100-year, 3-hour Chicago storm
Extracted from City of Ottawa Sewer Design Guidelines, October 2012, and ISSU, based on recent residential subdivisions in City of Ottawa.	

5.5 Stormwater Management Facilities

Stormwater runoff will be treated and attenuated within Storm Water Management Facilities per ***MECP Design Guidelines***. J.F. Sabourin and Associates Inc. (JFSA) was retained to prepare a preliminary Storm Water Management (SWM) Pond sizing for the proposed development and an existing conditions model to evaluate pre-development hydrology. Refer to the ***SWM Pond Report*** located in ***Appendix D.3*** for detailed modeling parameters.

There are two (2) proposed stormwater management facilities to service the development.

The west and east 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 wet land features were incorporated to optimize the active storage area and promote naturalized features in the facilities. The wet land features will enhance baseflow discharge to the FMD. The west facility has a total drainage area of 35.34 ha and as such will require 1,848m³ of extended detention volume. Extended detention will be released over 51 hours (2.14 days), at a peak outflow rate of 17 L/s. The east facility has a total drainage area of 26.25 ha and as such will require 1660m³ of extended detention which will be released over 56 hours (2.34 days), at a peak rate of 13 L/s. The West and East SWM facilities are illustrated in ***Figure 4*** and ***Figure 5***, respectively.

Table 7 summarizes the post development pond storage characteristics.

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Table 7: Stormwater Management Ponds

	SWM Facility West		SWM Facility East	
	Outflow (m^3/s)	**Storage (m^3)**	**Outflow (m^3/s)**	**Storage (m^3)**
25mmCH3hr	0.0	5,545	0.0	4,000
2yrSCS24hr	0.051	10,130	0.105	6,607
5yrSCS24hr	0.114	12,950	0.291	8,451
10yrSCS24hr	0.179	14,950	0.395	9,821
25yrSCS24hr	0.313	17,250	0.566	11,490
50yrSCS24hr	0.448	19,020	0.704	12,740
100yrSCS24hr	0.583	20,870	0.899	13,990

The West Facility will need approximately 20,870 m^3 of active storage to attenuate post-development flows to pre-development conditions up to and including the 100-year event. The East Facility will need approximately 13,990 m^3 of active storage to attenuate post-development flows to pre-development conditions up to and including the 100-year event.

5.6 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.

5.7 Stormwater Servicing Conclusions

The proposed stormwater management strategy will consist of two new SWM facilities with the East Pond located on the Eder parcel. JFSA completed an analysis of the existing hydrology to establish predevelopment flow contributions. DSEL completed a functional grading plan and sewer layout. JFSA completed an analysis of the post-development condition and established required storage volumes to attenuate flows to post-development conditions.

It is recommended that the contemplated development include two (2) new SWM facilities to provide quality control and reduce the volume of runoff.

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

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6.0 CONCLUSION AND RECOMMENDATIONS

Caivan has proposed a 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 provide 80% total suspended solids removal.

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

Prepared by,
David Schaeffer Engineering Ltd.

Per: Peter Mott, P.Eng.

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2025-04-11_1247_Caivan_Stittsville_FSR_Subm.docx

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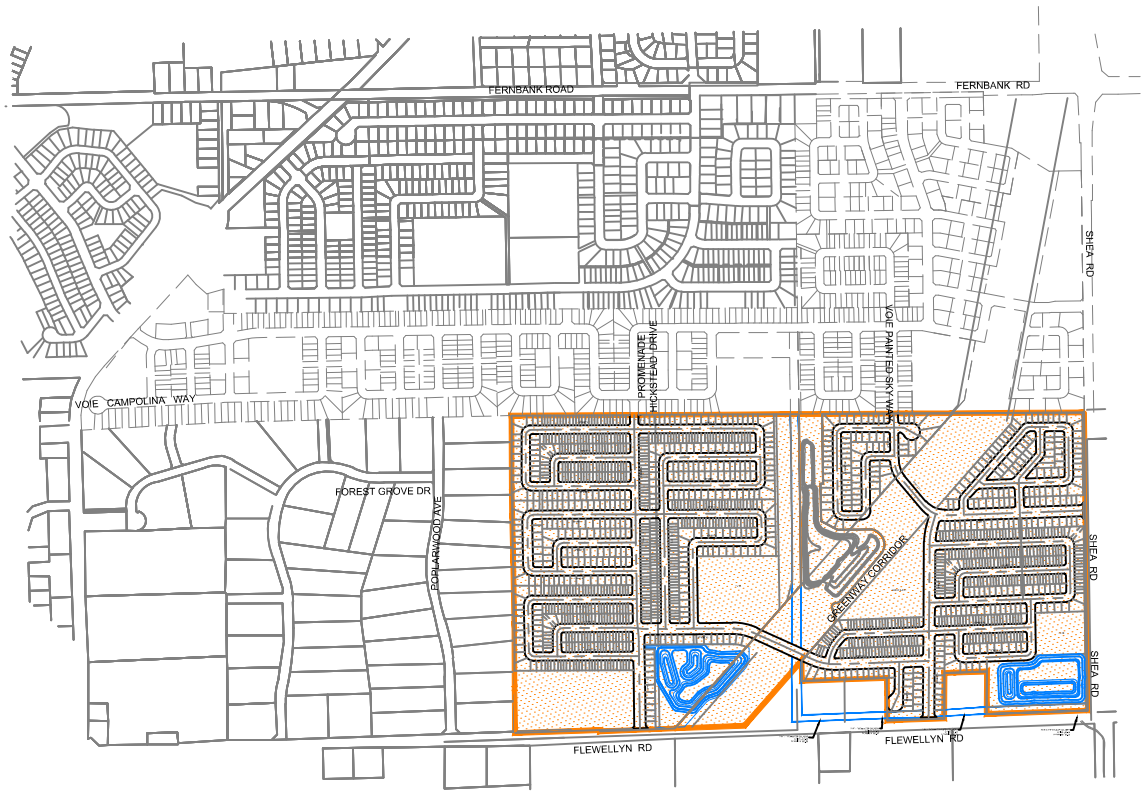
FIGURES



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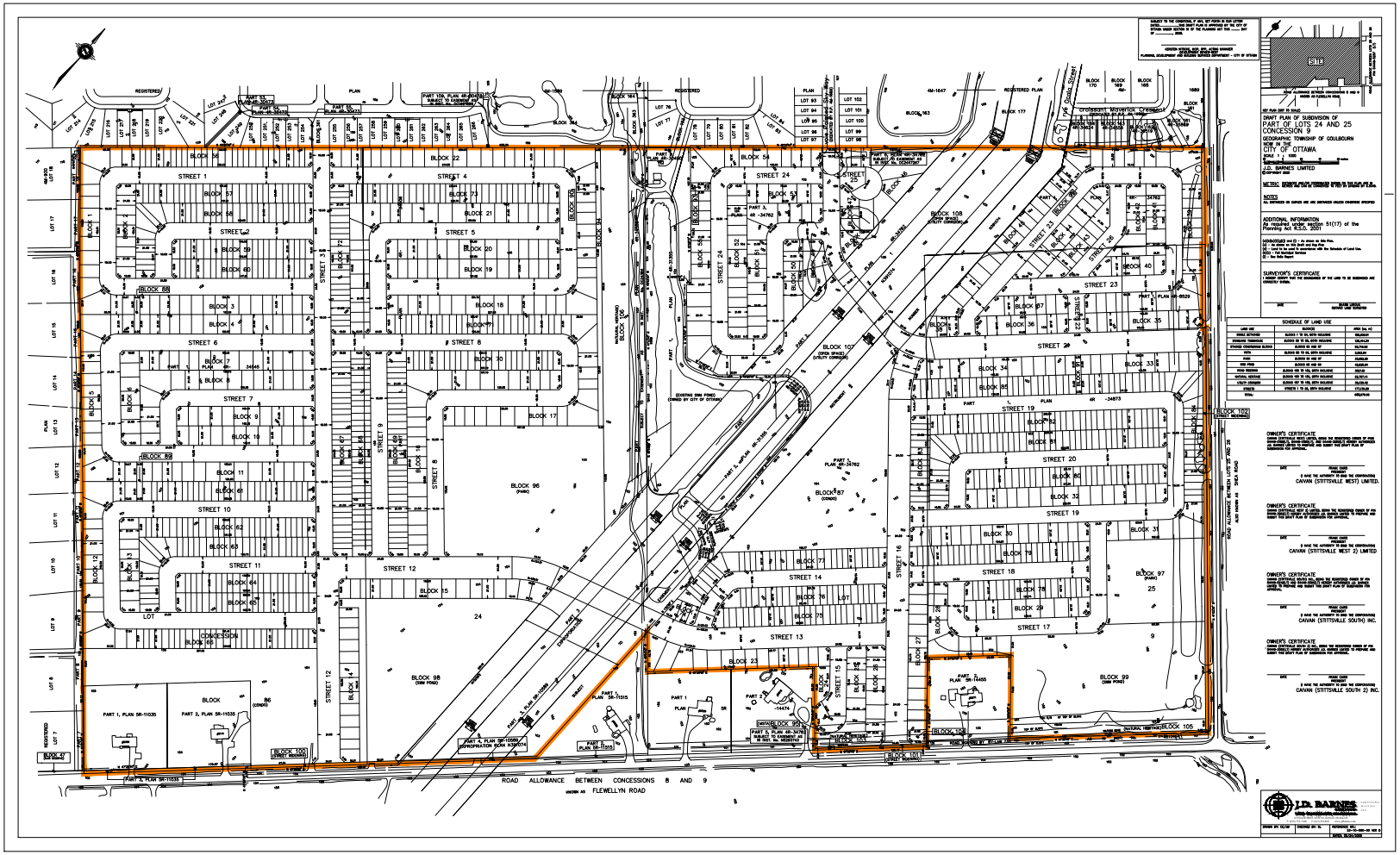
STITTSVILLE SOUTH URBAN EXPANSION AREA

KEY PLAN

CITY OF OTTAWA

DATE:	MAR 2025
SCALE:	1:16000
PROJECT No.:	21-1247
FIGURE:	1



LEGEND:

SITE BOUNDARY

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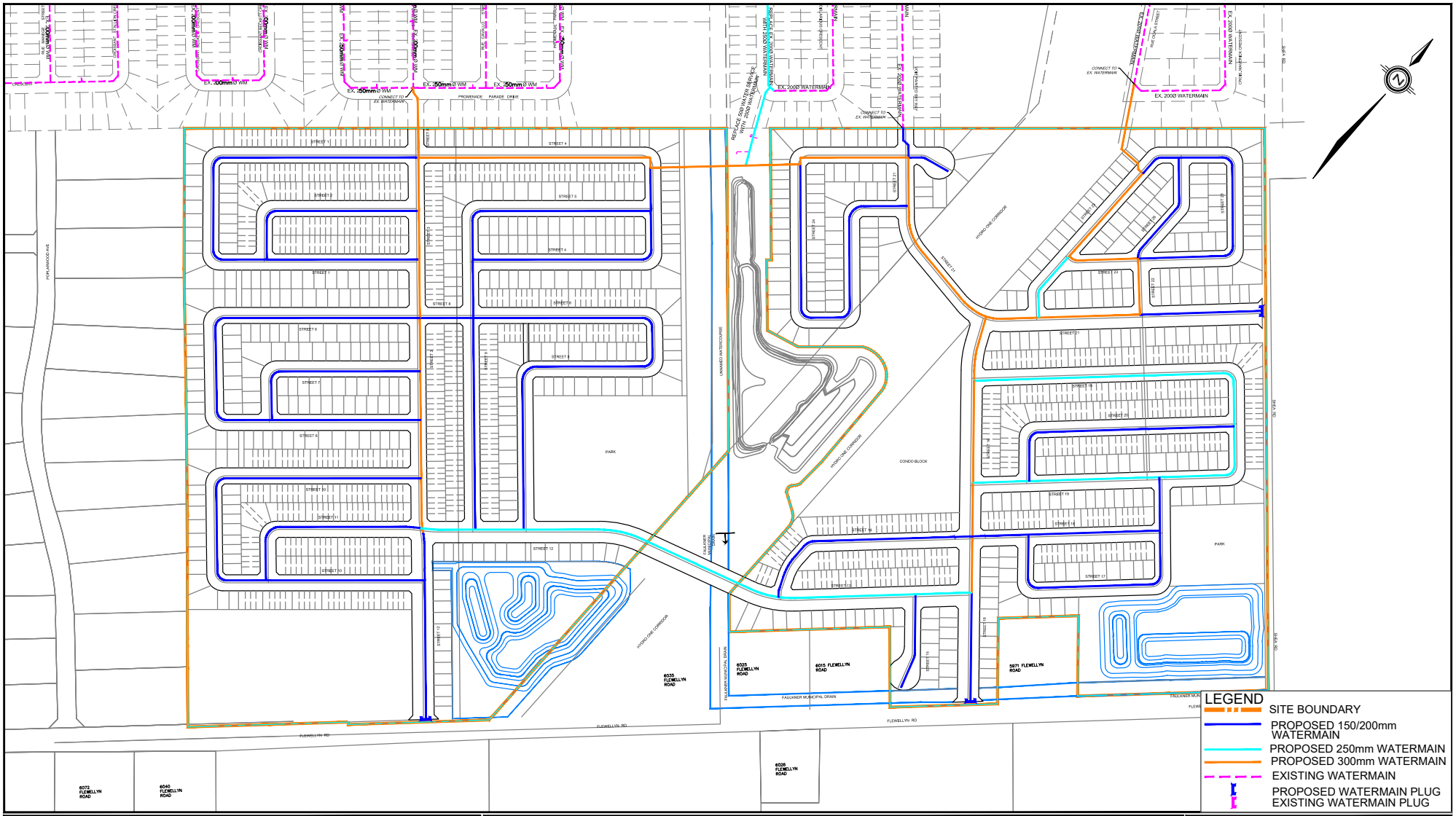
STITTSVILLE SOUTH URBAN EXPANSION AREA
SUBDIVISION PLAN
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	NTS
DATE:	MAR 2025
FIGURE:	2



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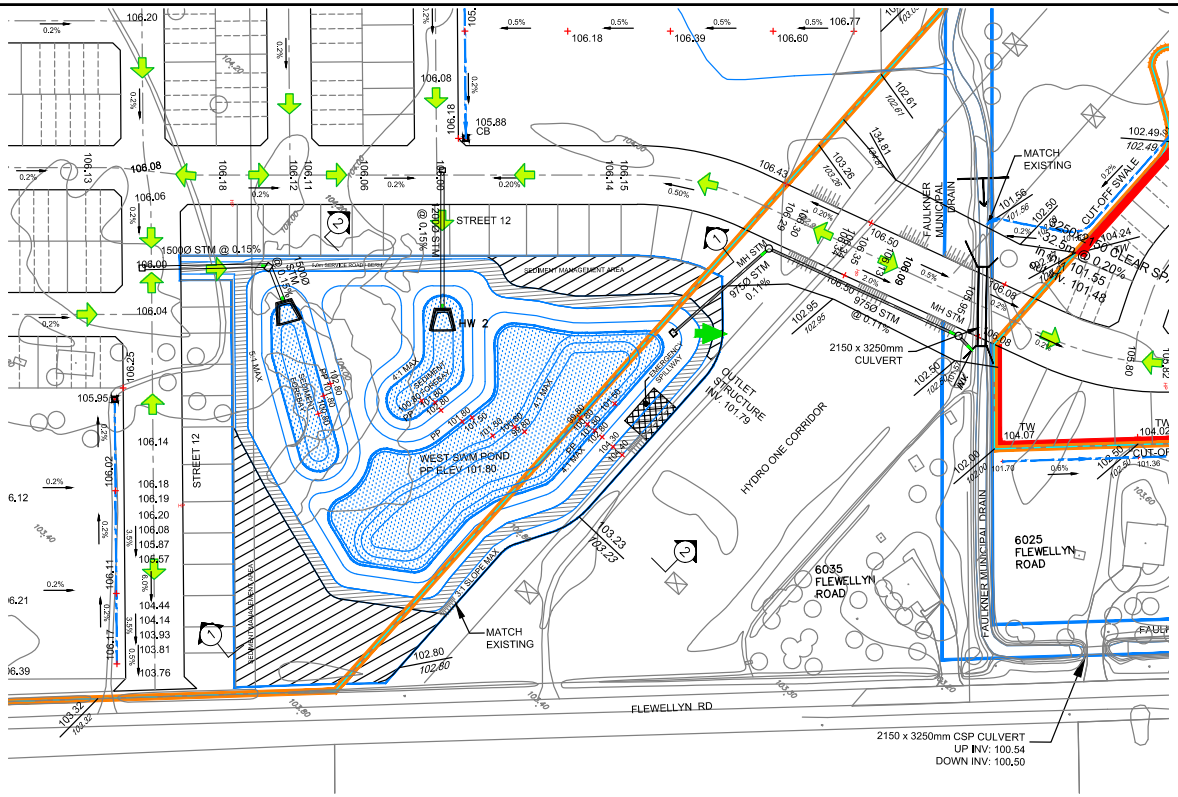
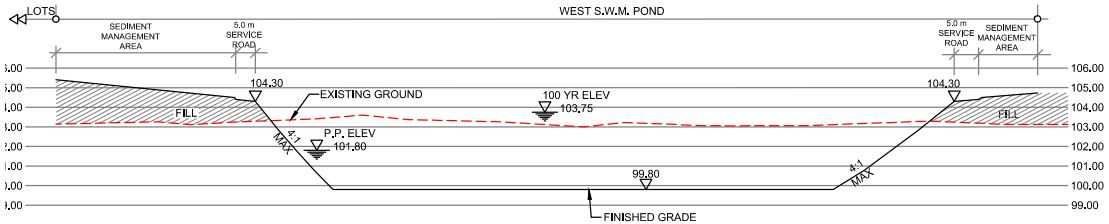
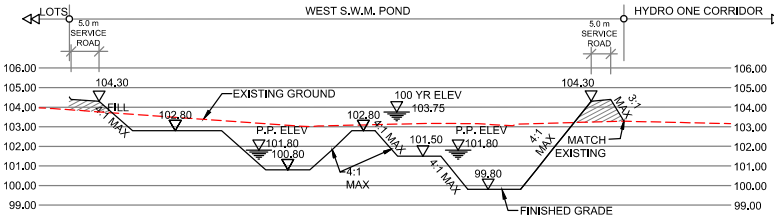
STITTSVILLE SOUTH URBAN EXPANSION AREA
WATERMAIN SERVICING PLAN
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	1:4000
DATE:	MAR 2025
FIGURE:	3





S.W.M. POND
SECTION 1-1
SCALE HOR. 1:1250
VER. 1:250



S.W.M. POND
SECTION 2-2
SCALE HOR. 1:1250
VER. 1:250

LEGEND

- SITE BOUNDARY
- ACCESS ROAD
- PERMANENT POOL
- POND INLET
- POND OUTLET
- STORM OVERLAND FLOW ARROW
- EMERGENCY OVERLAND FLOW ARROW
- 187.60 PROPOSED CENTERLINE ELEVATION
- 193.50 / 193.50 PROPOSED ELEVATION / EXISTING ELEVATION
- 244.50 EXISTING CONTOUR ELEVATION

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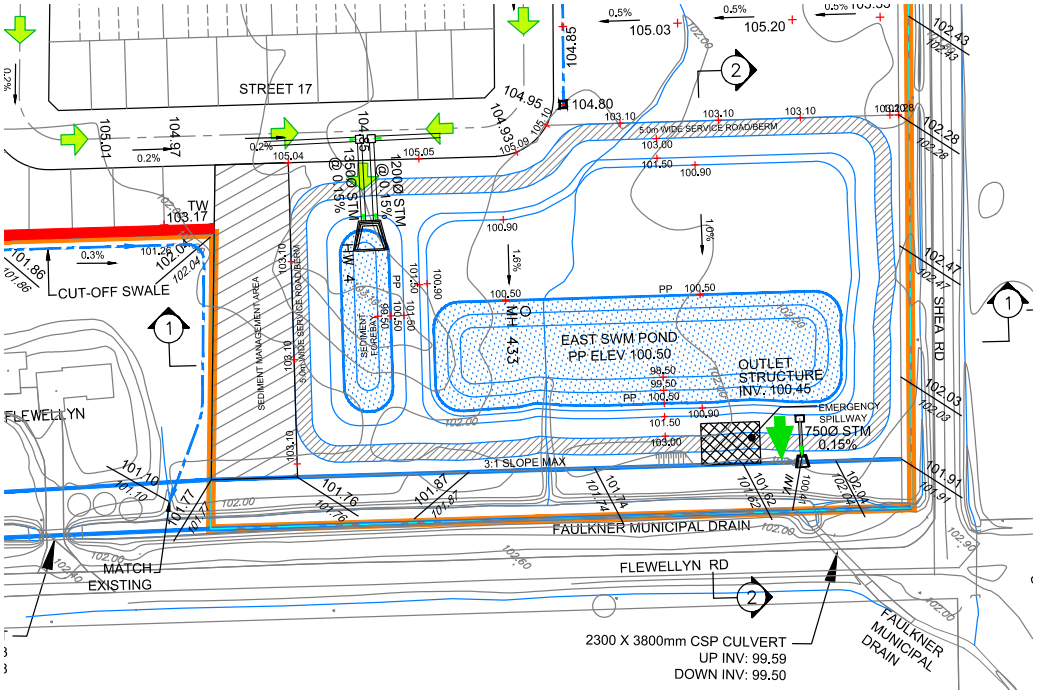
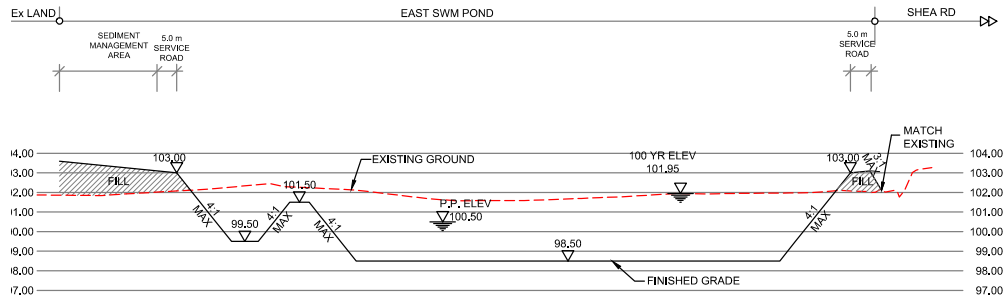
STITTSVILLE SOUTH URBAN EXPANSION AREA
WEST SWM POND
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	1:2000
DATE:	MAR 2025
FIGURE:	4





SWM POND
SECTION 1-1
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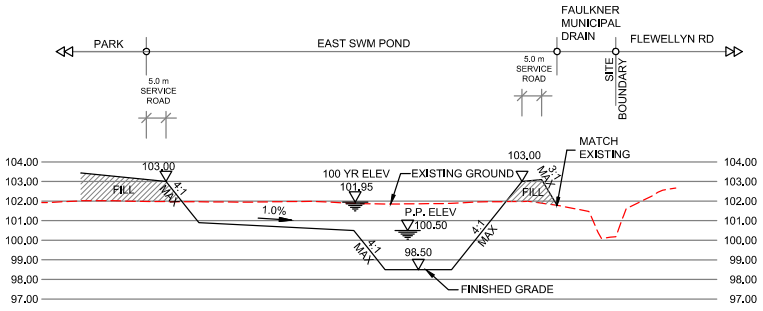
VER. 1:250



SWM POND
SECTION 2-2
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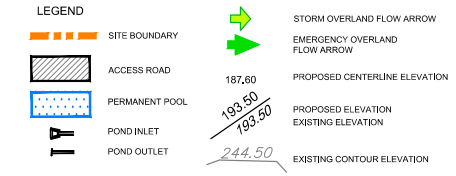
VER. 1:250



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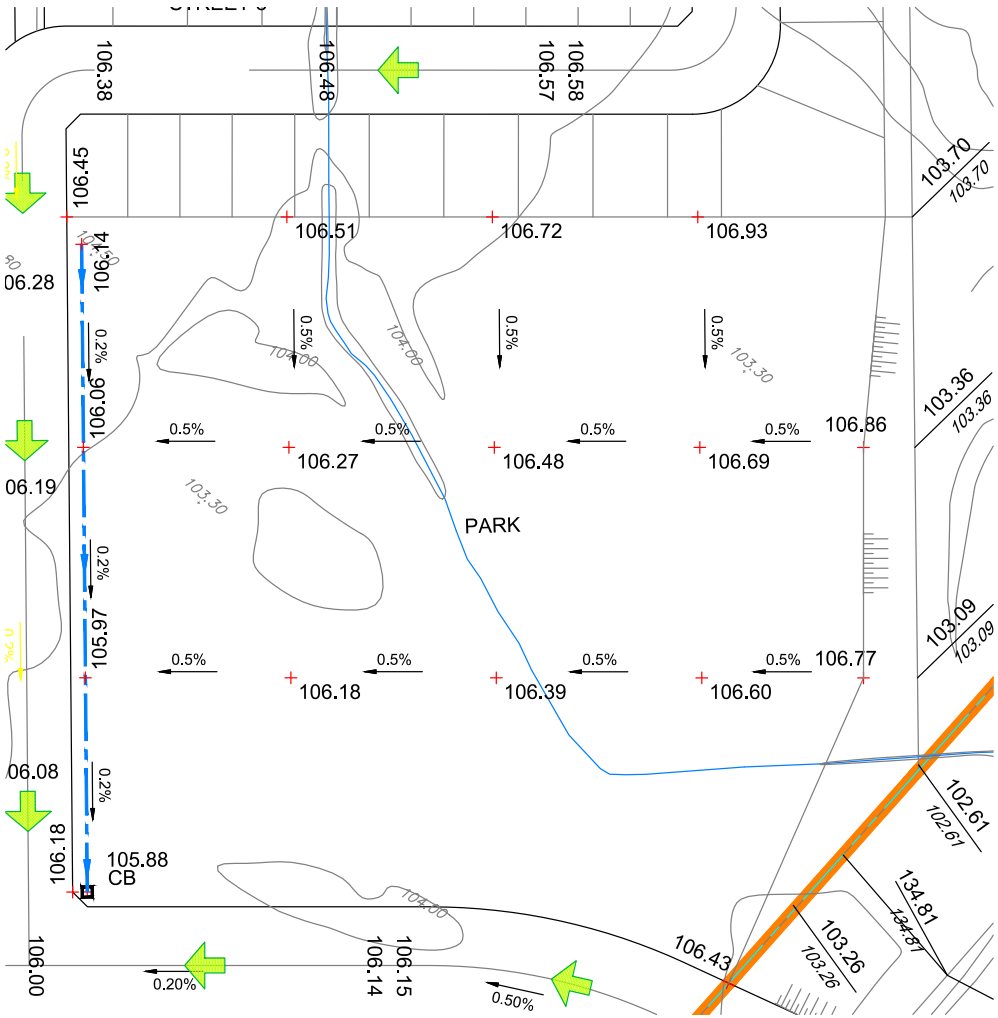
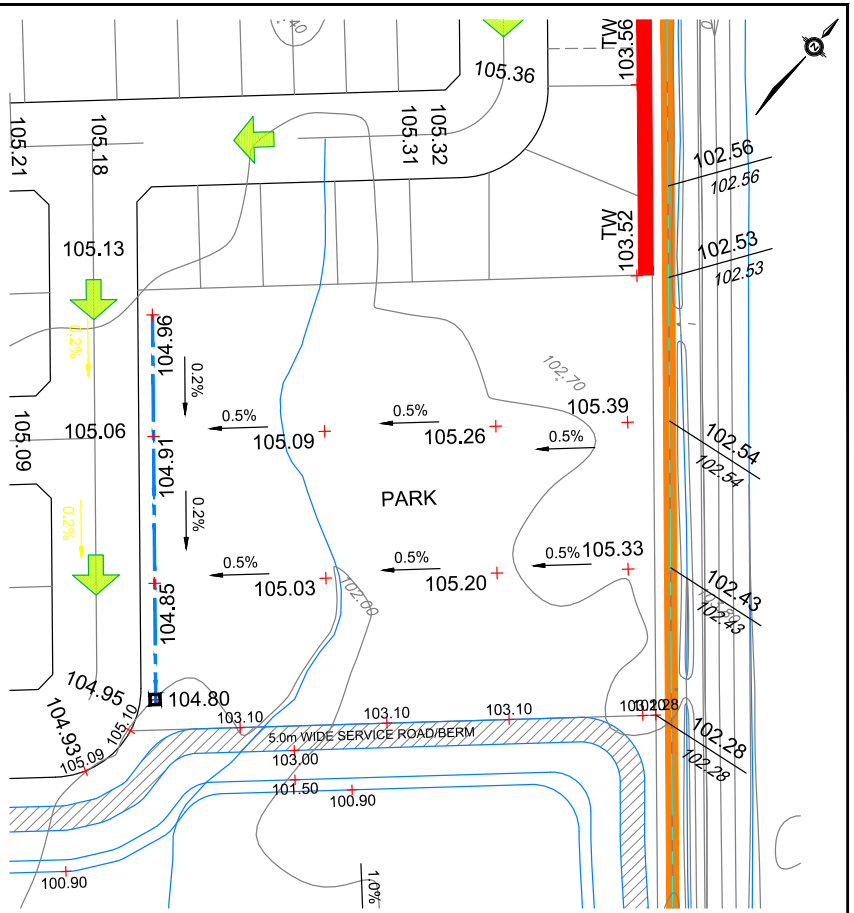
STITTSVILLE SOUTH URBAN EXPANSION AREA
EAST SWM POND
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	1:1500
DATE:	MAR 2025
FIGURE:	5





LEGEND

STORM OVERLAND FLOW ARROW

192.85 PROPOSED ELEVATION

193.50 / 193.50 PROPOSED ELEVATION EXISTING ELEVATION

244.50 EXISTING CONTOUR ELEVATION

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STITTSVILLE SOUTH URBAN EXPANSION AREA
CONCEPTUAL PARK BLOCKS 96 AND 97 GRADING PLAN
CITY OF OTTAWA

PROJECT No.:	21-1247
SCALE:	1:1000
DATE:	MAR 2025
FIGURE:	6

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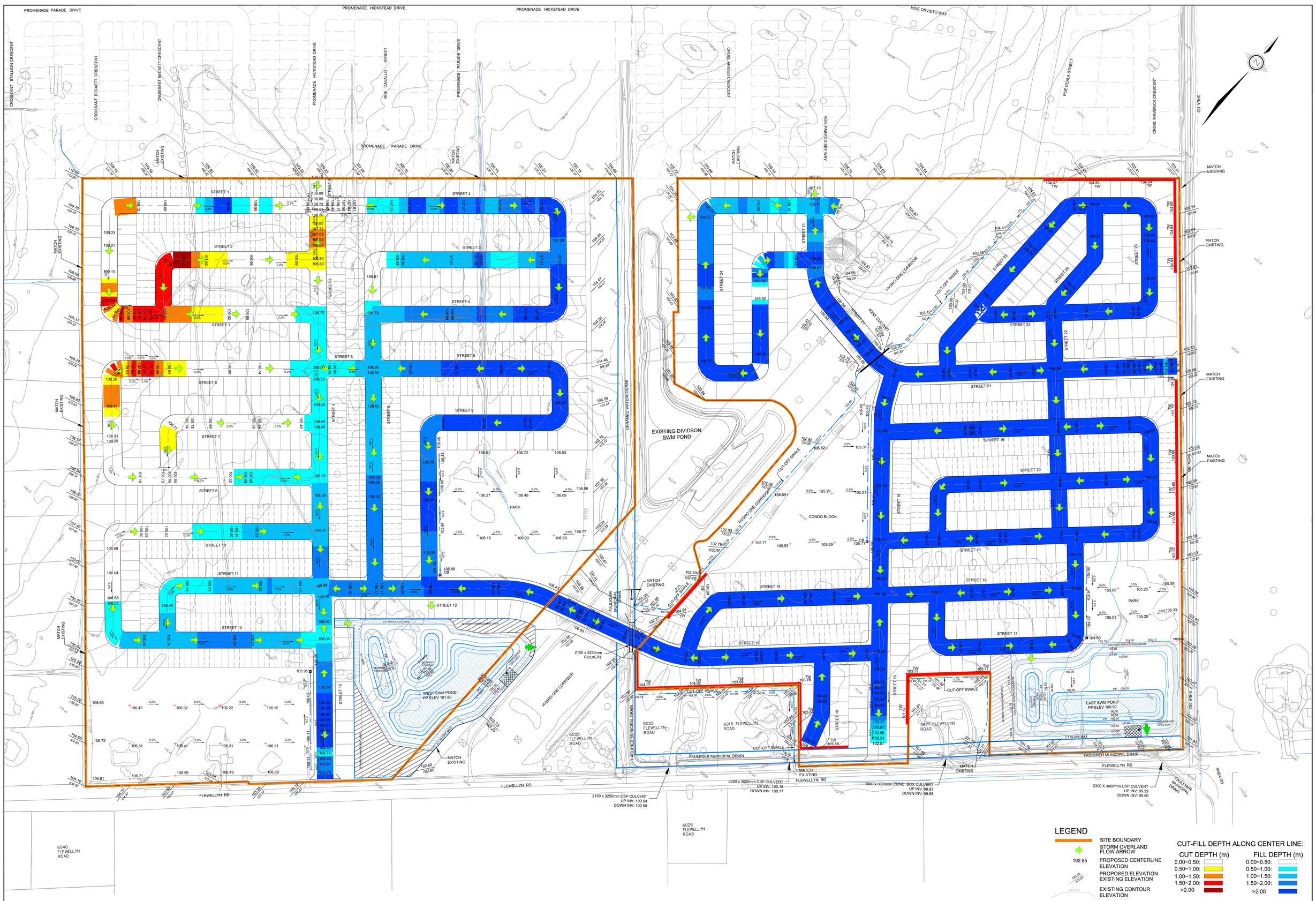
DRAWINGS



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STITTSVILLE SOUTH URBAN EXPANSION AREA
CONCEPTUAL GRADING PLAN
CITY OF OTTAWA

PROJECT No. :	21-1247
SCALE:	1:1250
DATE:	MAR 2025
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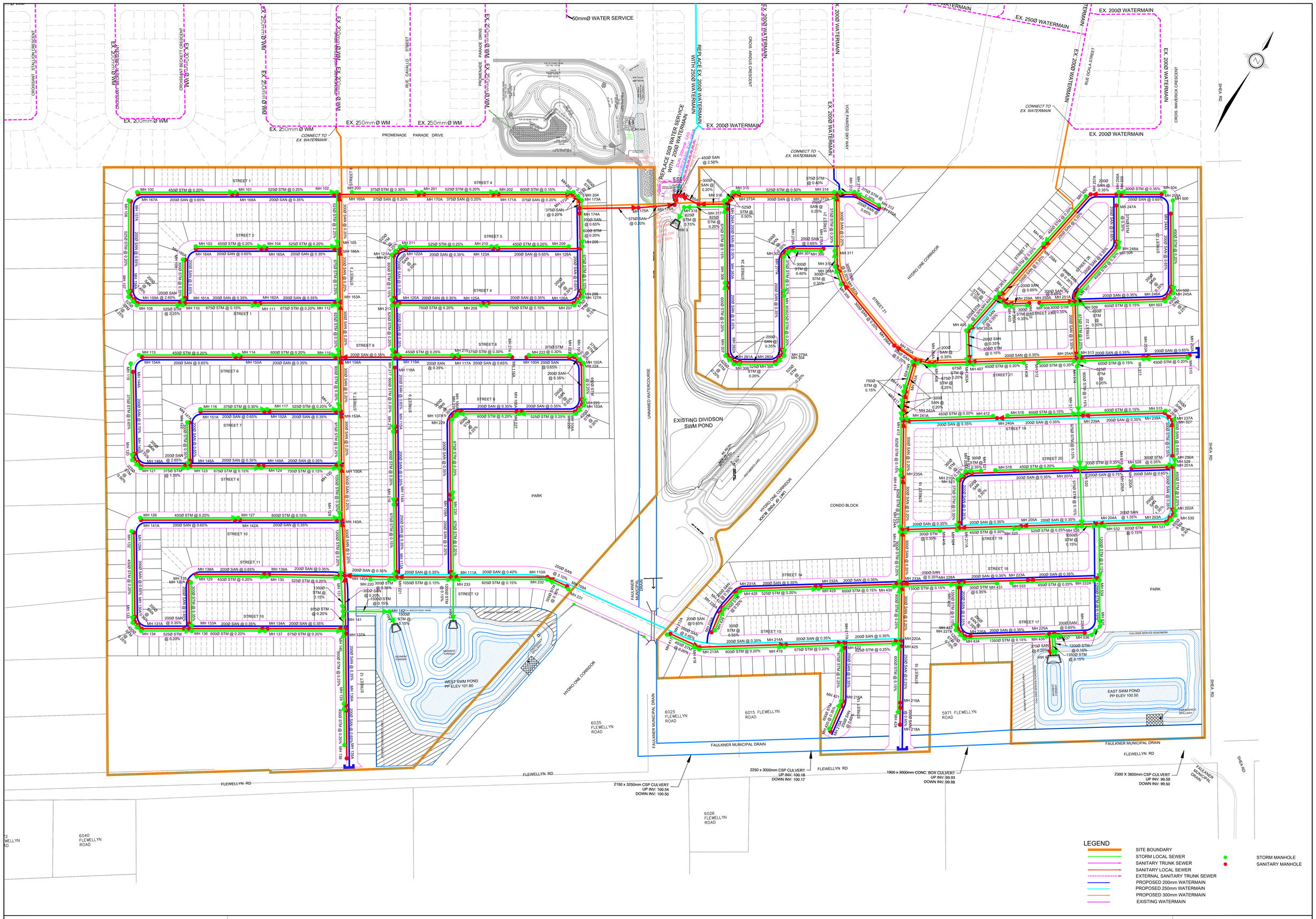

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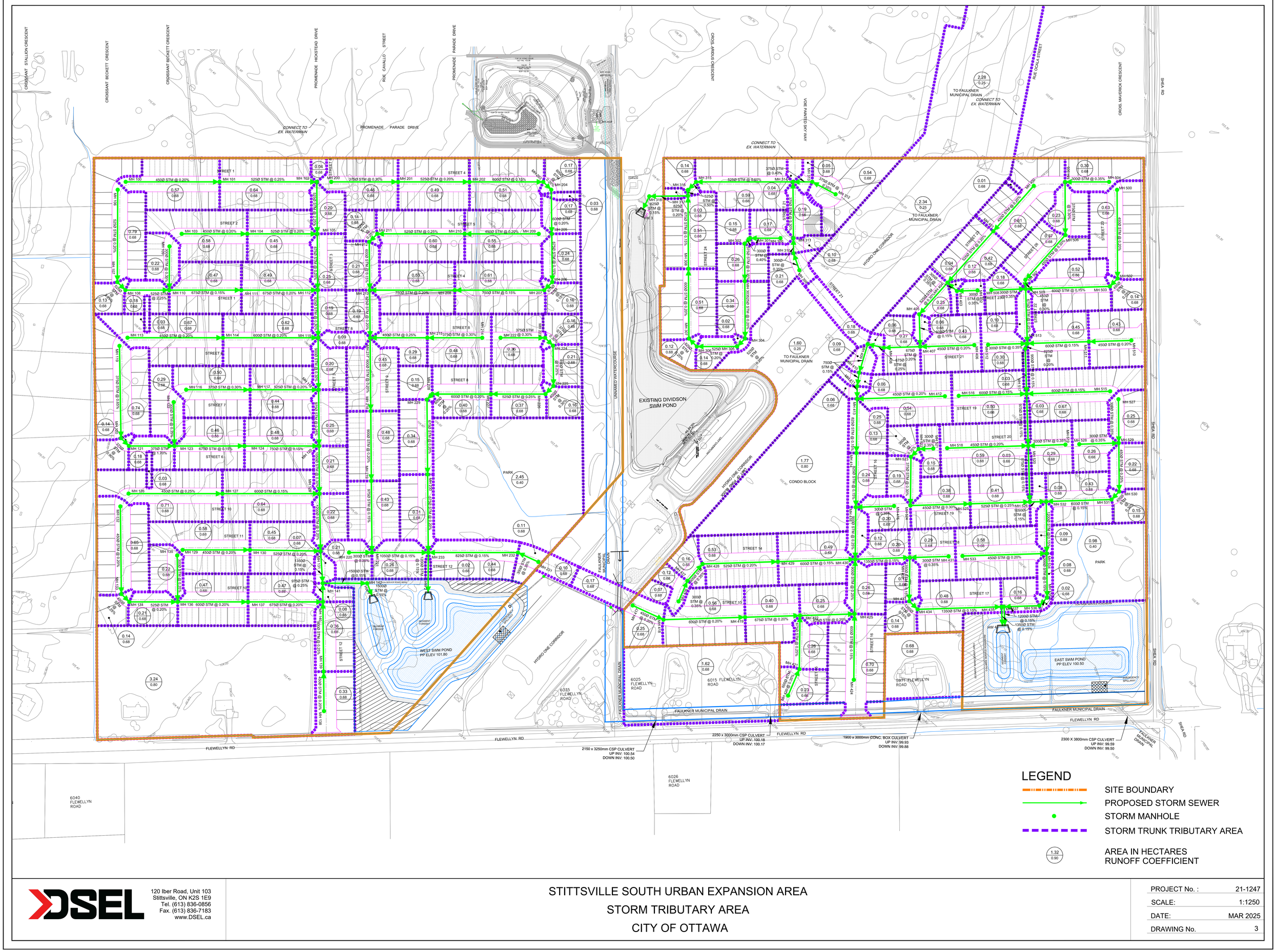
CONCEPTUAL SERVICING PLAN
CITY OF OTTAWA

PROJECT No. :	21-1247
SCALE:	1:1250
DATE:	MAR 2025
DRAWING No.	2



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STITTSVILLE SOUTH URBAN EXPANSION AREA
STORM TRIBUTARY AREA
CITY OF OTTAWA

PROJECT No. :	21-1247
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DATE:	MAR 2025
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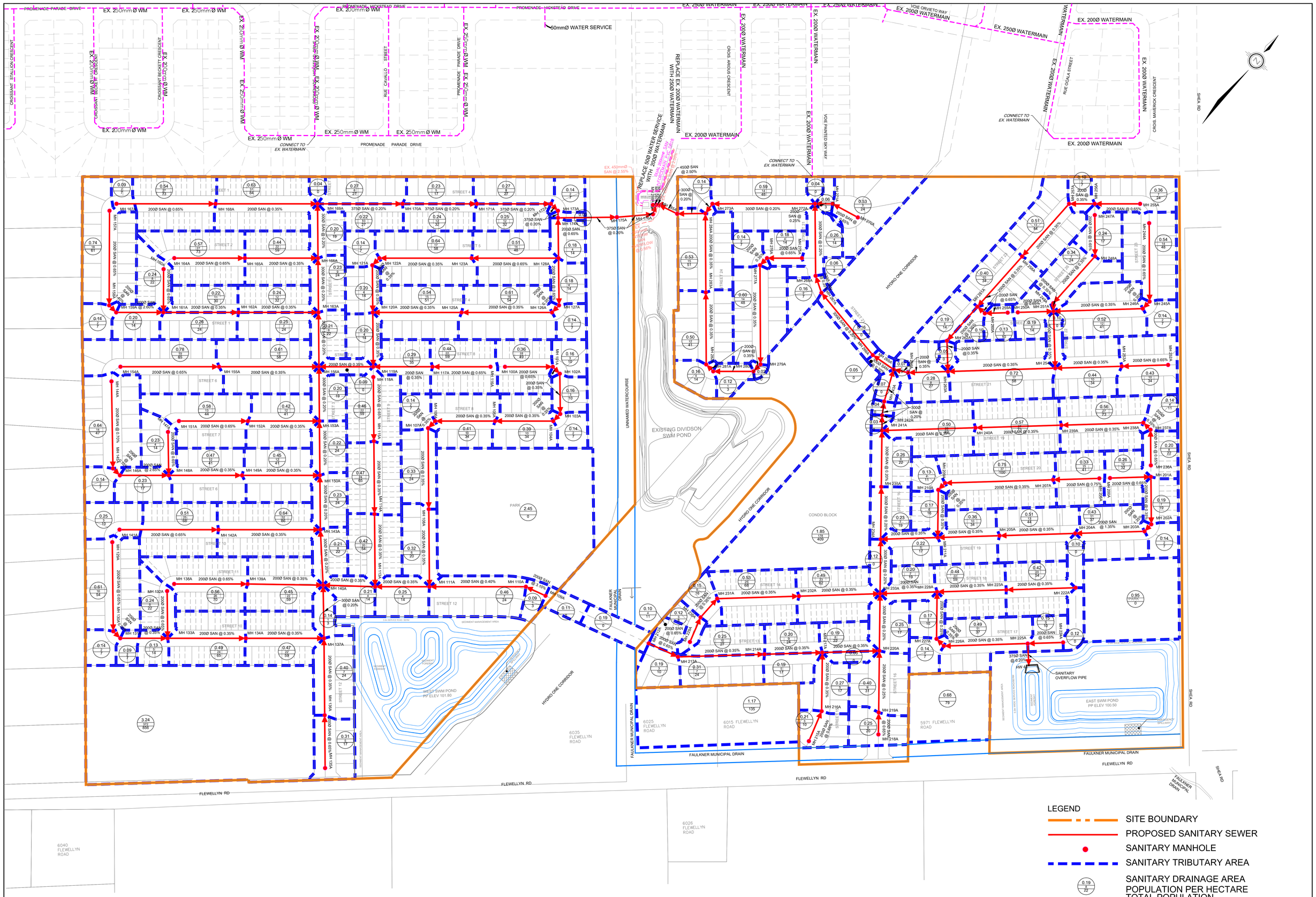

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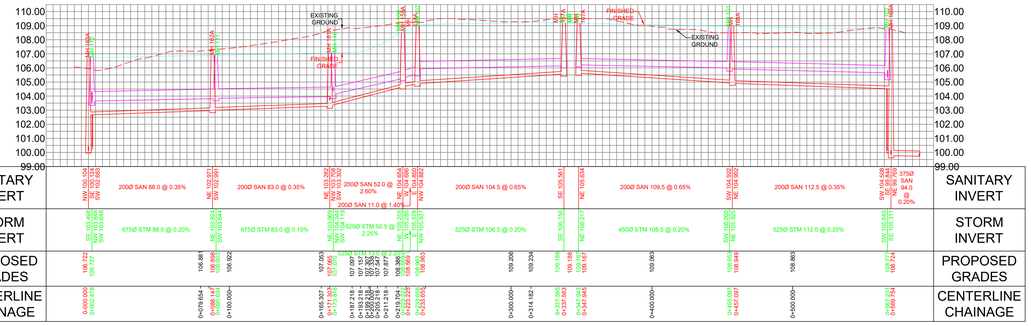
STITTSVILLE SOUTH URBAN EXPANSION AREA
SANITARY SERVICING PLAN
CITY OF OTTAWA

PROJECT No. :	21-1247
SCALE:	1:1250
DATE:	MAR 2025
DRAWING No.	4

STREET 01

1



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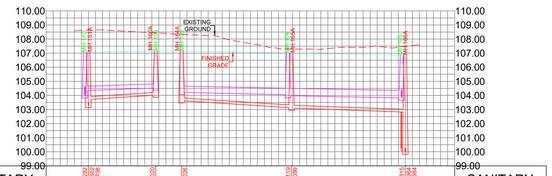
STORM INVERT	675Ø STM 88.0 @ 0.20% · 675Ø STM 83.0 @ 0.15% · 525Ø STM 50.5 @ 2.25% · 525Ø STM 106.5 @ 0.20% · 450Ø STM 108.5 @ 0.20% · 525Ø STM 112.0 @ 0.25%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+022.472 · 0+079.654 · 0+090.844 · 0+100.000+ · 0+165.307 · 0+171.307 · 0+193.218 · 0+198.218 · 0+211.216 · 0+219.754 · 0+229.754 · 0+233.852 · 0+300.000+ · 0+314.182+ · 0+337.995 · 0+337.563 · 0+347.945 · 0+347.945 · 0+400.000+ · 0+457.097 · 0+457.097 · 0+500.000+ · 0+557.754 · 0+557.754	CENTERLINE CHAINAGE

STREET 02

2



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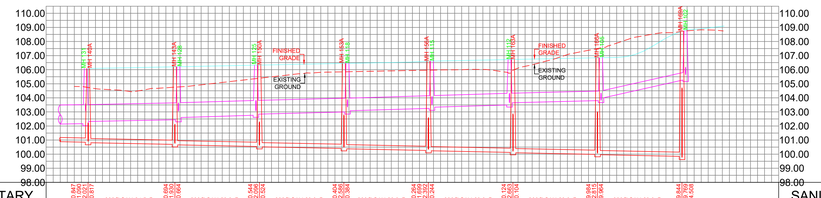
STORM INVERT	300Ø STM 50.5 @ 0.35% · 450Ø STM 75.5 @ 0.20% · 525Ø STM 81.0 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+000.000 · 0+047.207 · 0+047.207 · 0+100.000+ · 0+141.640 · 0+144.166 · 0+200.000+ · 0+222.402 · 0+224.924	CENTERLINE CHAINAGE

STREET 03

3



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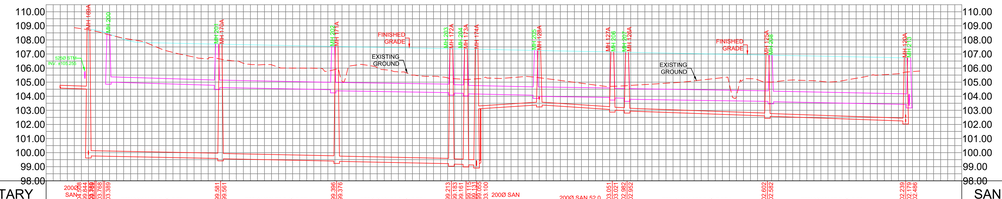
STORM INVERT	1350Ø STM 37.5 @ 0.15% · 1200Ø STM 66.5 @ 0.20% · 1050Ø STM 55.0 @ 0.30% · 975Ø STM 65.0 @ 0.25% · 900Ø STM 60.0 @ 0.30% · 825Ø STM 55.0 @ 0.30% · 675Ø STM 65.0 @ 0.25% · 525Ø STM 60.0 @ 2.25%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+000.334 · 0+055.395 · 0+061.395 · 0+100.000+ · 0+115.382 · 0+127.382 · 0+175.385 · 0+181.385 · 0+200.000+ · 0+228.861 · 0+241.397 · 0+254.397 · 0+295.389 · 0+301.389 · 0+355.391 · 0+361.391 · 0+370.391 · 0+382.231 · 0+388.231 · 0+400.227 · 0+409.394 · 0+421.394 · 0+433.394 · 0+451.316	CENTERLINE CHAINAGE

STREET 04

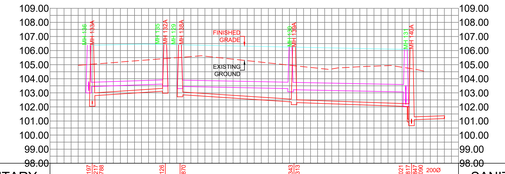
4



SANITARY INVERT	375Ø SAN 94.0 @ 0.20% · 375Ø SAN 82.5 @ 0.20% · 375Ø SAN 81.5 @ 0.20% · 375Ø SAN 11.0 @ 0.20% · 200Ø SAN 44.5 @ 0.65% · 200Ø SAN 52.0 @ 0.65% · 200Ø SAN 11.0 @ 0.35% · 200Ø SAN 100.0 @ 0.35% · 200Ø SAN 98.0 @ 0.35%	SANITARY INVERT
STORM INVERT	375Ø STM 77.0 @ 0.30% · 525Ø STM 82.5 @ 0.20% · 375Ø STM 8.0 @ 0.20% · 600Ø STM 85.0 @ 0.15% · 600Ø STM 13.0 @ 0.20% · 600Ø STM 51.0 @ 0.20% · 675Ø STM 55.5 @ 0.15% · 600Ø STM 13.0 @ 0.15% · 750Ø STM 103.5 @ 0.15% · 750Ø STM 98.0 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+009.429 · 0+021.504 · 0+033.504 · 0+039.504 · 0+080.016 · 0+092.016 · 0+101.296 · 0+107.296 · 0+100.000+ · 0+160.031 · 0+166.031 · 0+172.231 · 0+200.000+ · 0+240.049 · 0+246.049 · 0+300.000+ · 0+317.096 · 0+329.096 · 0+400.000+ · 0+426.702 · 0+432.702 · 0+452.216 · 0+458.216 · 0+469.458 · 0+475.458 · 0+480.154 · 0+492.154 · 0+500.000+	CENTERLINE CHAINAGE

STREET 11

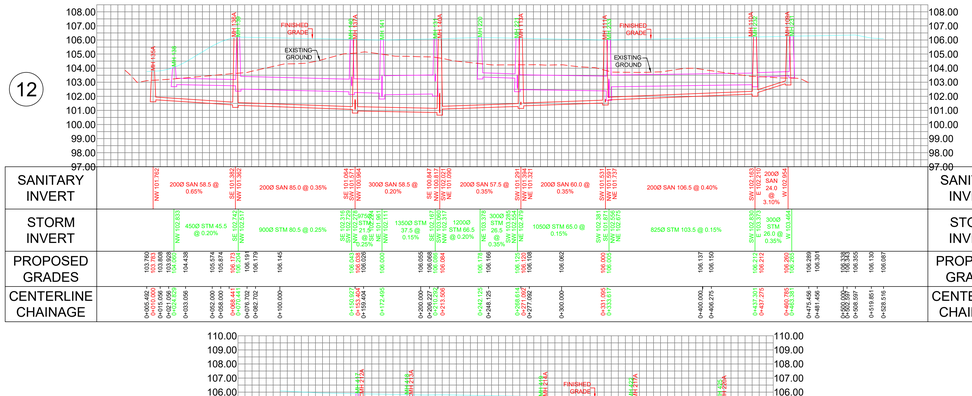
11



SANITARY INVERT	200Ø SAN 52.0 @ 0.65% · 200Ø SAN 81.0 @ 0.65% · 200Ø SAN 83.5 @ 0.35% · 300Ø SAN 17.5 @ 0.35%	SANITARY INVERT
STORM INVERT	300Ø STM 53.5 @ 0.35% · 450Ø STM 77.5 @ 0.20% · 525Ø STM 81.5 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+026.695 · 0+071.805 · 0+082.326 · 0+075.129 · 0+081.129 · 0+100.000+ · 0+143.256 · 0+149.256 · 0+156.257+ · 0+200.000+ · 0+225.695 · 0+231.695	CENTERLINE CHAINAGE

STREET 12

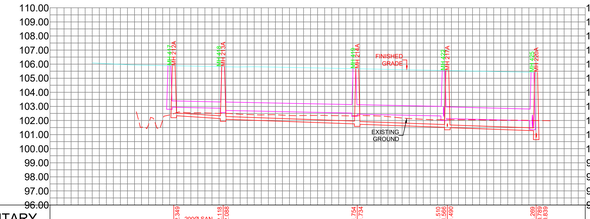
12



SANITARY INVERT	200Ø SAN 58.5 @ 0.65% · 200Ø SAN 85.0 @ 0.35% · 300Ø SAN 58.5 @ 0.20% · 200Ø SAN 57.5 @ 0.35% · 200Ø SAN 60.0 @ 0.35% · 200Ø SAN 106.5 @ 0.40% · 200Ø SAN 24.0 @ 3.10%	SANITARY INVERT
STORM INVERT	450Ø STM 45.5 @ 0.20% · 900Ø STM 80.5 @ 0.25% · 1350Ø STM 37.5 @ 0.15% · 1200Ø STM 66.5 @ 0.20% · 1050Ø STM 65.0 @ 0.15% · 825Ø STM 103.5 @ 0.15% · 300Ø STM 26.0 @ 0.35%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+026.695 · 0+033.696 · 0+052.700+ · 0+058.700+ · 0+068.441 · 0+074.441 · 0+078.702 · 0+082.702 · 0+100.000+ · 0+150.602 · 0+156.602 · 0+172.256 · 0+200.000+ · 0+206.227 · 0+212.227 · 0+213.556 · 0+247.170 · 0+248.125 · 0+256.614 · 0+262.614 · 0+277.082 · 0+300.000+ · 0+331.095 · 0+333.617 · 0+400.000+ · 0+409.275+ · 0+437.201 · 0+443.278 · 0+460.778 · 0+463.138 · 0+475.456 · 0+481.456 · 0+500.097 · 0+506.097 · 0+516.951 · 0+528.514	CENTERLINE CHAINAGE

STREET 13

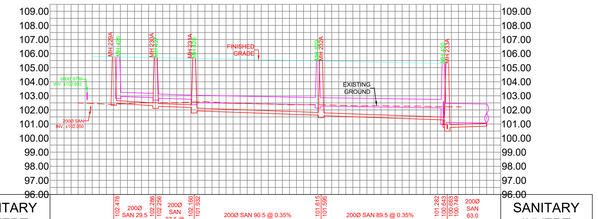
13



SANITARY INVERT	200Ø SAN 39.5 @ 0.65% · 200Ø SAN 95.5 @ 0.35% · 200Ø SAN 64.0 @ 0.35% · 200Ø SAN 63.0 @ 0.35%	SANITARY INVERT
STORM INVERT	450Ø STM 39.0 @ 0.20% · 600Ø STM 94.5 @ 0.20% · 675Ø STM 63.5 @ 0.20% · 825Ø STM 63.0 @ 0.25%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+028.121 · 0+034.121 · 0+047.299 · 0+053.299 · 0+092.933 · 0+098.933 · 0+100.000+ · 0+114.709 · 0+177.695 · 0+186.150 · 0+192.150 · 0+200.000+ · 0+242.471 · 0+248.878 · 0+300.000+ · 0+312.153 · 0+318.153	CENTERLINE CHAINAGE

STREET 14

14



SANITARY INVERT	200Ø SAN 29.5 @ 0.65% · 200Ø SAN 27.5 @ 0.35% · 200Ø SAN 90.5 @ 0.35% · 200Ø SAN 89.5 @ 0.35% · 200Ø SAN 63.0 @ 0.35%	SANITARY INVERT
STORM INVERT	300Ø STM 20.0 @ 0.35% · 300Ø STM 26.0 @ 0.35% · 525Ø STM 87.0 @ 0.20% · 600Ø STM 89.0 @ 0.15% · 1350Ø STM 63.0 @ 0.15%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE	0+000.000 · 0+008.000 · 0+014.000 · 0+045.393 · 0+051.393 · 0+077.022 · 0+083.022 · 0+088.008 · 0+094.008 · 0+100.000+ · 0+161.196 · 0+167.196 · 0+174.617 · 0+180.617 · 0+200.000+ · 0+249.408 · 0+255.408 · 0+282.653	CENTERLINE CHAINAGE

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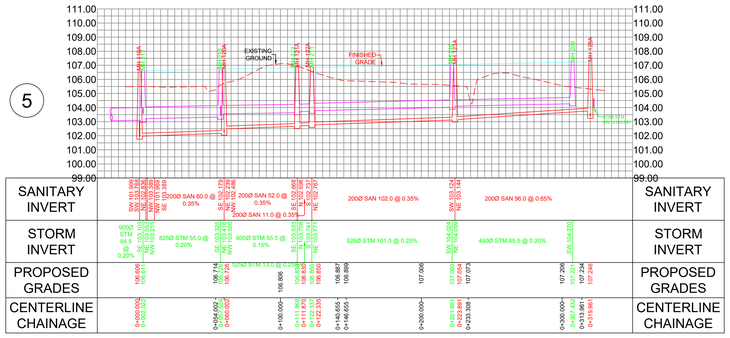
STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

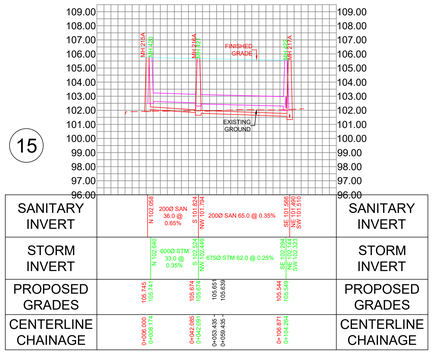
CITY OF OTTAWA

PROJECT No. :	21-1247
SCALE: VER= 1:150 HOR= 1:1500	
DATE:	MAR 2025
DRAWING No.	5

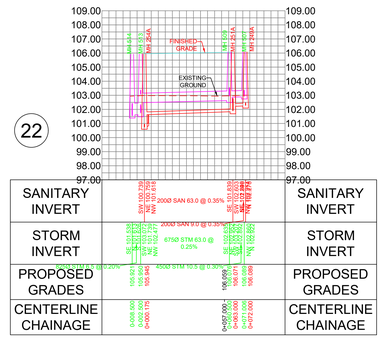
STREET 05



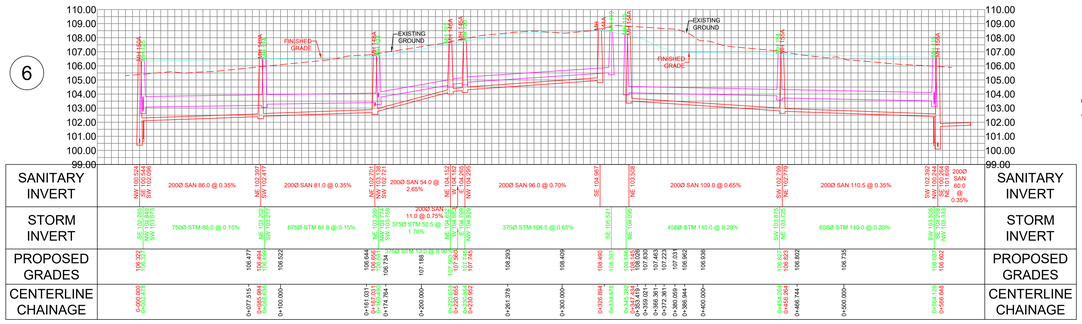
STREET 15



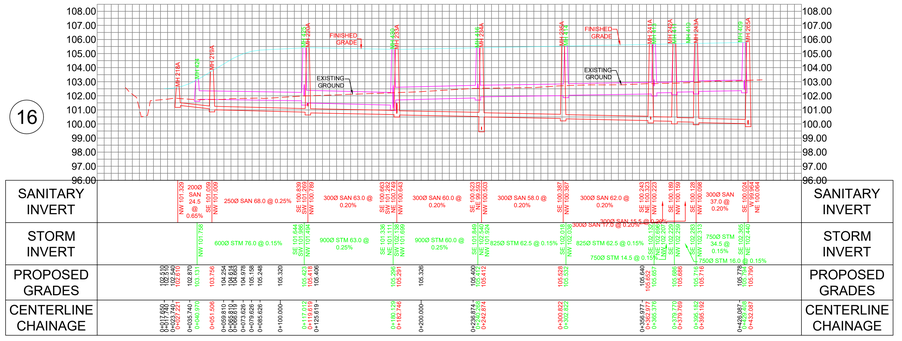
STREET 22



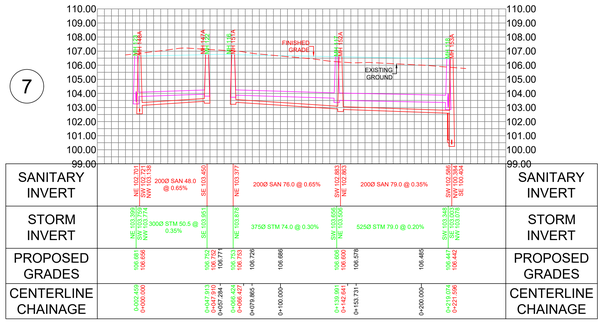
STREET 06



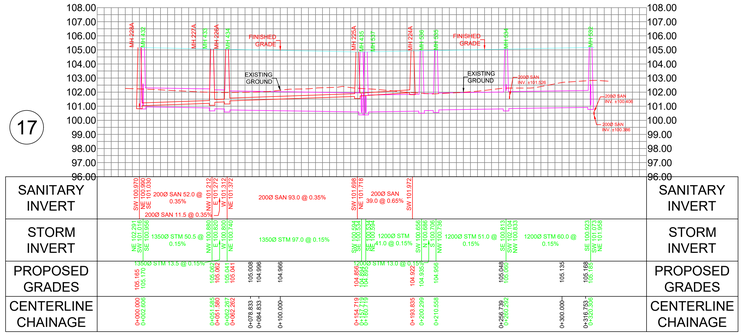
STREET 16



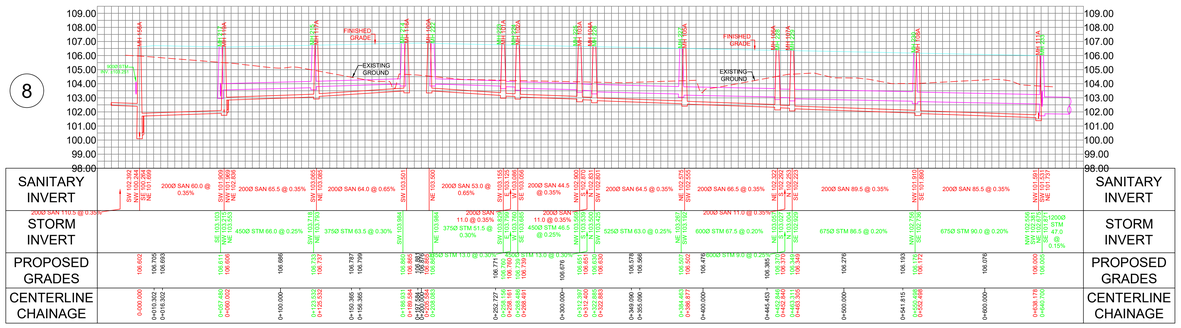
STREET 07



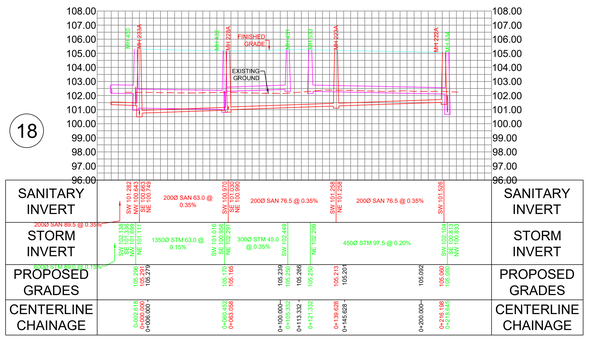
STREET 17



STREET 08



STREET 18



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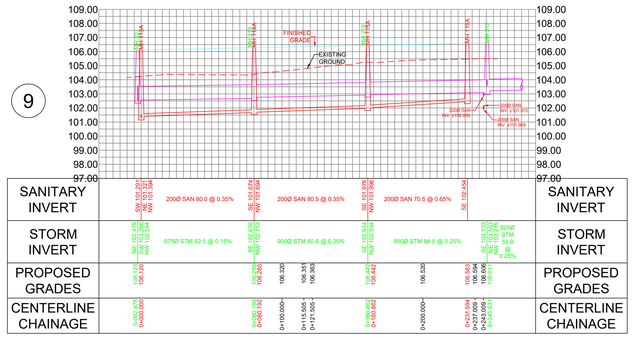
STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

CITY OF OTTAWA

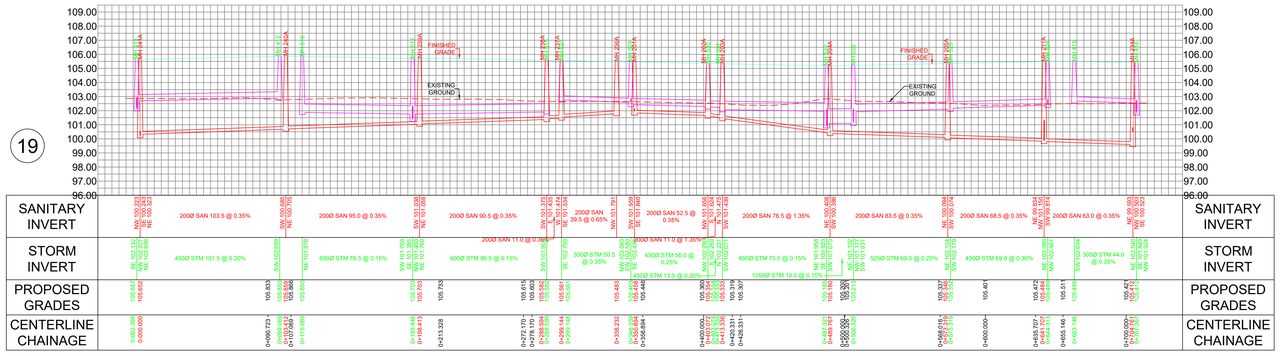
PROJECT No. :	21-1247
SCALE: VER= 1:150 HOR= 1:1500	
DATE:	MAR 2025
DRAWING No.	6

STREET 09



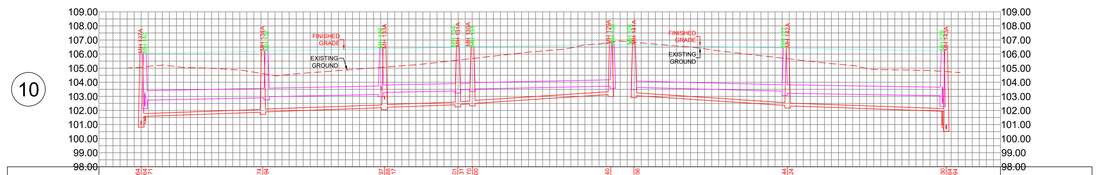
SANITARY INVERT	200Ø SAN 80.0 @ 0.35% / 200Ø SAN 80.5 @ 0.35% / 200Ø SAN 70.5 @ 0.65%	SANITARY INVERT
STORM INVERT	975Ø STM 82.5 @ 0.15% / 900Ø STM 80.5 @ 0.20% / 900Ø STM 84.5 @ 0.20% / 825Ø STM 55.0 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 19



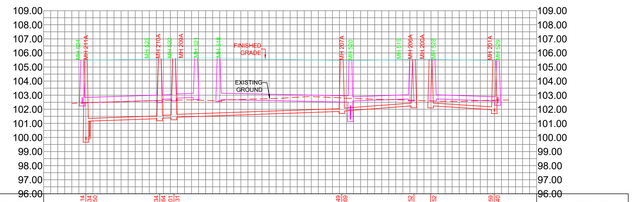
SANITARY INVERT	200Ø SAN 103.5 @ 0.35% / 200Ø SAN 95.0 @ 0.35% / 200Ø SAN 90.5 @ 0.35% / 200Ø SAN 39.5 @ 0.65% / 200Ø SAN 52.5 @ 0.35% / 200Ø SAN 76.5 @ 1.35% / 200Ø SAN 83.5 @ 0.35% / 200Ø SAN 68.5 @ 0.35% / 200Ø SAN 63.0 @ 0.35%	SANITARY INVERT
STORM INVERT	450Ø STM 101.5 @ 0.20% / 600Ø STM 78.5 @ 0.15% / 600Ø STM 96.5 @ 0.15% / 300Ø STM 50.5 @ 0.50% / 450Ø STM 56.0 @ 0.25% / 600Ø STM 75.5 @ 0.15% / 825Ø STM 69.0 @ 0.25% / 450Ø STM 69.0 @ 0.30% / 300Ø STM 44.0 @ 0.35%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 10



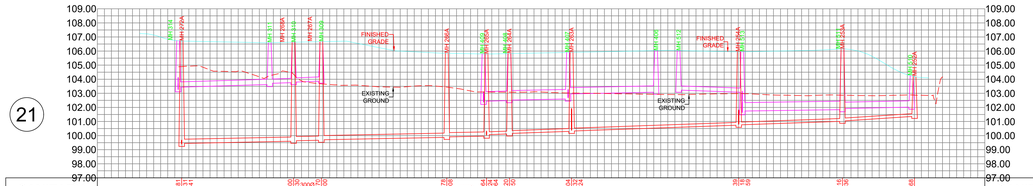
SANITARY INVERT	200Ø SAN 86.5 @ 0.35% / 200Ø SAN 86.5 @ 0.35% / 200Ø SAN 52.5 @ 0.35% / 200Ø SAN 98.5 @ 0.65% / 200Ø SAN 109.5 @ 0.65% / 200Ø SAN 112.5 @ 0.35%	SANITARY INVERT
STORM INVERT	675Ø STM 86.5 @ 0.20% / 600Ø STM 81.0 @ 0.20% / 525Ø STM 56.0 @ 0.20% / 450Ø STM 11.0 @ 0.20% / 450Ø STM 101.0 @ 0.20% / 450Ø STM 108.5 @ 0.25% / 600Ø STM 112.0 @ 0.15% / 450Ø STM 13.0 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 20



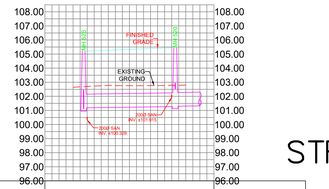
SANITARY INVERT	200Ø SAN 52.5 @ 0.35% / 200Ø SAN 119.5 @ 0.35% / 200Ø SAN 51.0 @ 0.75% / 200Ø SAN 45.0 @ 0.65% / 200Ø SAN 10.5 @ 0.30%	SANITARY INVERT
STORM INVERT	375Ø STM 56.5 @ 0.30% / 450Ø STM 93.5 @ 0.20% / 300Ø STM 43.0 @ 0.30% / 300Ø STM 45.5 @ 0.35% / 300Ø STM 12.5 @ 0.35%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 21



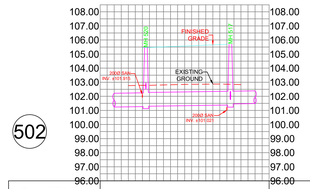
SANITARY INVERT	300Ø SAN 79.5 @ 0.20% / 300Ø SAN 89.0 @ 0.20% / 200Ø SAN 78.0 @ 0.35% / 3000 SAN 28.0 @ 0.20% / 200Ø SAN 44.0 @ 0.35% / 200Ø SAN 118.5 @ 0.35% / 200Ø SAN 73.5 @ 0.35% / 200Ø SAN 51.0 @ 0.65%	SANITARY INVERT
STORM INVERT	375Ø STM 65.0 @ 0.30% / 375Ø STM 19.0 @ 0.20% / 975Ø STM 42.0 @ 0.20% / 450Ø STM 62.5 @ 0.20% / 300Ø STM 45.0 @ 0.35% / 600Ø STM 71.0 @ 0.15% / 450Ø STM 49.0 @ 0.20%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 501



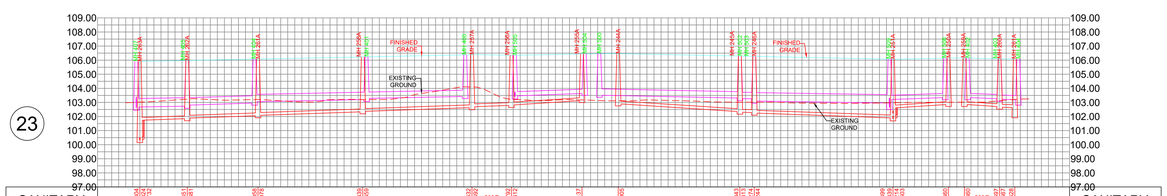
SANITARY INVERT		SANITARY INVERT
STORM INVERT	975Ø STM 65.0 @ 0.15%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 502



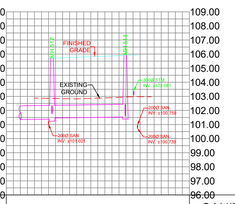
SANITARY INVERT		SANITARY INVERT
STORM INVERT	975Ø STM 60.0 @ 0.15% / 900Ø STM 52.0 @ 0.15%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 23



SANITARY INVERT	200Ø SAN 74.5 @ 0.35% / 200Ø SAN 78.0 @ 0.35% / 200Ø SAN 50.0 @ 0.65% / 200Ø SAN 86.5 @ 0.65% / 200Ø SAN 11.0 @ 0.35% / 200Ø SAN 98.5 @ 0.35% / 200Ø SAN 99.5 @ 0.65% / 200Ø SAN 25.0 @ 0.65% / 200Ø SAN 11.0 @ 0.35%	SANITARY INVERT
STORM INVERT	600Ø STM 97.5 @ 0.15% / 525Ø STM 49.0 @ 0.30% / 525Ø STM 79.5 @ 0.20% / 450Ø STM 70.0 @ 0.20% / 300Ø STM 51.0 @ 0.35% / 450Ø STM 102.5 @ 0.20% / 450Ø STM 13.0 @ 0.25% / 600Ø STM 97.0 @ 0.15% / 300Ø STM 39.5 @ 0.35% / 300Ø STM 14.5 @ 0.35%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

STREET 503



SANITARY INVERT		SANITARY INVERT
STORM INVERT	900Ø STM 52.0 @ 0.15%	STORM INVERT
PROPOSED GRADES		PROPOSED GRADES
CENTERLINE CHAINAGE		CENTERLINE CHAINAGE

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STITTSVILLE SOUTH URBAN EXPANSION AREA

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CITY OF OTTAWA

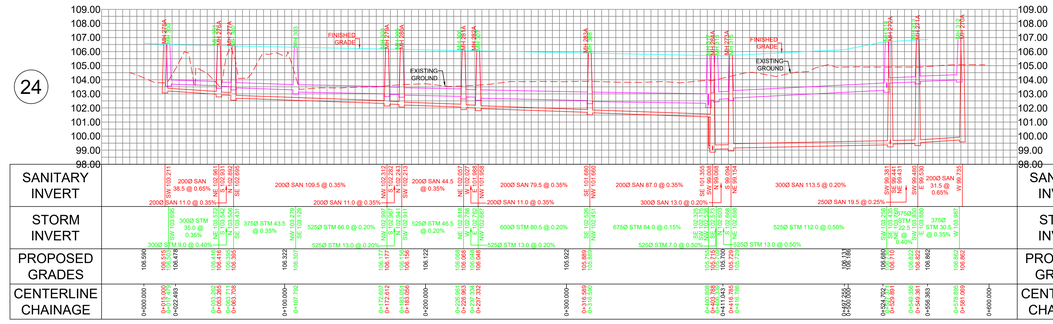
PROJECT No. : 21-1247

SCALE: VER= 1:150 HOR= 1:1500

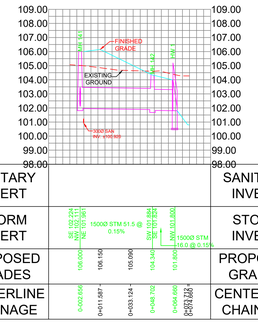
DATE: MAR 2025

DRAWING No. 7

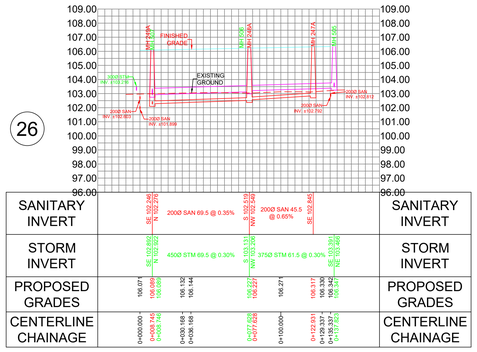
STREET 24



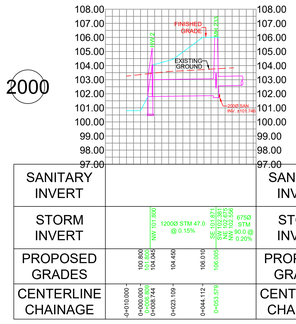
STREET 1000



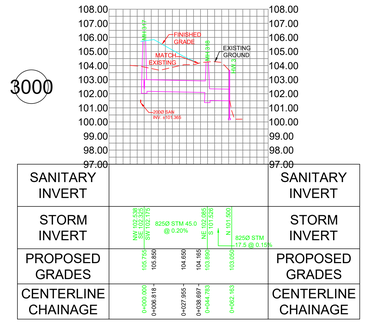
STREET 26



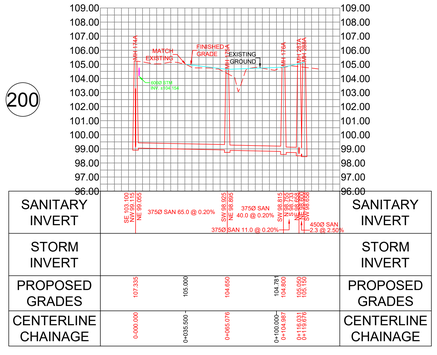
STREET 2000



STREET 3000



STREET 200



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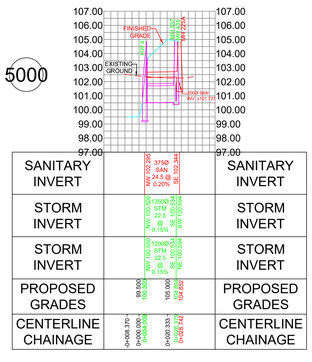

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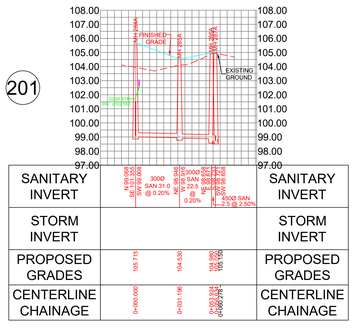

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STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

CITY OF OTTAWA

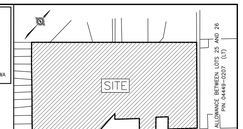
PROJECT No. :	21-1247
SCALE: VER= 1:150 HOR= 1:1500	
DATE:	MAR 2025
DRAWING No.	8

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

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
0 10 20 40 60 metres

J.D. BARNES LIMITED
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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)(i) 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
(j) – 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 54, BOTH INCLUSIVE	189,808.91
STANDARD TOWNHOUSE	BLOCKS 55 TO 85, BOTH INCLUSIVE	126,414.34
STACKED CONDOMINIUM BLOCKS	BLOCKS 86 AND 87	50,716.93
VISTA	BLOCKS 88 TO 95, BOTH INCLUSIVE	2,982.94
PARK	BLOCKS 96 AND 97	33,952.26
SWM POND	BLOCKS 98 AND 99	42,620.94
ROAD WIDENING	BLOCKS 100 TO 102, BOTH INCLUSIVE	3027.81
NATURAL HERITAGE	BLOCKS 103 TO 106, BOTH INCLUSIVE	22,797.14
UTILITY CORRIDOR	BLOCKS 107 TO 108, 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 04449-0198(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 04449-0211(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.

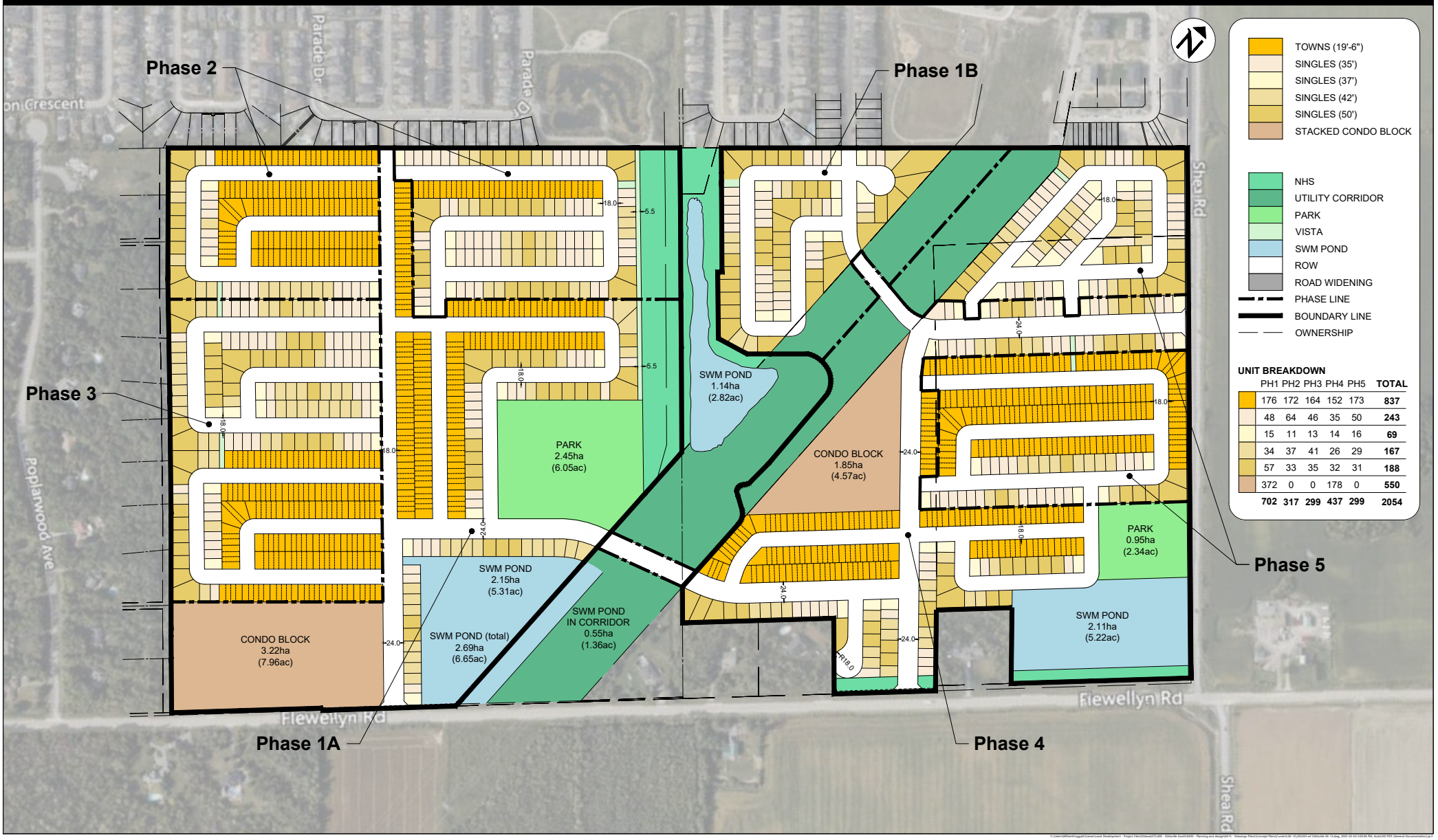
J.D. BARNES LIMITED — SURVEYING, MAPPING, GIS
LAND INFORMATION SPECIALISTS
10 STACEY DRIVE, SUITE 103, KANATA, ON K2K 2A9
T: (613) 721-7244 F: (613) 254-8679 www.jdbarnes.com

DRAWN BY: EC/AM | CHECKED BY: SL | REFERENCE NO.: 23-10-060-00 VER D | DATED: 02/24/2025

CAIVAN

STITTSVILLE

DRAWING: SK-13
DATE: 2025-02-04
AUTHOR: WF
SCALE: 1:4,000



UNIT BREAKDOWN

	PH1	PH2	PH3	PH4	PH5	TOTAL
	176	172	164	152	173	**837**
	48	64	46	35	50	**243**
	15	11	13	14	16	**69**
	34	37	41	26	29	**167**
	57	33	35	32	31	**188**
	372	0	0	178	0	**550**
	702	**317**	**299**	**437**	**299**	**2054**

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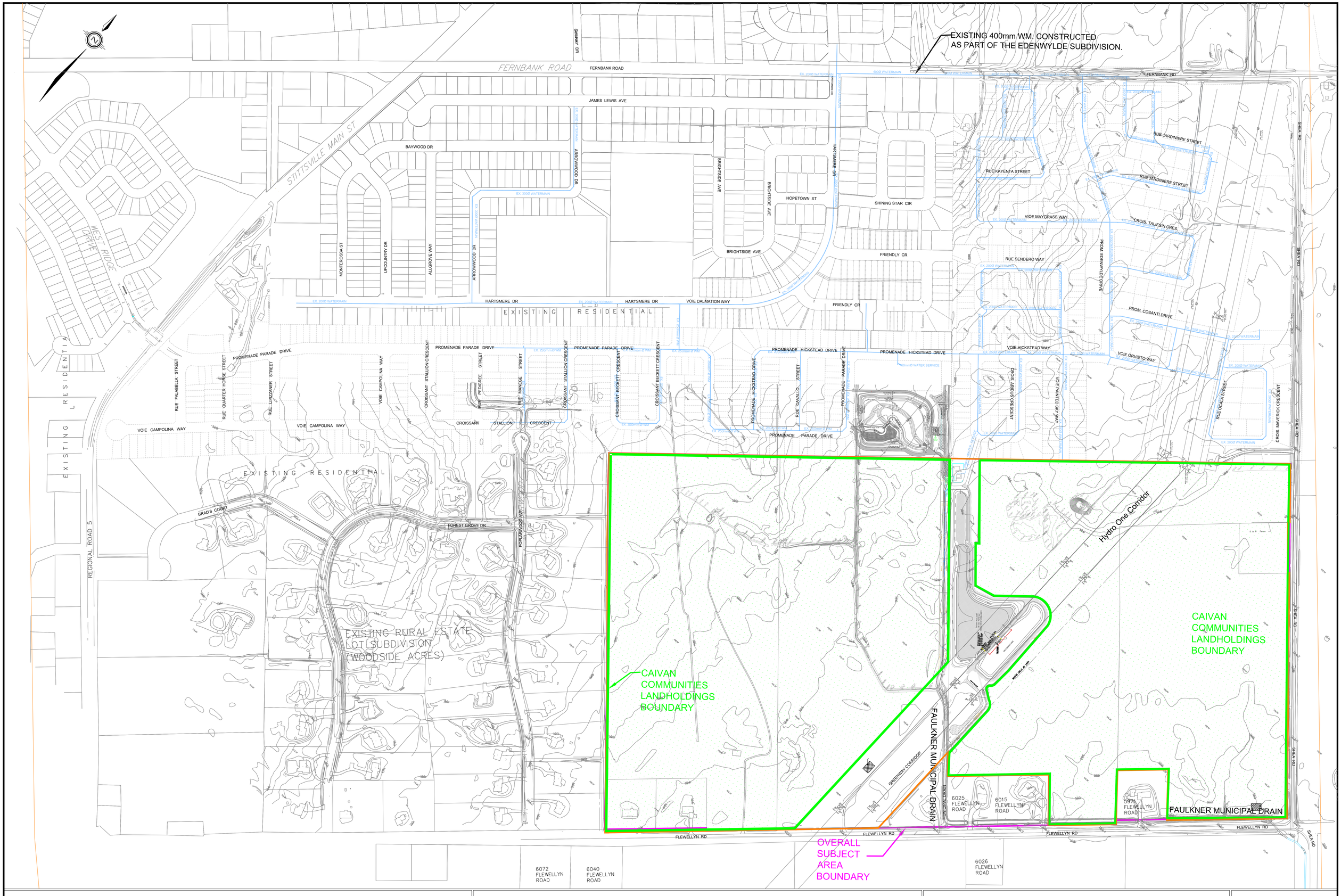
dsel.ca

APPENDIX B



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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:	MAR 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

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Permit to Practice: 1000623

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

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1 Introduction

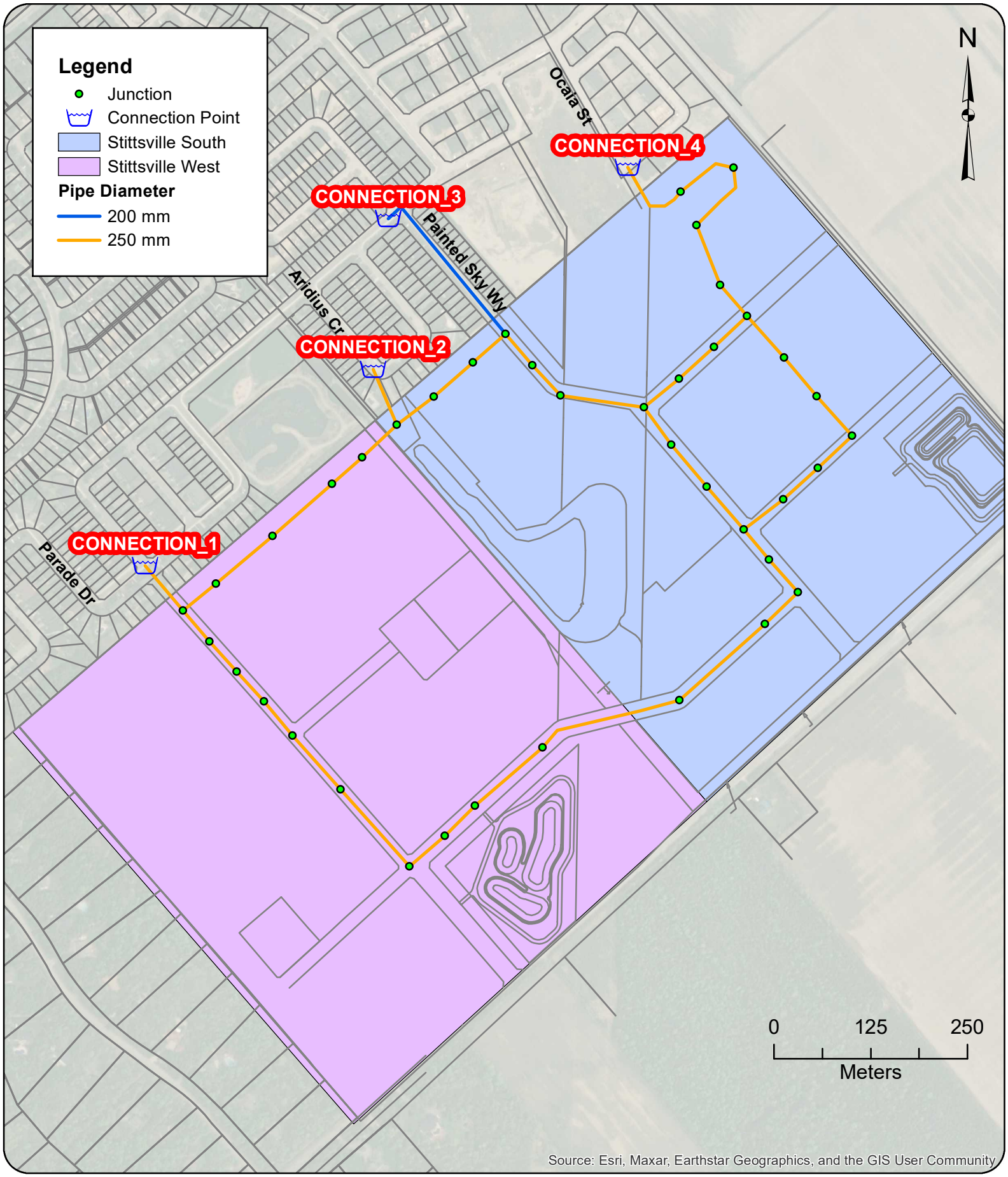
GeoAdvice Engineering Inc. ("GeoAdvice") was retained by David Schaeffer Engineering Ltd. ("DSEL") to size the proposed trunk water main network for the Stittsville South Urban Expansion Area (SSUEA) development ("Development") in the City of Ottawa, ON ("City").

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**

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.

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
		Persons per Unit	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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	Peak Hour
			(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)	1.5 x Avg. Day (L/s)	1.8 x Max Day (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
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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
		Persons per Unit	Population Per Dwelling Type	(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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	Peak Hour
			(L/ha/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)	1.5 x Avg. Day (L/s)	1.8 x Max Day (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
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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
		Persons per Ha	Population Per Dwelling Type	(L/unit/d)	(L/d)	(L/s)	(L/unit/d)	(L/s)		2.1 x Max Day (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**

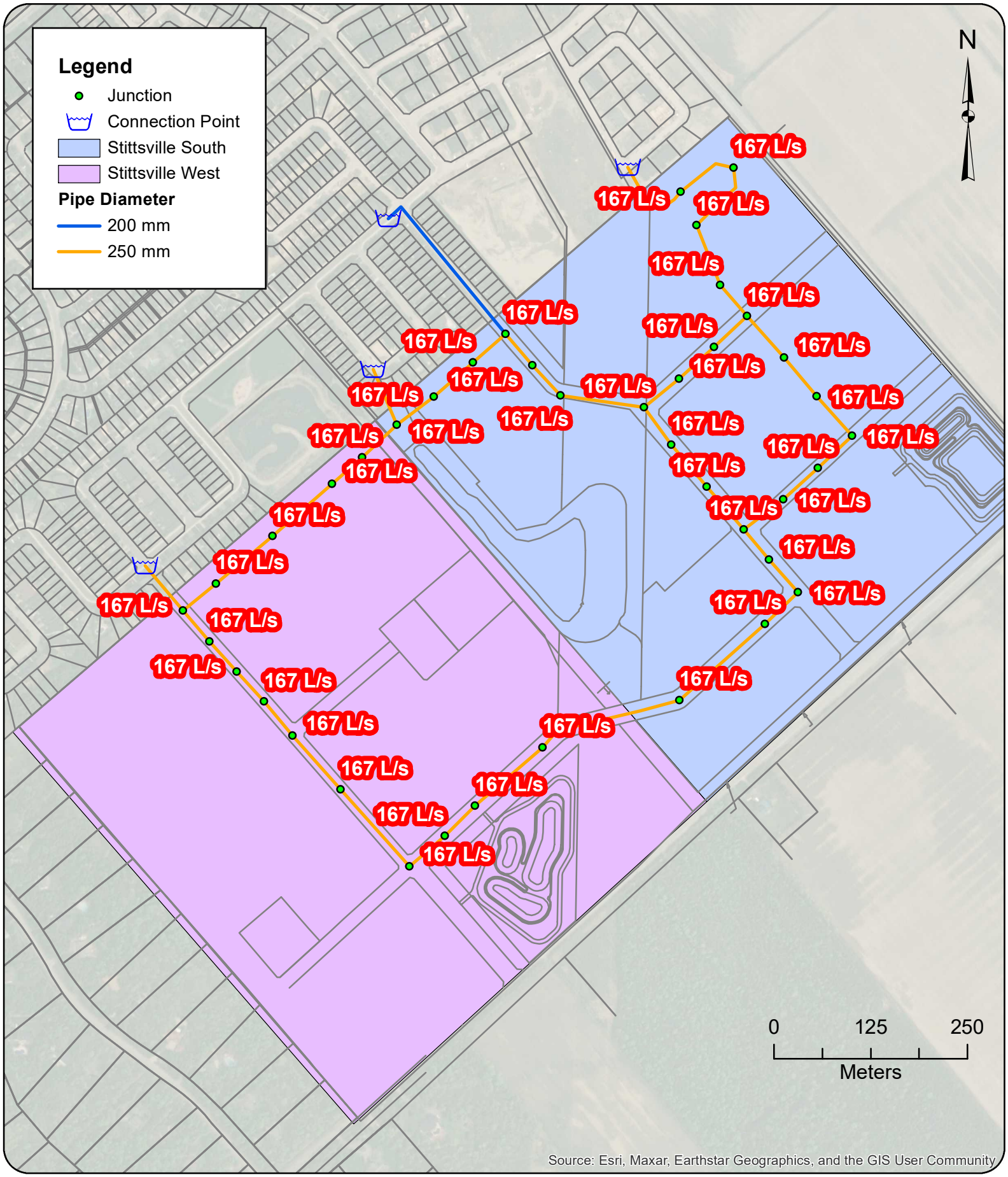
		Average Day	Max Day	Peak Hour
Stittsville West		**9.15**	**14.56**	**29.15**
Stittsville South		**7.57**	**11.64**	**23.09**

*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**

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.

Required Fire Flow

Figure B.1

Appendix C Boundary Conditions

Boundary Conditions
Stittsville South Urban Expansion Area

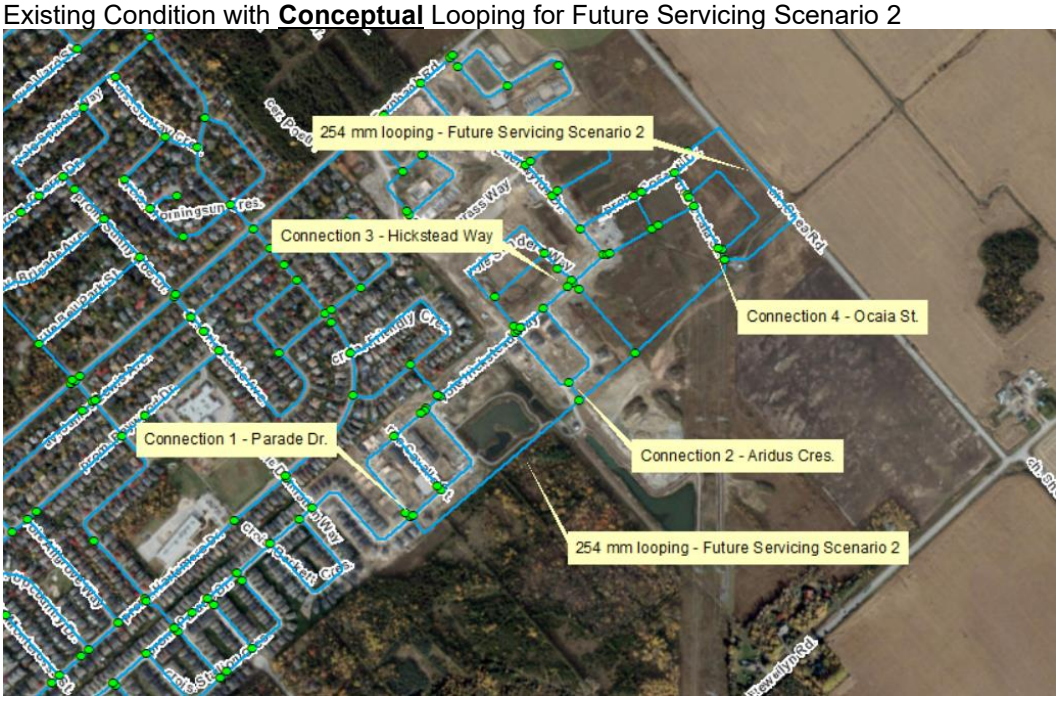
Provided Information

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



Results

1. Existing Condition Model (No Future Demand)

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

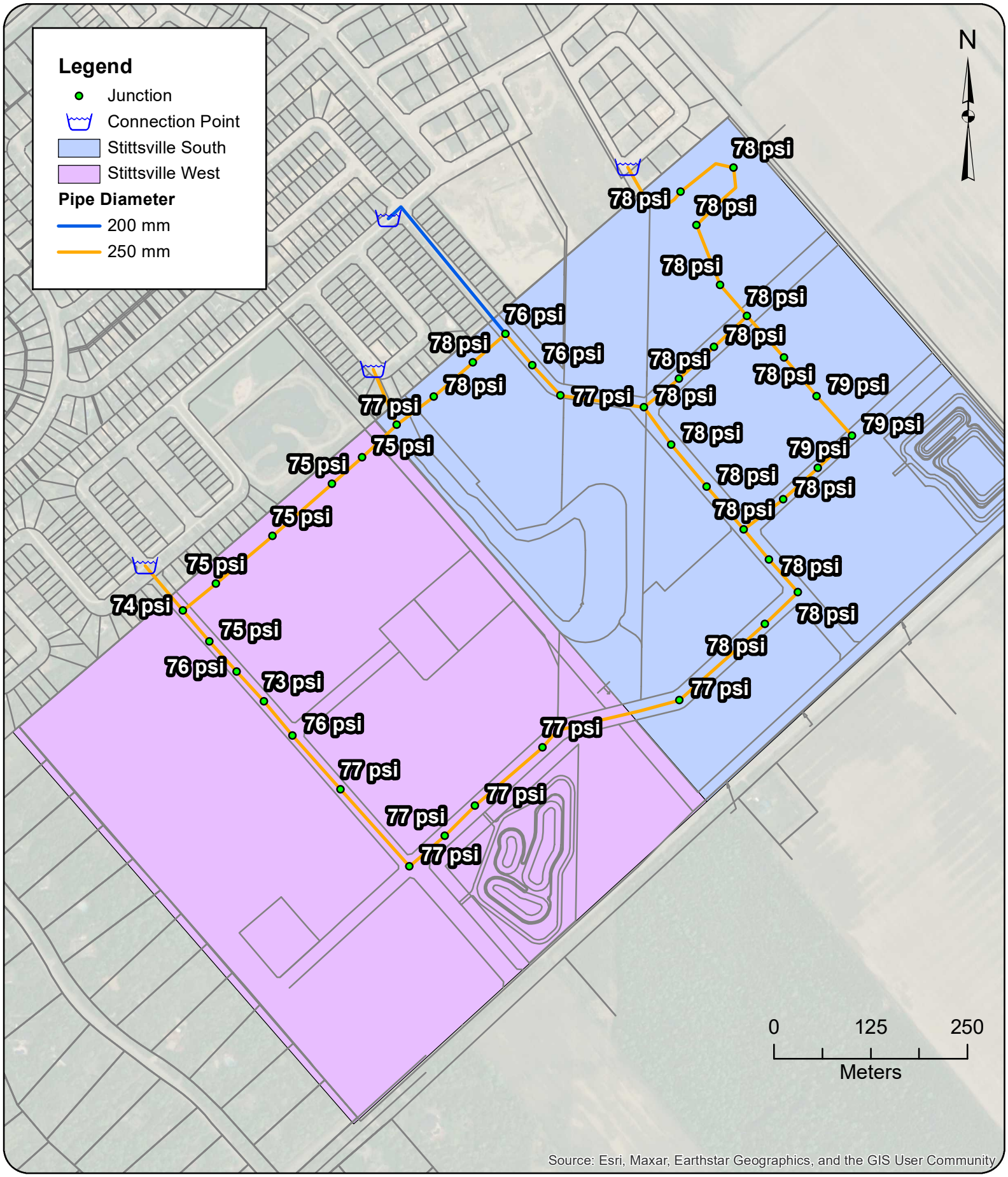
Notes

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.

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SSUEA
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Client: **David Schaeffer Engineering Ltd.**
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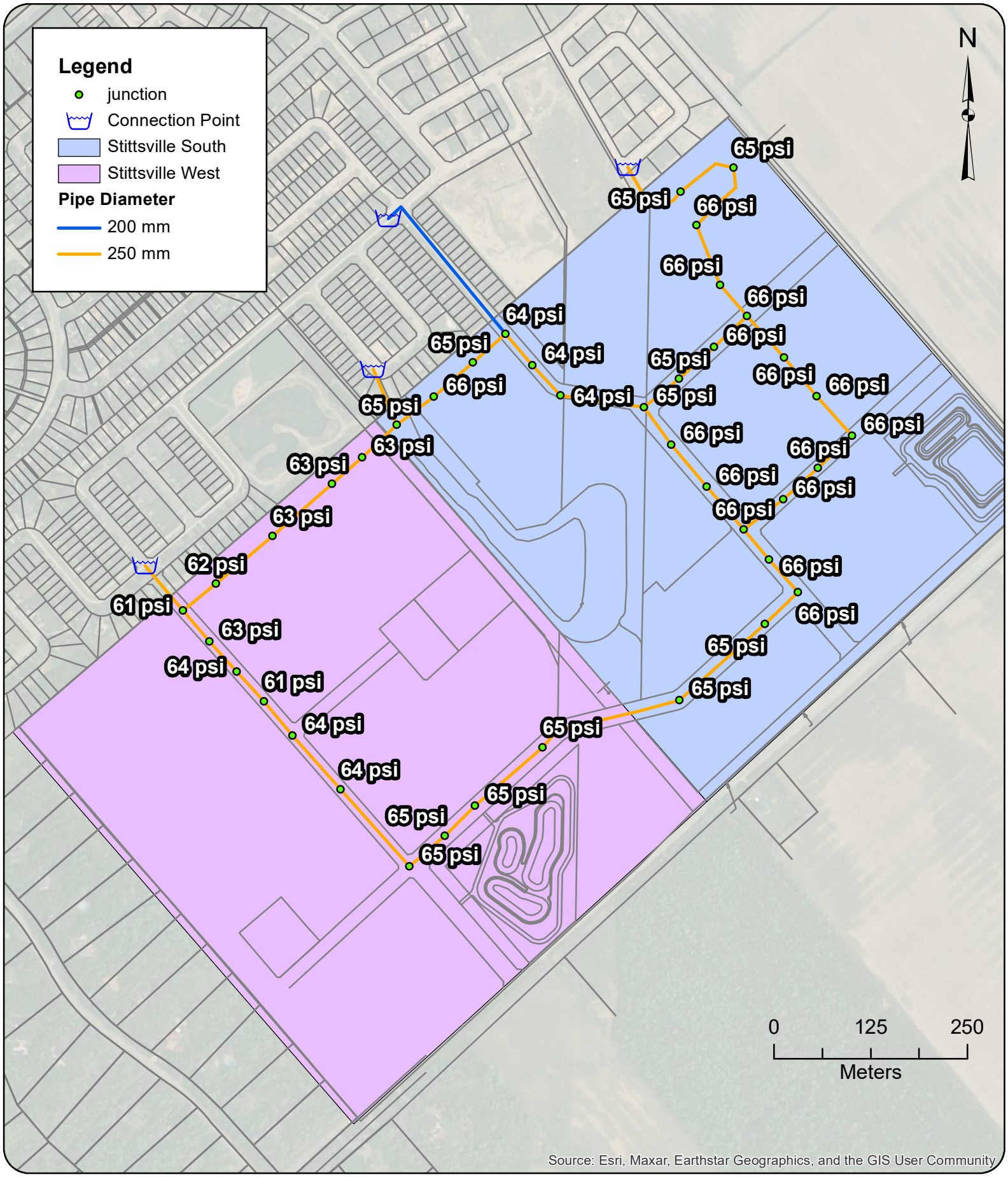
ADD Pressure Modeling Results

Figure D.1



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SSUEA
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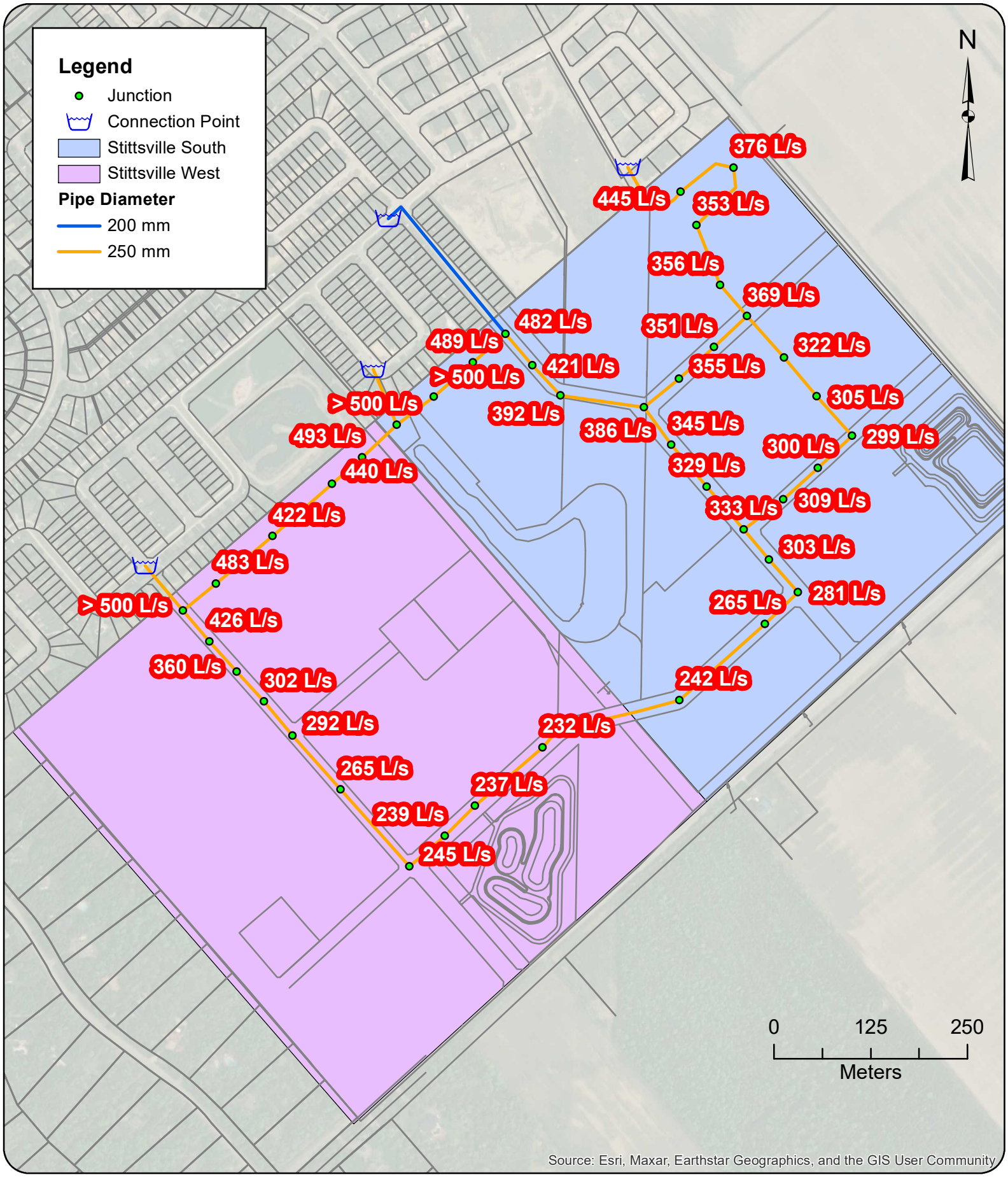
PHD Pressure Modeling Results

Figure D.2

Appendix E MDD+FF Model Results



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SSUEA
2022-018-DSE
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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

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

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

CAUTION: This email originated from an External Sender. Please do not click links or open attachments unless you recognize the source.
ATTENTION : Ce courriel provient d'un expéditeur externe. Ne cliquez sur aucun lien et n'ouvrez pas de pièce jointe, excepté si vous connaissez l'expéditeur.

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.

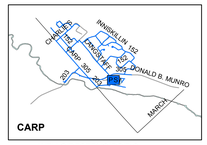
[2] Apply a rate of 17,000 l/h/day if employment totals are unknown. The rate represents the average demand for ICI areas at the 90th percentile.

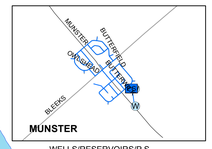
[3] Occupancy factors should be chosen according to housing type. The values shown were extracted from Section 4.2.8 of the Ottawa Design Guidelines - Water Distribution (2010)

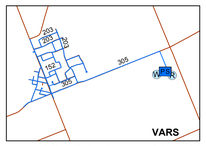
[4] Outdoor water demand is applied to single family, semi-detached and townhome units with rear yards.

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

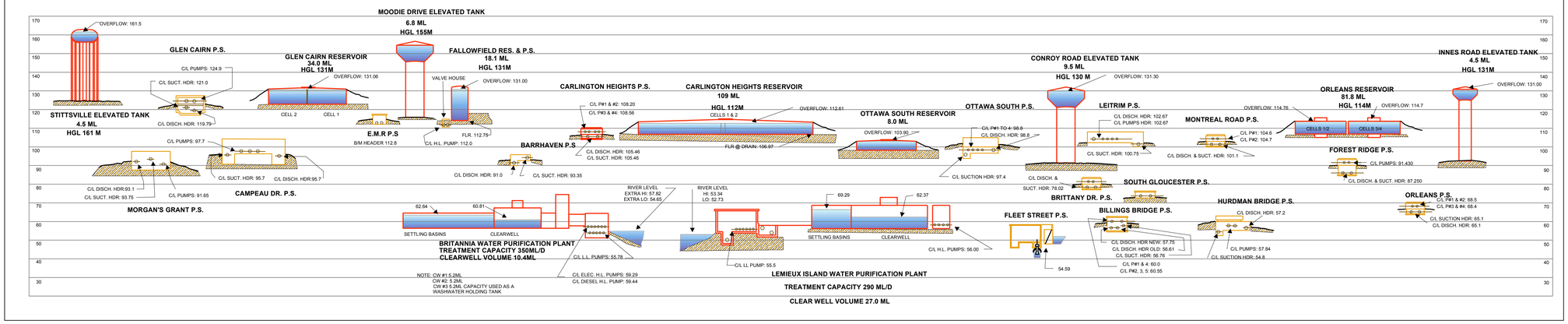
City of Ottawa - Water Distribution System
Facilities & Feedermains







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
HURDMAN P.S.
Innes Rd Backup P.S.
Innes Rd/BearBrook Rd Backup P.S.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
BILLINGS BRIDGE P.S.
MORGAN'S GRANT P.S.
CAMPEAU DR. P.S.
ENERGY MINES & RESOURCES P.S.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
SOUTH GLOUCESTER P.S.
LEITRIM P.S.
GLEN CAIRN P.S. & RES
BARRHAVEN P.S.
Merivale Rd. Backup P.S.
OTTAWA SOUTH P.S & RES.
FALLOWFIELD RD. RES. & P.S.
STITTSVILLE ELEVATED TANK
Abbott/Iber St. Backup P.S.
MOODIE ELEVATED TANK
SUBJECT SITE
SHADOW RIDGE P.S. & WELLS



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

N
W E
S

Ottawa

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

FIGURE 1-1

Drawn By: Gis & Data Management

Date:23- Oct- 2017

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

APPENDIX C

FORCEMAIN CONNECTION POINT AS OF DECEMBER 2022

CONSTRUCTED AS OF DECEMBER 2022

EX. LIARD STREET SANITARY PUMP STATION

EX. FRIENDLY CRESCENT SANITARY PUMP STATION TO BE DECOMMISSIONED IN FUTURE WITH FLOWS DIRECTED TO SHEA ROAD PUMP STATION

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

EXISTING RESIDENTIAL

EXISTING RURAL ESTATE LOT SUBDIVISION (WOODSIDE ACRES)

EX. SHEA ROAD SANITARY PUMP STATION (57 Aridius Crescent)

- one (1) 2400 mm diameter FRP wet well,
- houses three (3) pumps with each pump capable of delivering 42 litres /second at a TDH of 29 metres for an ultimate firm capacity of 84 litres/second;(commissioned as of December 2022)
- wastewater flows are pumped via approximately 815.0 metres of dual 200 mm diameter HDPE DR13.5 sanitary forcemains to a discharge chamber at Fernbank Road outletting flows to the Fernbank Sanitary Trunk Sewer.
- one (1) 170 KW self - enclosed diesel generator complete with diesel fuel tank, valves and controls;
- emergency sanitary sewer overflow consisting of a 600 mm diameter sewer to the adjacent SWM Facility #2 (to the south).

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

OVERALL SUBJECT AREA BOUNDARY

FAULKNER MUNICIPAL DRAIN

FAULKNER MUNICIPAL DRAIN

Hydro One Corridor

GREENWAY CORRIDOR

STITTSVILLE MAIN ST

FERNBANK ROAD

FERNBANK ROAD

JAMES LEWIS AVE

BAYWOOD DR

MONTEROSSA ST

UPCOUNTRY DR

ALLGROVE WAY

ARROWWOOD DR

ARROWWOOD DR

BRIGHTSIDE AVE

BRIGHTSIDE AVE

BRIGHTSIDE AVE

HARTSMERE DR

HOPETOWN ST

SHINING STAR CIR

FRIENDLY CR

FRIENDLY CR

HARTSMERE DR

HARTSMERE DR

VOIE DALMATION WAY

WEST RIDGE DRIVE

RUE JARDINIERE STREET

RUE JARDINIERE STREET

RUE KAYENTA STREET

VIOE MAYGRASS WAY

CROIS. TALIESIN CRES.

RUE SENDERO WAY

PROM. EDENWYLDE DRIVE

PROM. COSANTI DRIVE

VOIE HICKSTEAD WAY

VOIE ORVIETO WAY

CROIS. ARDUS CRESCENT

VOIE HAMPTONS WAY

RUE OCALA STREET

CROIS. MAVERICK CRESCENT

PROMENADE HICKSTEAD DRIVE

PROMENADE HICKSTEAD DRIVE

PROMENADE HICKSTEAD DRIVE

PROMENADE PARADE DRIVE

PROMENADE PARADE DRIVE

PROMENADE PARADE DRIVE

PROMENADE PARADE DRIVE

RUE FALABELLA STREET

RUE QUARTER HORSE STREET

RUE LIPIZZANER STREET

VOIE CAMPOLINA WAY

VOIE CAMPOLINA WAY

VOIE CAMPOLINA WAY

CROISSANT STALLION CRESCENT

CROISSANT STALLION CRESCENT

RUE PEDIGREE STREET

RUE MANEGE STREET

CROISSANT STALLION CRESCENT

CROISSANT BECKETT CRESCENT

CROISSANT BECKETT CRESCENT

RUE CAVALLO STREET

CROISSANT STALLION CRESCENT

CROISSANT STALLION CRESCENT

CROISSANT STALLION CRESCENT

BRAD'S COURT

FOREST GROVE DR

POPLAR GROVE

REGIONAL ROAD 5

SHEA RD

SHEA RD

SHEA RD

SHEA RD

FLEWELLYN RD

FLEWELLYN RD

FLEWELLYN RD

6072 FLEWELLYN ROAD

6040 FLEWELLYN ROAD

6026 FLEWELLYN ROAD

6025 FLEWELLYN ROAD

6015 FLEWELLYN ROAD

5971 FLEWELLYN ROAD

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

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:	MAR 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																											
	200A	201A	0.26	12	32	0.26	32	3.7	0.38		0.00		0.00		0.00	0.00	0.26	0.26	0.09	0.47	45.0	200	0.65	26.44	0.02	0.84	0.32
To STREET 19, Pipe 201A - 202A						0.26	32				0.00		0.00		0.00			0.26									
	206A	207A	0.33	15	41	0.33	41	3.7	0.49		0.00		0.00		0.00	0.00	0.33	0.33	0.11	0.60	51.0	200	0.75	28.40	0.02	0.90	0.36
	207A	209A	0.75	37	100	1.08	141	3.6	1.63		0.00		0.00		0.00	0.00	0.75	1.08	0.36	1.98	119.5	200	0.35	19.40	0.10	0.62	0.40
	209A	210A	0.13	4	11	1.21	152	3.6	1.75		0.00		0.00		0.00	0.00	0.13	1.21	0.40	2.15	10.5	200	0.35	19.40	0.11	0.62	0.40
	210A	211A	0.17	6	16	1.38	168	3.5	1.93		0.00		0.00		0.00	0.00	0.17	1.38	0.46	2.38	52.5	200	0.35	19.40	0.12	0.62	0.42
To STREET 19, Pipe 211A - 234A						1.38	168				0.00		0.00		0.00			1.38									
STREET 19																											
	236A	237A	0.20	8	22	0.20	22	3.7	0.26		0.00		0.00		0.00	0.00	0.20	0.20	0.07	0.33	39.5	200	0.65	26.44	0.01	0.84	0.28
	237A	238A	0.14	4	11	0.34	33	3.7	0.39		0.00		0.00		0.00	0.00	0.14	0.34	0.11	0.51	11.0	200	0.35	19.40	0.03	0.62	0.26
	238A	239A	0.56	27	73	0.90	106	3.6	1.23		0.00		0.00		0.00	0.00	0.56	0.90	0.30	1.53	90.5	200	0.35	19.40	0.08	0.62	0.36
	239A	240A	0.57	27	73	1.47	179	3.5	2.05		0.00		0.00		0.00	0.00	0.57	1.47	0.49	2.53	95.0	200	0.35	19.40	0.13	0.62	0.42
	240A	241A	0.50	23	62	1.97	241	3.5	2.73		0.00		0.00		0.00	0.00	0.50	1.97	0.65	3.38	103.5	200	0.35	19.40	0.17	0.62	0.46
To STREET 16, Pipe 241A - 242A						1.97	241				0.00		0.00		0.00			1.97									
Contribution From STREET 20, Pipe 200A - 201A						0.26	32				0.00		0.00		0.00		0.26	0.26									
	201A	202A	0.19	7	19	0.45	51	3.7	0.60		0.00		0.00		0.00	0.00	0.19	0.45	0.15	0.75	52.5	200	0.35	19.40	0.04	0.62	0.29
	202A	203A	0.14	2	7	0.59	58	3.6	0.68		0.00		0.00		0.00	0.00	0.14	0.59	0.19	0.88	11.0	200	1.35	38.11	0.02	1.21	0.49
	203A	204A	0.43	11	37	1.02	95	3.6	1.11		0.00		0.00		0.00	0.00	0.43	1.02	0.34	1.44	76.5	200	1.35	38.11	0.04	1.21	0.57
	204A	205A	0.51	13	44	1.53	139	3.6	1.60		0.00		0.00		0.00	0.00	0.51	1.53	0.50	2.11	83.5	200	0.35	19.40	0.11	0.62	0.40
	205A	211A	0.36	10	34	1.89	173	3.5	1.98		0.00		0.00		0.00	0.00	0.36	1.89	0.62	2.61	68.5	200	0.35	19.40	0.13	0.62	0.43
Contribution From STREET 20, Pipe 210A - 211A						1.38	168				0.00		0.00		0.00		1.38	3.27									
	211A	234A	0.22	5	17	3.49	358	3.4	3.99		0.00		0.00		0.00	0.00	0.22	3.49	1.15	5.14	63.0	200	0.35	19.40	0.26	0.62	0.52
To STREET 16, Pipe 234A - 235A						3.49	358				0.00		0.00		0.00			3.49									
STREET 14																											
	229A	230A	0.12	3	8	0.12	8	3.7	0.10		0.00		0.00		0.00	0.00	0.12	0.12	0.04	0.14	29.5	200	0.65	26.44	0.01	0.84	0.22
	230A	231A	0.15	6	16	0.27	24	3.7	0.29		0.00		0.00		0.00	0.00	0.15	0.27	0.09	0.38	27.5	200	0.35	19.40	0.02	0.62	0.24
	231A	232A	0.53	25	68	0.80	92	3.6	1.07		0.00		0.00		0.00	0.00	0.53	0.80	0.26	1.34	90.5	200	0.35	19.40	0.07	0.62	0.35
	232A	233A	0.49	23	62	1.29	154	3.5	1.77		0.00		0.00		0.00	0.00	0.49	1.29	0.43	2.20	89.5	200	0.35	19.40	0.11	0.62	0.41
To STREET 16, Pipe 233A - 234A						1.29	154				0.00		0.00		0.00			1.29									
STREET 17																											
			0.12		0	0.12	0				0.00		0.00		0.00		0.12	0.12									
	224A	225A	0.15	3	10	0.27	10	3.7	0.12		0.00		0.00		0.00	0.00	0.15	0.27	0.09	0.21	39.0	200	0.65	26.44	0.01	0.84	0.24
			0.49	11	37	0.76	47				0.00		0.00		0.00		0.49	0.76									
	225A	226A	0.68		79	1.44	126	3.6	1.46		0.00		0.00		0.00	0.00	0.68	1.44	0.48	1.93	93.0	200	0.35	19.40	0.10	0.62	0.39
	226A	227A	0.14	2	7	1.58	133	3.6	1.54		0.00		0.00		0.00	0.00	0.14	1.58	0.52	2.06	11.5	200	0.35	19.40	0.11	0.62	0.40
	227A	228A	0.17	3	10	1.75	143	3.6	1.65		0.00		0.00		0.00	0.00	0.17	1.75	0.58	2.23	52.0	200	0.35	19.40	0.11	0.62	0.41
To STREET 18, Pipe 228A - 233A						1.75	143				0.00		0.00		0.00			1.75									
STREET 18																											
			0.10		0	0.10	0				0.00		0.00	0.95	0.95		1.05	1.05									
	222A	223A	0.42	20	54	0.52	54	3.6	0.64		0.00		0.00		0.95	0.10	0.42	1.47	0.49	1.23	76.5	200	0.35	19.40	0.06	0.62	0.34
	223A	228A	0.44	22	59	0.96	113	3.6	1.31		0.00		0.00		0.95	0.10	0.44	1.91	0.63	2.04	76.5	200	0.35	19.40	0.11	0.62	0.40

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: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 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)
Contribution From STREET 17, Pipe 227A - 228A						1.75	143				0.00		0.00		0.00		1.75	3.66									
	228A	233A	0.20	7	19	2.91	275	3.5	3.10		0.00		0.00		0.95	0.10	0.20	3.86	1.27	4.47	63.0	200	0.35	19.40	0.23	0.62	0.50
To STREET 16, Pipe 233A - 234A						2.91	275				0.00		0.00		0.95			3.86									
STREET 15																											
			0.21	3	10	0.21	10				0.00		0.00		0.00		0.21	0.21									
	215A	216A	1.17		135	1.38	145	3.6	1.67		0.00		0.00		0.00	0.00	1.17	1.38	0.46	2.13	36.0	200	0.65	26.44	0.08	0.84	0.50
	216A	217A	0.27	5	17	1.65	162	3.5	1.86		0.00		0.00		0.00	0.00	0.27	1.65	0.54	2.41	65.0	200	0.35	19.40	0.12	0.62	0.42
To STREET 13, Pipe 217A - 220A						1.65	162				0.00		0.00		0.00			1.65									
STREET 13																											
			0.10	4	11	0.10	11				0.00		0.00		0.00		0.10	0.10									
			0.19	3	10	0.29	21				0.00		0.00		0.00		0.19	0.29									
	212A	213A	0.19		0	0.48	21	3.7	0.25		0.00		0.00		0.00	0.00	0.19	0.48	0.16	0.41	35.5	200	0.65	26.44	0.02	0.84	0.30
			0.25	10	27	0.73	48				0.00		0.00		0.00		0.25	0.73									
	213A	214A	0.31	7	24	1.04	72	3.6	0.85		0.00		0.00		0.00	0.00	0.31	1.04	0.34	1.19	95.5	200	0.35	19.40	0.06	0.62	0.34
			0.19	5	17	1.23	89				0.00		0.00		0.00		0.19	1.23									
	214A	217A	0.20	9	24	1.43	113	3.6	1.31		0.00		0.00		0.00	0.00	0.20	1.43	0.47	1.78	64.0	200	0.35	19.40	0.09	0.62	0.38
Contribution From STREET 15, Pipe 216A - 217A						1.65	162				0.00		0.00		0.00		1.65	3.08									
			0.06		0	3.14	275				0.00		0.00		0.00		0.06	3.14									
	217A	220A	0.19	8	22	3.33	297	3.5	3.33		0.00		0.00		0.00	0.00	0.19	3.33	1.10	4.43	63.0	200	0.35	19.40	0.23	0.62	0.50
To STREET 16, Pipe 220A - 233A						3.33	297				0.00		0.00		0.00			3.33									
STREET 16																											
	218A	219A	0.25	6	20	0.25	20	3.7	0.24		0.00		0.00		0.00	0.00	0.25	0.25	0.08	0.32	24.5	200	0.65	26.44	0.01	0.84	0.28
	219A	220A	0.40	9	31	0.65	51	3.7	0.60		0.00		0.00		0.00	0.00	0.40	0.65	0.21	0.82	68.0	250	0.25	29.73	0.03	0.61	0.26
Contribution From STREET 13, Pipe 217A - 220A						3.33	297				0.00		0.00		0.00		3.33	3.98									
	220A	233A	0.25	5	17	4.23	365	3.4	4.06		0.00		0.00		0.00	0.00	0.25	4.23	1.40	5.46	63.0	300	0.20	43.25	0.13	0.61	0.41
Contribution From STREET 18, Pipe 228A - 233A						2.91	275				0.00		0.00		0.95		3.86	8.09									
Contribution From STREET 14, Pipe 232A - 233A						1.29	154				0.00		0.00		0.00		1.29	9.38									
			0.12		0	8.55	794				0.00		0.00		0.95		0.12	9.50									
	233A	234A	1.85	178	409	10.40	1203	3.2	12.47		0.00		0.00		0.95	0.10	1.85	11.35	3.75	16.31	60.0	300	0.20	43.25	0.38	0.61	0.57
Contribution From STREET 19, Pipe 211A - 234A						3.49	358				0.00		0.00		0.00		3.49	14.84									
	234A	235A	0.23	7	19	14.12	1580	3.1	16.03		0.00		0.00		0.95	0.10	0.23	15.07	4.97	21.10	58.0	300	0.20	43.25	0.49	0.61	0.61
	235A	241A	0.26	8	22	14.38	1602	3.1	16.23		0.00		0.00		0.95	0.10	0.26	15.33	5.06	21.40	62.0	300	0.20	43.25	0.49	0.61	0.61
Contribution From STREET 19, Pipe 240A - 241A						1.97	241				0.00		0.00		0.00		1.97	17.30									
	241A	242A	0.03		0	16.38	1843	3.1	18.46		0.00		0.00		0.95	0.10	0.03	17.33	5.72	24.28	17.0	300	0.20	43.25	0.56	0.61	0.63
	242A	243A	0.04		0	16.42	1843	3.1	18.46		0.00		0.00		0.95	0.10	0.04	17.37	5.73	24.29	15.5	300	0.20	43.25	0.56	0.61	0.63
	243A	265A	0.07		0	16.49	1843	3.1	18.46		0.00		0.00		0.95	0.10	0.07	17.44	5.76	24.32	37.0	300	0.20	43.25	0.56	0.61	0.63
To STREET 21, Pipe 265A - 266A						16.49	1843				0.00		0.00		0.95			17.44									
STREET 23																											
	250A	251A	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	39.5	200	0.65	26.44	0.01	0.84	0.26
To STREET 22, Pipe 251A - 254A						0.19	14				0.00		0.00		0.00			0.19									
	259A	260A	0.13	3	10	0.13	10	3.7	0.12		0.00		0.00		0.00	0.00	0.13	0.13	0.04	0.16	25.0	200	0.65	26.44	0.01	0.84	0.23
	260A	261A	0.10	1	3	0.23	13	3.7	0.16		0.00		0.00		0.00	0.00	0.10	0.23	0.08	0.23	11.0	200	0.35	19.40	0.01	0.62	0.21

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.00			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =	0.330	L/s/ha		
Minimum Velocity =	0.600	m/s		
Manning's n =	(Conc)	0.013	(Pvc)	0.013
Townhouse coeff=		2.7		
Single house coeff=		3.4		

Designed: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 2025**

Sheet No. 2 of 8

1247_San_FSR3.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)
		244A	245A	0.54	14	48	0.54	48	3.7	0.57		0.00		0.00		0.00	0.00	0.54	0.54	0.18	0.75	86.5	200	0.65	26.44	0.03	0.84	0.37
		245A	246A	0.14	2	7	0.68	55	3.6	0.65		0.00		0.00		0.00	0.00	0.14	0.68	0.22	0.87	11.0	200	0.35	19.40	0.05	0.62	0.31
		246A	251A	0.52	12	41	1.20	96	3.6	1.12		0.00		0.00		0.00	0.00	0.52	1.20	0.40	1.52	98.5	200	0.35	19.40	0.08	0.62	0.36
To STREET 22, Pipe 251A - 254A							1.20	96				0.00		0.00		0.00			1.20									
		255A	256A	0.36	7	24	0.36	24	3.7	0.29		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.41	50.0	200	0.65	26.44	0.02	0.84	0.30
		256A	257A	0.10	2	7	0.46	31	3.7	0.37		0.00		0.00		0.00	0.00	0.10	0.46	0.15	0.52	28.5	200	0.35	19.40	0.03	0.62	0.26
		257A	258A	0.51	13	44	0.97	75	3.6	0.88		0.00		0.00		0.00	0.00	0.51	0.97	0.32	1.20	78.0	200	0.35	19.40	0.06	0.62	0.34
		258A	261A	0.40	10	34	1.37	109	3.6	1.27		0.00		0.00		0.00	0.00	0.40	1.37	0.45	1.72	74.5	200	0.35	19.40	0.09	0.62	0.38
		261A	262A	0.19	4	14	1.79	136	3.6	1.57		0.00		0.00		0.00	0.00	0.19	1.79	0.59	2.16	50.5	200	0.35	19.40	0.11	0.62	0.41
		262A	263A	0.05		0	1.84	136	3.6	1.57		0.00		0.00		0.00	0.00	0.05	1.84	0.61	2.18	34.0	200	0.35	19.40	0.11	0.62	0.41
To STREET 21, Pipe 263A - 264A							1.84	136				0.00		0.00		0.00			1.84									
STREET 26																												
		247A	248A	0.24	5	17	0.24	17	3.7	0.20		0.00		0.00		0.00	0.00	0.24	0.24	0.08	0.28	45.5	200	0.65	26.44	0.01	0.84	0.27
		248A	249A	0.34	7	24	0.58	41	3.7	0.49		0.00		0.00		0.00	0.00	0.34	0.58	0.19	0.68	69.5	200	0.35	19.40	0.03	0.62	0.29
To STREET 22, Pipe 249A - 251A							0.58	41				0.00		0.00		0.00			0.58									
STREET 22																												
Contribution From STREET 26, Pipe 248A - 249A							0.58	41				0.00		0.00		0.00		0.58	0.58									
		249A	251A				0.58	41	3.7	0.49		0.00		0.00		0.00	0.00	0.00	0.58	0.19	0.68	9.0	200	0.35	19.40	0.03	0.62	0.29
Contribution From STREET 23, Pipe 246A - 251A							1.20	96				0.00		0.00		0.00		1.20	1.78									
Contribution From STREET 23, Pipe 250A - 251A							0.19	14				0.00		0.00		0.00		0.19	1.97									
		251A	254A	0.10		0	2.07	151	3.6	1.74		0.00		0.00		0.00	0.00	0.10	2.07	0.68	2.42	63.0	200	0.35	19.40	0.12	0.62	0.42
To STREET 21, Pipe 254A - 263A							2.07	151				0.00		0.00		0.00			2.07									
STREET 21																												
		252A	253A	0.43	10	34	0.43	34	3.7	0.41		0.00		0.00		0.00	0.00	0.43	0.43	0.14	0.55	51.0	200	0.65	26.44	0.02	0.84	0.33
		253A	254A	0.44	10	34	0.87	68	3.6	0.80		0.00		0.00		0.00	0.00	0.44	0.87	0.29	1.09	73.5	200	0.35	19.40	0.06	0.62	0.33
Contribution From STREET 22, Pipe 251A - 254A							2.07	151				0.00		0.00		0.00		2.07	2.94									
		254A	263A	0.72	17	58	3.66	277	3.5	3.12		0.00		0.00		0.00	0.00	0.72	3.66	1.21	4.33	118.5	200	0.35	19.40	0.22	0.62	0.50
Contribution From STREET 23, Pipe 262A - 263A							1.84	136				0.00		0.00		0.00		1.84	5.50									
		263A	264A	0.28	8	27	5.78	440	3.4	4.85		0.00		0.00		0.00	0.00	0.28	5.78	1.91	6.76	44.0	200	0.35	19.40	0.35	0.62	0.56
		264A	265A	0.07	1	3	5.85	443	3.4	4.88		0.00		0.00		0.00	0.00	0.07	5.85	1.93	6.81	16.0	200	0.35	19.40	0.35	0.62	0.56
Contribution From STREET 16, Pipe 243A - 265A							16.49	1843				0.00		0.00		0.95		17.44	23.29									
		265A	266A	0.05		0	22.39	2286	3.0	22.46		0.00		0.00		0.95	0.10	0.05	23.34	7.70	30.27	28.0	300	0.20	43.25	0.70	0.61	0.66
		266A	267A	0.16		0	22.55	2286	3.0	22.46		0.00		0.00		0.95	0.10	0.16	23.50	7.76	30.32	89.0	300	0.20	43.25	0.70	0.61	0.66
				0.06	1	3	22.61	2289				0.00		0.00		0.95		0.06	23.56									
		267A	268A	0.16	2	7	22.77	2296	3.0	22.55		0.00		0.00		0.95	0.10	0.16	23.72	7.83	30.48	20.0	300	0.20	43.25	0.70	0.61	0.66
		268A	272A	0.26	4	14	23.03	2310	3.0	22.68		0.00		0.00		0.95	0.10	0.26	23.98	7.91	30.69	79.5	300	0.20	43.25	0.71	0.61	0.66
To STREET 24, Pipe 272A - 273A							23.03	2310				0.00		0.00		0.95			23.98									
STREET 24																												
		275A	276A	0.18	4	14	0.18	14	3.7	0.17		0.00		0.00		0.00	0.00	0.18	0.18	0.06	0.23	38.5	200	0.65	26.44	0.01	0.84	0.26
		276A	277A	0.14	2	7	0.32	21	3.7	0.25		0.00		0.00		0.00	0.00	0.14	0.32	0.11	0.36	11.0	200	0.35	19.40	0.02	0.62	0.23
		277A	279A	0.60	14	48	0.92	69	3.6	0.81		0.00		0.00		0.00	0.00	0.60	0.92	0.30	1.11	109.5	200	0.35	19.40	0.06	0.62	0.33
		279A	280A	0.02		0	0.94	69	3.6	0.81		0.00		0.00		0.00	0.00	0.02	0.94	0.31	1.12	11.0	200	0.35	19.40	0.06	0.62	0.33

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: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 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)
		280A	281A	0.12	1	3	1.06	72	3.6	0.85		0.00		0.00		0.00	0.00	0.12	1.06	0.35	1.20	44.5	200	0.35	19.40	0.06	0.62	0.34
		281A	282A	0.16	4	14	1.22	86	3.6	1.01		0.00		0.00		0.00	0.00	0.16	1.22	0.40	1.41	11.0	200	0.35	19.40	0.07	0.62	0.36
		282A	283A	0.50	12	41	1.72	127	3.6	1.47		0.00		0.00		0.00	0.00	0.50	1.72	0.57	2.04	79.5	200	0.35	19.40	0.10	0.62	0.40
		283A	284A	0.53	15	51	2.25	178	3.5	2.04		0.00		0.00		0.00	0.00	0.53	2.25	0.74	2.78	87.0	200	0.35	19.40	0.14	0.62	0.44
To SANITARY OUTLET 2, Pipe 284A - 285A							2.25	178				0.00		0.00		0.00			2.25									
		270A	271A	0.53	7	24	0.53	24	3.7	0.29		0.00		0.00		0.00	0.00	0.53	0.53	0.17	0.46	31.5	200	0.65	26.44	0.02	0.84	0.32
		271A	272A	0.06	1	3	0.59	27	3.7	0.32		0.00		0.00		0.00	0.00	0.06	0.59	0.19	0.52	19.5	250	0.25	29.73	0.02	0.61	0.23
Contribution From STREET 21, Pipe 268A - 272A							23.03	2310				0.00		0.00		0.95		23.98	24.57									
				0.04		0	23.66	2337				0.00		0.00		0.95		0.04	24.61									
		272A	273A	0.59	14	48	24.25	2385	3.0	23.34		0.00		0.00		0.95	0.10	0.59	25.20	8.32	31.76	113.5	300	0.20	43.25	0.73	0.61	0.67
		273A	284A	0.14	2	7	24.39	2392	3.0	23.40		0.00		0.00		0.95	0.10	0.14	25.34	8.36	31.87	13.0	300	0.20	43.25	0.74	0.61	0.67
To SANITARY OUTLET 2, Pipe 284A - 285A							24.39	2392				0.00		0.00		0.95			25.34									
SANITARY OUTLET 2																												
Contribution From STREET 24, Pipe 273A - 284A							24.39	2392				0.00		0.00		0.95		25.34	25.34									
Contribution From STREET 24, Pipe 283A - 284A							2.25	178				0.00		0.00		0.00		2.25	27.59									
		284A	285A				26.64	2570	3.0	24.98		0.00		0.00		0.95	0.10	0.00	27.59	9.10	34.18	31.0	300	0.20	43.25	0.79	0.61	0.68
		285A	286A				26.64	2570	3.0	24.98		0.00		0.00		0.95	0.10	0.00	27.59	9.10	34.18	22.5	300	0.20	43.25	0.79	0.61	0.68
		286A	287A				26.64	2570	3.0	24.98		0.00		0.00		0.95	0.10	0.00	27.59	9.10	34.18	2.5	450	2.50	450.79	0.08	2.83	1.66
To SANITARY OUTLET 1, Pipe 287A - 288A							26.64	2570				0.00		0.00		0.95			27.59									
STREET 2																												
		160A	161A	0.24	8	22	0.24	22	3.7	0.26		0.00		0.00		0.00	0.00	0.24	0.24	0.08	0.34	48.0	200	0.65	26.44	0.01	0.84	0.28
To STREET 1, Pipe 161A - 162A							0.24	22				0.00		0.00		0.00			0.24									
		164A	165A	0.57	27	73	0.57	73	3.6	0.86		0.00		0.00		0.00	0.00	0.57	0.57	0.19	1.05	78.0	200	0.65	26.44	0.04	0.84	0.41
		165A	166A	0.44	22	59	1.01	132	3.6	1.53		0.00		0.00		0.00	0.00	0.44	1.01	0.33	1.86	81.0	200	0.35	19.40	0.10	0.62	0.39
To STREET 3, Pipe 166A - 169A							1.01	132				0.00		0.00		0.00			1.01									
STREET 1																												
				0.09	2	7	0.09	7				0.00		0.00		0.00		0.09	0.09									
		167A	168A	0.54	27	73	0.63	80	3.6	0.94		0.00		0.00		0.00	0.00	0.54	0.63	0.21	1.15	109.5	200	0.65	26.44	0.04	0.84	0.42
		168A	169A	0.63	31	84	1.26	164	3.5	1.88		0.00		0.00		0.00	0.00	0.63	1.26	0.42	2.30	112.5	200	0.35	19.40	0.12	0.62	0.41
To STREET 4, Pipe 169A - 170A							1.26	164				0.00		0.00		0.00			1.26									
		157A	158A	0.74	18	61	0.74	61	3.6	0.72		0.00		0.00		0.00	0.00	0.74	0.74	0.24	0.96	104.5	200	0.65	26.44	0.04	0.84	0.40
		158A	159A	0.14	2	7	0.88	68	3.6	0.80		0.00		0.00		0.00	0.00	0.14	0.88	0.29	1.09	11.0	200	1.40	38.81	0.03	1.24	0.54
		159A	161A	0.20	4	14	1.08	82	3.6	0.96		0.00		0.00		0.00	0.00	0.20	1.08	0.36	1.32	52.0	200	2.60	52.89	0.02	1.68	0.70
Contribution From STREET 2, Pipe 160A - 161A							0.24	22				0.00		0.00		0.00		0.24	1.32									
				0.22	11	30	1.54	134				0.00		0.00		0.00		0.22	1.54									
		161A	162A	0.26	7	24	1.80	158	3.5	1.82		0.00		0.00		0.00	0.00	0.26	1.80	0.59	2.41	83.0	200	0.35	19.40	0.12	0.62	0.42
				0.24	12	32	2.04	190				0.00		0.00		0.00		0.24	2.04									
		162A	163A	0.25	7	24	2.29	214	3.5	2.43		0.00		0.00		0.00	0.00	0.25	2.29	0.76	3.19	88.0	200	0.35	19.40	0.16	0.62	0.45
To STREET 3, Pipe 163A - 166A							2.29	214				0.00		0.00		0.00			2.29									
STREET 5																												
		128A	123A	0.51	14	48	0.51	48	3.7	0.57		0.00		0.00		0.00	0.00	0.51	0.51	0.17	0.74	96.0	200	0.65	26.44	0.03	0.84	0.36

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: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 2025**

Sheet No. 4 of 8

1247_San_FSR3.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)
	123A	122A	0.64	17	58	1.15	106	3.6	1.23		0.00		0.00		0.00	0.00	0.64	1.15	0.38	1.61	102.0	200	0.35	19.40	0.08	0.62	0.37
	122A	121A	0.14	2	7	1.29	113	3.6	1.31		0.00		0.00		0.00	0.00	0.14	1.29	0.43	1.74	11.0	200	0.35	19.40	0.09	0.62	0.38
	121A	120A	0.20	4	14	1.49	127	3.6	1.47		0.00		0.00		0.00	0.00	0.20	1.49	0.49	1.96	52.0	200	0.35	19.40	0.10	0.62	0.39
Contribution From STREET 4, Pipe 125A - 120A						1.47	126				0.00		0.00		0.00		1.47	2.96									
	120A	119A	0.20	4	14	3.16	267	3.5	3.01		0.00		0.00		0.00	0.00	0.20	3.16	1.04	4.05	60.0	200	0.35	19.40	0.21	0.62	0.49
To STREET 8, Pipe 119A - 156A						3.16	267				0.00		0.00		0.00			3.16									
STREET 7																											
	147A	148A	0.23	4	14	0.23	14	3.7	0.17		0.00		0.00		0.00	0.00	0.23	0.23	0.08	0.24	48.0	200	0.65	26.44	0.01	0.84	0.26
To STREET 6, Pipe 148A - 149A						0.23	14				0.00		0.00		0.00			0.23									
	151A	152A	0.58	13	44	0.58	44	3.7	0.52		0.00		0.00		0.00	0.00	0.58	0.58	0.19	0.71	76.0	200	0.65	26.44	0.03	0.84	0.36
	152A	153A	0.42	12	41	1.00	85	3.6	0.99		0.00		0.00		0.00	0.00	0.42	1.00	0.33	1.32	79.0	200	0.35	19.40	0.07	0.62	0.35
To STREET 3, Pipe 153A - 156A						1.00	85				0.00		0.00		0.00			1.00									
STREET 6																											
	154A	155A	0.78	19	65	0.78	65	3.6	0.77		0.00		0.00		0.00	0.00	0.78	0.78	0.26	1.02	109.0	200	0.65	26.44	0.04	0.84	0.40
	155A	156A	0.61	17	58	1.39	123	3.6	1.42		0.00		0.00		0.00	0.00	0.61	1.39	0.46	1.88	110.5	200	0.35	19.40	0.10	0.62	0.39
To STREET 3, Pipe 156A - 163A						1.39	123				0.00		0.00		0.00			1.39									
	144A	145A	0.64	14	47	0.64	47	3.7	0.56		0.00		0.00		0.00	0.00	0.64	0.64	0.21	0.77	96.0	200	0.70	27.44	0.03	0.87	0.37
	145A	146A	0.14	2	7	0.78	54	3.6	0.64		0.00		0.00		0.00	0.00	0.14	0.78	0.26	0.90	11.0	200	0.75	28.40	0.03	0.90	0.41
	146A	148A	0.23	5	17	1.01	71	3.6	0.83		0.00		0.00		0.00	0.00	0.23	1.01	0.33	1.17	54.0	200	2.65	53.39	0.02	1.70	0.68
Contribution From STREET 7, Pipe 147A - 148A						0.23	14				0.00		0.00		0.00		0.23	1.24									
	148A	149A	0.47	12	41	1.71	126	3.6	1.46		0.00		0.00		0.00	0.00	0.47	1.71	0.56	2.02	81.0	200	0.35	19.40	0.10	0.62	0.40
	149A	150A	0.45	12	41	2.16	167	3.5	1.92		0.00		0.00		0.00	0.00	0.45	2.16	0.71	2.63	86.0	200	0.35	19.40	0.14	0.62	0.43
To STREET 3, Pipe 150A - 153A						2.16	167				0.00		0.00		0.00			2.16									
STREET 11																											
	132A	133A	0.24	8	22	0.24	22	3.7	0.26		0.00		0.00		0.00	0.00	0.24	0.24	0.08	0.34	52.0	200	0.65	26.44	0.01	0.84	0.28
To STREET 10, Pipe 133A - 134A						0.24	22				0.00		0.00		0.00			0.24									
	138A	139A	0.56	26	70	0.56	70	3.6	0.82		0.00		0.00		0.00	0.00	0.56	0.56	0.18	1.01	81.0	200	0.65	26.44	0.04	0.84	0.40
	139A	140A	0.45	22	59	1.01	129	3.6	1.49		0.00		0.00		0.00	0.00	0.45	1.01	0.33	1.83	83.5	200	0.35	19.40	0.09	0.62	0.39
To STREET 3, Pipe 140A - 143A						1.01	129				0.00		0.00		0.00			1.01									
STREET 10																											
			0.25	3	10	0.25	10				0.00		0.00		0.00		0.25	0.25									
	141A	142A	0.51	25	68	0.76	78	3.6	0.91		0.00		0.00		0.00	0.00	0.51	0.76	0.25	1.17	109.5	200	0.65	26.44	0.04	0.84	0.42
	142A	143A	0.64	32	86	1.40	164	3.5	1.88		0.00		0.00		0.00	0.00	0.64	1.40	0.46	2.34	112.5	200	0.35	19.40	0.12	0.62	0.41
To STREET 3, Pipe 143A - 150A						1.40	164				0.00		0.00		0.00			1.40									
	129A	130A	0.61	16	54	0.61	54	3.6	0.64		0.00		0.00		0.00	0.00	0.61	0.61	0.20	0.84	98.5	200	0.65	26.44	0.03	0.84	0.38
	130A	131A	0.14	2	7	0.75	61	3.6	0.72		0.00		0.00		0.00	0.00	0.14	0.75	0.25	0.97	11.0	200	0.35	19.40	0.05	0.62	0.32
			0.09	2	7	0.84	68				0.00		0.00		0.00		0.09	0.84									
	131A	133A	0.13	5	14	0.97	82	3.6	0.96		0.00		0.00		0.00	0.00	0.13	0.97	0.32	1.28	52.5	200	0.35	19.40	0.07	0.62	0.34
Contribution From STREET 11, Pipe 132A - 133A						0.24	22				0.00		0.00		0.00		0.24	1.21									
	133A	134A	0.49	24	65	1.70	169	3.5	1.94		0.00		0.00		0.00	0.00	0.49	1.70	0.56	2.50	86.5	200	0.35	19.40	0.13	0.62	0.42

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.00			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow = 0.330 L/s/ha

Minimum Velocity = 0.600 m/s

Manning's n = (Conc) 0.013 (Pvc) 0.013

Townhouse coeff= 2.7

Single house coeff= 3.4

Designed: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 2025**

Sheet No. 5 of 8

1247_San_FSR3.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)
	134A	137A	0.47	22	59	2.17	228	3.5	2.59		0.00		0.00		0.00	0.00	0.47	2.17	0.72	3.30	86.5	200	0.35	19.40	0.17	0.62	0.46
To STREET 12, Pipe 137A - 140A						2.17	228				0.00		0.00		0.00			2.17									
STREET 9																											
			0.09		0	0.09	0				0.00		0.00		0.00		0.09	0.09									
	118A	115A	0.46	22	59	0.55	59	3.6	0.70		0.00		0.00		0.00	0.00	0.46	0.55	0.18	0.88	70.5	200	0.65	26.44	0.03	0.84	0.38
	115A	114A	0.47	24	65	1.02	124	3.6	1.44		0.00		0.00		0.00	0.00	0.47	1.02	0.34	1.77	80.5	200	0.35	19.40	0.09	0.62	0.38
	114A	113A	0.42	20	54	1.44	178	3.5	2.04		0.00		0.00		0.00	0.00	0.42	1.44	0.48	2.51	80.0	200	0.35	19.40	0.13	0.62	0.42
To STREET 12, Pipe 113A - 140A						1.44	178				0.00		0.00		0.00			1.44									
STREET 8																											
	116A	117A	0.44	22	59	0.44	59	3.6	0.70		0.00		0.00		0.00	0.00	0.44	0.44	0.15	0.84	64.0	200	0.65	26.44	0.03	0.84	0.38
	117A	119A	0.29	13	35	0.73	94	3.6	1.10		0.00		0.00		0.00	0.00	0.29	0.73	0.24	1.34	65.5	200	0.35	19.40	0.07	0.62	0.35
Contribution From STREET 5, Pipe 120A - 119A						3.16	267				0.00		0.00		0.00		3.16	3.89									
	119A	156A				3.89	361	3.4	4.02		0.00		0.00		0.00	0.00	0.00	3.89	1.28	5.30	60.0	200	0.35	19.40	0.27	0.62	0.52
To STREET 3, Pipe 156A - 163A						3.89	361				0.00		0.00		0.00			3.89									
	100A	101A	0.36	18	49	0.36	49	3.7	0.58		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.70	53.0	200	0.65	26.44	0.03	0.84	0.36
	101A	102A	0.16	3	10	0.52	59	3.6	0.70		0.00		0.00		0.00	0.00	0.16	0.52	0.17	0.87	11.0	200	0.35	19.40	0.04	0.62	0.31
	102A	103A	0.16	3	10	0.68	69	3.6	0.81		0.00		0.00		0.00	0.00	0.16	0.68	0.22	1.04	44.5	200	0.35	19.40	0.05	0.62	0.33
	103A	104A	0.14	2	7	0.82	76	3.6	0.89		0.00		0.00		0.00	0.00	0.14	0.82	0.27	1.16	11.0	200	0.35	19.40	0.06	0.62	0.34
	104A	105A	0.39	10	34	1.21	110	3.6	1.28		0.00		0.00		0.00	0.00	0.39	1.21	0.40	1.68	64.5	200	0.35	19.40	0.09	0.62	0.37
	105A	106A	0.41	10	34	1.62	144	3.6	1.66		0.00		0.00		0.00	0.00	0.41	1.62	0.53	2.19	66.5	200	0.35	19.40	0.11	0.62	0.41
	106A	107A	0.14	2	7	1.76	151	3.6	1.74		0.00		0.00		0.00	0.00	0.14	1.76	0.58	2.32	11.0	200	0.35	19.40	0.12	0.62	0.41
	107A	108A	0.33	7	24	2.09	175	3.5	2.00		0.00		0.00		0.00	0.00	0.33	2.09	0.69	2.69	89.5	200	0.35	19.40	0.14	0.62	0.43
	108A	111A	0.32	6	20	2.41	195	3.5	2.23		0.00		0.00		0.00	0.00	0.32	2.41	0.80	3.02	85.5	200	0.35	19.40	0.16	0.62	0.45
To STREET 12, Pipe 111A - 113A						2.41	195				0.00		0.00		0.00			2.41									
STREET 12																											
	135A	136A	0.31	5	17	0.31	17	3.7	0.20		0.00		0.00		0.00	0.00	0.31	0.31	0.10	0.31	58.5	200	0.65	26.44	0.01	0.84	0.28
			0.40	7	24	0.71	41				0.00		0.00		0.00		0.40	0.71									
	136A	137A	3.24	372	856	3.95	897	3.3	9.49		0.00		0.00		0.00	0.00	3.24	3.95	1.30	10.79	85.0	200	0.35	19.40	0.56	0.62	0.63
Contribution From STREET 10, Pipe 134A - 137A						2.17	228				0.00		0.00		0.00		2.17	6.12									
	137A	140A	0.14	1	3	6.26	1128	3.2	11.74		0.00		0.00		0.00	0.00	0.14	6.26	2.07	13.81	58.5	300	0.20	43.25	0.32	0.61	0.54
To STREET 3, Pipe 140A - 143A						6.26	1128				0.00		0.00		0.00			6.26									
			0.09	1	3	0.09	3				0.00		0.00		0.00		0.09	0.09									
	109A	110A	0.11		0	0.20	3	3.8	0.04		0.00		0.00		0.00	0.00	0.11	0.20	0.07	0.10	24.0	200	3.10	57.75	0.00	1.84	0.34
	110A	111A	0.46	7	24	0.66	27	3.7	0.32		0.00		0.00	2.45	2.45	0.26	2.91	3.11	1.03	1.61	106.5	200	0.40	20.74	0.08	0.66	0.39
Contribution From STREET 8, Pipe 108A - 111A						2.41	195				0.00		0.00		0.00		2.41	5.52									
	111A	113A	0.25	4	14	3.32	236	3.5	2.67		0.00		0.00		2.45	0.26	0.25	5.77	1.90	4.84	60.0	200	0.35	19.40	0.25	0.62	0.51
Contribution From STREET 9, Pipe 114A - 113A						1.44	178				0.00		0.00		0.00		1.44	7.21									
	113A	140A	0.21	4	14	4.97	428	3.4	4.72		0.00		0.00		2.45	0.26	0.21	7.42	2.45	7.44	57.5	200	0.35	19.40	0.38	0.62	0.57
To STREET 3, Pipe 140A - 143A						4.97	428				0.00		0.00		2.45			7.42									

DESIGN PARAMETERS

Park Flow =	9300	L/ha/da	0.10764	l/s/Ha
Average Daily Flow =	280	l/p/day		
Comm/Inst Flow =	28000	L/ha/da	0.3241	l/s/Ha
Industrial Flow =	35000	L/ha/da	0.40509	l/s/Ha
Max Res. Peak Factor =	4.00			
Commercial/Inst./Park Peak Factor =	1.00			
Institutional =	0.32	l/s/Ha		

Industrial Peak Factor = as per MOE Graph

Extraneous Flow =	0.330	L/s/ha	
Minimum Velocity =	0.600	m/s	
Manning's n = (Conc)	0.013	(Pvc)	0.013
Townhouse coeff=	2.7		
Single house coeff=	3.4		

Designed: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247

Date: **Mar 2025**

Sheet No. 6 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)
STREET 3																											
Contribution From STREET 12, Pipe 113A - 140A						4.97	428				0.00		0.00		2.45		7.42	7.42									
Contribution From STREET 12, Pipe 137A - 140A						6.26	1128				0.00		0.00		0.00		6.26	13.68									
Contribution From STREET 11, Pipe 139A - 140A						1.01	129				0.00		0.00		0.00		1.01	14.69									
	140A	143A	0.21	8	22	12.45	1707	3.1	17.21		0.00		0.00		2.45	0.26	0.21	14.90	4.92	22.39	61.5	300	0.20	43.25	0.52	0.61	0.62
Contribution From STREET 10, Pipe 142A - 143A						1.40	164				0.00		0.00		0.00		1.40	16.30									
	143A	150A	0.23	9	24	14.08	1895	3.1	18.93		0.00		0.00		2.45	0.26	0.23	16.53	5.45	24.65	60.0	300	0.20	43.25	0.57	0.61	0.63
Contribution From STREET 6, Pipe 149A - 150A						2.16	167				0.00		0.00		0.00		2.16	18.69									
	150A	153A	0.22	9	24	16.46	2086	3.1	20.67		0.00		0.00		2.45	0.26	0.22	18.91	6.24	27.17	60.0	300	0.20	43.25	0.63	0.61	0.64
Contribution From STREET 7, Pipe 152A - 153A						1.00	85				0.00		0.00		0.00		1.00	19.91									
	153A	156A	0.20	7	19	17.66	2190	3.0	21.60		0.00		0.00		2.45	0.26	0.20	20.11	6.64	28.50	60.0	300	0.20	43.25	0.66	0.61	0.65
Contribution From STREET 8, Pipe 119A - 156A						3.89	361				0.00		0.00		0.00		3.89	24.00									
Contribution From STREET 6, Pipe 155A - 156A						1.39	123				0.00		0.00		0.00		1.39	25.39									
	156A	163A	0.21	8	22	23.15	2696	3.0	26.08		0.00		0.00		2.45	0.26	0.21	25.60	8.45	34.79	60.0	300	0.20	43.25	0.80	0.61	0.68
Contribution From STREET 1, Pipe 162A - 163A						2.29	214				0.00		0.00		0.00		2.29	27.89									
	163A	166A	0.23	9	24	25.67	2934	3.0	28.15		0.00		0.00		2.45	0.26	0.23	28.12	9.28	37.69	60.0	300	0.20	43.25	0.87	0.61	0.69
Contribution From STREET 2, Pipe 165A - 166A						1.01	132				0.00		0.00		0.00		1.01	29.13									
	166A	169A	0.20	7	19	26.88	3085	2.9	29.45		0.00		0.00		2.45	0.26	0.20	29.33	9.68	39.39	60.0	300	0.20	43.25	0.91	0.61	0.69
To STREET 4, Pipe 169A - 170A						26.88	3085				0.00		0.00		2.45			29.33									
STREET 4																											
	128A	174A	0.18	4	14	0.18	14	3.7	0.17		0.00		0.00		0.00	0.00	0.18	0.18	0.06	0.23	44.5	200	0.65	26.44	0.01	0.84	0.26
To SANITARY OUTLET 1, Pipe 174A - 175A						0.18	14				0.00		0.00		0.00			0.18									
	128A	127A	0.18	4	14	0.18	14	3.7	0.17		0.00		0.00		0.00	0.00	0.18	0.18	0.06	0.23	52.0	200	0.65	26.44	0.01	0.84	0.26
	127A	126A	0.14	2	7	0.32	21	3.7	0.25		0.00		0.00		0.00	0.00	0.14	0.32	0.11	0.36	11.0	200	0.35	19.40	0.02	0.62	0.23
	126A	125A	0.61	16	54	0.93	75	3.6	0.88		0.00		0.00		0.00	0.00	0.61	0.93	0.31	1.19	100.0	200	0.35	19.40	0.06	0.62	0.34
	125A	120A	0.54	15	51	1.47	126	3.6	1.46		0.00		0.00		0.00	0.00	0.54	1.47	0.49	1.94	98.0	200	0.35	19.40	0.10	0.62	0.39
To STREET 5, Pipe 120A - 119A						1.47	126				0.00		0.00		0.00			1.47									
Contribution From STREET 3, Pipe 166A - 169A						26.88	3085				0.00		0.00		2.45		29.33	29.33									
Contribution From STREET 1, Pipe 168A - 169A						1.26	164				0.00		0.00		0.00		1.26	30.59									
			0.04		0	28.18	3249				0.00		0.00		2.45		0.04	30.63									
			0.22	10	27	28.40	3276				0.00		0.00		2.45		0.22	30.85									
	169A	170A	0.27	8	27	28.67	3303	2.9	31.31		0.00		0.00		2.45	0.26	0.27	31.12	10.27	41.85	94.0	375	0.20	78.41	0.53	0.71	0.72
			0.23	5	17	28.90	3320				0.00		0.00		2.45		0.23	31.35									
	170A	171A	0.24	12	32	29.14	3352	2.9	31.73		0.00		0.00		2.45	0.26	0.24	31.59	10.42	42.42	82.5	375	0.20	78.41	0.54	0.71	0.72
			0.25	12	32	29.39	3384				0.00		0.00		2.45		0.25	31.84									
	171A	172A	0.27	8	27	29.66	3411	2.9	32.23		0.00		0.00		2.45	0.26	0.27	32.11	10.60	43.09	81.5	375	0.20	78.41	0.55	0.71	0.72
	172A	173A	0.14	2	7	29.80	3418	2.9	32.29		0.00		0.00		2.45	0.26	0.14	32.25	10.64	43.19	11.0	375	0.20	78.41	0.55	0.71	0.72
	173A	174A	0.03		0	29.83	3418	2.9	32.29		0.00		0.00		2.45	0.26	0.03	32.28	10.65	43.20	8.0	375	0.20	78.41	0.55	0.71	0.72
To SANITARY OUTLET 1, Pipe 174A - 175A						29.83	3418				0.00		0.00		2.45			32.28									
SANITARY OUTLET 1																											
Contribution From STREET 4, Pipe 128A - 174A						0.18	14				0.00		0.00		0.00		0.18	0.18									
Contribution From STREET 4, Pipe 173A - 174A						29.83	3418				0.00		0.00		2.45		32.28	32.46									
	174A	175A				30.01	3432	2.9	32.41		0.00		0.00		2.45	0.26	0.00	32.46	10.71	43.38	65.0	375	0.20	78.41	0.55	0.71	0.73
	175A	176A				30.01	3432	2.9	32.41		0.00		0.00		2.45	0.26	0.00	32.46	10.71	43.38	40.0	375	0.20	78.41	0.55	0.71	0.73
	176A	287A				30.01	3432	2.9	32.41		0.00		0.00		2.45	0.26	0.00	32.46	10.71	43.38	11.0	375	0.20	78.41	0.55	0.71	0.73

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: A.S.

Checked: W.L.

Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4

PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**

LOCATION: **City of Ottawa**

File Ref: 21-1247 | Date: **Mar 2025** | Sheet No. 7 of 8

1247_San_FSR3.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)
Contribution From SANITARY OUTLET 2, Pipe 286A - 287A						26.64	2570				0.00		0.00		0.95		27.59	60.05									
	287A	288A				56.65	6002	2.7	53.23		0.00		0.00		3.40	0.37	0.00	60.05	19.82	73.41	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: A.S.	PROJECT: **STITTSVILLE SOUTH URBAN EXPANSION AREA**		
Checked: W.L.	LOCATION: **City of Ottawa**		
Dwg. Reference: Sanitary Servicing Plan, Dwg. No. 4	File Ref: 21-1247	Date: **Mar 2025**	Sheet No. 8 of 8

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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.

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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)

POPULATION:

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

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

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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**	
	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**	**84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.**
	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)

POPULATION:

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

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

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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
Project Name: Fernbank Trunk Sanitary Sewer
Date Prepared: 5/26/2020
Date Revised: 5/17/2022
Input By: Ben Sweet
Reviewed By: Sam Bahia
Drawing Reference: 122163-SAN

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- CALCULATED ANNUAL CELL OUTPUT
- CALCULATED RARE CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION				DEMAND																				AS-BUILT CAPACITY							
				RESIDENTIAL FLOW								INDUSTRIAL / COMMERICAL / INSTITUTIONAL FLOW							EXTRANOUS FLOW AREA METHOD				TOTAL DESIGN FLOW			AS-BUILT SEWER PIPE SIZING / DESIGN VERIFICATION							
STREET	AREA	FROM MH	TO MH	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW Q(a) (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)	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	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	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	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	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	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	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	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	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	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	148.270	48.93	44.48	81.55	258.50	184.38	263.446	139.62	600 CONC	0.610	0.013	0.26	326.6	1.12	79.1%
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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*	*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%*

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 = 280 L/per/day (design)
   (L/per/day)= 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(e) = Extraneous Flow (L/sec)
Q(p) = Population Flow (L/sec)
Q(A) = Peak Annual Flow (L/sec)
Q(R) = Peak Rare Flow (L/sec)
K = Harmon Correction Factor
P = Residential Population
Typ Service Diameter (mm)
Typ Service Length (m)
I/I Pipe Rate (L/mm dia/m/hr) =
Q(fd) = Foundation Flow (L/sec)
Q(ici) = Industrial / Commercial / Institutional Flow (L/sec)

	Singles	Semis/Towns	Apts (2-BR)
	3.4	2.7	2.1
	135		
	15	15	
	0.007		

Institutional / Commercial / Industrial

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

Std ICI -->

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

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	Pipe Friction n = 0.013		
Comm./Inst. Flow =	28,000	l/ha/day	Residential Peaking Factor = Harmon Equation (max 4, min 2)		
Infiltration =	0.33	l/s/ha	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.

ABBOTT STREET
TRANS CANADA TRAIL
FERNBANK TRUNK FLOWS DIRECTED TO HAZELDEAN PUMP STATION
SHEA ROAD
COPE DR (FUTURE)
COPE DR
FERNBANK ROAD
STITTSVILLE MAIN STREET
FLEWELLYN ROAD
PARK
INSTITUTIONAL
COMMERCIAL
AREA 6 - EAST
AREA 6 - WEST
BELL LANDS
BLK 353
BLK 349
FRIENDLY CRESCENT
SWM
HYDRO CORRIDOR
HOLDOUT 4
MAGUIRE
FAULKNER
DAVIDSON
EDER
EXTERNAL 1
EXTERNAL 2
EXT 3
E-1 2.900 37.00ha
A-1 0.418 6.13ha
A-2I 3.921 137.14ha
A-2II 0.00 5.000ha
A-3 0.238 4.66ha
A-4I 0.140 0.57ha
A-4II 1.947 29.36ha
A-4III 2.317 32.41ha
B-1 0.248 3.28ha
B-2 0.853 11.32ha
B-3 1.285 18.010ha
B-4 0.373 6.81ha
B-5 0.265 3.72ha
B-6 0.00 2.95ha
B-7 1.00 10.92ha
B-8 0.143 1.92ha
B-9 0.236 2.74ha
B-10 1.347 20.00ha
B-11 0.000 0.03ha
B-12 0.230 4.29ha
B-13 0.000 6.34ha
C-1 0.00 8.99ha
C-2 0.00 5.55ha
D-1 1.661 18.73ha
D-2 1.171 13.96ha
D-3 1.181 13.64ha
D-4 0.971 12.07ha
D-5 0.189 1.70ha
D-6 0.230 2.44ha
D-7 0.073 0.86ha
D-8 0.014 0.81ha
FLOW ALLOWANCE = 40 L/s TO EXISTING LAIRD PUMP STATION - FERNBANK TRUNK SEWER
LAIRD PUMP STATION (TO BE DECOMMISSIONED WITH FLOWS DIRECTED TO FUTURE SANITARY TRUNK SEWER - BY OTHERS)
DISCHARGE CHAMBER
SHEA PUMP STATION FLOWS TO SANITARY TRUNK SEWER
FRIENDLY PUMP STATION (TO BE DECOMMISSIONED WITH FLOWS DIRECTED TO SHEA PUMP STATION THROUGH AREA 6 - EAST)
DUAL FORCEMAIN
SHEA PUMP STATION CURRENT CAPACITY = 84 L/s UPGRADED CAPACITY = 125 L/s
TRIBUTARY TO FAULKNER DRAIN
EXISTING EMERGENCY OVERFLOW
EXISTING SWM
PROPOSED EMERGENCY OVERFLOW
PROPOSED SWM

LEGEND

B-1 / 0.196 / 2.68ha — AREA NUMBER; POPULATION (in 1000s); AREA

- SANITARY DRAINAGE AREA (AREA WITHIN URBAN BOUNDARY)
- TRIBUTARY TO FAULKNER DRAIN
- OFFICIAL EXPANSION AREA - W3 WEST STITTSVILLE
- OFFICIAL EXPANSION AREA - W4 WEST STITTSVILLE
- PROPOSED / EXISTING SWM FACILITY
- EXISTING PUMPING STATION
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCEMAIN
- EXISTING SANITARY TRUNK SEWER
- FUTURE SANITARY TRUNK SEWER (BY OTHERS)
- PROPOSED SANITARY SEWER

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 (1:5000, 0 50 100 150 200)

DESIGN DJC
CHECKED BCS
DRAWN DJC
CHECKED BCS
APPROVED BHB

FOR REVIEW ONLY

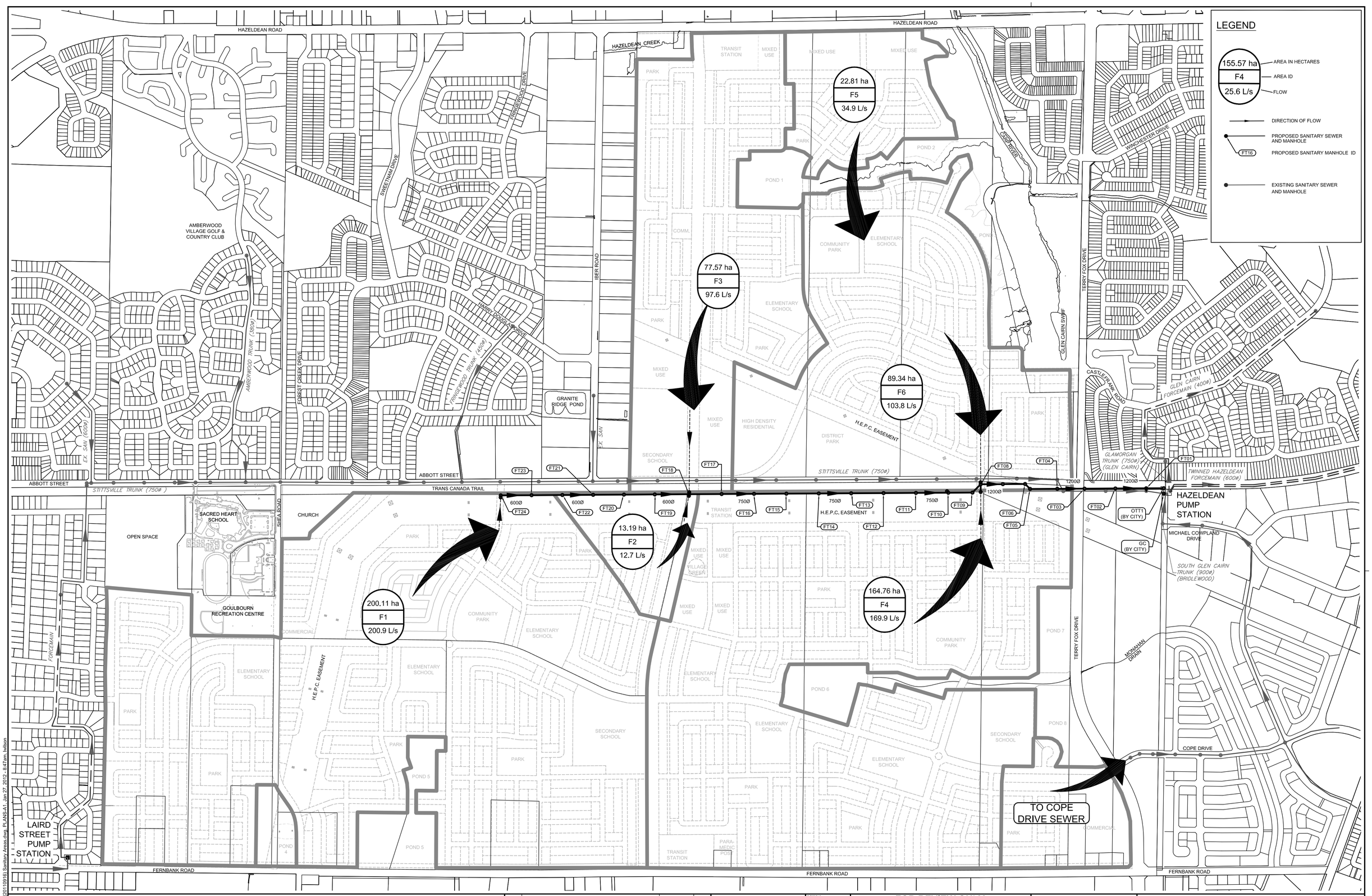
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
SHEA PUMP STATION UPGRADES FOR UEA

DRAWING NAME
SANITARY DRAINAGE AREA PLAN

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

M:\2022\122163\CAD\Civil\122163-SAN.dwg, SAN, May 09, 2023 - 4:03pm, tbrewer



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 K. J. MURPHY 100123021 PROVINCE OF ONTARIO JAN. 26/12

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT PROVINCE OF ONTARIO Jan. 26/12

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ENGINEERS & PLANNERS
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Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

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

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

PLANA1.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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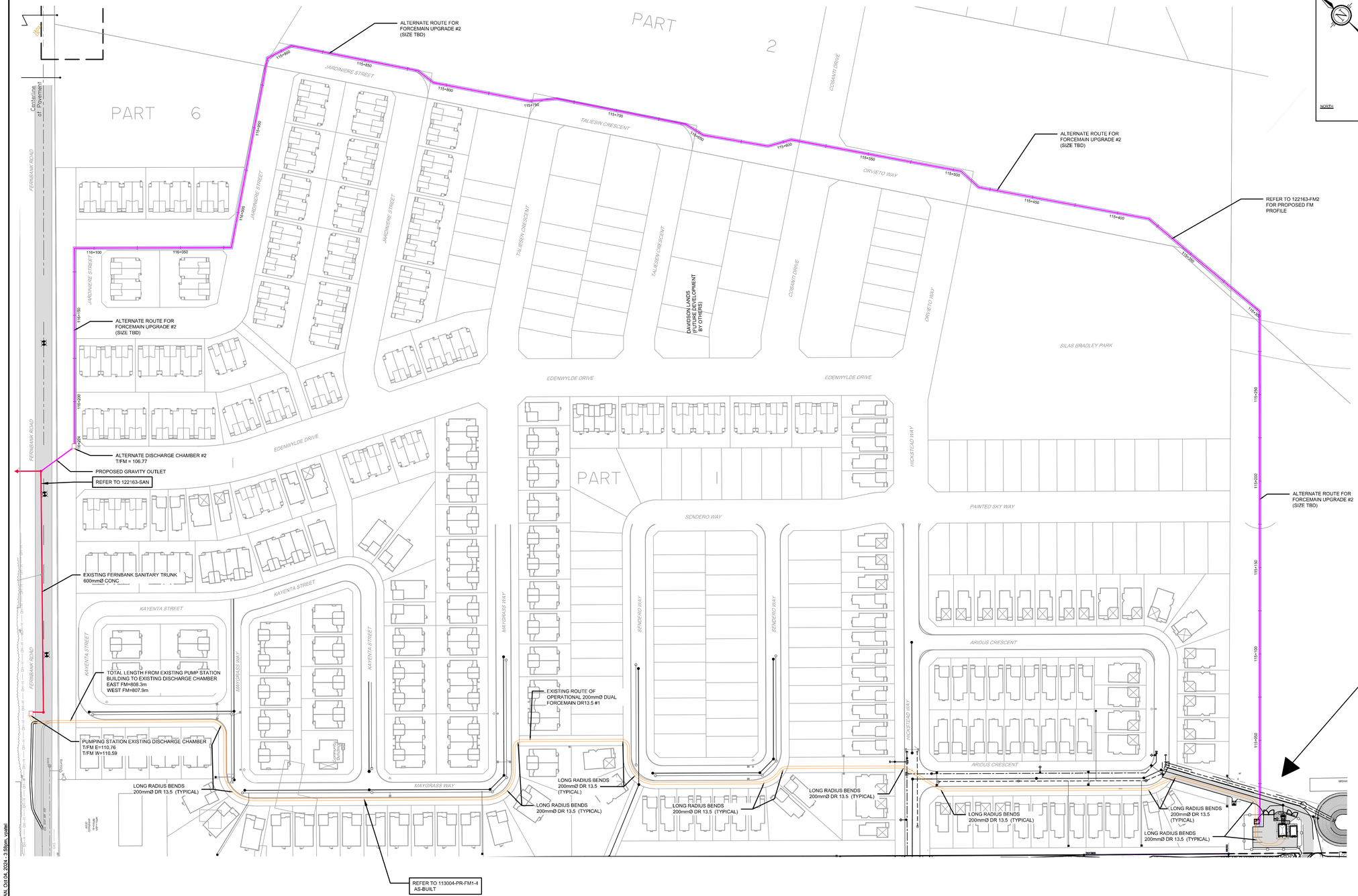

AREA W4

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

NOVATECH
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Website www.novatech-eng.com

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

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ARCADIS Design & Consultancy for natural and built assets

NOVATECH

Click here to enter text.

Transient Analysis Report

Shea Road and Forcemain System Upgrades
City of Ottawa, ON

ARCADIS
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

1 Introduction 1

2 Background 1

3 Methodology 1

4 Transient Analysis 3

4.1 Scenario 1 – Flow via Two Existing Forcemains 3

4.2 Scenario 2 – Flow via Two Existing Forcemains plus One Proposed Forcemain 4

5 Conclusions and Recommendations 5

List of Attachments

Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains

Attachment 1: Transient Envelopes along the Existing Dual Forcemains from the Upgraded Shea Road SPS to Existing Discharge Manhole (SAN MH-5) upon Emergency Pump Shutdown without Surge Protection

Attachment 1A: Transient History at the Upgraded Shea Road SPS upon Emergency Pump Shutdown without Surge Protection

Attachment 2: Transient Envelopes along the Existing Dual Forcemains from the Upgraded Shea Road SPS to Existing Discharge Manhole (SAN MH-5) under Normal Pump Shutdown and Restart without Surge Protection

Attachment 2A: Transient History at the Upgraded Shea Road SPS under Normal Pump Shutdown and Restart without Surge Protection

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

Attachment 3: Transient Envelopes along the Existing Dual Forcemains from the Existing Shea Road SPS to Existing Discharge Manhole (SAN MH-5) upon Emergency Pump Shutdown without Surge Protection

Attachment 3A: Transient History at the Existing Shea Road SPS upon Emergency Pump Shutdown without Surge Protection

Attachment 4: Transient Envelopes along the Proposed Forcemain from the Existing Shea Road SPS to Existing Discharge Manhole upon Emergency Pump Shutdown without Surge Protection

Attachment 5: Transient Envelopes along the Existing Dual Forcemains from the Existing Shea Road SPS to Existing Discharge Manhole (SAN MH-5) under Normal Pump Shutdown and Restart without Surge Protection

Attachment 5A: Transient History at the Existing Shea Road SPS under Normal Pump Shutdown and Restart without Surge Protection

Table of Contents (continued)

Attachment 6: Transient Envelopes along the Proposed Forcemain from the Existing Shea Road SPS to Existing Discharge Manhole under Normal Pump Shutdown and Restart without Surge Protection

Appendices

Appendix A Location Map
Appendix B Background Information

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

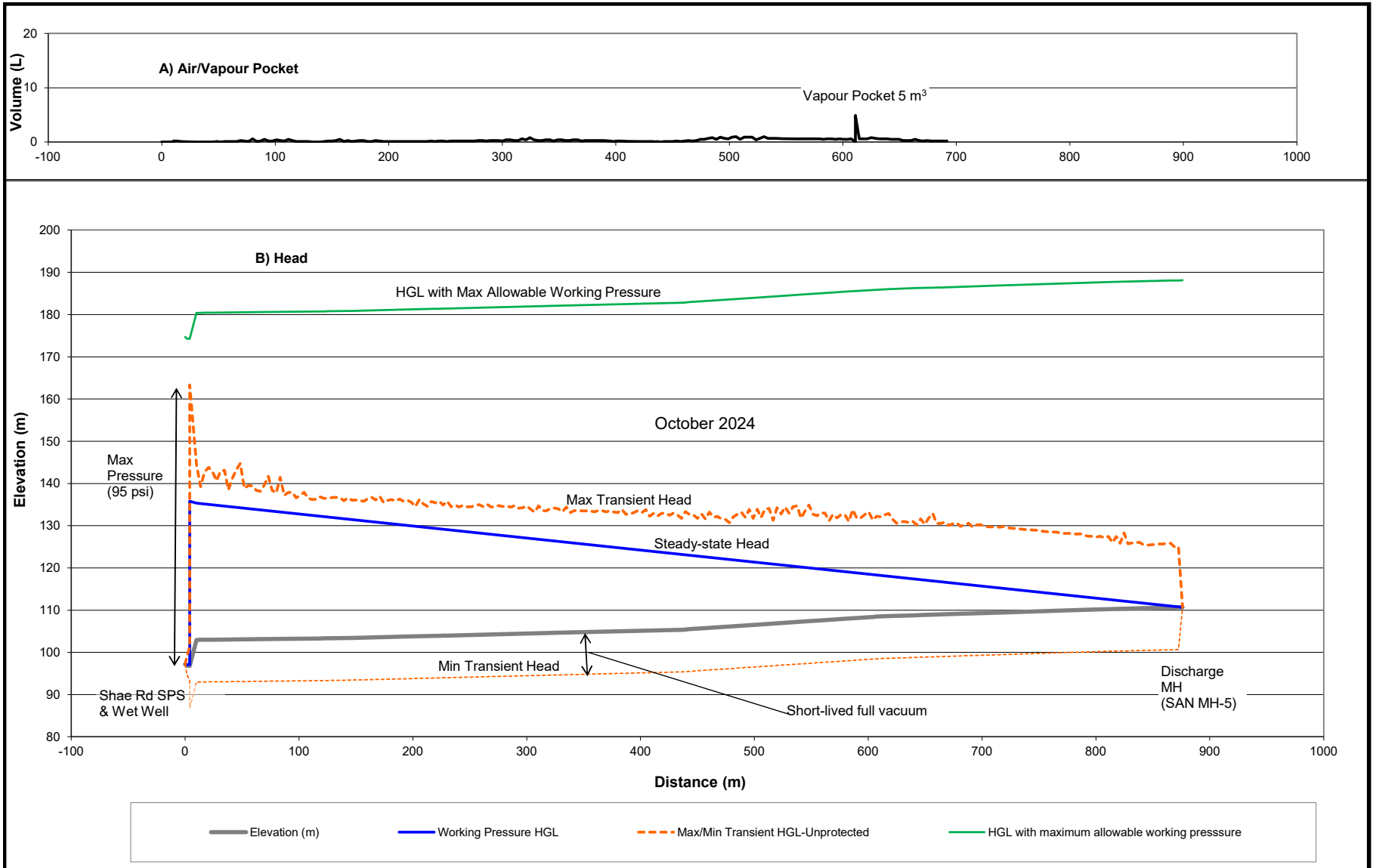
Based on the HAMMER model simulation results, the following conclusions and recommendations can be drawn:

- 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.

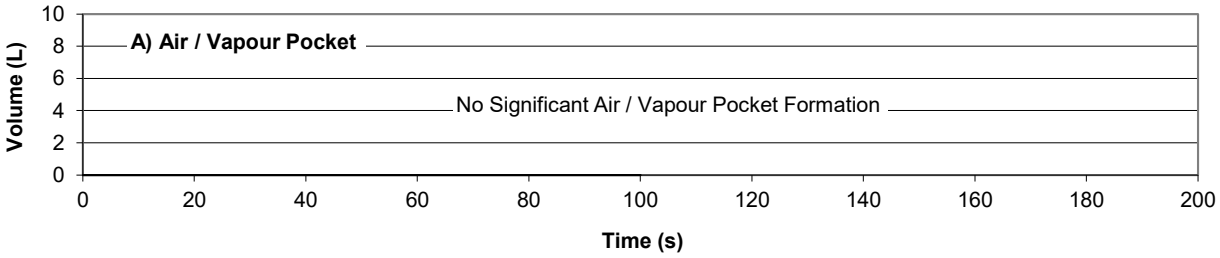
ATTACHMENTS

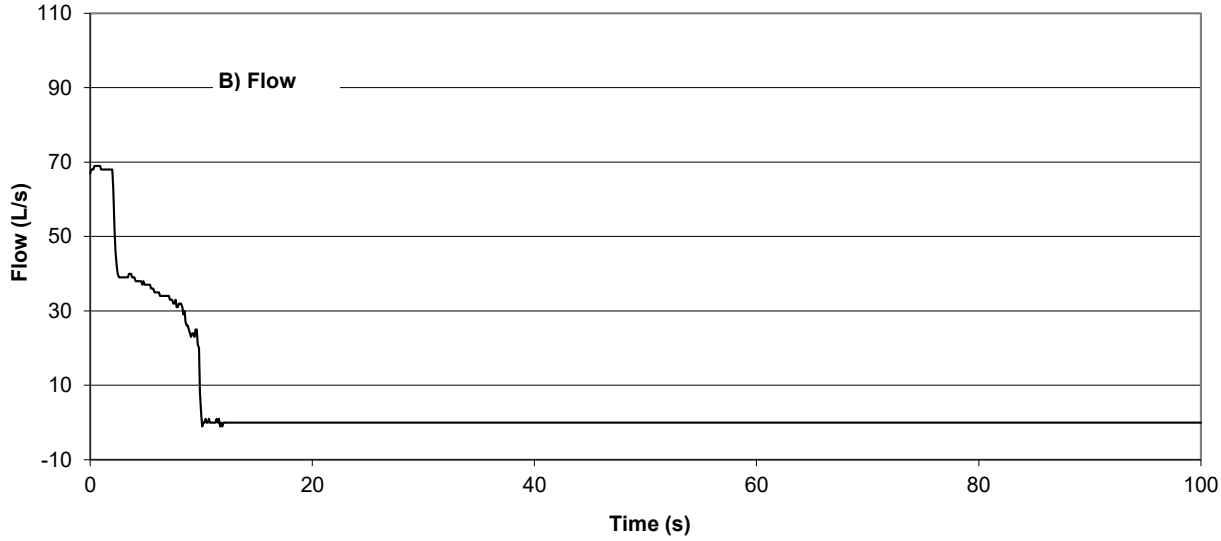


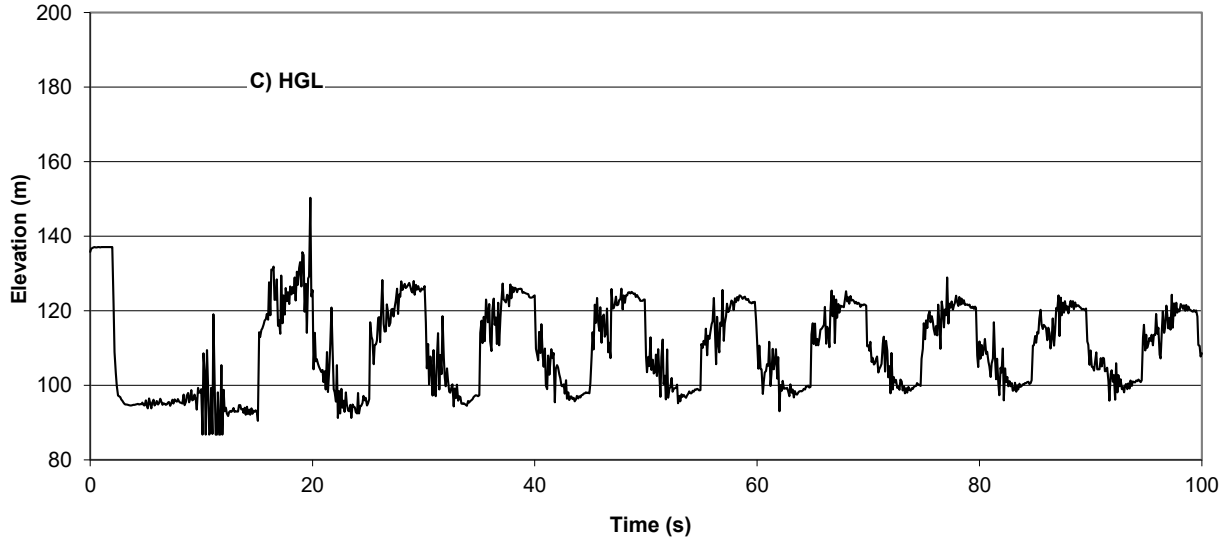
	Project: 147554	October 2024
	ARCADIS	Attachment 1

Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains

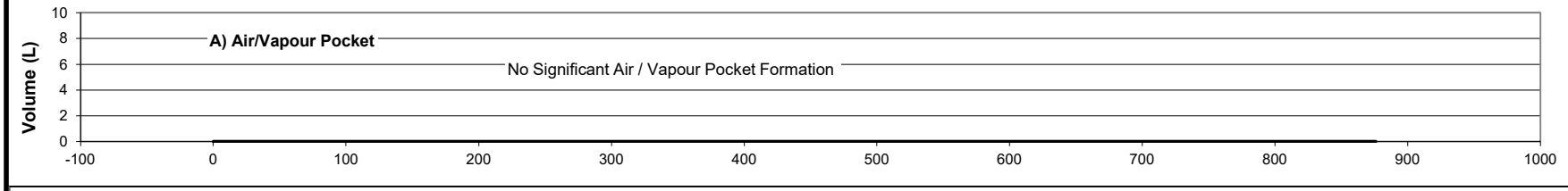
Transient Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Emergency Pump Shutdown** without Surge Protection

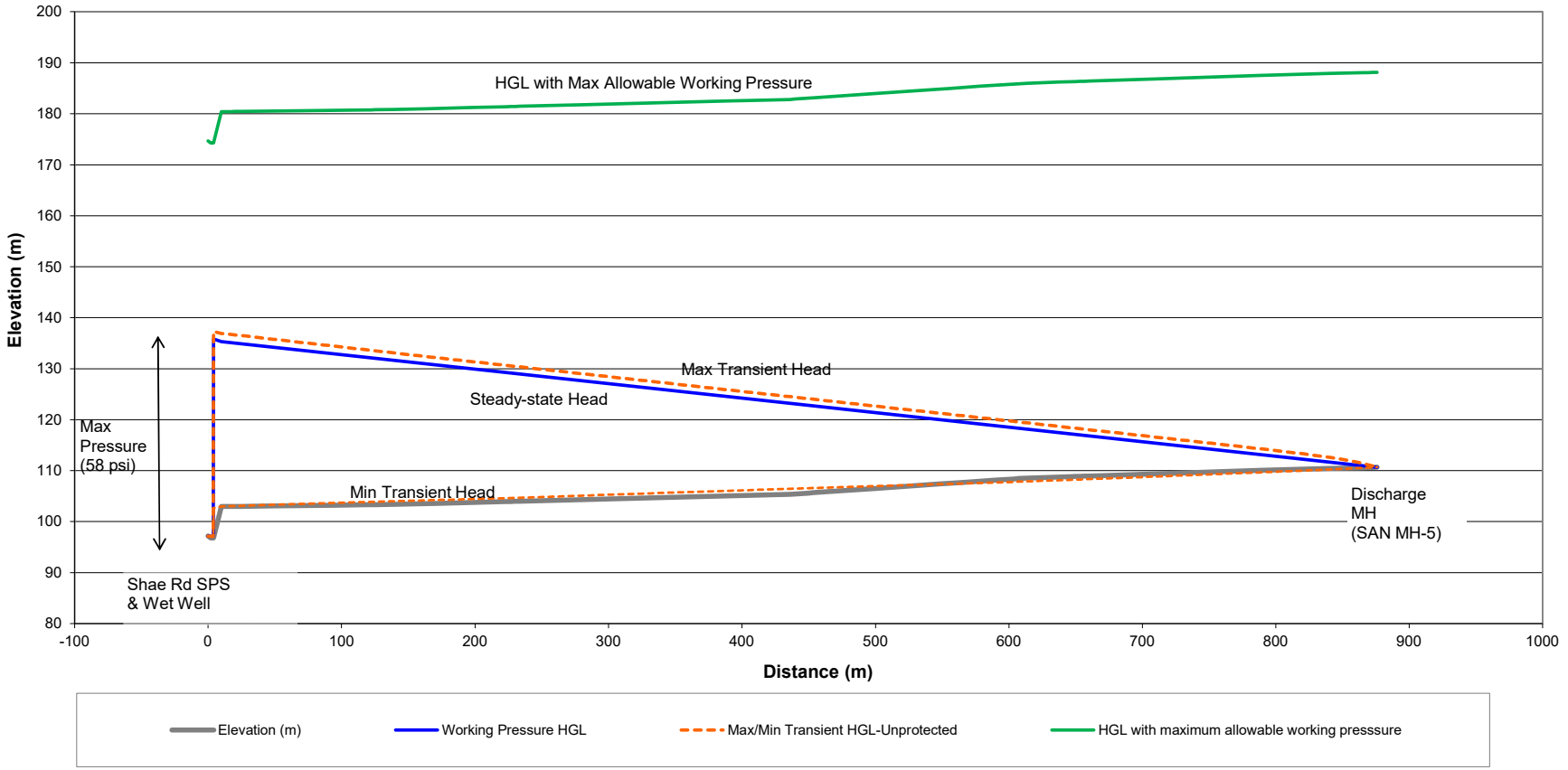






	Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
	ARCADIS	Attachment 1A	Transient History at the Proposed Shea SPS upon Emergency Pump Shutdown without Surge Protection

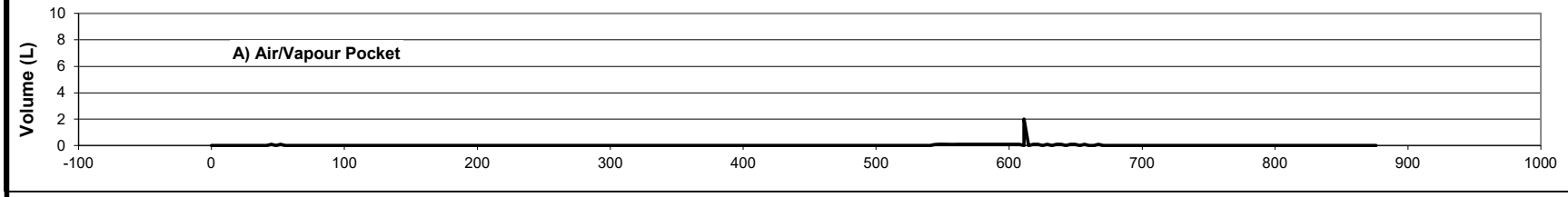


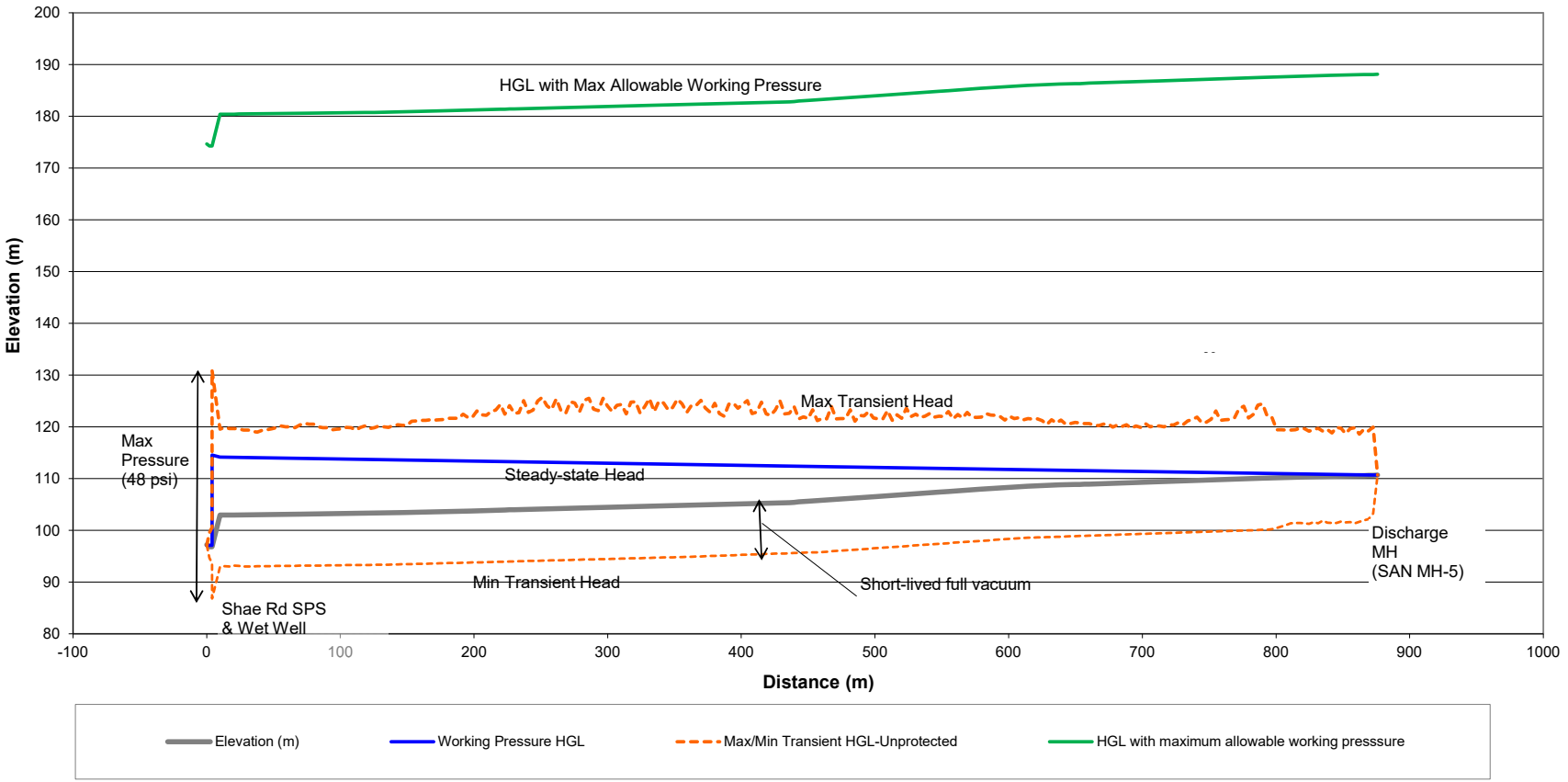


	Project: 147554	October 2024
	ARCADIS	Attachment 2

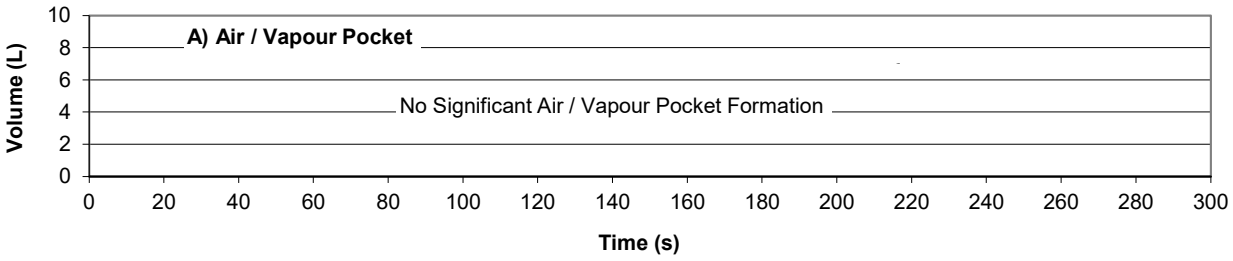
Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains

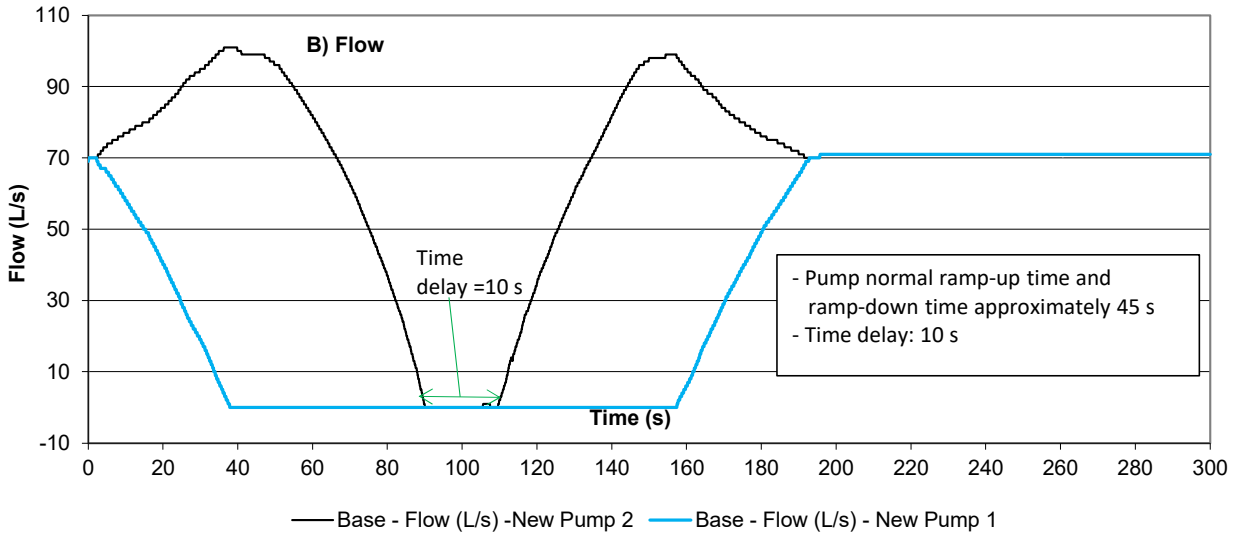
Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Normal Pump Shutdown and Re-start** without Surge Protection

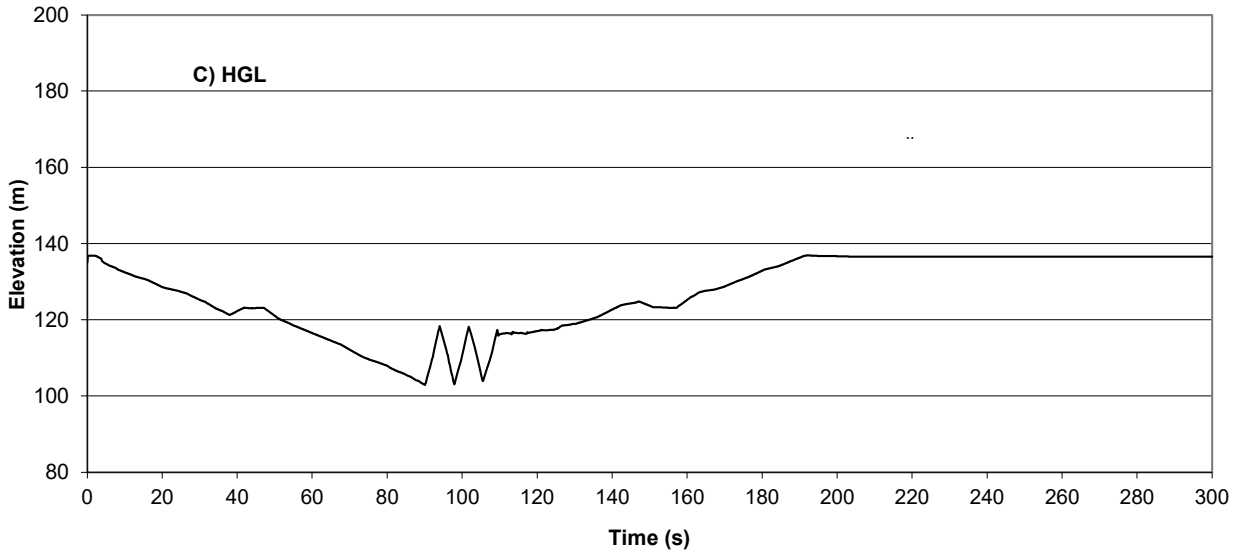




	Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 3	Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Emergency Pump Shutdown** without Surge Protection







	Project: 147554	October 2024	**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**
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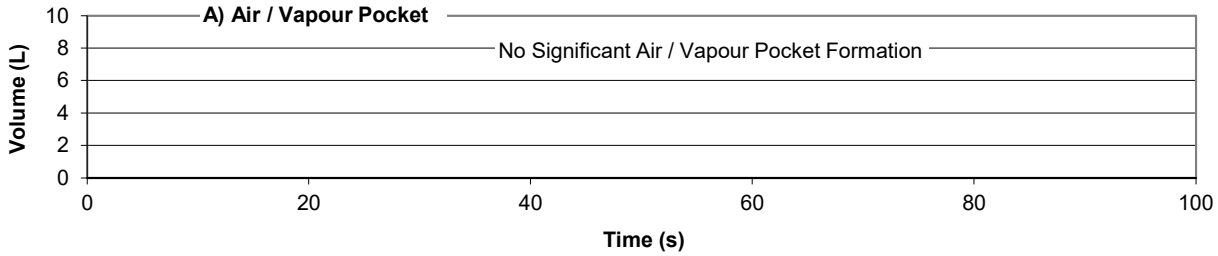
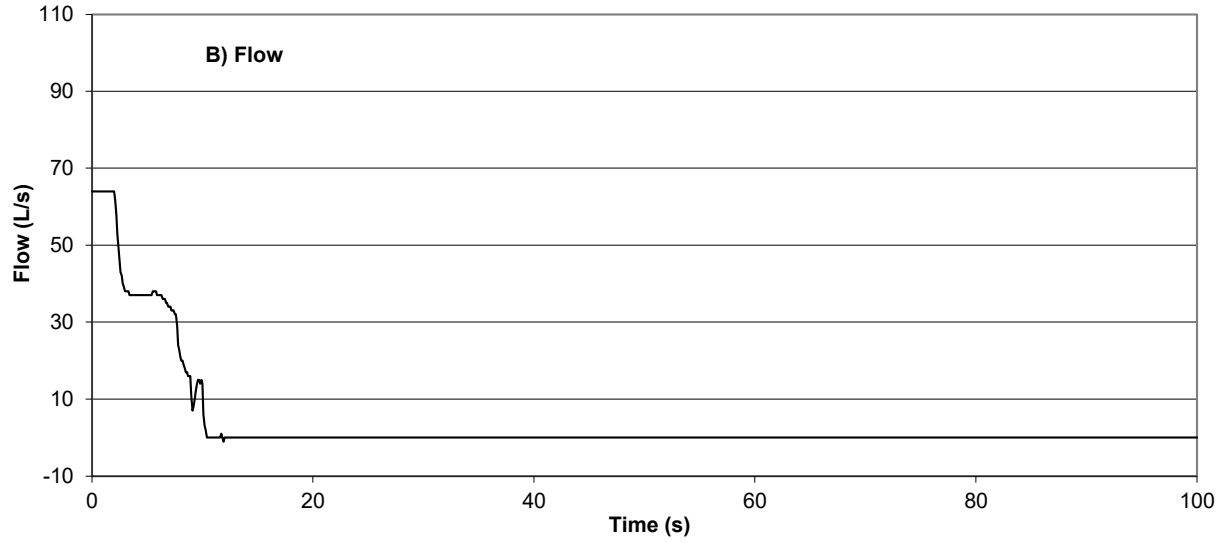
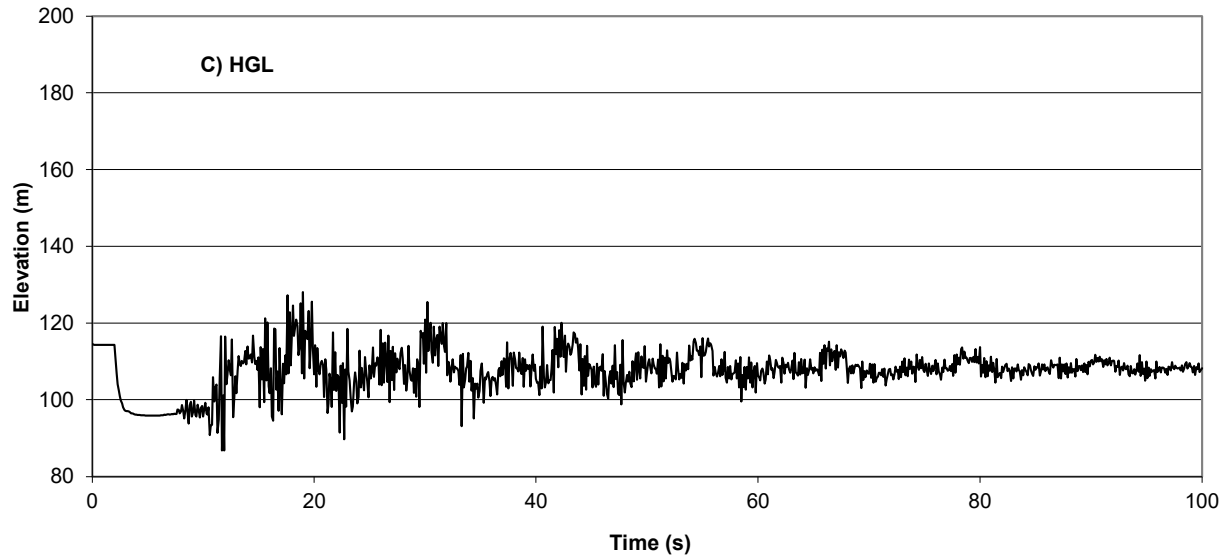
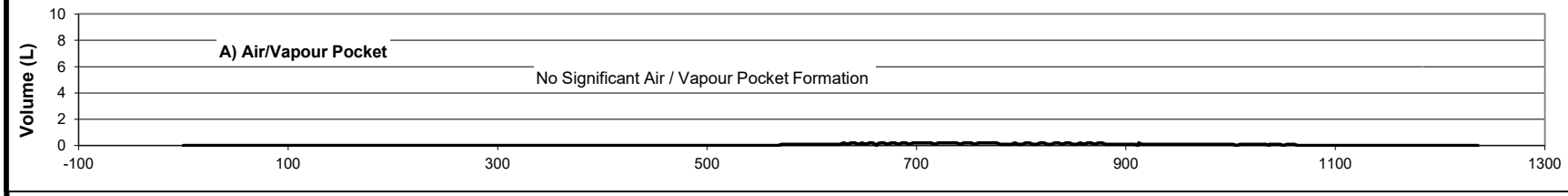
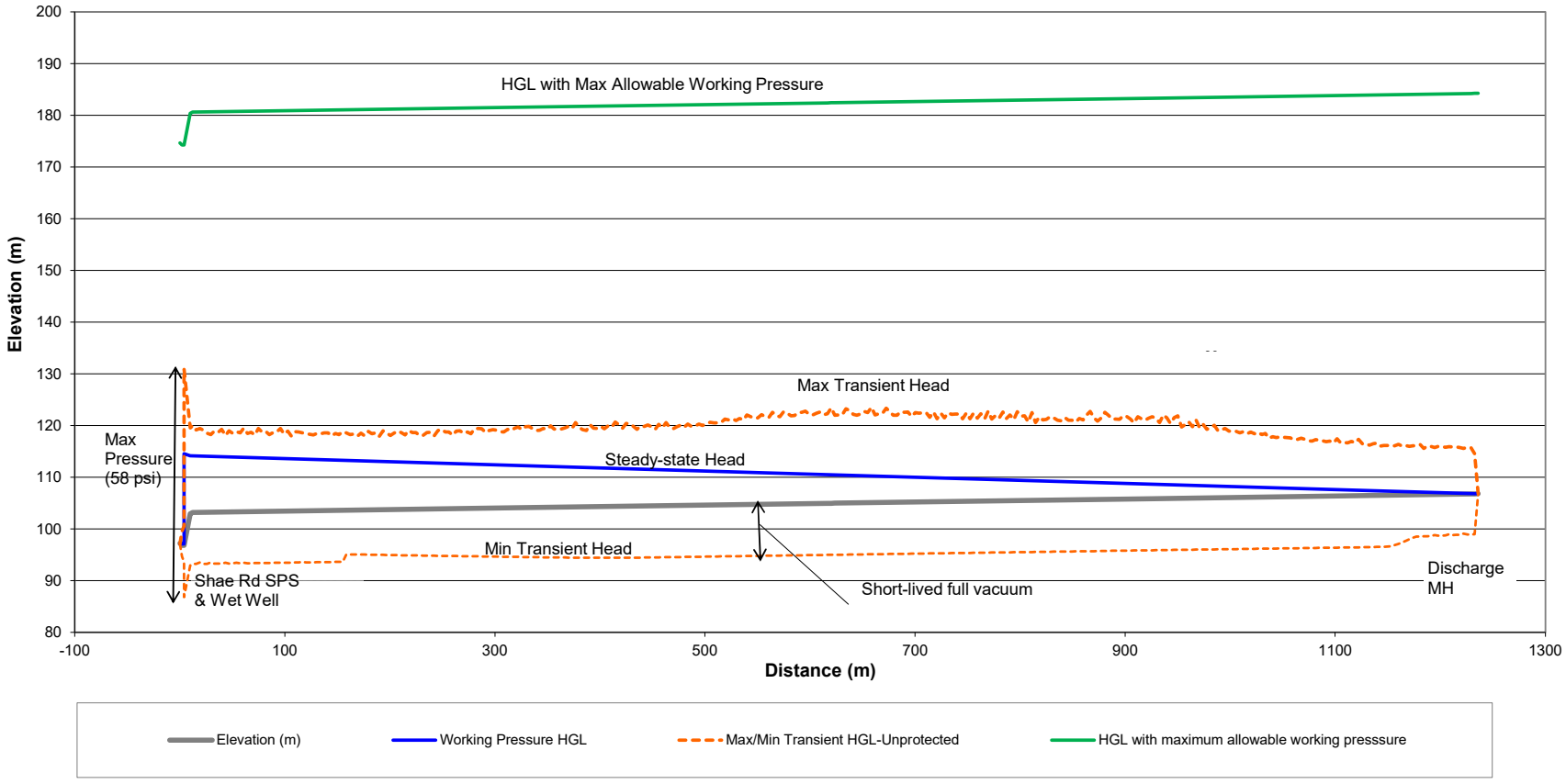




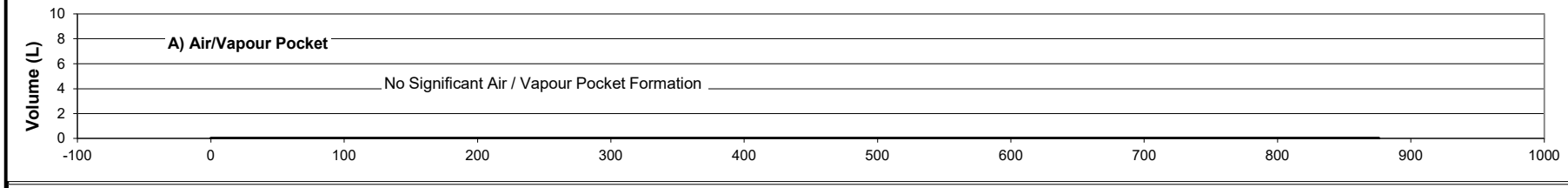


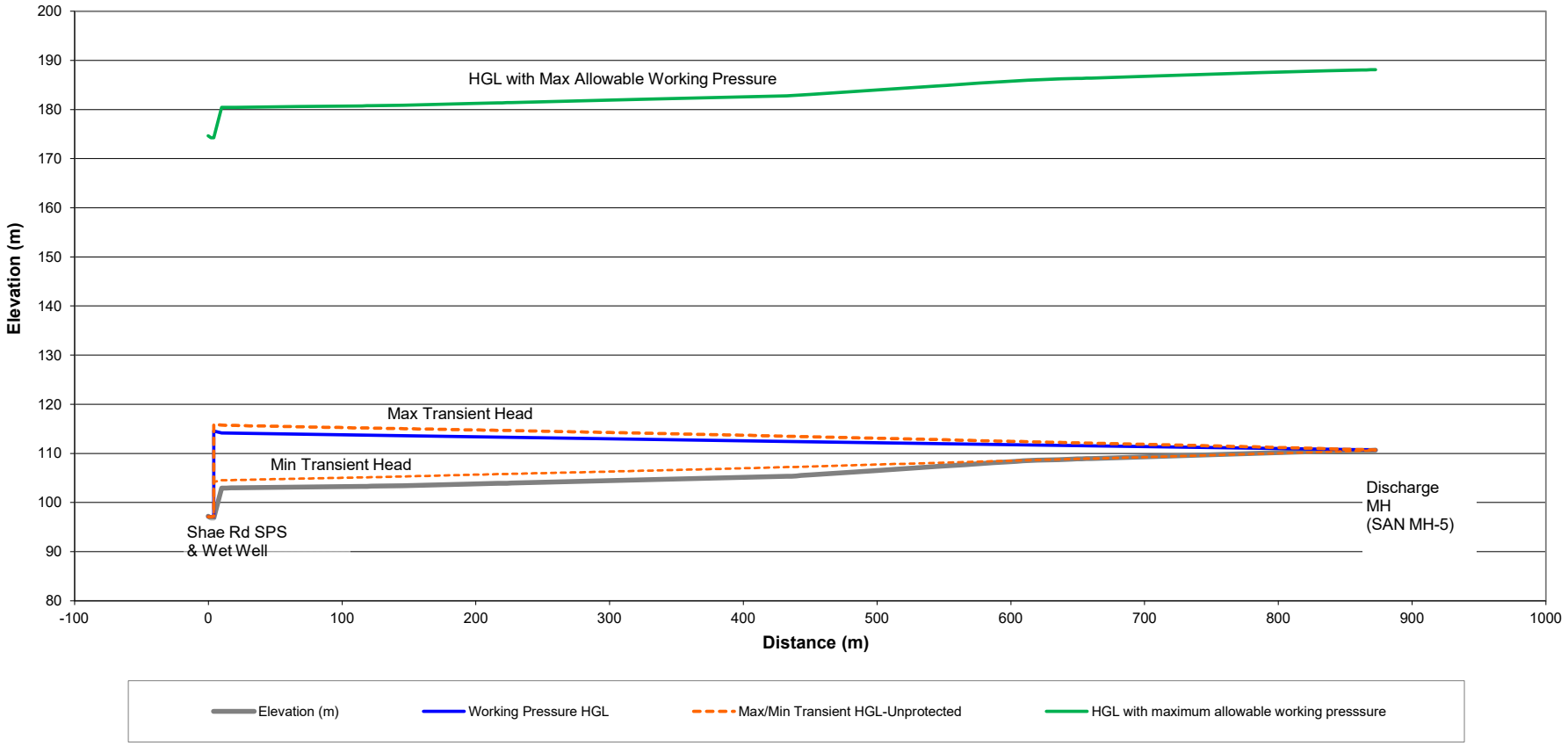
	Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 3A	Transient History at the Existing Shea SPS upon Emergency Pump Shutdown without Surge Protection





	Project : 147554	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS Attachment 4	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**
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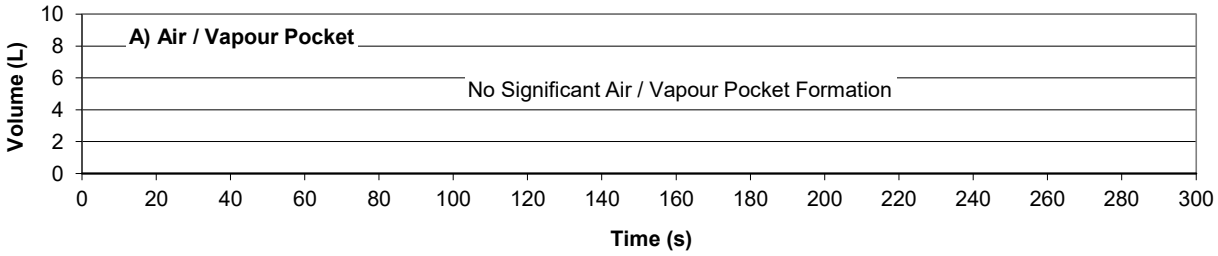
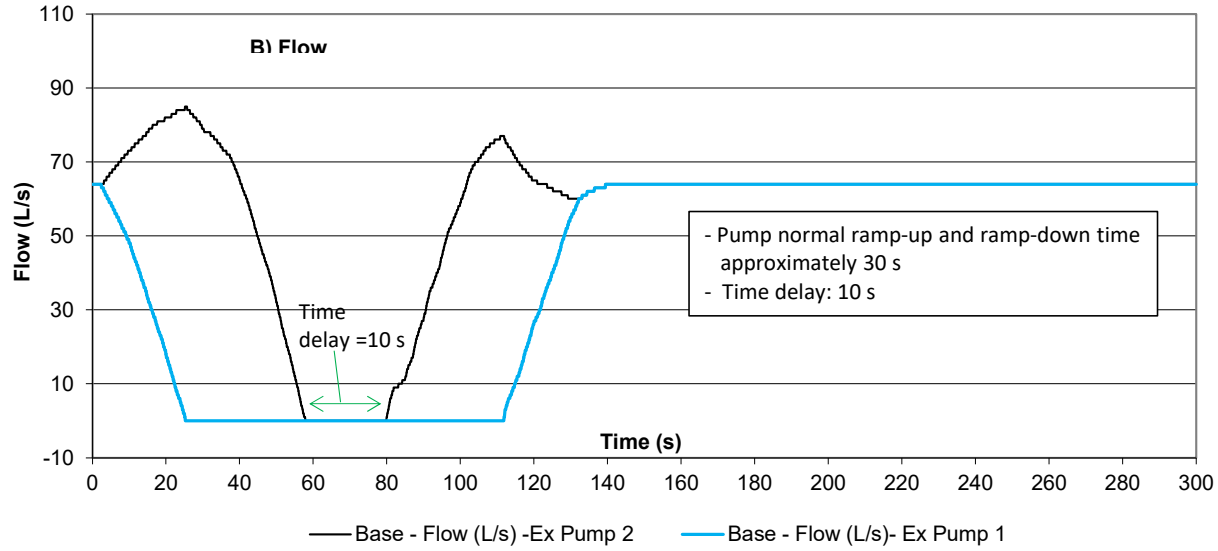
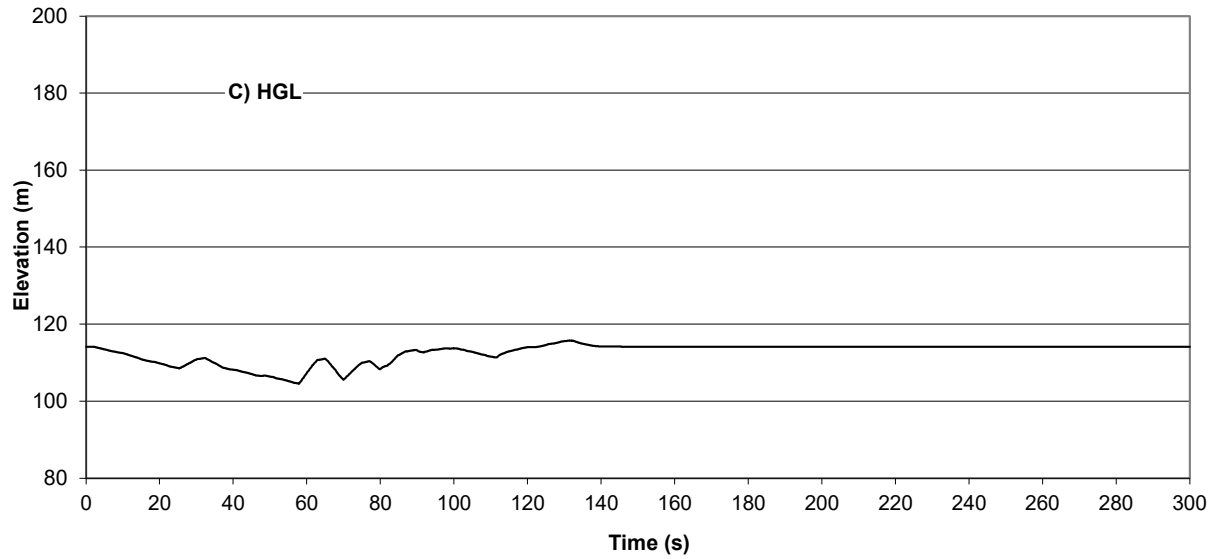
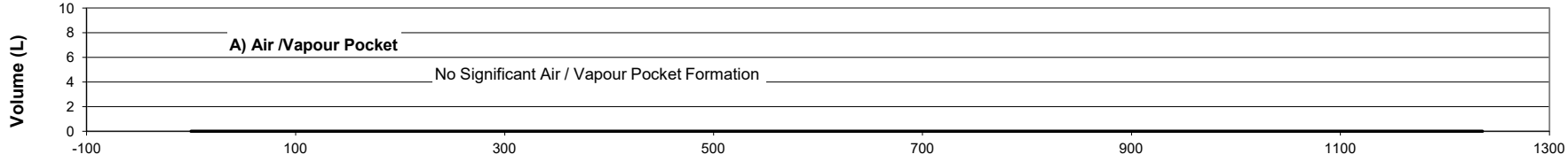
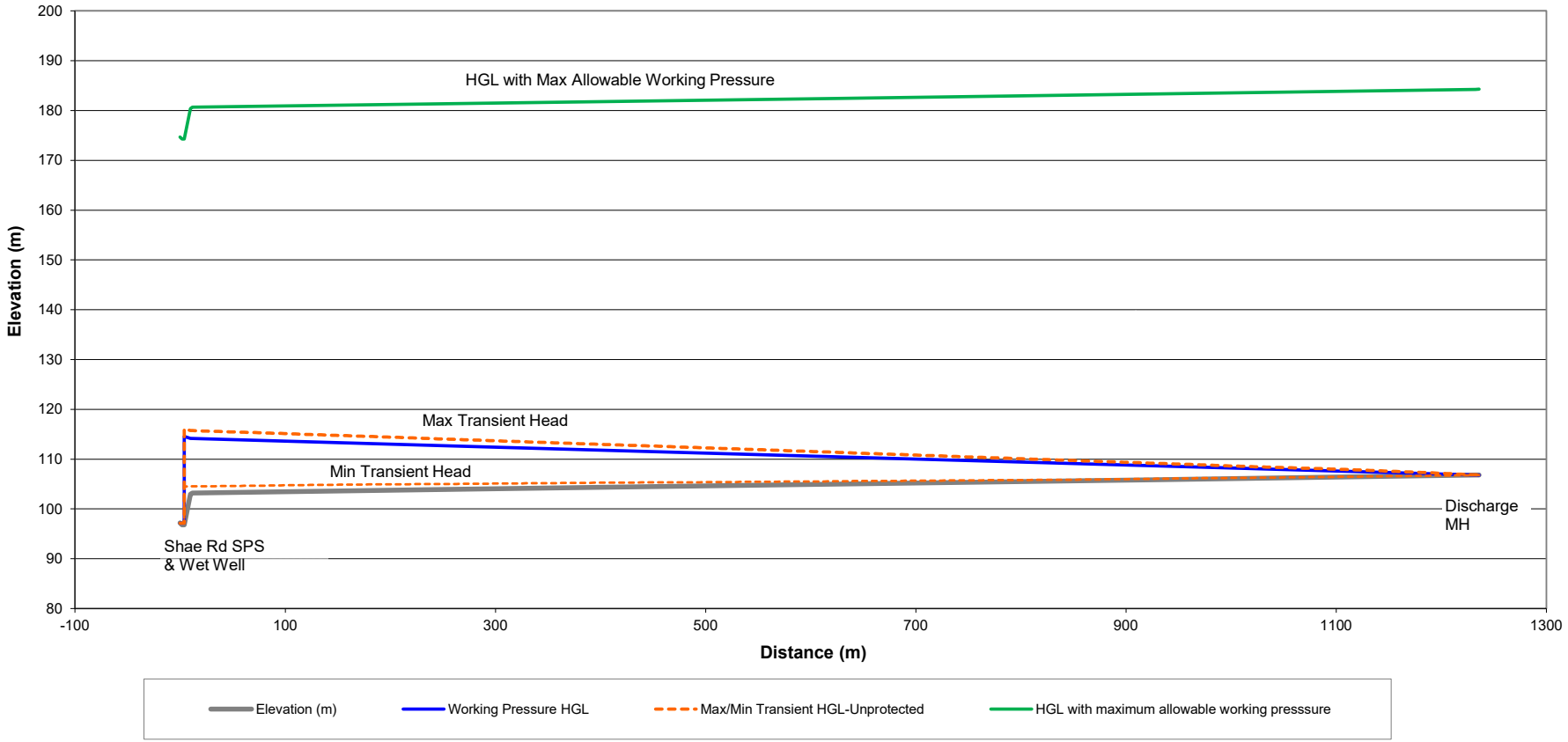






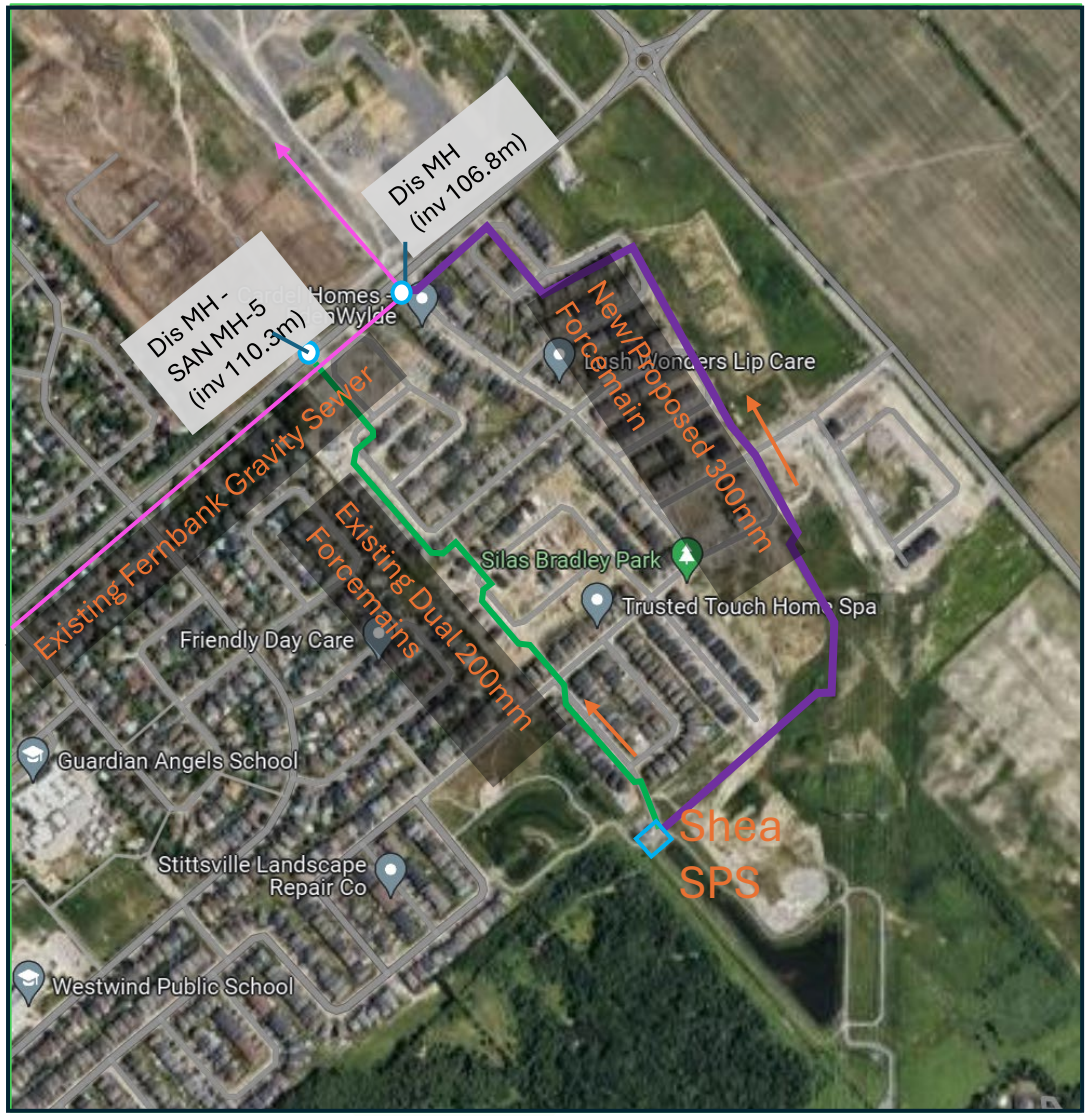
	Project:147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 5A	Transient History at the Existing Shea SPS under Normal Pump Shutdown and Re-start without Surge Protection



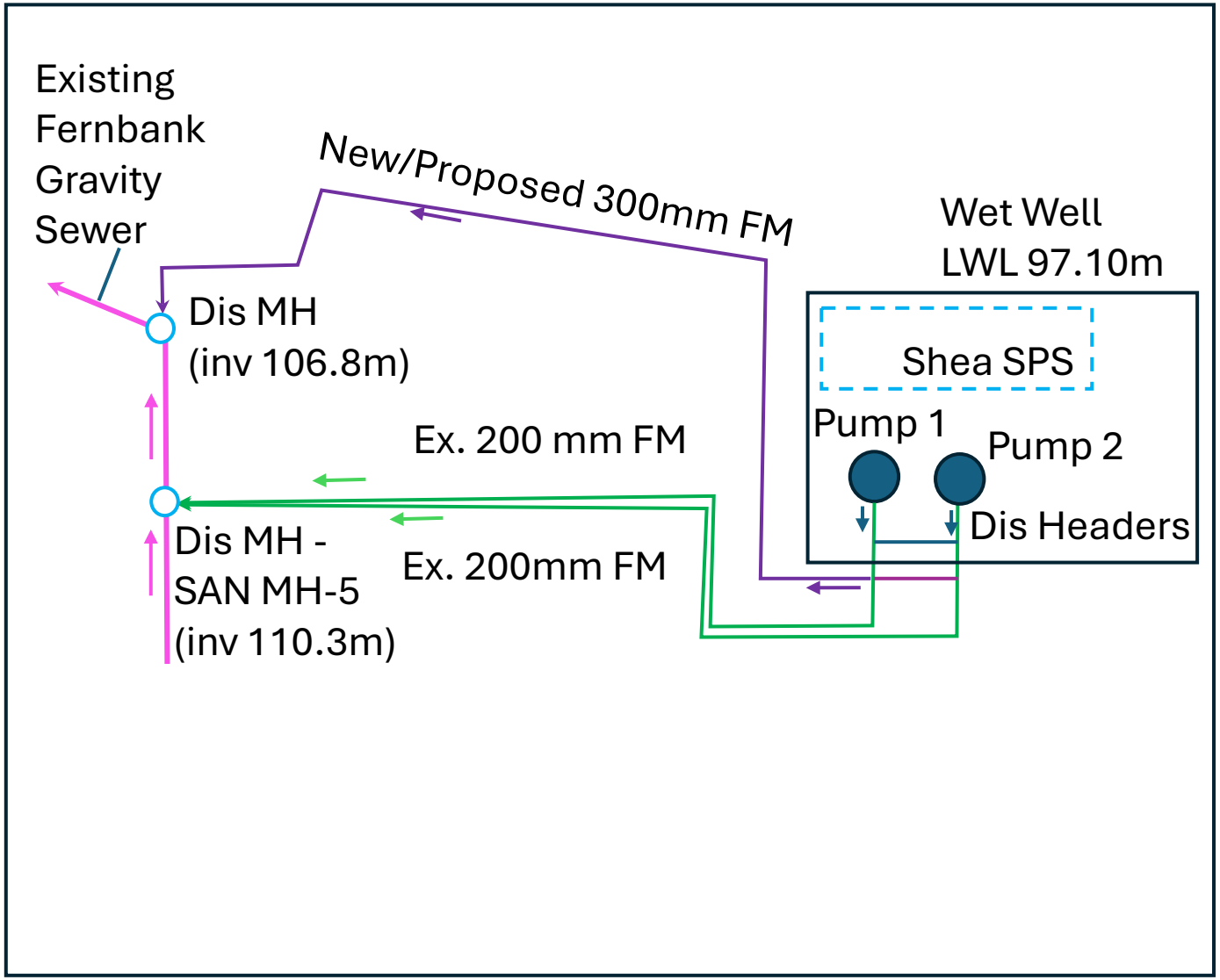


	Project: 147554	October 2024	**Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain**
	ARCADIS	Attachment 6	Envelopes for the New Forcemain from the Existing Shae Road SPS to Discharge MH under **Normal Pump Shutdown and Re-start** without Surge Protection

APPENDIX A
Location Map



Plan View of Shea SPS and Forcemain System



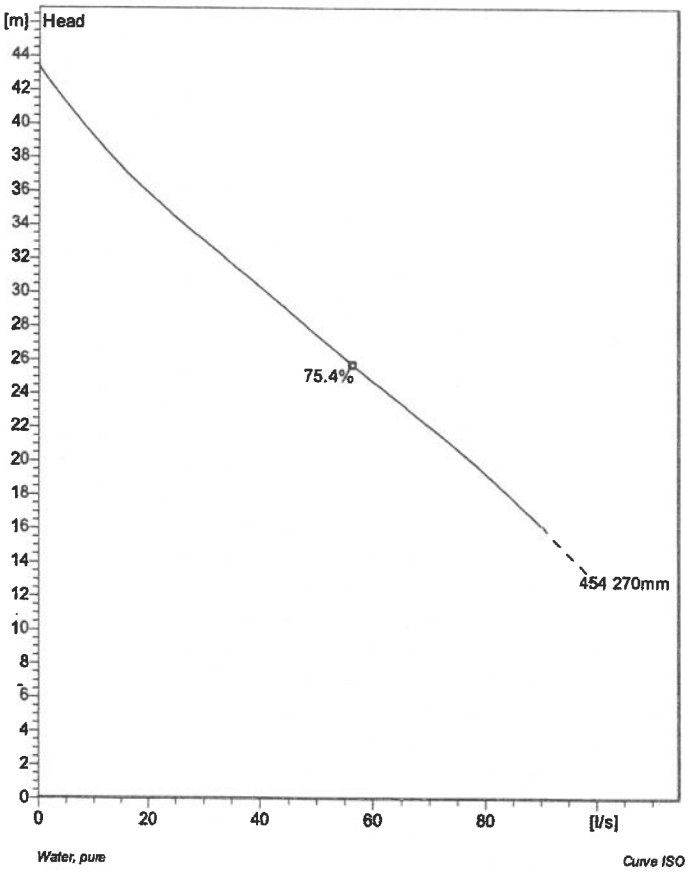
Schematic of Shea SPS and Forcemain System

APPENDIX B
Background Information

Existing pumps at Shea SPS

NP 3171 HT 3~ 454

Technical specification



Water, pure *Curve ISO*

Note: Picture might not correspond to the current configuration.

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.

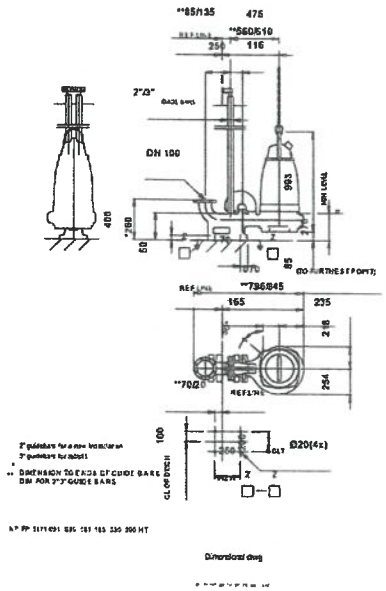
Impeller

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 %

Installation: P - Semi permanent, Wet



Dimensional drawing

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

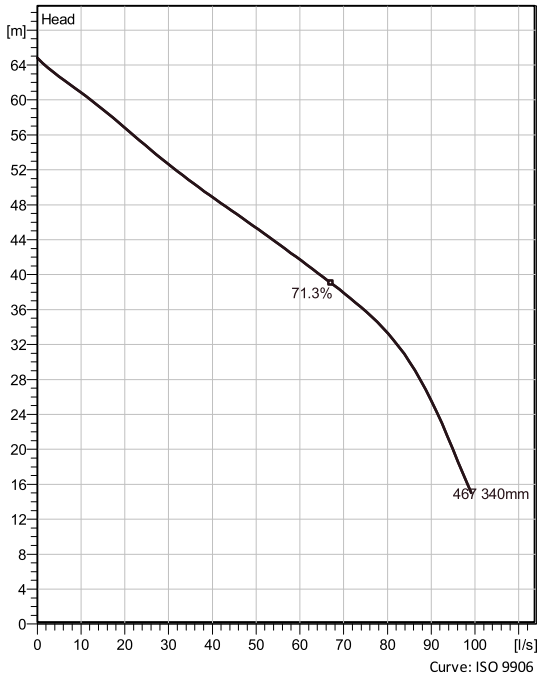
Project	Project ID	Created by	Created on	Last update
			2016-03-10 20:34:53	

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

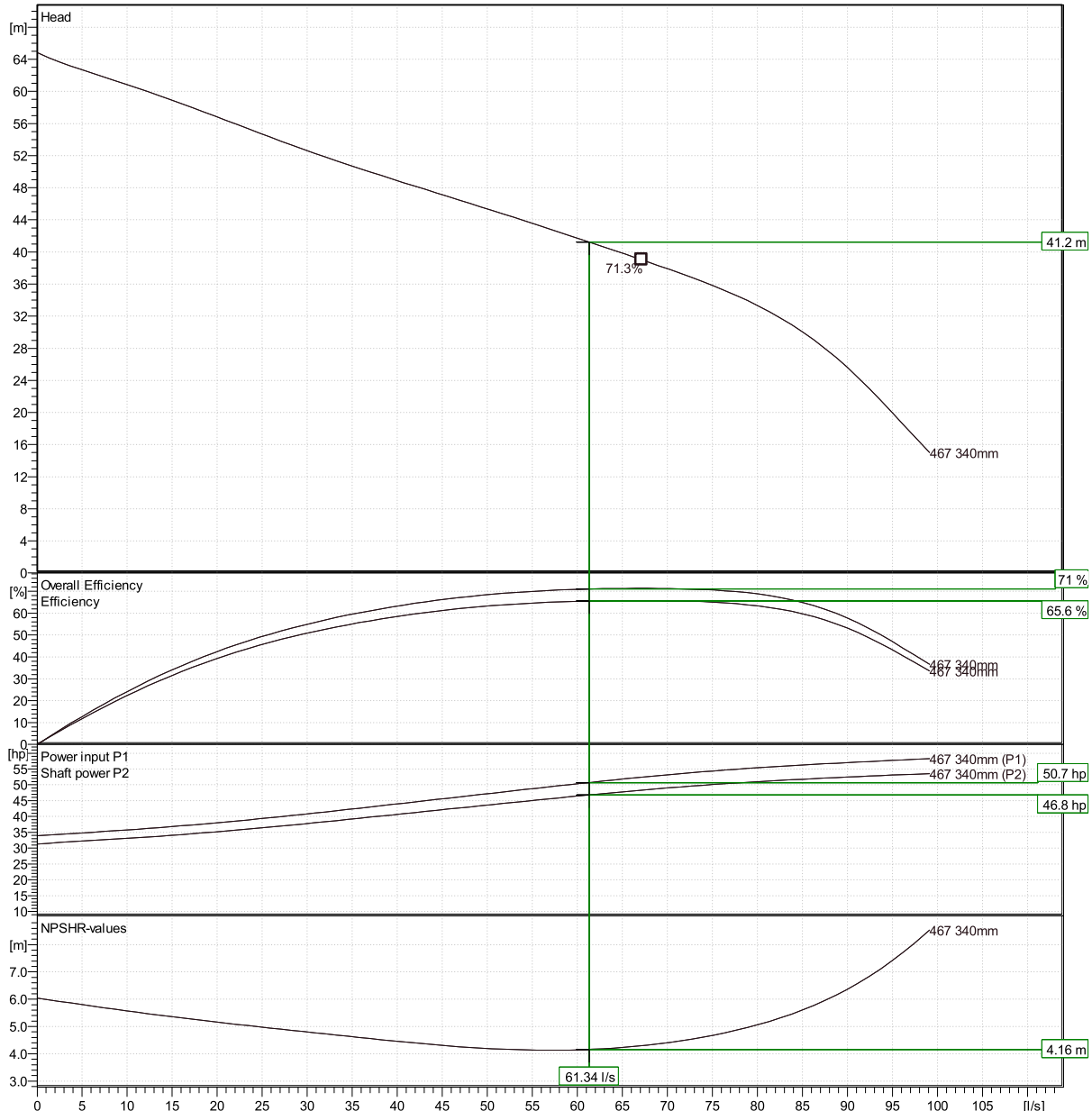
NP 3202 HT 3~ 467

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.

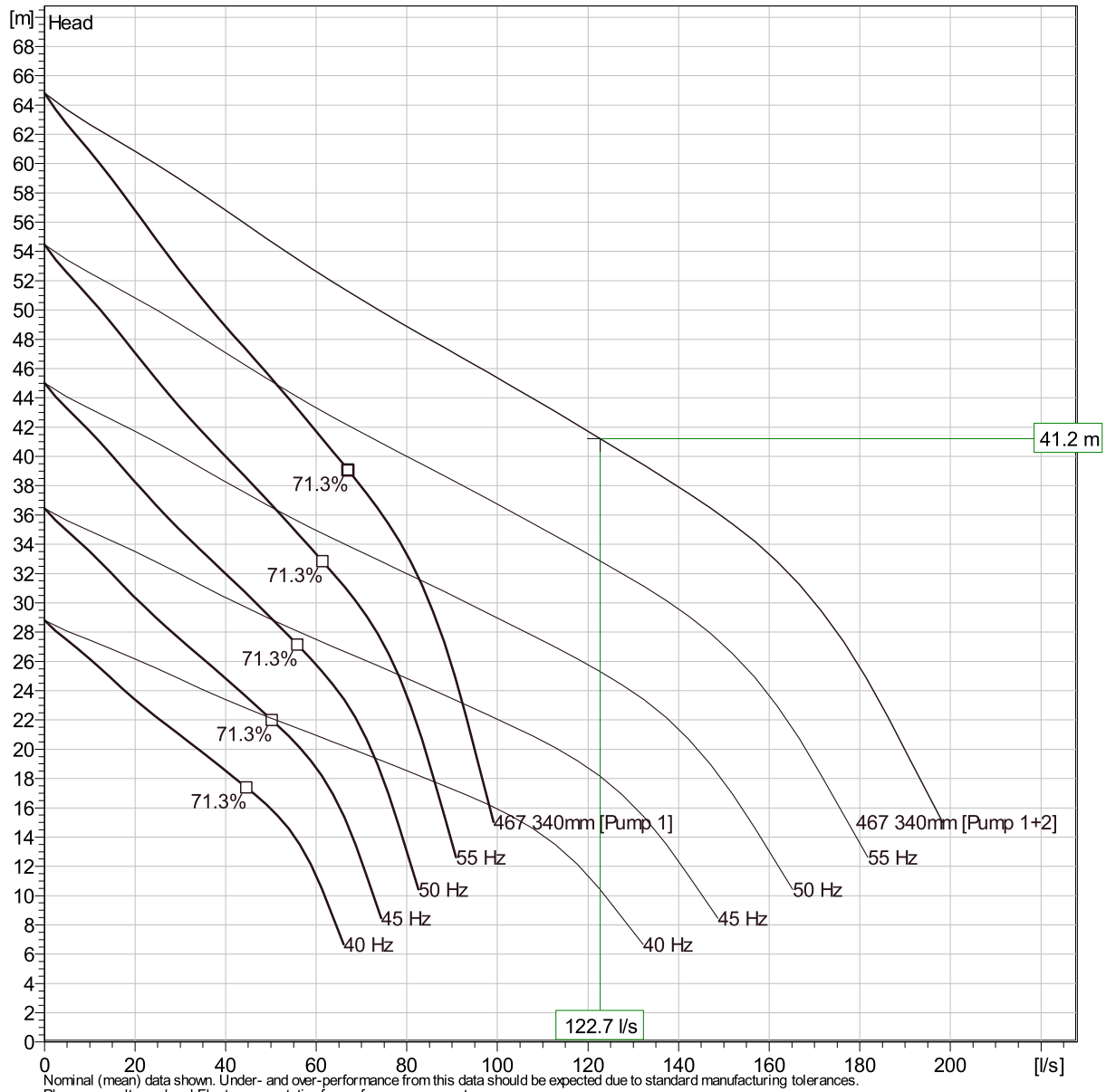
Curve: ISO 9906

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

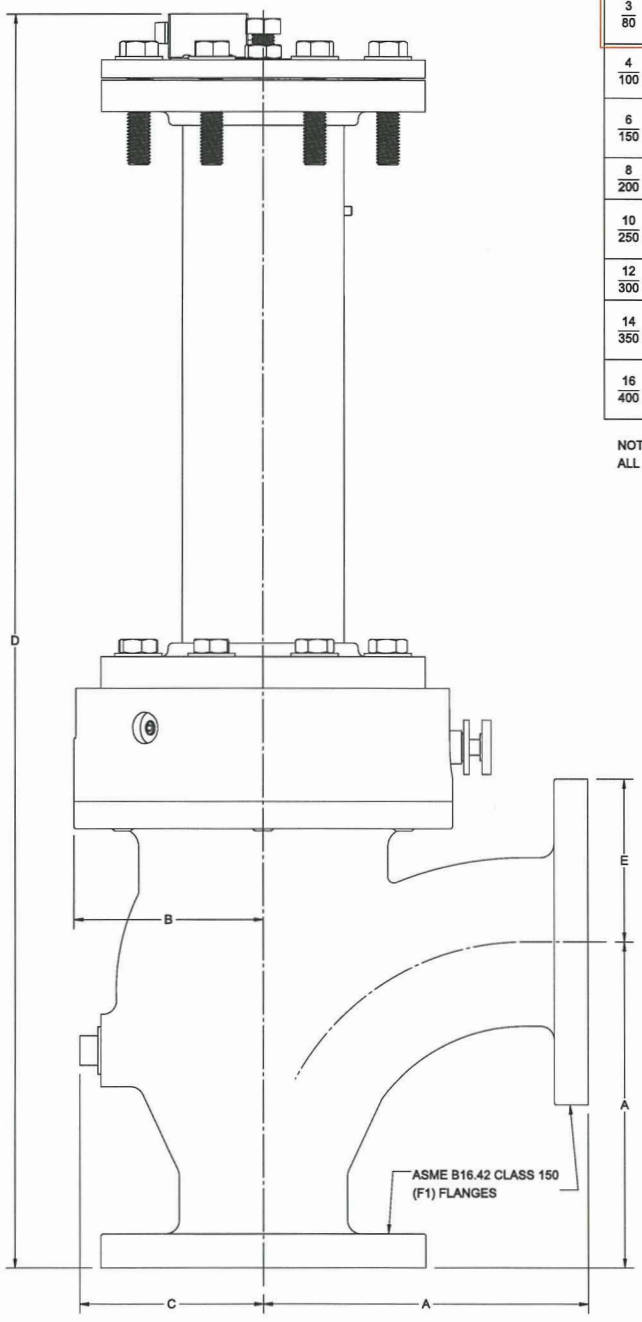
DRAWINGS SUBMITTAL

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	

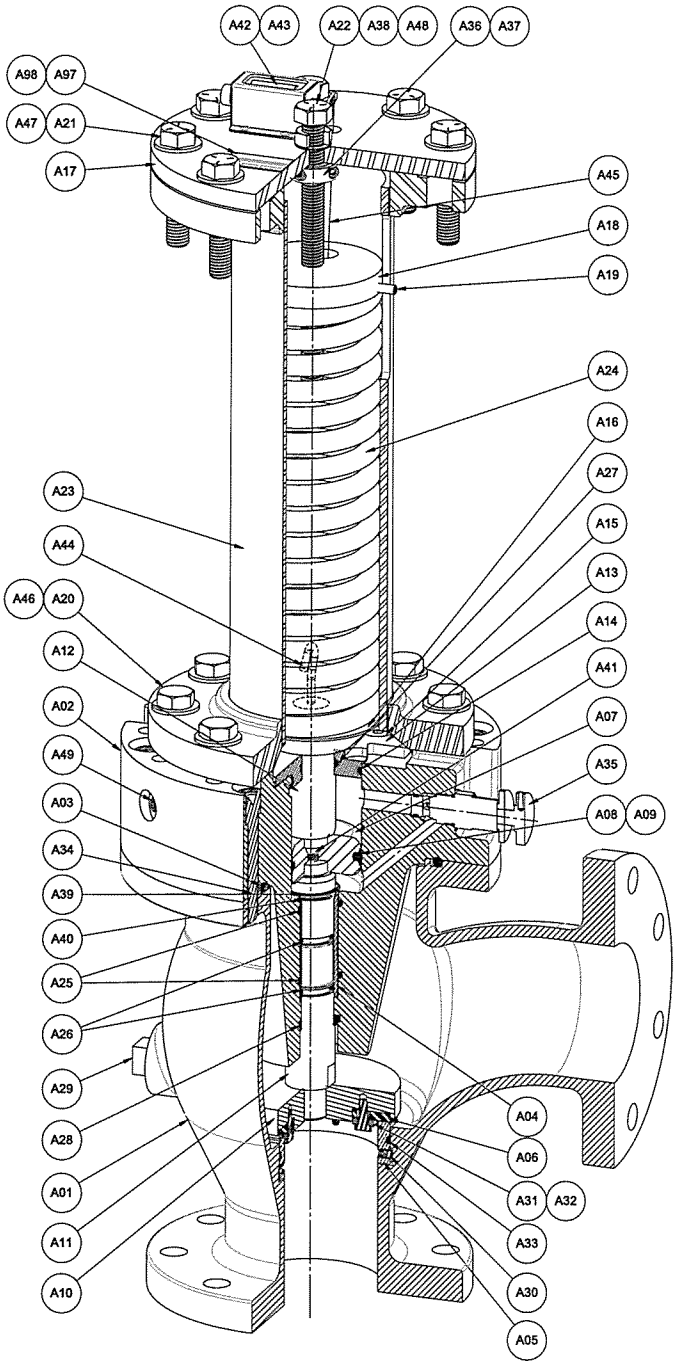
NOTE:
ALL DIMENSIONS ARE SHOWN IN INCHES/MILLIMETERS.

DeZURIK
APCO | HILTON

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

DOCT CODE	DRAWN	APPROVED
C1	JPD	TMO
	CHECKED	DATE
	TMO	11/05/2015

A70148



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	05/31/2016

DeZURIK
APCO | HILTON

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

DOCT 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	**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.**
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.

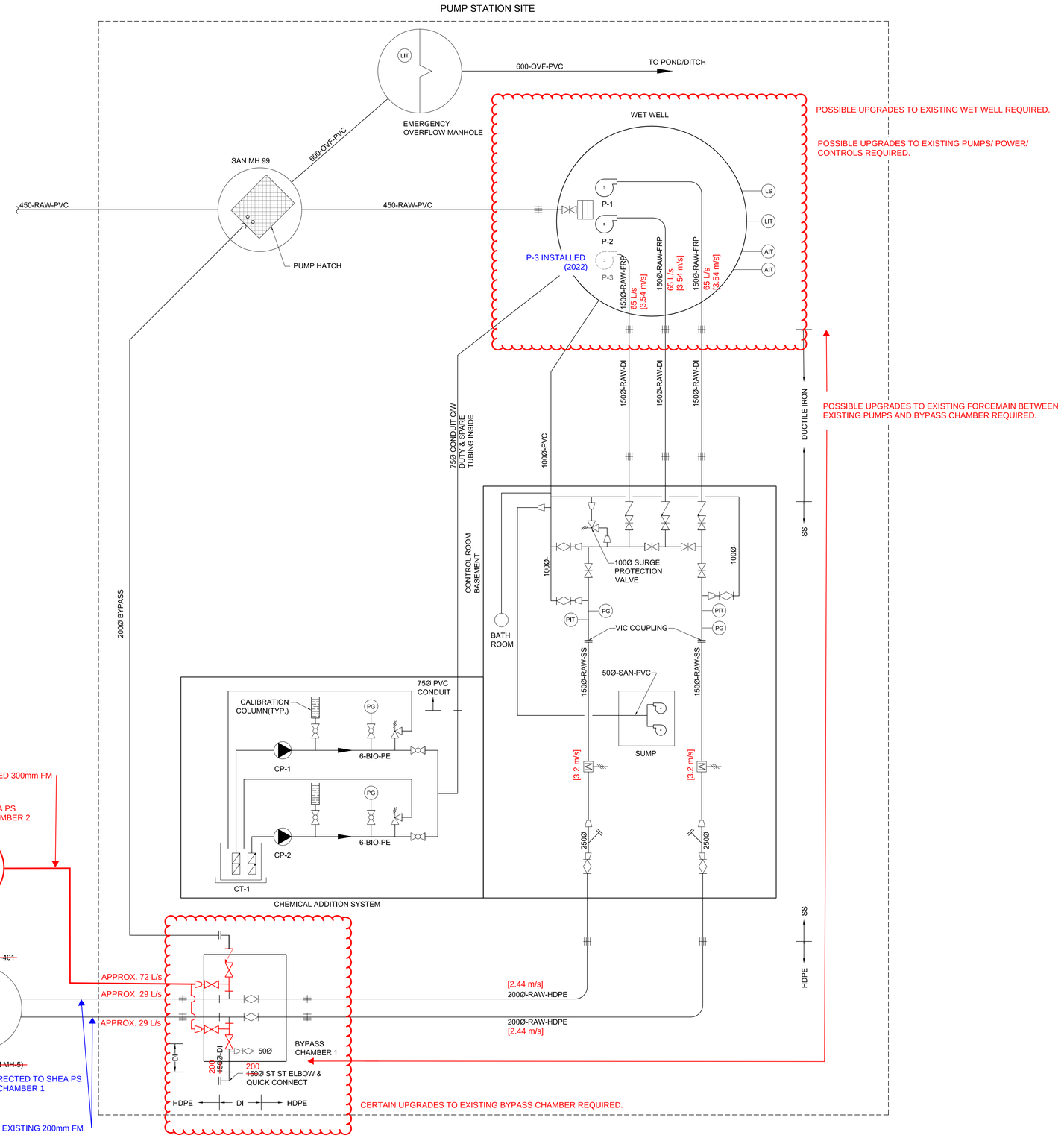
Possible Upgrades:

- 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
The information contained in this email message is confidential and is for exclusive use of the addressee.

PROCESS LEGEND

- GATE VALVE
- BALL VALVE
- KNIFE GATE VALVE
- CHECK VALVE
- PLUG VALVE
- BUTTERFLY VALVE
- MAGNETIC FLOWMETER
- RIGHT ANGLE PRESSURE RELIEF VALVE
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- RAW SEWAGE PUMP
- PIT — PRESSURE INSTRUMENT TRANSOUCER
- LIT — LEVEL INSTRUMENT TRANSOUCER
- PG — PRESSURE GAUGE
- FOOT VALVE
- CHEMICAL PUMP — CP-1
- CT - CHLORINE TANK
- RESTRAINED COUPLING



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

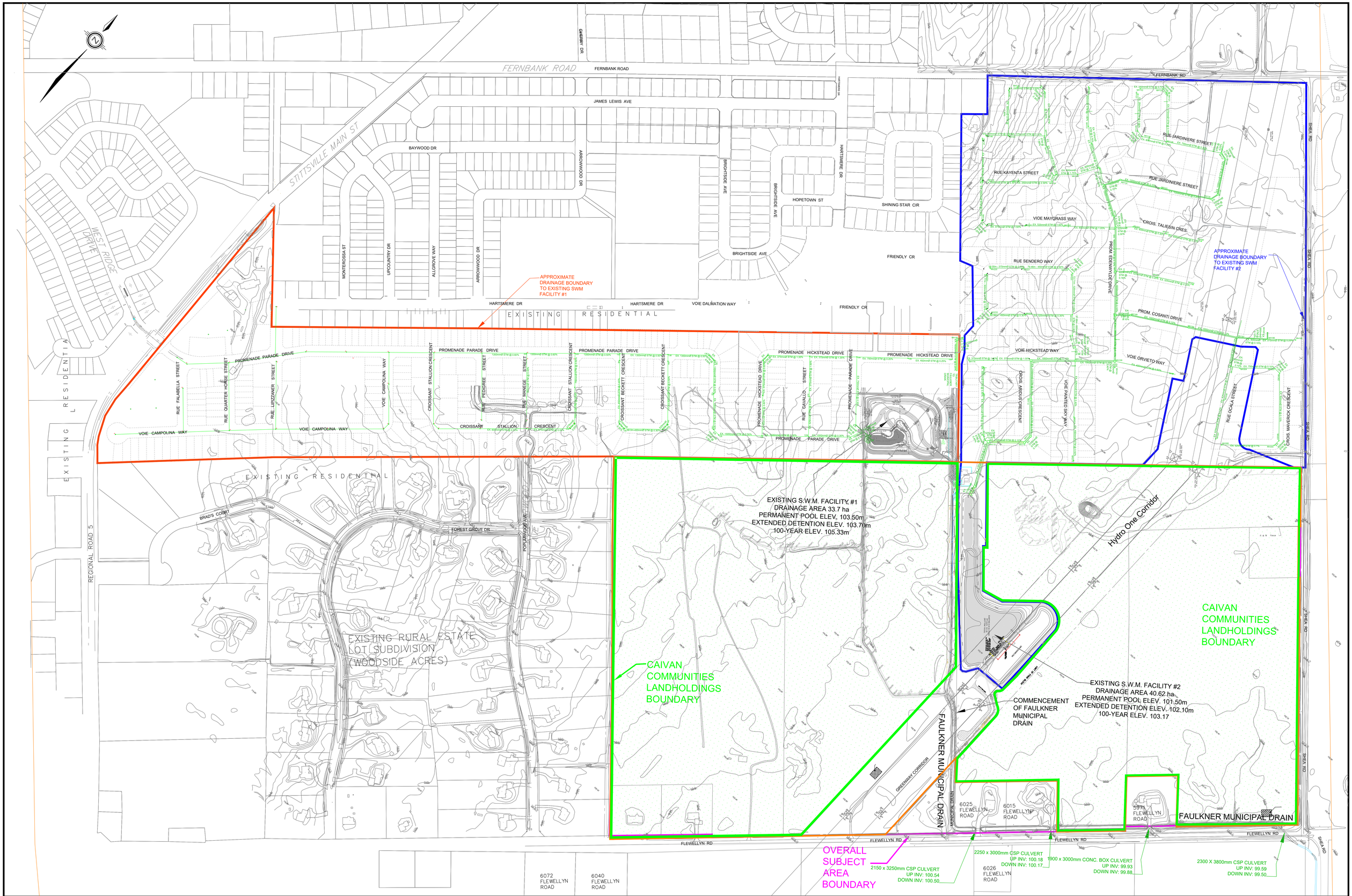
DRAWING NAME
PROCESS SCHEMATICS
NOVATECH MARKUP
CJS, MAR 26/25

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

M:\2015\113004\CAD\Design\Drawings\Sheets\113004-PS.dwg, PS1, Sep 11, 2018 - 10:33am, tkalam

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

APPENDIX D



DSEL
120 Iber Road, Unit 103
Stittsville, Ontario, K2S 1E9
Tel. (613) 836-0856
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:	MAR 2025
SCALE:	1:2000
DRAWING:	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 11																																			
	135	136	0.22	0.68	0.42	0.42			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	32	300	300	PVC	0.35	53.5	103.626	103.926	106.426	57.2089	0.8093	1.1017	0.558
To STREET 10, Pipe 136 - 137						0.42				0.00				0.00				0.00	11.10																	
	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	77.5	103.453	103.903	106.405	127.5033	0.8017	1.6112	0.660
	130	131	0.45	0.68	0.85	1.95			0.00	0.00			0.00	0.00			0.00	0.00	11.61	71.13	96.39	112.95	165.06	138	525	525	CONC	0.20	81.5	103.223	103.748	106.249	192.3297	0.8885	1.5289	0.720
To STREET 12, Pipe 131 - 141						1.95				0.00				0.00				0.00	13.14																	
STREET 10																																			
			0.03	0.68	0.06	0.06			0.00	0.00			0.00	0.00			0.00	0.00																		
	126	127	0.71	0.68	1.34	1.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	107	450	450	CONC	0.25	108.5	103.639	104.089	106.645	142.5531	0.8963	2.0175	0.754
	127	128	0.64	0.68	1.21	2.61			0.00	0.00			0.00	0.00			0.00	0.00	12.02	69.84	94.62	110.87	162.00	182	600	600	CONC	0.15	112.0	103.218	103.818	106.431	237.8056	0.8411	2.2194	0.766
To STREET 3, Pipe 128 - 131						2.61				0.00				0.00				0.00	14.24																	
	132	133	0.65	0.68	1.23	1.23			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	94	450	450	CONC	0.20	101.0	103.726	104.176	106.676	127.5033	0.8017	2.0997	0.740
	133	134	0.14	0.68	0.26	1.49			0.00	0.00			0.00	0.00			0.00	0.00	12.10	69.58	94.27	110.46	161.40	104	450	450	CONC	0.25	13.0	103.494	103.944	106.509	142.5531	0.8963	0.2417	0.729
	134	136	0.21	0.68	0.40	1.89			0.00	0.00			0.00	0.00			0.00	0.00	12.34	68.85	93.26	109.27	159.66	130	525	525	CONC	0.20	56.0	103.386	103.911	106.488	192.3297	0.8885	1.0505	0.677
Contribution From STREET 11, Pipe 135 - 136						0.42				0.00				0.00				0.00	11.10																	
	136	137	0.47	0.68	0.89	3.19			0.00	0.00			0.00	0.00			0.00	0.00	13.39	65.84	89.14	104.42	152.53	210	600	600	CONC	0.20	81.0	103.139	103.739	106.379	274.5943	0.9712	1.3901	0.766
	137	140	0.47	0.68	0.89	4.08			0.00	0.00			0.00	0.00			0.00	0.00	14.78	62.29	84.27	98.69	144.12	254	675	675	CONC	0.20	86.5	102.902	103.577	106.216	375.9224	1.0505	1.3723	0.677
To STREET 12, Pipe 140 - 141						4.08				0.00				0.00				0.00	16.15																	
STREET 7																																			
	122	123	0.29	0.68	0.55	0.55			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	42	300	300	PVC	0.35	50.5	103.951	104.251	106.752	57.2089	0.8093	1.0399	0.736
To STREET 6, Pipe 123 - 124						0.55				0.00				0.00				0.00	11.04																	
	116	117	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	74.0	103.878	104.253	106.753	96.0323	0.8695	1.4185	0.756
	117	118	0.44	0.68	0.83	1.78			0.00	0.00			0.00	0.00			0.00	0.00	11.42	71.76	97.25	113.97	166.55	128	525	525	CONC	0.20	79.0	103.506	104.031	106.606	192.3297	0.8885	1.4820	0.663
To STREET 3, Pipe 118 - 125						1.78				0.00				0.00				0.00	12.90																	
STREET 6																																			
	113	114	0.67	0.68	1.27	1.27			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	450	450	CONC	0.20	110.0	104.095	104.545	108.186	127.5033	0.8017	2.2868	0.763
	114	115	0.62	0.68	1.17	2.44			0.00	0.00			0.00	0.00			0.00	0.00	12.29	69.01	93.49	109.54	160.05	168	600	600	CONC	0.20	110.0	103.725	104.325	106.827	274.5943	0.9712	1.8877	0.613
To STREET 3, Pipe 115 - 118						2.44				0.00				0.00				0.00	14.17																	
	119	120	0.74	0.68	1.40	1.40			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	107	375	375	PVC	0.65	106.5	105.521	105.896	108.396	141.3557	1.2799	1.3869	0.760
	120	121	0.14	0.68	0.26	1.66			0.00	0.00			0.00	0.00			0.00	0.00	11.39	71.86	97.40	114.14	166.80	120	375	375	PVC	0.90	13.0	104.799	105.174	107.745	166.3328	1.5060	0.1439	0.719
	121	123	0.18	0.68	0.34	2.00			0.00	0.00			0.00	0.00			0.00	0.00	11.53	71.39	96.75	113.37	165.68	143	375	375	PVC	1.70	52.5	104.652	105.027	107.560	228.6025	2.0698	0.4227	0.626
Contribution From STREET 7, Pipe 122 - 123						0.55				0.00				0.00				0.00	11.04																	
	123	124	0.46	0.68	0.87	3.42			0.00	0.00			0.00	0.00			0.00	0.00	11.95	70.04	94.89	111.19	162.48	240	675	675	CONC	0.15	81.0	103.399	104.074	106.681	325.5584	0.9098	1.4839	0.736
	124	125	0.48	0.68	0.91	4.33			0.00	0.00			0.00	0.00			0.00	0.00	13.44	65.72	88.97	104.22	152.24	285	750	750	CONC	0.15	86.0	103.202	103.952	106.499	431.1703	0.9760	1.4686	0.660
To STREET 3, Pipe 125 - 128						4.33				0.00				0.00				0.00	14.91																	
STREET 2																																			
	109	110	0.22	0.68	0.42	0.42			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	32	300	300	PVC	0.35	50.5	104.521	104.821	107.160	57.2089	0.8093	1.0399	0.558
To STREET 1, Pipe 110 - 111						0.42				0.00				0.00				0.00	11.04																	
	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	75.5	104.209	104.659	107.160	127.5033	0.8017	1.5696	0.660
	104	105	0.45	0.68	0.85	1.95			0.00	0.00			0.00	0.00			0.00	0.00	11.57	71.26	96.57	113.17	165.38	139	525	525	CONC	0.20	81.0	103.983	104.508	107.009	192.3297	0.8885	1.5195	0.721
To STREET 3, Pipe 105 - 112						1.95				0.00				0.00				0.00	13.09																	
STREET 1																																			
	100	101	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	108.5	106.217	106.667	109.167	127.5033	0.8017	2.2557	0.649
	101	102	0.64	0.68	1.21	2.29			0.00	0.00			0.00	0.00			0.00	0.00	12.26	69.11	93.62	109.69	160.27	158	525	525	CONC	0.25	112.0	105.925	106.450	108.953	215.0311	0.9933	1.8792	0.735
To STREET 3, Pipe 102 - 105						2.29				0.00				0.00				0.00	14.13																	
	106	107	0.79	0.68	1.49	1.49			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	115	525	525	CONC	0.20	106.5	106.150	106.675	109.188	192.3297	0.8885	1.9978	0.596

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: A.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: 14 Mar 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)														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
	107	108	0.13	0.68	0.25	1.74			0.00	0.00			0.00	0.00			0.00	0.00	12.00	69.90	94.70	110.97	162.15	122	525	525	CONC	2.25	13.0	105.578	106.103	108.963	645.0934	2.9800	0.0727	0.188
			0.03	0.68	0.06	1.80			0.00	0.00			0.00	0.00			0.00	0.00																		
	108	110	0.18	0.68	0.34	2.14			0.00	0.00			0.00	0.00			0.00	0.00	12.07	69.67	94.40	110.60	161.61	149	525	525	CONC	2.25	50.5	105.255	105.780	108.569	645.0934	2.9800	0.2824	0.231
Contribution From STREET 2, Pipe 109 - 110						0.42				0.00				0.00				0.00	11.04																	
	110	111	0.47	0.68	0.89	3.44			0.00	0.00			0.00	0.00			0.00	0.00	12.35	68.81	93.21	109.21	159.57	237	675	675	CONC	0.15	83.0	103.969	104.644	107.070	325.5584	0.9098	1.5205	0.727
	111	112	0.49	0.68	0.93	4.37			0.00	0.00			0.00	0.00			0.00	0.00	13.87	64.56	87.38	102.35	149.50	282	675	675	CONC	0.20	88.0	103.824	104.499	106.903	375.9224	1.0505	1.3961	0.750
To STREET 3, Pipe 112 - 115						4.37				0.00				0.00				0.00	15.27																	
STREET 3																																				
Contribution From STREET 1, Pipe 101 - 102						2.29				0.00				0.00				0.00	14.13																	
			0.04	0.68	0.08	2.36			0.00	0.00			0.00	0.00			0.00	0.00																		
	102	105	0.20	0.68	0.38	2.74			0.00	0.00			0.00	0.00			0.00	0.00	14.13	63.89	86.46	101.27	147.91	175	525	525	CONC	2.25	60.0	105.311	105.836	108.777	645.0934	2.9800	0.3356	0.271
Contribution From STREET 2, Pipe 104 - 105						1.95				0.00				0.00				0.00	13.09																	
	105	112	0.25	0.68	0.47	5.16			0.00	0.00			0.00	0.00			0.00	0.00	14.47	63.05	85.31	99.91	145.92	325	675	675	CONC	0.25	65.0	103.811	104.486	106.847	420.2941	1.1745	0.9224	0.774
Contribution From STREET 1, Pipe 111 - 112						4.37				0.00				0.00				0.00	15.27																	
	112	115	0.19	0.68	0.36	9.89			0.00	0.00			0.00	0.00			0.00	0.00	15.39	60.86	82.31	96.38	140.74	602	825	825	CONC	0.30	55.0	103.498	104.323	106.717	786.2205	1.4708	0.6233	0.765
Contribution From STREET 6, Pipe 114 - 115						2.44				0.00				0.00				0.00	14.17																	
	115	118	0.20	0.68	0.38	12.70			0.00	0.00			0.00	0.00			0.00	0.00	16.02	59.47	80.41	94.15	137.47	755	900	900	CONC	0.30	60.0	103.258	104.158	106.607	991.5483	1.5586	0.6416	0.762
Contribution From STREET 7, Pipe 117 - 118						1.78				0.00				0.00				0.00	12.90																	
	118	125	0.25	0.68	0.47	14.95			0.00	0.00			0.00	0.00			0.00	0.00	16.66	58.11	78.56	91.97	134.27	869	975	975	CONC	0.25	65.0	103.003	103.978	106.447	1120.5266	1.5008	0.7218	0.776
Contribution From STREET 6, Pipe 124 - 125						4.33				0.00				0.00				0.00	14.91																	
	125	128	0.21	0.68	0.40	19.68			0.00	0.00			0.00	0.00			0.00	0.00	17.38	56.67	76.58	89.65	130.86	1115	1050	1050	CONC	0.30	55.0	102.765	103.815	106.317	1495.6798	1.7273	0.5307	0.746
Contribution From STREET 10, Pipe 127 - 128						2.61				0.00				0.00				0.00	14.24																	
	128	131	0.22	0.68	0.42	22.70			0.00	0.00			0.00	0.00			0.00	0.00	17.91	55.66	75.20	88.02	128.48	1264	1200	1200	CONC	0.20	66.5	102.450	103.650	106.207	1743.5652	1.5417	0.7189	0.725
To STREET 12, Pipe 131 - 141						22.70				0.00				0.00				0.00	18.63																	
STORM OUTLET 1																																				
Contribution From STREET 12, Pipe 131 - 141						24.65				0.13				0.00				0.00	19.06																	
Contribution From STREET 12, Pipe 140 - 141						11.29				1.46				0.00				0.00	16.39																	
	141	142			0.00	35.94			0.00	1.59			0.00	0.00			0.00	0.00	19.06	53.59	72.38	84.71	123.62	2041	1500	1500	CONC	0.15	51.5	101.961	103.461	106.000	2737.7609	1.5493	0.5540	0.745
	142	HW1			0.00	35.94			0.00	1.59			0.00	0.00			0.00	0.00	19.62	52.66	71.11	83.21	121.42	2005	1500	1500	CONC	0.15	16.0	101.824	103.324	104.340	2737.7609	1.5493	0.1721	0.733
STREET 8																																				
	214	215	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	63.5	103.984	104.359	106.860	96.0323	0.8695	1.2172	0.665
	215	217	0.29	0.68	0.55	1.38			0.00	0.00			0.00	0.00			0.00	0.00	11.22	72.43	98.18	115.05	168.15	100	450	450	CONC	0.25	66.0	103.718	104.168	106.733	142.5531	0.8963	1.2272	0.701
To STREET 9, Pipe 217 - 218						1.38				0.00				0.00				0.00	12.44																	
	222	223	0.36	0.68	0.68	0.68			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	52	375	375	PVC	0.30	51.5	103.984	104.359	106.860	96.0323	0.8695	0.9872	0.544
	223	224	0.16	0.68	0.30	0.98			0.00	0.00			0.00	0.00			0.00	0.00	10.99	73.21	99.25	116.32	170.01	72	375	375	PVC	0.30	13.0	103.799	104.174	106.760	96.0323	0.8695	0.2492	0.749
	224	225	0.21	0.68	0.40	1.38			0.00	0.00			0.00	0.00			0.00	0.00	11.24	72.36	98.09	114.95	168.00	100	450	450	CONC	0.25	46.5	103.685	104.135	106.739	142.5531	0.8963	0.8646	0.701
	225	226	0.16	0.68	0.30	1.68			0.00	0.00			0.00	0.00			0.00	0.00	12.10	69.58	94.27	110.45	161.39	117	450	450	CONC	0.30	13.0	103.539	103.989	106.652	156.1591	0.9819	0.2207	0.750
	226	227	0.37	0.68	0.70	2.38			0.00	0.00			0.00	0.00			0.00	0.00	12.32	68.91	93.34	109.37	159.80	164	525	525	CONC	0.25	63.0	103.425	103.950	106.630	215.0311	0.9933	1.0571	0.763
	227	228	0.40	0.68	0.76	3.14			0.00	0.00			0.00	0.00			0.00	0.00	13.38	65.88	89.19	104.48	152.62	207	600	600	CONC	0.20	67.5	103.192	103.792	106.507	274.5943	0.9712	1.1584	0.753
	228	229	0.15	0.68	0.28	3.42			0.00	0.00			0.00	0.00			0.00	0.00	14.54	62.88	85.08	99.65	145.53	215	600	600	CONC	0.25	9.0	103.027	103.627	106.370	307.0058	1.0858	0.1381	0.701
	229	230	0.34	0.68	0.64	4.06			0.00	0.00			0.00	0.00			0.00	0.00	14.68	62.54	84.62	99.10	144.73	254	675	675	CONC	0.20	86.5	102.929	103.604	106.349	375.9224	1.0505	1.3723	0.676
	230	233	0.31	0.68	0.59	4.65			0.00	0.00			0.00	0.00			0.00	0.00	16.05	59.40	80.32	94.04	137.31	276	675	675	CONC	0.20	90.0	102.736	103.411	106.176	375.9224	1.0505	1.4279	0.735
To STORM OUTLET 2, Pipe 233 - HW2						4.65				0.00				0.00				0.00	17.48																	
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	77.0	105.007	105.382	108.445	96.0323	0.8695	1.4760	0.695
	201	202	0.49	0.68	0.93	1.80			0.00	0.00			0.00	0.00			0.00	0.00	11.48	71.57	96.99	113.66	166.11	129	525	525	CONC	0.20	82.5	104.626	105.151	107.703	192.3297	0.8885	1.5476	0.668
	202	203	0.51	0.68	0.96	2.76			0.00	0.00			0.00	0.00			0.00	0.00	13.02	66.86	90.54	106.07	154.95	185	600	600	CONC	0.15	85.0	104.386	104.986	107.539	237.8056	0.8411	1.6844	0.776
	203	204	0.17	0.68	0.32	3.08			0.00	0.00			0.00	0.00			0.00	0.00	14.71	62.47	84.51	98.98	144.54	192	600	600	CONC	0.20	13.0	104.228	104.828	107.371	274.5943	0.9712	0.2231	0.701
			0.03	0.68	0.06	3.14			0.00	0.00			0.00	0.00			0.00	0.00																		
	204	205	0.17	0.68	0.32	3.46			0.00	0.00			0.00	0.00			0.00	0.00	14.93	61.93	83.78	98.11	143.28	214	600	600	CONC	0.20	51.0	104.172	104.772	107.350	274.5943	0.9712	0.8752	0.780
	205	206	0.24	0.68	0.45	3.91			0.00	0.00			0.00	0.00			0.00	0.00	15.81	59.93	81.04	94.89	138.55	235	675	675	CONC	0.15	55.5	103.995	104.670	107.251	325.5584	0.9098	1.0167	0.720
	206	207	0.16	0.68	0.30	4.22			0.00	0.00			0.00	0.00			0.00	0.00	16.82	57.77	78.10	91.43	133.47	244	675	675	CONC	0.15	13.0	103.882	104.557	107.142	325.5584	0.9098	0.2382	0.748

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: A.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: 14 Mar 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		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
	207	208	0.61	0.68	1.15	5.37			0.00	0.00			0.00	0.00			0.00	0.00	17.06	57.30	77.44	90.66	132.34	308	750	750	CONC	0.15	103.5	103.787	104.537	107.122	431.1703	0.9760	1.7675	0.713
	208	213	0.53	0.68	1.00	6.37			0.00	0.00			0.00	0.00			0.00	0.00	18.83	54.00	72.93	85.36	124.57	344	750	750	CONC	0.20	98.0	103.612	104.362	106.917	497.8726	1.1270	1.4493	0.691
To STREET 5, Pipe 213 - 217						6.37				0.00				0.00				0.00	20.28																
STREET 5																																			
	209	210	0.55	0.68	1.04	1.04			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	80	450	450	CONC	0.20	85.5	104.270	104.720	107.221	127.5033	0.8017	1.7775	0.626
	210	211	0.60	0.68	1.13	2.17			0.00	0.00			0.00	0.00			0.00	0.00	11.78	70.59	95.66	112.09	163.79	153	525	525	CONC	0.25	101.0	104.024	104.549	107.050	215.0311	0.9933	1.6946	0.714
	211	212	0.14	0.68	0.26	2.44			0.00	0.00			0.00	0.00			0.00	0.00	13.47	65.63	88.84	104.07	152.02	160	525	525	CONC	0.25	13.0	103.741	104.266	106.851	215.0311	0.9933	0.2181	0.744
	212	213	0.21	0.68	0.40	2.84			0.00	0.00			0.00	0.00			0.00	0.00	13.69	65.04	88.04	103.13	150.64	184	600	600	CONC	0.15	55.5	103.633	104.233	106.829	237.8056	0.8411	1.0998	0.776
Contribution From STREET 4, Pipe 208 - 213						6.37				0.00				0.00				0.00	20.28																
	213	217	0.19	0.68	0.36	9.57			0.00	0.00			0.00	0.00			0.00	0.00	20.28	51.59	69.65	81.50	118.91	493	825	825	CONC	0.20	55.0	103.325	104.150	106.721	641.9463	1.2009	0.7633	0.769
To STREET 9, Pipe 217 - 218						9.57				0.00				0.00				0.00	21.04																
STREET 9																																			
Contribution From STREET 5, Pipe 213 - 217						9.57				0.00				0.00				0.00	21.04																
Contribution From STREET 8, Pipe 215 - 217						1.38				0.00				0.00				0.00	12.44																
			0.09	0.68	0.17	11.12			0.00	0.00			0.00	0.00			0.00	0.00																	
	217	218	0.45	0.68	0.85	11.97			0.00	0.00			0.00	0.00			0.00	0.00	21.04	50.41	68.05	79.62	116.15	603	900	900	CONC	0.20	84.5	103.103	104.003	106.606	809.5958	1.2726	1.1067	0.745
	218	219	0.48	0.68	0.91	12.87			0.00	0.00			0.00	0.00			0.00	0.00	22.15	48.81	65.86	77.06	112.40	628	900	900	CONC	0.20	80.5	102.914	103.814	106.442	809.5958	1.2726	1.0543	0.776
	219	221	0.43	0.68	0.81	13.69			0.00	0.00			0.00	0.00			0.00	0.00	23.20	47.39	63.93	74.78	109.06	649	975	975	CONC	0.15	82.5	102.678	103.653	106.280	867.9562	1.1625	1.1828	0.747
To STREET 12, Pipe 221 - 233						13.69				0.00				0.00				0.00	24.39																
STREET 12																																			
					0.00	0.00	0.10	0.68	0.19	0.19			0.00	0.00			0.00	0.00																	
	231	232			0.00	0.00	0.11	0.68	0.21	0.40			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	300	300	PVC	0.35	26.0	103.464	103.764	106.265	57.2089	0.8093	0.5354	0.723
					0.00	0.00	0.44	0.68	0.83	1.23			0.00	0.00			0.00	0.00																	
	232	233			0.00	0.00	2.45	0.40	2.72	3.95			0.00	0.00			0.00	0.00	10.54	74.81	101.45	118.91	173.81	401	825	825	CONC	0.15	103.5	102.830	103.655	106.213	555.9418	1.0400	1.6587	0.721
To STORM OUTLET 2, Pipe 233 - HW2						0.00				3.95				0.00				0.00	12.19																
	138	139			0.00	0.00	0.33	0.68	0.62	0.62			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	65	450	450	CONC	0.20	45.5	102.833	103.283	104.060	127.5033	0.8017	0.9459	0.510
					0.00	0.00	0.36	0.68	0.68	1.30			0.00	0.00			0.00	0.00																	
	139	140	3.24	0.80	7.21	7.21			0.00	1.30			0.00	0.00			0.00	0.00	10.95	73.35	99.45	116.55	170.35	658	900	900	CONC	0.25	80.5	102.517	103.417	106.203	905.1556	1.4228	0.9430	0.727
Contribution From STREET 10, Pipe 137 - 140						4.08				0.00				0.00				0.00	16.15																
	140	141			0.00	11.29	0.08	0.68	0.15	1.46			0.00	0.00			0.00	0.00	16.15	59.17	80.00	93.67	136.76	784	975	975	CONC	0.25	21.5	102.278	103.253	106.043	1120.5266	1.5008	0.2388	0.700
To STORM OUTLET 1, Pipe 141 - 142						11.29				1.46				0.00				0.00	16.39																
Contribution From STREET 3, Pipe 128 - 131						22.70				0.00				0.00				0.00	18.63																
Contribution From STREET 11, Pipe 130 - 131						1.95				0.00				0.00				0.00	13.14																
	131	141			0.00	24.65	0.07	0.68	0.13	0.13			0.00	0.00			0.00	0.00	18.63	54.35	73.41	85.92	125.40	1349	1350	1350	CONC	0.15	37.5	102.167	103.517	106.076	2067.1669	1.4442	0.4328	0.653
To STORM OUTLET 1, Pipe 141 - 142						24.65				0.13				0.00				0.00	19.06																
	220	221			0.00	0.00	0.21	0.68	0.40	0.40			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	41	300	300	PVC	0.35	26.5	103.378	103.678	106.178	57.2089	0.8093	0.5457	0.723
Contribution From STREET 9, Pipe 219 - 221						13.69				0.00				0.00				0.00	24.39																
	221	233			0.00	13.69	0.26	0.68	0.49	0.89			0.00	0.00			0.00	0.00	24.39	45.90	61.90	72.40	105.57	683	1050	1050	CONC	0.15	65.0	102.479	103.529	106.125	1057.6053	1.2214	0.8870	0.646
To STORM OUTLET 2, Pipe 233 - HW2						13.69				0.89				0.00				0.00	25.27																
STORM OUTLET 2																																			
Contribution From STREET 12, Pipe 221 - 233						13.69				0.89				0.00				0.00	25.27																
Contribution From STREET 8, Pipe 230 - 233						4.65				0.00				0.00				0.00	17.48																
Contribution From STREET 12, Pipe 232 - 233						0.00				3.95				0.00				0.00	12.19																
	233	HW2			0.00	18.34	0.02	0.68	0.04	4.88			0.00	0.00			0.00	0.00	25.27	44.85	60.47	70.72	103.11	1117	1200	1200	CONC	0.15	47.0	101.871	103.071	106.002	1509.9717	1.3351	0.5867	0.740
STREET 24																																			
	312	313	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	375	375	PVC	0.35	30.5	103.987	104.362	106.862	103.7267	0.9392	0.5413	0.756
	313	314	0.05	0.68	0.09	1.12			0.00	0.00			0.00	0.00			0.00	0.00	10.54	74.79	101.42	118.87	173.76	83	375	375	PVC	0.40	22.5	103.850	104.225	106.822	110.8885	1.0040	0.3735	0.752
Contribution From STREET 21, Pipe 311 - 314						0.95				0.00				0.00				0.00	12.03																
			0.04	0.68	0.08	2.14			0.00	0.00			0.00	0.00			0.00	0.00																	
	314	315	0.59	0.68	1.12	3.25			0.00	0.00			0.00	0.00			0.00	0.00	12.03	69.81	94.57	110.82	161.92	227	525	525	CONC	0.50	112.0	103.258	103.783	106.695	304.0999	1.4048	1.3288	0.746

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: A.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: 14 Mar 2025	Sheet No. SHEET 3 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
	315	316	0.14	0.68	0.26	3.52			0.00	0.00			0.00	0.00			0.00	0.00	13.36	65.94	89.27	104.57	152.76	232	525	525	CONC	0.50	13.0	102.668	103.193	105.729	304.0999	1.4048	0.1542	0.762
	316	317			0.00	3.52			0.00	0.00			0.00	0.00			0.00	0.00	13.51	65.52	88.70	103.90	151.77	230	525	525	CONC	0.50	7.0	102.573	103.098	105.707	304.0999	1.4048	0.0830	0.758
To STORM OUTLET 3, Pipe 317 - 318						3.52				0.00				0.00				0.00	13.59																
	300	301	0.17	0.68	0.32	0.32			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	25	300	300	PVC	0.35	35.0	103.695	103.995	106.503	57.2089	0.8093	0.7208	0.431
	301	302	0.15	0.68	0.28	0.60			0.00	0.00			0.00	0.00			0.00	0.00	10.72	74.14	100.53	117.83	172.23	45	300	300	PVC	0.40	9.0	103.542	103.842	106.416	61.1589	0.8652	0.1734	0.733
	302	303	0.26	0.68	0.49	1.10			0.00	0.00			0.00	0.00			0.00	0.00	10.89	73.53	99.70	116.85	170.78	81	375	375	PVC	0.35	43.5	103.431	103.806	106.395	103.7267	0.9392	0.7720	0.777
	303	304	0.34	0.68	0.64	1.74			0.00	0.00			0.00	0.00			0.00	0.00	11.67	70.95	96.15	112.66	164.64	123	525	525	CONC	0.20	66.0	103.129	103.654	106.306	192.3297	0.8885	1.2381	0.642
	304	305	0.02	0.68	0.04	1.78			0.00	0.00			0.00	0.00			0.00	0.00	12.90	67.20	91.00	106.61	155.75	119	525	525	CONC	0.20	13.0	102.967	103.492	106.178	192.3297	0.8885	0.2439	0.621
	305	306	0.14	0.68	0.26	2.04			0.00	0.00			0.00	0.00			0.00	0.00	13.15	66.51	90.06	105.50	154.12	136	525	525	CONC	0.20	46.5	102.911	103.436	106.157	192.3297	0.8885	0.8723	0.706
	306	307	0.12	0.68	0.23	2.27			0.00	0.00			0.00	0.00			0.00	0.00	14.02	64.18	86.86	101.74	148.60	146	525	525	CONC	0.20	13.0	102.788	103.313	106.068	192.3297	0.8885	0.2439	0.757
	307	308	0.51	0.68	0.96	3.23			0.00	0.00			0.00	0.00			0.00	0.00	14.26	63.56	86.01	100.74	147.13	205	600	600	CONC	0.20	80.5	102.687	103.287	106.047	274.5943	0.9712	1.3815	0.748
	308	317	0.51	0.68	0.96	4.20			0.00	0.00			0.00	0.00			0.00	0.00	15.65	60.28	81.53	95.46	139.39	253	675	675	CONC	0.15	84.0	102.451	103.126	105.889	325.5584	0.9098	1.5389	0.777
To STORM OUTLET 3, Pipe 317 - 318						4.20				0.00				0.00				0.00	17.18																
STORM OUTLET 3																																			
Contribution From STREET 24, Pipe 308 - 317						4.20				0.00				0.00				0.00	17.18																
Contribution From STREET 24, Pipe 316 - 317						3.52				0.00				0.00				0.00	13.59																
	317	318	0.03	0.68	0.06	7.77			0.00	0.00			0.00	0.00			0.00	0.00	17.18	57.05	77.10	90.27	131.76	443	825	825	CONC	0.20	45.0	102.175	103.000	105.755	641.9463	1.2009	0.6245	0.690
	318	HW3			0.00	7.77			0.00	0.00			0.00	0.00			0.00	0.00	17.81	55.85	75.46	88.33	128.92	434	825	825	CONC	0.15	17.5	101.526	102.351	103.890	555.9418	1.0400	0.2804	0.780
STREET 14																																			
	426	427	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	300	300	PVC	0.35	26.0	102.958	103.258	105.758	57.2089	0.8093	0.5354	0.305
	427	428	0.16	0.68	0.30	0.53			0.00	0.00			0.00	0.00			0.00	0.00	10.54	74.81	101.45	118.91	173.81	40	300	300	PVC	0.35	26.0	102.837	103.137	105.705	57.2089	0.8093	0.5354	0.692
	428	429	0.53	0.68	1.00	1.53			0.00	0.00			0.00	0.00			0.00	0.00	11.07	72.92	98.86	115.86	169.33	112	525	525	CONC	0.20	87.0	102.521	103.046	105.650	192.3297	0.8885	1.6320	0.581
	429	430	0.49	0.68	0.93	2.46			0.00	0.00			0.00	0.00			0.00	0.00	12.70	67.78	91.80	107.55	157.12	167	600	600	CONC	0.15	89.0	102.272	102.872	105.475	237.8056	0.8411	1.7636	0.700
To STREET 18, Pipe 430 - 432						2.46				0.00				0.00				0.00	14.47																
STREET 15																																			
			0.23	0.68	0.43	0.43			0.00	0.00			0.00	0.00			0.00	0.00																	
	420	421	1.62	0.68	3.06	3.50			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	269	600	600	CONC	0.35	33.0	102.640	103.240	105.741	363.2541	1.2847	0.4281	0.739
	421	422	0.26	0.68	0.49	3.99			0.00	0.00			0.00	0.00			0.00	0.00	10.43	75.20	101.98	119.54	174.74	300	675	675	CONC	0.25	62.0	102.449	103.124	105.674	420.2941	1.1745	0.8798	0.714
To STREET 13, Pipe 422 - 425						3.99				0.00				0.00				0.00	11.31																
STREET 13																																			
					0.00	0.00	0.07	0.68	0.13	0.13			0.00	0.00			0.00	0.00																	
					0.00	0.00	0.17	0.68	0.32	0.45			0.00	0.00			0.00	0.00																	
	417	418			0.00	0.00	0.25	0.68	0.47	0.93			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	450	450	CONC	0.20	39.0	102.942	103.392	105.892	127.5033	0.8017	0.8108	0.757
	418	419			0.00	0.00	0.56	0.68	1.06	1.98			0.00	0.00			0.00	0.00	10.81	73.83	100.10	117.32	171.47	199	600	600	CONC	0.20	94.5	102.714	103.314	105.815	274.5943	0.9712	1.6217	0.724
	419	422			0.00	0.00	0.40	0.68	0.76	2.74			0.00	0.00			0.00	0.00	12.43	68.58	92.89	108.83	159.01	255	675	675	CONC	0.20	63.5	102.450	103.125	105.676	375.9224	1.0505	1.0074	0.677
Contribution From STREET 15, Pipe 421 - 422						3.99				0.00				0.00				0.00	11.31																
	422	425			0.00	3.99	0.25	0.68	0.47	3.21			0.00	0.00			0.00	0.00	13.44	65.71	88.96	104.21	152.22	548	825	825	CONC	0.25	63.0	102.144	102.969	105.549	717.7178	1.3426	0.7820	0.764
To STREET 16, Pipe 425 - 430						3.99				3.21				0.00				0.00	14.22																
STREET 16																																			
	424	425			0.00	0.00	0.70	0.68	1.32	1.32			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	138	600	600	CONC	0.15	76.0	101.758	102.358	103.132	237.8056	0.8411	1.5060	0.580
Contribution From STREET 13, Pipe 422 - 425						3.99				3.21				0.00				0.00	14.22																
	425	430			0.00	3.99	0.26	0.68	0.49	5.03			0.00	0.00			0.00	0.00	14.22	63.67	86.16	100.91	147.38	687	900	900	CONC	0.25	63.0	101.494	102.394	105.405	905.1556	1.4228	0.7380	0.759
To STREET 18, Pipe 430 - 432						3.99				5.03				0.00				0.00	14.96																
Contribution From STREET 21, Pipe 408 - 409						2.85				1.44				0.00				0.00	15.38																
					0.00	2.85	0.09	0.68	0.17	1.61			0.00	0.00			0.00	0.00																	
	409	410	0.18	0.68	0.34	3.19			0.00	1.61			0.00	0.00			0.00	0.00	15.38	60.89	82.36	96.45	140.83	327	750	750	CONC	0.15	34.5	102.365	103.115	105.785	431.1703	0.9760	0.5892	0.758
	410	411			0.00	3.19	0.06	0.68	0.11	1.72			0.00	0.00			0.00	0.00	15.97	59.58	80.56	94.33	137.73	329	750	750	CONC	0.15	16.0	102.283	103.033	105.716	431.1703	0.9760	0.2732	0.763
	411	413	0.00		0.00	3.19	0.06	0.68	0.11	1.83			0.00	0.00			0.00	0.00	16.24	58.99	79.76	93.38	136.34	335	750	750	CONC	0.15	14.5	102.229	102.979	105.685	431.1703	0.9760	0.2476	0.776
Contribution From STREET 19, Pipe 412 - 413						1.02				0.00				0.00				0.00	12.11																
	413	414			0.00	4.22	0.25	0.68	0.47	2.31			0.00	0.00			0.00	0.00	16.49	58.47	79.04	92.54	135.11	429	825	825	CONC	0.15	62.5	102.132	102.957	105.657	555.9418	1.0400	1.0016	0.771
	414	416			0.00	4.22	0.24	0.68	0.45	2.76			0.00	0.00			0.00	0.00	17.49	56.46	76.30	89.31	130.37	449	825	825	CONC	0.15	62.5	102.018	102.843	105.532	555.9418	1.0400	1.0016	0.807

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: A.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: 14 Mar 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		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 19, Pipe 415 - 416						0.38				0.00				0.00				0.00	10.91																	
					0.00	4.59	0.12	0.68	0.23	2.99			0.00	0.00			0.00	0.00																		
	416	430	1.78	0.80	3.96	8.55			0.00	2.99			0.00	0.00			0.00	0.00	18.49	54.60	73.75	86.32	125.98	687	900	900	CONC	0.25	60.0	101.849	102.749	105.407	905.1556	1.4228	0.7028	0.759
To STREET 18, Pipe 430 - 432						8.55				2.99				0.00				0.00	19.19																	
STREET 18																																				
	431	432	0.29	0.68	0.55	0.55			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	42	300	300	PVC	0.35	45.0	102.449	102.749	105.250	57.2089	0.8093	0.9267	0.736
To STREET 17, Pipe 432 - 433						0.55				0.00				0.00				0.00	10.93																	
	533	534	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	97.5	102.299	102.749	105.250	127.5033	0.8017	2.0270	0.660
To STREET 17, Pipe 534 - 535						1.10				0.00				0.00				0.00	12.03																	
Contribution From STREET 16, Pipe 416 - 430						8.55				2.99				0.00				0.00	19.19																	
Contribution From STREET 16, Pipe 425 - 430						3.99				5.03				0.00				0.00	14.96																	
Contribution From STREET 14, Pipe 429 - 430						2.46				0.00				0.00				0.00	14.47																	
	430	432	0.20	0.68	0.38	15.38			0.00	8.02			0.00	0.00			0.00	0.00	19.19	53.37	72.08	84.35	123.09	1398	1350	1350	CONC	0.15	63.0	101.111	102.461	105.295	2067.1669	1.4442	0.7271	0.676
To STREET 17, Pipe 432 - 433						15.38				8.02				0.00				0.00	19.92																	
STREET 21																																				
	512	513			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	45.0	103.230	103.530	106.031	57.2089	0.8093	0.9267	0.000
To STREET 22, Pipe 513 - 514						0.00				0.00				0.00				0.00	10.93																	
	510	511			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	49.0	102.019	102.469	104.232	127.5033	0.8017	1.0187	0.664
	511	513			0.00	0.00	0.45	0.68	0.85	1.66			0.00	0.00			0.00	0.00	11.02	73.10	99.10	116.15	169.75	165	600	600	CONC	0.15	71.0	101.846	102.446	106.150	237.8056	0.8411	1.4069	0.693
To STREET 22, Pipe 513 - 514						0.00				1.66				0.00				0.00	12.43																	
	309	310	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	20.5	103.868	104.168	106.669	57.2089	0.8093	0.4222	0.533
	310	311	0.10	0.68	0.19	0.59			0.00	0.00			0.00	0.00			0.00	0.00	10.42	75.22	102.01	119.58	174.79	44	300	300	PVC	0.35	17.5	103.766	104.066	106.629	57.2089	0.8093	0.3604	0.771
	311	314	0.19	0.68	0.36	0.95			0.00	0.00			0.00	0.00			0.00	0.00	10.78	73.93	100.23	117.48	171.71	70	375	375	PVC	0.30	65.0	103.630	104.005	106.595	96.0323	0.8695	1.2459	0.728
To STREET 24, Pipe 314 - 315						0.95				0.00				0.00				0.00	12.03																	
	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	62.5	103.080	103.530	106.031	127.5033	0.8017	1.2993	0.664
Contribution From STREET 23, Pipe 405 - 407						2.85				0.00				0.00				0.00	14.44																	
	407	408			0.00	2.85	0.27	0.68	0.51	1.32			0.00	0.00			0.00	0.00	14.44	63.12	85.41	100.03	146.09	293	675	675	CONC	0.20	42.0	102.602	103.277	105.906	375.9224	1.0505	0.6663	0.780
	408	409			0.00	2.85	0.06	0.68	0.11	1.44			0.00	0.00			0.00	0.00	15.11	61.52	83.21	97.45	142.30	295	675	675	CONC	0.25	19.0	102.488	103.163	105.822	420.2941	1.1745	0.2696	0.702
To STREET 16, Pipe 409 - 410						2.85				1.44				0.00				0.00	15.38																	
STREET 23																																				
	504	505	0.30	0.68	0.57	0.57			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	44	300	300	PVC	0.35	51.0	103.645	103.945	106.446	57.2089	0.8093	1.0502	0.761
To STREET 26, Pipe 505 - 506						0.57				0.00				0.00				0.00	11.05																	
	508	509	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	39.5	103.345	103.645	106.145	57.2089	0.8093	0.8134	0.457
To STREET 22, Pipe 509 - 513						0.34				0.00				0.00				0.00	10.81																	
	402	403	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	300	300	PVC	0.35	24.0	103.345	103.645	106.145	57.2089	0.8093	0.4942	0.305
	403	404	0.04	0.68	0.08	0.30			0.00	0.00			0.00	0.00			0.00	0.00	10.49	74.96	101.65	119.15	174.16	23	300	300	PVC	0.35	14.5	103.231	103.531	106.100	57.2089	0.8093	0.2986	0.396
	500	502	0.63	0.68	1.19	1.19			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	91	450	450	CONC	0.20	102.5	103.516	103.966	106.466	127.5033	0.8017	2.1309	0.717
	502	503	0.14	0.68	0.26	1.46			0.00	0.00			0.00	0.00			0.00	0.00	12.13	69.49	94.14	110.30	161.17	101	450	450	CONC	0.25	13.0	103.281	103.731	106.289	142.5531	0.8963	0.2417	0.710
	503	509	0.52	0.68	0.98	2.44			0.00	0.00			0.00	0.00			0.00	0.00	12.37	68.76	93.13	109.12	159.43	168	600	600	CONC	0.15	97.0	103.098	103.698	106.268	237.8056	0.8411	1.9222	0.705
To STREET 22, Pipe 509 - 513						2.44				0.00				0.00				0.00	14.29																	
			0.01	0.68	0.02	0.02			0.00	0.00			0.00	0.00			0.00	0.00																	
	400	401	0.61	0.68	1.15	1.17			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	90	450	450	CONC	0.20	70.0	103.422	103.872	106.372	127.5033	0.8017	1.4553	0.706
	401	404	0.42	0.68	0.79	1.97			0.00	0.00			0.00	0.00			0.00	0.00	11.46	71.64	97.09	113.77	166.27	141	525	525	CONC	0.20	79.5	103.207	103.732	106.233	192.3297	0.8885	1.4913	0.732
	404	405	0.25	0.68	0.47	2.74			0.00	0.00			0.00	0.00			0.00	0.00	12.95	67.08	90.84	106.42	155.47	184	525	525	CONC	0.30	49.0	102.955	103.480	106.074	235.5548	1.0881	0.7505	0.781
	405	407	0.06	0.68	0.11	2.85			0.00	0.00			0.00	0.00			0.00	0.00	13.70	65.02	88.02	103.10	150.59	186	600	600	CONC	0.15	37.5	102.733	103.333	105.978	237.8056	0.8411	0.7431	0.781
To STREET 21, Pipe 407 - 408						2.85				0.00				0.00				0.00	14.44																	

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

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

Designed: A.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: 14 Mar 2025	Sheet No. SHEET 5 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
STREET 26																																			
Contribution From STREET 23, Pipe 504 - 505						0.57				0.00				0.00				0.00	11.05																
	505	506	0.23	0.68	0.43	1.00			0.00	0.00			0.00	0.00			0.00	0.00	11.05	72.99	98.95	115.97	169.50	73	375	375	PVC	0.30	61.5	103.391	103.766	106.342	96.0323	0.8695	1.1789	0.762
	506	507	0.37	0.68	0.70	1.70			0.00	0.00			0.00	0.00			0.00	0.00	12.23	69.19	93.73	109.82	160.46	118	450	450	CONC	0.30	69.5	103.131	103.581	106.226	156.1591	0.9819	1.1797	0.754
To STREET 22, Pipe 507 - 509						1.70				0.00				0.00				0.00	13.41																
STREET 22																																			
Contribution From STREET 26, Pipe 506 - 507						1.70				0.00				0.00				0.00	13.41																
	507	509			0.00	1.70			0.00	0.00			0.00	0.00			0.00	0.00	13.41	65.80	89.08	104.35	152.42	112	450	450	CONC	0.30	10.5	102.892	103.342	106.079	156.1591	0.9819	0.1782	0.717
Contribution From STREET 23, Pipe 503 - 509						2.44				0.00				0.00				0.00	14.29																
Contribution From STREET 23, Pipe 508 - 509						0.34				0.00				0.00				0.00	10.81																
	509	513	0.10	0.68	0.19	4.67			0.00	0.00			0.00	0.00			0.00	0.00	14.29	63.48	85.91	100.62	146.95	296	675	675	CONC	0.25	63.0	102.635	103.310	106.066	420.2941	1.1745	0.8940	0.705
Contribution From STREET 21, Pipe 511 - 513						0.00				1.66				0.00				0.00	12.43																
Contribution From STREET 21, Pipe 512 - 513						0.00				0.00				0.00				0.00	10.93																
					0.00	4.67	0.03	0.68	0.06	1.72			0.00	0.00			0.00	0.00																	
	513	514			0.00	4.67	0.30	0.68	0.57	2.29			0.00	0.00			0.00	0.00	15.19	61.33	82.95	97.14	141.85	476	825	825	CONC	0.20	6.5	101.626	102.451	105.935	641.9463	1.2009	0.0902	0.742
To STORM SERVICING BLOCK 3, Pipe 514 - 517						4.67				2.29				0.00				0.00	15.28																
STORM SERVICING BLOCK 3																																			
Contribution From STREET 22, Pipe 513 - 514						4.67				2.29				0.00				0.00	15.28																
	514	517			0.00	4.67			0.00	2.29			0.00	0.00			0.00	0.00	15.28	61.12	82.67	96.80	141.36	474	900	900	CONC	0.15	52.0	101.538	102.438	105.911	701.1305	1.1021	0.7864	0.677
To STORM SERVICING BLOCK 3, Pipe 517 - 520						4.67				2.29				0.00				0.00	16.07																
STORM SERVICING BLOCK 3																																			
Contribution From STORM SERVICING BLOCK 3, Pipe 514 -						4.67				2.29				0.00				0.00	16.07																
Contribution From STREET 19, Pipe 515 - 517						1.27				0.00				0.00				0.00	11.91																
Contribution From STREET 19, Pipe 516 - 517						0.95				0.00				0.00				0.00	11.56																
	517	520			0.00	6.88			0.00	2.29			0.00	0.00			0.00	0.00	16.07	59.36	80.27	93.98	137.22	592	975	975	CONC	0.15	60.0	101.385	102.360	105.693	867.9562	1.1625	0.8602	0.682
To STORM SERVICING BLOCK 1 STORM SERVICING BLO						6.88				2.29				0.00				0.00	16.93																
STORM SERVICING BLOCK 1 STORM SERVICING BLOCK 2																																			
Contribution From STORM SERVICING BLOCK 3, Pipe 517 -						6.88				2.29				0.00				0.00	16.93																
Contribution From STREET 20, Pipe 518 - 520						1.12				0.00				0.00				0.00	11.94																
Contribution From STREET 20, Pipe 519 - 520						0.55				0.00				0.00				0.00	10.89																
	520	526	0.03	0.68	0.06	8.60			0.00	2.29			0.00	0.00			0.00	0.00	16.93	57.57	77.81	91.10	132.98	673	975	975	CONC	0.15	65.0	101.275	102.250	105.453	867.9562	1.1625	0.9319	0.776
To STREET 19, Pipe 526 - 532						8.60				2.29				0.00				0.00	17.86																
STREET 20																																			
	518	520	0.59	0.68	1.12	1.12			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	86	450	450	CONC	0.20	93.5	102.690	103.140	105.640	127.5033	0.8017	1.9438	0.672
To STORM SERVICING BLOCK 1 STORM SERVICING BLO						1.12				0.00				0.00				0.00	11.94																
	519	520	0.29	0.68	0.55	0.55			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	42	300	300	PVC	0.35	43.0	102.738	103.038	105.539	57.2089	0.8093	0.8855	0.736
To STORM SERVICING BLOCK 1 STORM SERVICING BLO						0.55				0.00				0.00				0.00	10.89																
	528	529	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	45.5	102.739	103.039	105.540	57.2089	0.8093	0.9370	0.660
To STREET 19, Pipe 529 - 530						0.49				0.00				0.00				0.00	10.94																
	521	522	0.15	0.68	0.28	0.28			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	22	300	300	PVC	0.35	17.0	102.840	103.140	105.640	57.2089	0.8093	0.3501	0.381
	522	523	0.13	0.68	0.25	0.53			0.00	0.00			0.00	0.00			0.00	0.00	10.35	75.49	102.38	120.01	175.42	40	300	300	PVC	0.35	12.5	102.750	103.050	105.609	57.2089	0.8093	0.2574	0.698
	523	524	0.19	0.68	0.36	0.89			0.00	0.00			0.00	0.00			0.00	0.00	10.61	74.55	101.09	118.49	173.19	66	375	375	PVC	0.30	56.5	102.631	103.006	105.589	96.0323	0.8695	1.0830	0.690
To STREET 19, Pipe 524 - 525						0.89				0.00				0.00				0.00	11.69																
STREET 19																																			
	412	413	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	101.5	102.899	103.349	105.850	127.5033	0.8017	2.1101	0.615
To STREET 16, Pipe 413 - 414						1.02				0.00				0.00				0.00	12.11																

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: A.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: 14 Mar 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
	415	416	0.20	0.68	0.38	0.38			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	29	300	300	PVC	0.35	44.0	102.694	102.994	105.495	57.2089	0.8093	0.9061	0.508
To STREET 16, Pipe 416 - 430						0.38				0.00				0.00				0.00	10.91																	
	515	517	0.67	0.68	1.27	1.27			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	97	600	600	CONC	0.15	96.5	101.905	102.505	105.582	237.8056	0.8411	1.9123	0.409
To STORM SERVICING BLOCK 3, Pipe 517 - 520						1.27				0.00				0.00				0.00	11.91																	
	516	517	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	600	600	CONC	0.15	78.5	101.878	102.478	105.850	237.8056	0.8411	1.5556	0.305
To STORM SERVICING BLOCK 3, Pipe 517 - 520						0.95				0.00				0.00				0.00	11.56																	
	527	529	0.25	0.68	0.47	0.47			0.00	0.00			0.00	0.00			0.00	0.00	10.00	76.81	104.19	122.14	178.56	36	300	300	PVC	0.35	50.5	102.760	103.060	105.561	57.2089	0.8093	1.0399	0.634
Contribution From STREET 20, Pipe 528 - 529						0.49				0.00				0.00				0.00	10.94																	
	529	530	0.22	0.68	0.42	1.38			0.00	0.00			0.00	0.00			0.00	0.00	11.04	73.03	99.00	116.03	169.58	101	450	450	CONC	0.25	56.0	102.430	102.880	105.463	142.5531	0.8963	1.0413	0.707
	530	531	0.15	0.68	0.28	1.66			0.00	0.00			0.00	0.00			0.00	0.00	12.08	69.64	94.35	110.55	161.54	116	450	450	CONC	0.30	13.0	102.260	102.710	105.354	156.1591	0.9819	0.2207	0.742
	531	532	0.43	0.68	0.81	2.48			0.00	0.00			0.00	0.00			0.00	0.00	12.30	68.97	93.43	109.46	159.94	171	600	600	CONC	0.15	75.5	102.071	102.671	105.333	237.8056	0.8411	1.4961	0.718
To STREET 17, Pipe 532 - 534						2.48				0.00				0.00				0.00	13.80																	
Contribution From STREET 20, Pipe 523 - 524						0.89				0.00				0.00				0.00	11.69																	
	524	525	0.38	0.68	0.72	1.61			0.00	0.00			0.00	0.00			0.00	0.00	11.69	70.87	96.04	112.54	164.45	114	450	450	CONC	0.30	69.0	102.386	102.836	105.489	156.1591	0.9819	1.1712	0.729
	525	526	0.41	0.68	0.78	2.38			0.00	0.00			0.00	0.00			0.00	0.00	12.86	67.32	91.17	106.81	156.04	160	525	525	CONC	0.25	69.0	102.104	102.629	105.352	215.0311	0.9933	1.1577	0.746
Contribution From STORM SERVICING BLOCK 1 STORM SE						8.60				2.29				0.00				0.00	17.86																	
			0.03	0.68	0.06	11.04			0.00	2.29			0.00	0.00			0.00	0.00																	
	526	532	0.08	0.68	0.15	11.19			0.00	2.29			0.00	0.00			0.00	0.00	17.86	55.75	75.33	88.18	128.71	796	1050	1050	CONC	0.15	19.0	101.102	102.152	105.213	1057.6053	1.2214	0.2593	0.753
To STREET 17, Pipe 532 - 534						11.19				2.29				0.00				0.00	18.12																	
STREET 17																																			
Contribution From STREET 19, Pipe 526 - 532						11.19				2.29				0.00				0.00	18.12																	
Contribution From STREET 19, Pipe 531 - 532						2.48				0.00				0.00				0.00	13.80																	
	532	534	0.09	0.68	0.17	13.84			0.00	2.29			0.00	0.00			0.00	0.00	18.12	55.27	74.68	87.41	127.57	936	1200	1200	CONC	0.15	60.0	100.923	102.123	105.175	1509.9717	1.3351	0.7490	0.620
Contribution From STREET 18, Pipe 533 - 534						1.10				0.00				0.00				0.00	12.03																	
			0.08	0.68	0.15	15.09			0.00	2.29			0.00	0.00			0.00	0.00																	
	534	535			0.00	15.09	0.98	0.40	1.09	3.38			0.00	0.00			0.00	0.00	18.87	53.93	72.84	85.26	124.42	1060	1200	1200	CONC	0.15	51.0	100.813	102.013	105.055	1509.9717	1.3351	0.6367	0.702
	535	536	0.02	0.68	0.04	15.12			0.00	3.38			0.00	0.00			0.00	0.00	19.50	52.85	71.36	83.52	121.87	1040	1200	1200	CONC	0.15	13.0	100.706	101.906	104.956	1509.9717	1.3351	0.1623	0.689
	536	537	0.16	0.68	0.30	15.43			0.00	3.38			0.00	0.00			0.00	0.00	19.66	52.58	71.00	83.09	121.23	1051	1200	1200	CONC	0.15	41.0	100.656	101.856	104.936	1509.9717	1.3351	0.5118	0.696
To STORM OUTLET 4, Pipe 537 - 5370						15.43				3.38				0.00				0.00	20.18																	
Contribution From STREET 18, Pipe 430 - 432						15.38				8.02				0.00				0.00	19.92																	
Contribution From STREET 18, Pipe 431 - 432						0.55				0.00				0.00				0.00	10.93																	
	432	433	0.17	0.68	0.32	16.25			0.00	8.02			0.00	0.00			0.00	0.00	19.92	52.16	70.43	82.42	120.26	1412	1350	1350	CONC	0.15	50.5	100.956	102.306	105.160	2067.1669	1.4442	0.5828	0.683
	433	434	0.14	0.68	0.26	16.51			0.00	8.02			0.00	0.00			0.00	0.00	20.50	51.24	69.17	80.94	118.08	1400	1350	1350	CONC	0.15	13.5	100.820	102.170	105.062	2067.1669	1.4442	0.1558	0.677
			0.48	0.68	0.91	17.42			0.00	8.02			0.00	0.00			0.00	0.00																	
	434	435	0.68	0.68	1.29	18.70			0.00	8.02			0.00	0.00			0.00	0.00	20.66	51.00	68.84	80.55	117.52	1506	1350	1350	CONC	0.15	97.0	100.740	102.090	105.041	2067.1669	1.4442	1.1194	0.728
To STORM OUTLET 4, Pipe 435 - HW4						18.70				8.02				0.00				0.00	21.78																	
STORM OUTLET 4																																			
Contribution From STREET 17, Pipe 536 - 537						15.43				3.38				0.00				0.00	20.18																	
	537	HW4			0.00	15.43			0.00	3.38			0.00	0.00			0.00	0.00	20.18	51.75	69.87	81.76	119.29	1034	1200	1200	CONC	0.15	22.5	100.534	101.734	104.895	1509.9717	1.3351	0.2809	0.685
Contribution From STREET 17, Pipe 434 - 435						18.70				8.02				0.00				0.00	21.78																	
	435	HW4			0.00	18.70			0.00	8.02			0.00	0.00			0.00	0.00	21.78	49.34	66.58	77.89	113.62	1456	1350	1350	CONC	0.15	22.5	100.534	101.884	104.894	2067.1669	1.4442	0.2597	0.705

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: A.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: 14 Mar 2025	Sheet No. SHEET 7 OF 7