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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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**FUNCTIONAL SERVICING REPORT**
**FOR**
**STITTSVILLE SOUTH URBAN EXPANSION AREA (W-4)**

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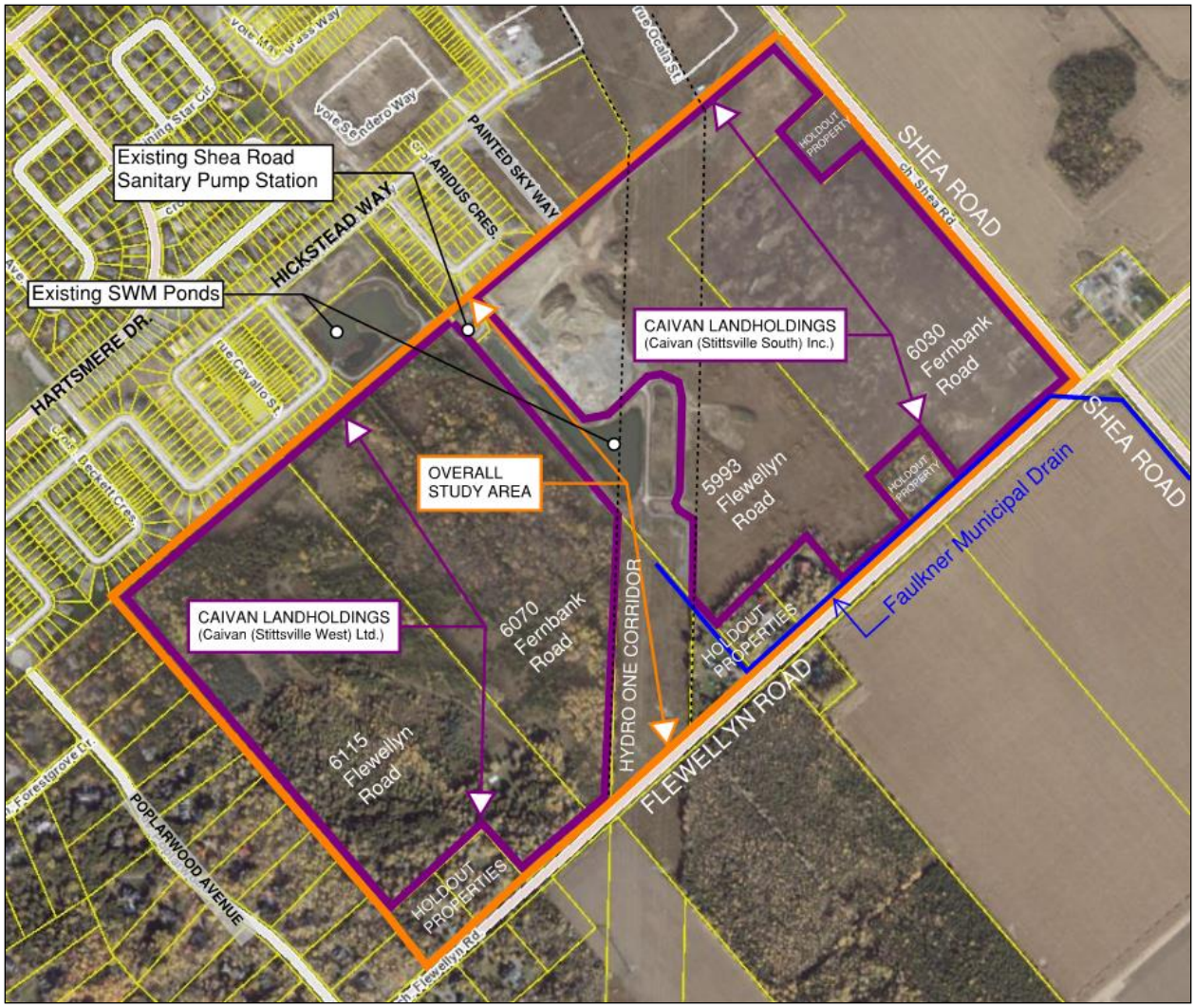



**Figure 1: Caivan Stittsville Lands**

## 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<br>(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 | $Q = \frac{1}{n} A R^{2/3} S^{1/2}$ |
| Minimum Sewer Size | 200mm diameter |
| Minimum Manning's 'n' | 0.013 |
| Minimum Depth of Cover | 2.5m from crown of sewer to grade |
| Minimum Full Flowing Velocity | 0.6m/s |
| Maximum Full Flowing Velocity | 3.0m/s |


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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.<br>• 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.<br>• Otherwise, a partial retrofit with an additional new 2400mm x 2400mm box manhole.<br>• 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.<br>• Provides isolation for maintenance, aligning with City guidelines. |
| New Forcemain (between pumps and Bypass Chamber) | • High velocities during rare peak flows exceed City guidelines.<br>• 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<br>1:5 year (PIEDTB-2016-01) for collector roads, without ponding<br>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:<br>A=732.951 \| B=6.199 \| C=0.810<br>5-year storm event:<br>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.**

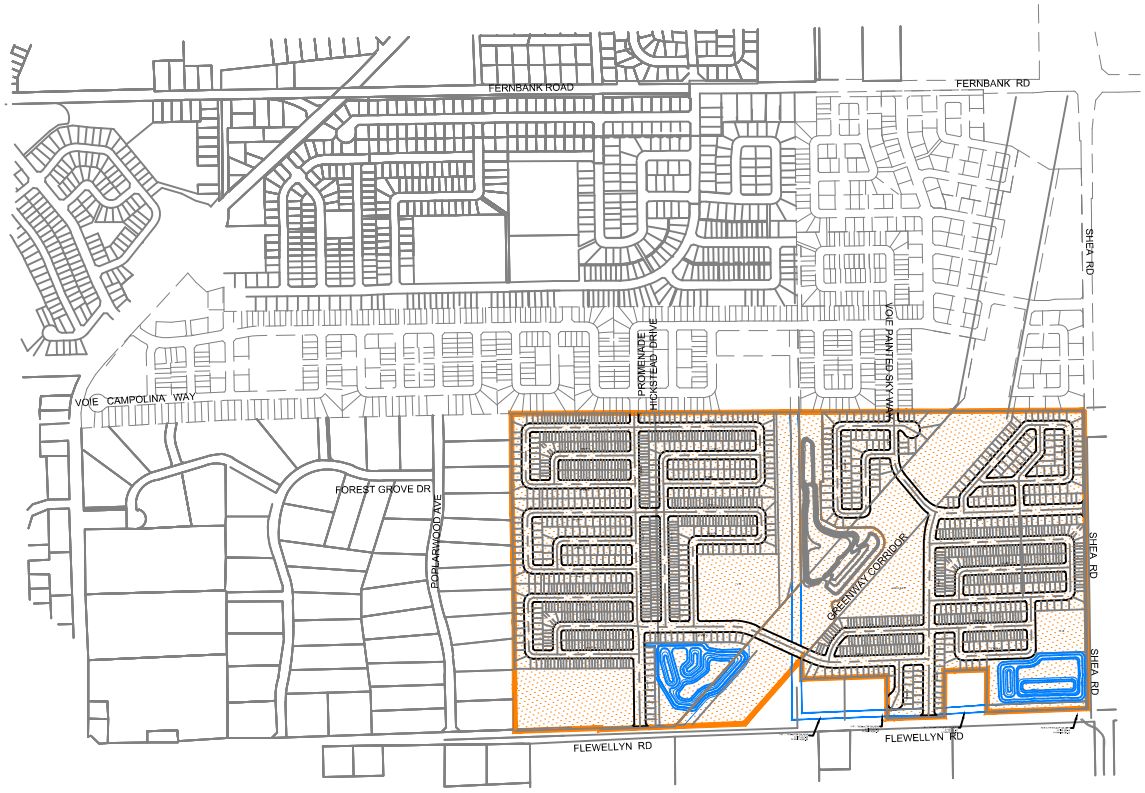



Per: Peter Mott, P.Eng.

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# FIGURES



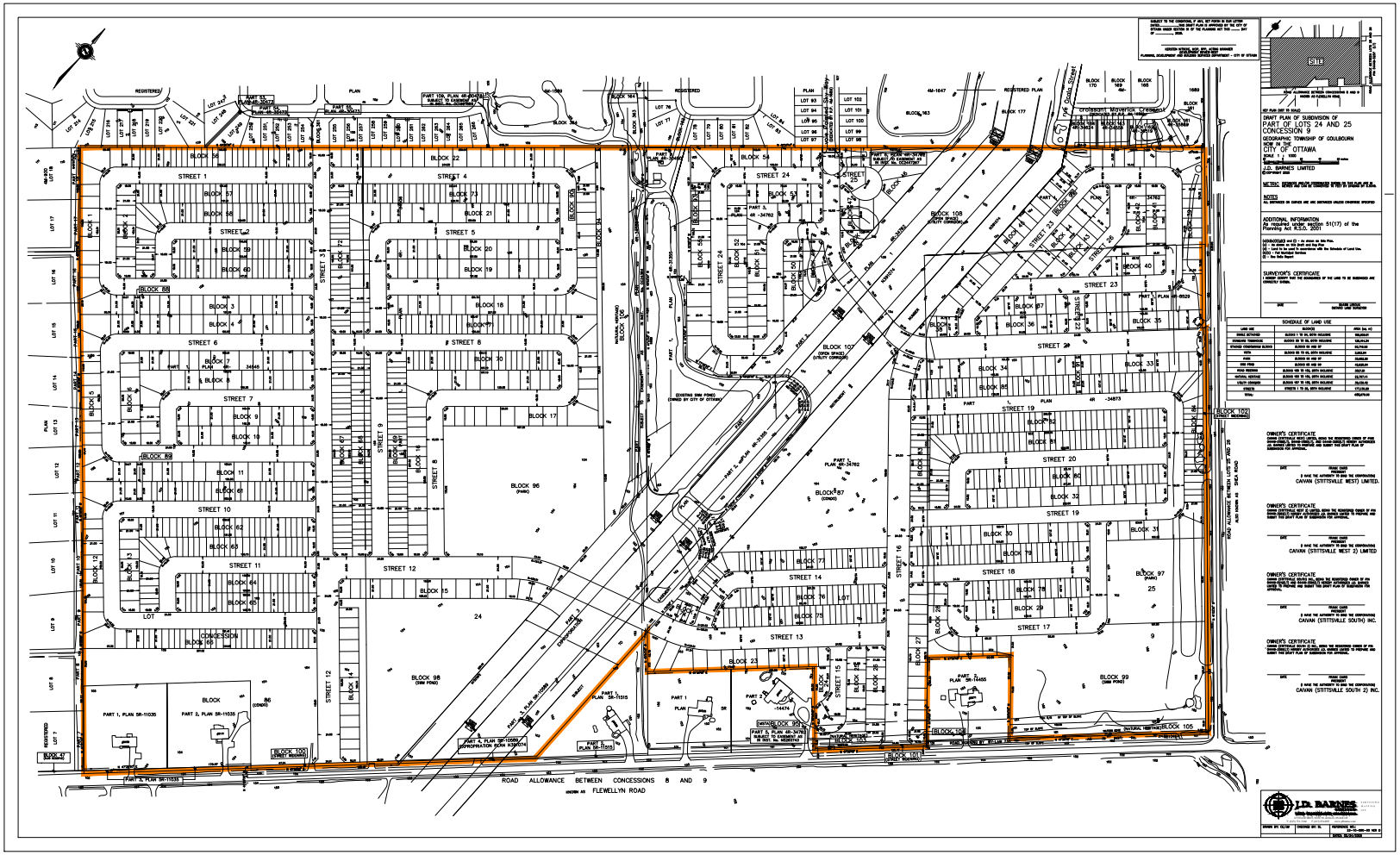

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# STITTSVILLE SOUTH URBAN EXPANSION AREA

# KEY PLAN

## CITY OF OTTAWA

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



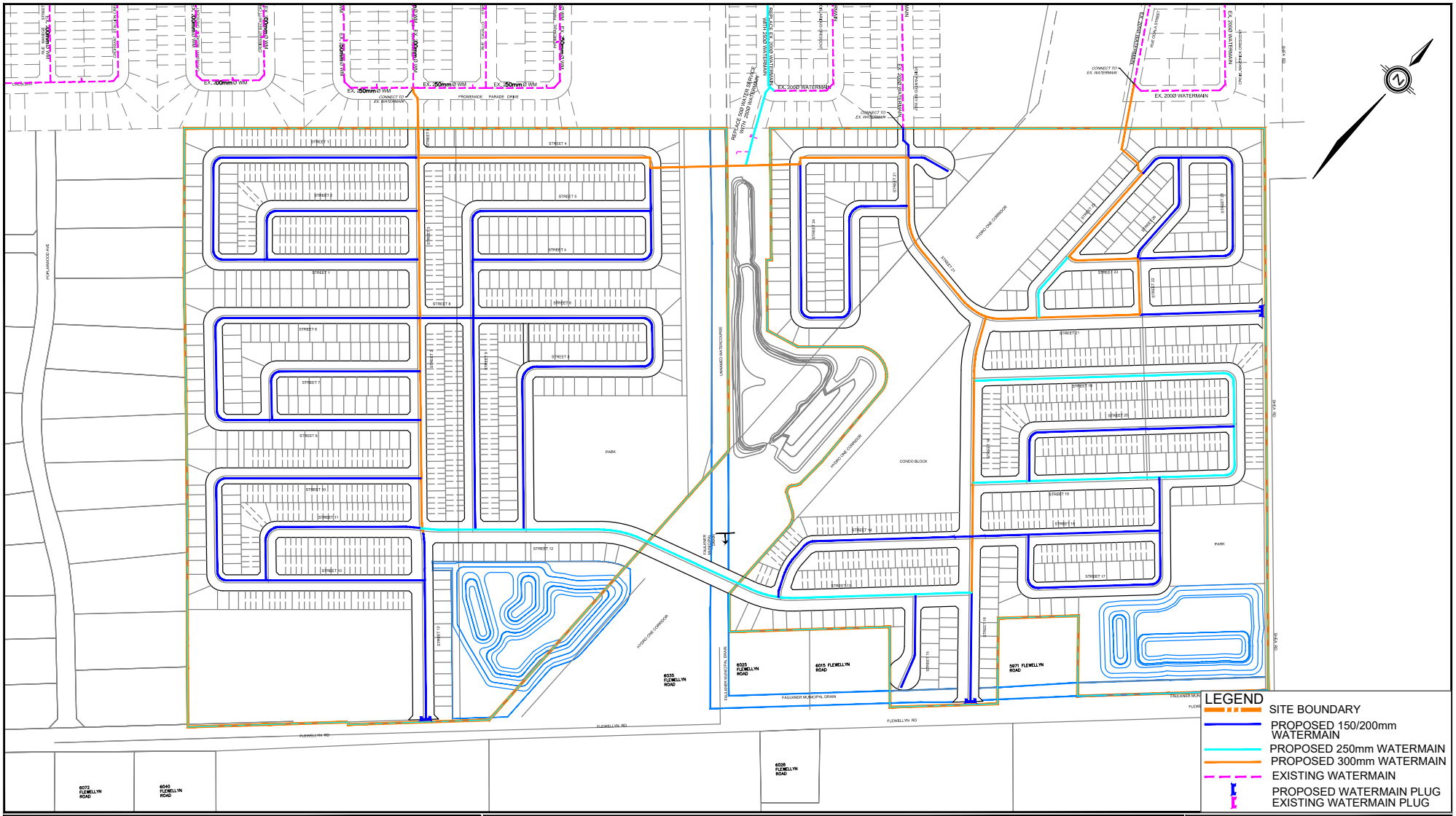

LEGEND:

SITE BOUNDARY

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# STITTSVILLE SOUTH URBAN EXPANSION AREA
## SUBDIVISION PLAN
## CITY OF OTTAWA

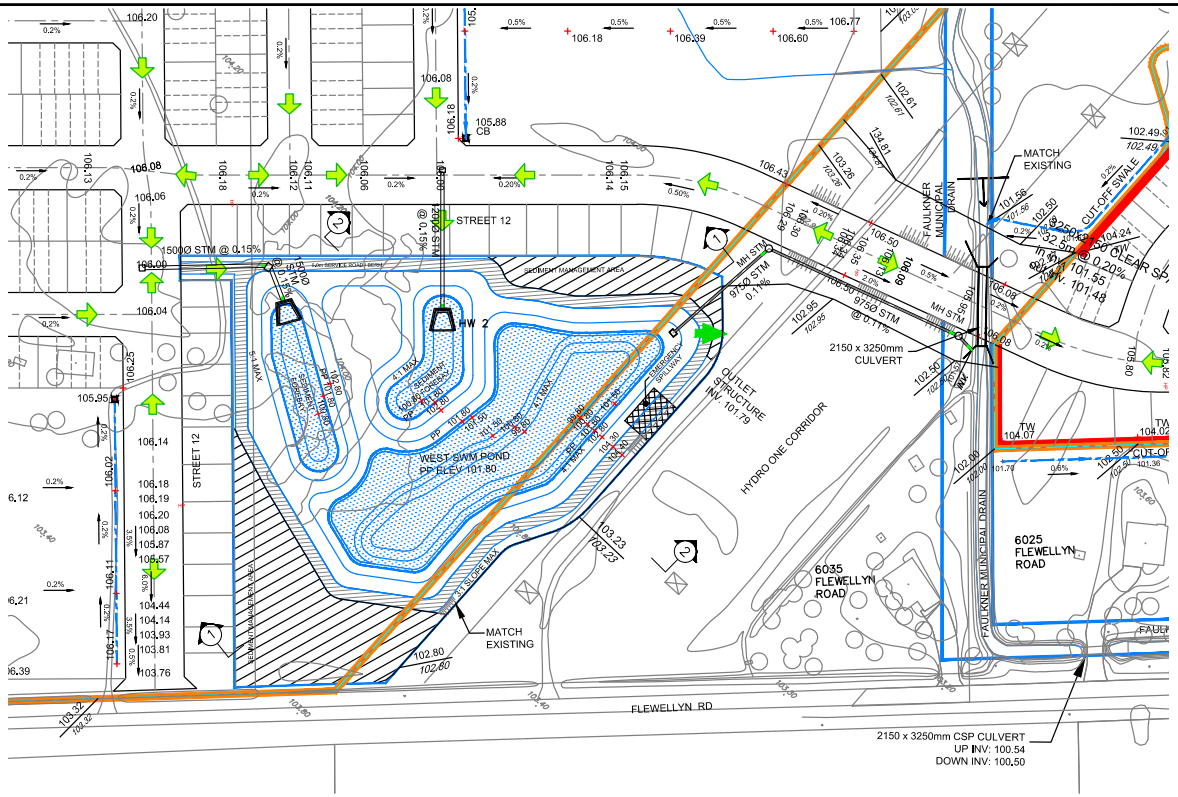
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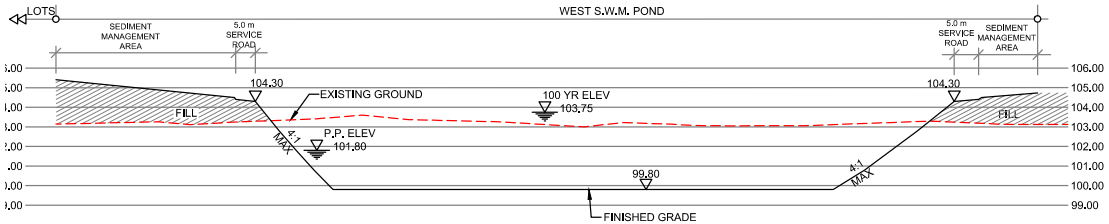



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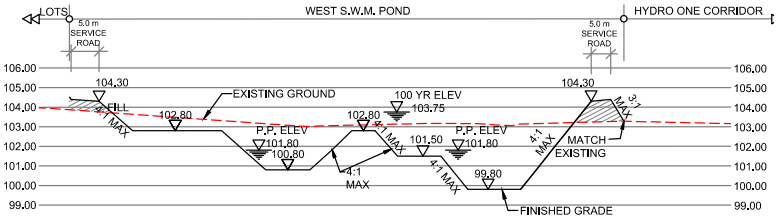
# STITTSVILLE SOUTH URBAN EXPANSION AREA
## WATERMAIN SERVICING PLAN
## CITY OF OTTAWA

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| SCALE: | 1:4000 |
| DATE: | MAR 2025 |
| FIGURE: | 3 |

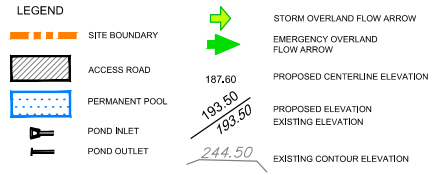



S.W.M. POND
SECTION 1-1
SCALE HOR. 1:1250
VER. 1:250



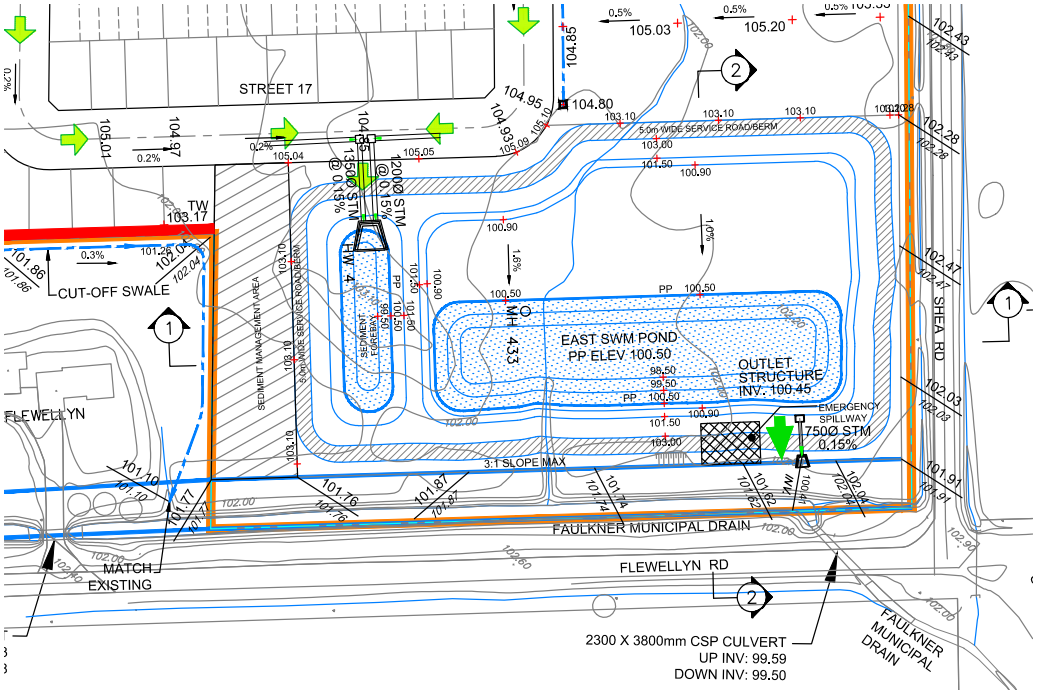

S.W.M. POND
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VER. 1:250

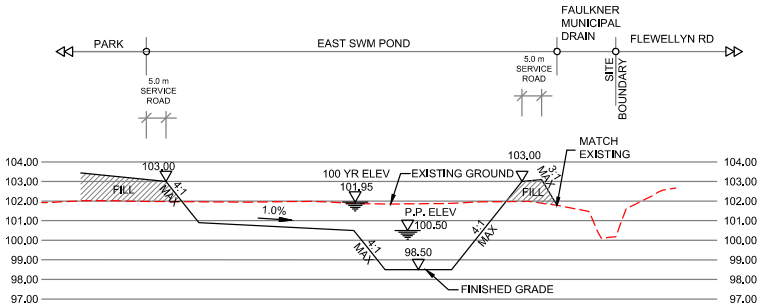



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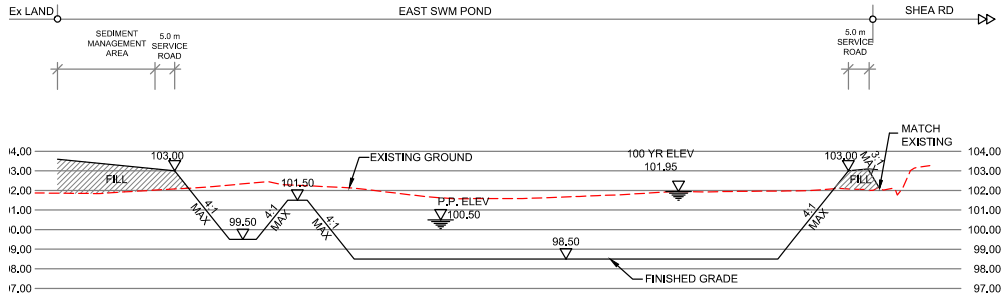
# STITTSVILLE SOUTH URBAN EXPANSION AREA
## WEST SWM POND
## CITY OF OTTAWA

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

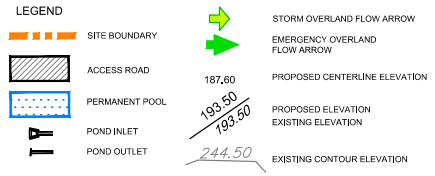



SWM POND
SECTION 2-2
SCALE HOR. 1:1250
VER. 1:250



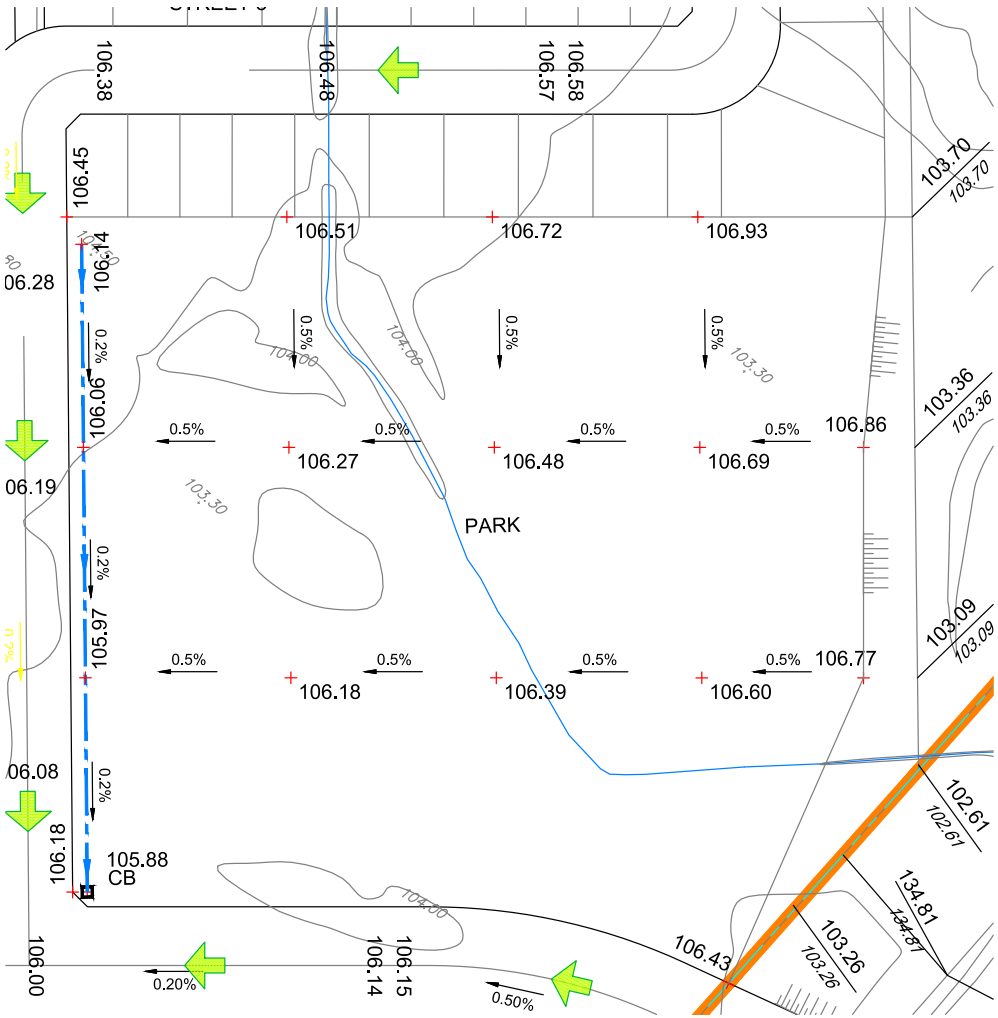

SWM POND
SECTION 1-1
SCALE HOR. 1:1250
VER. 1:250

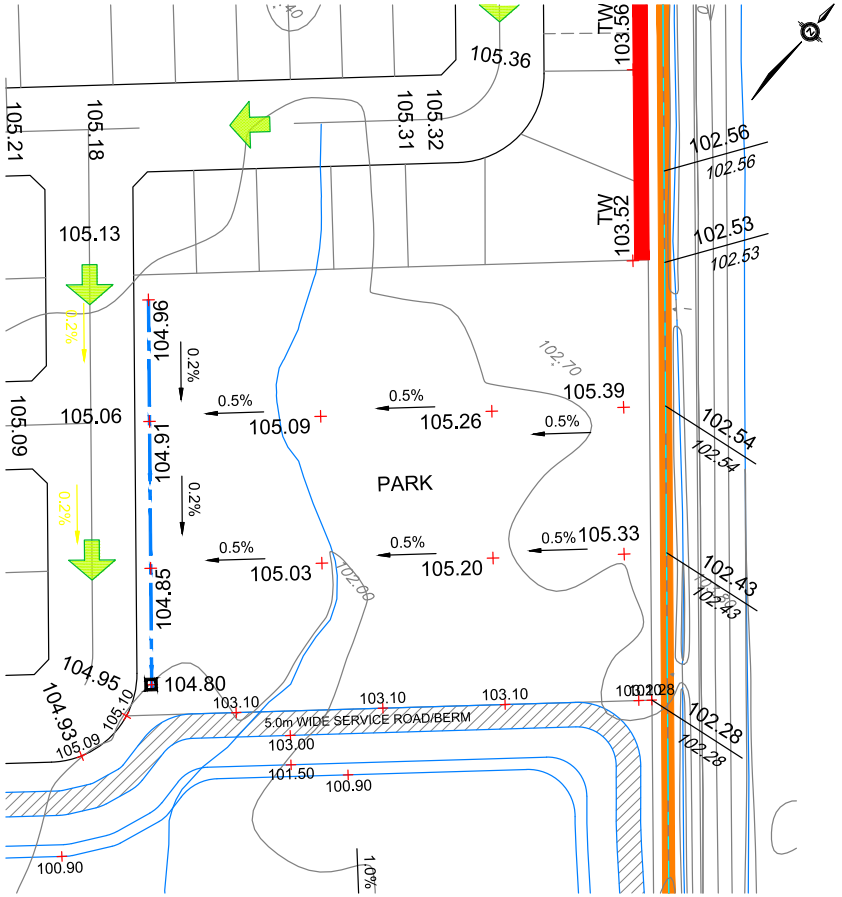



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# STITTSVILLE SOUTH URBAN EXPANSION AREA
## EAST SWM POND
## CITY OF OTTAWA

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|---|---|
| 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

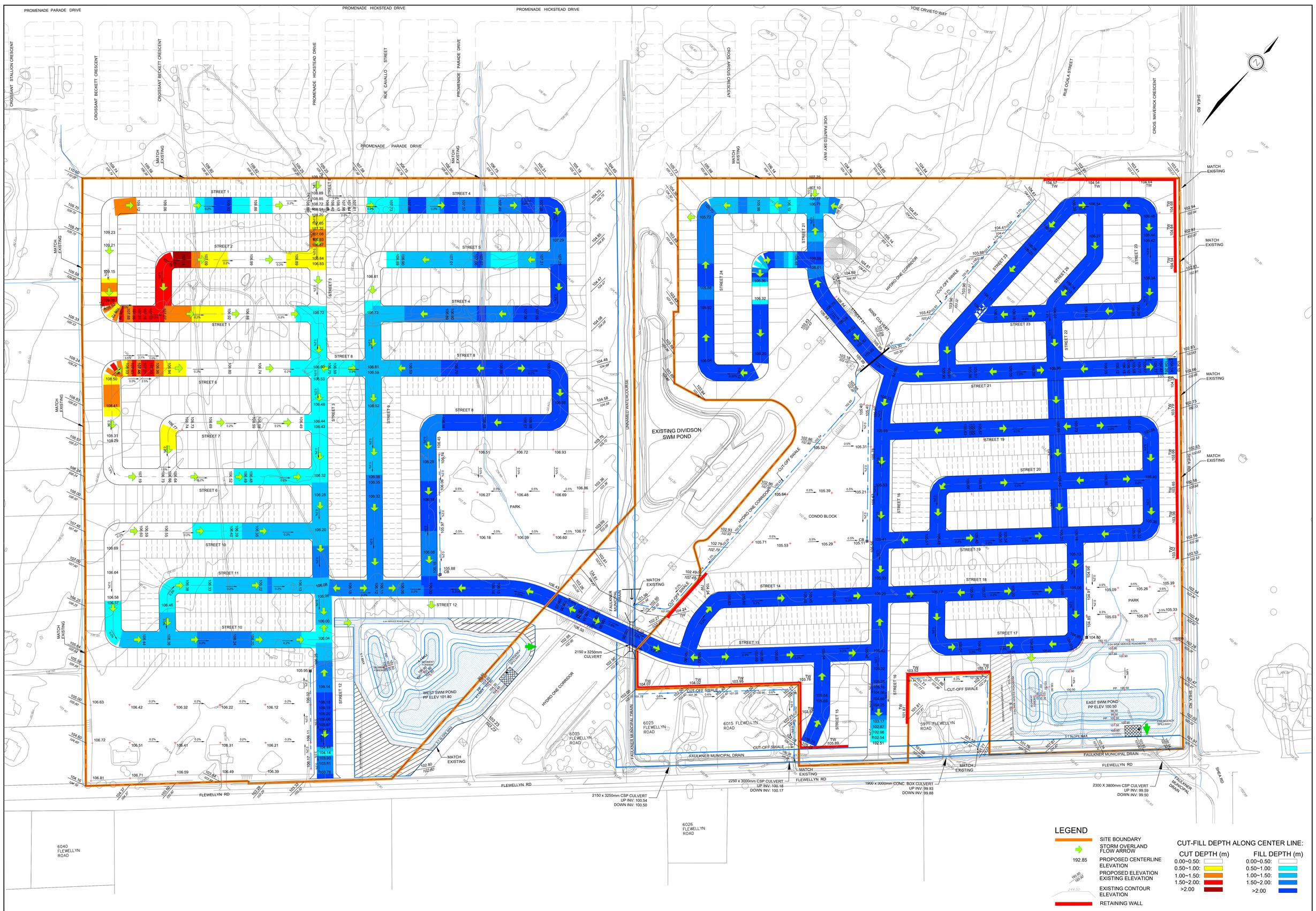
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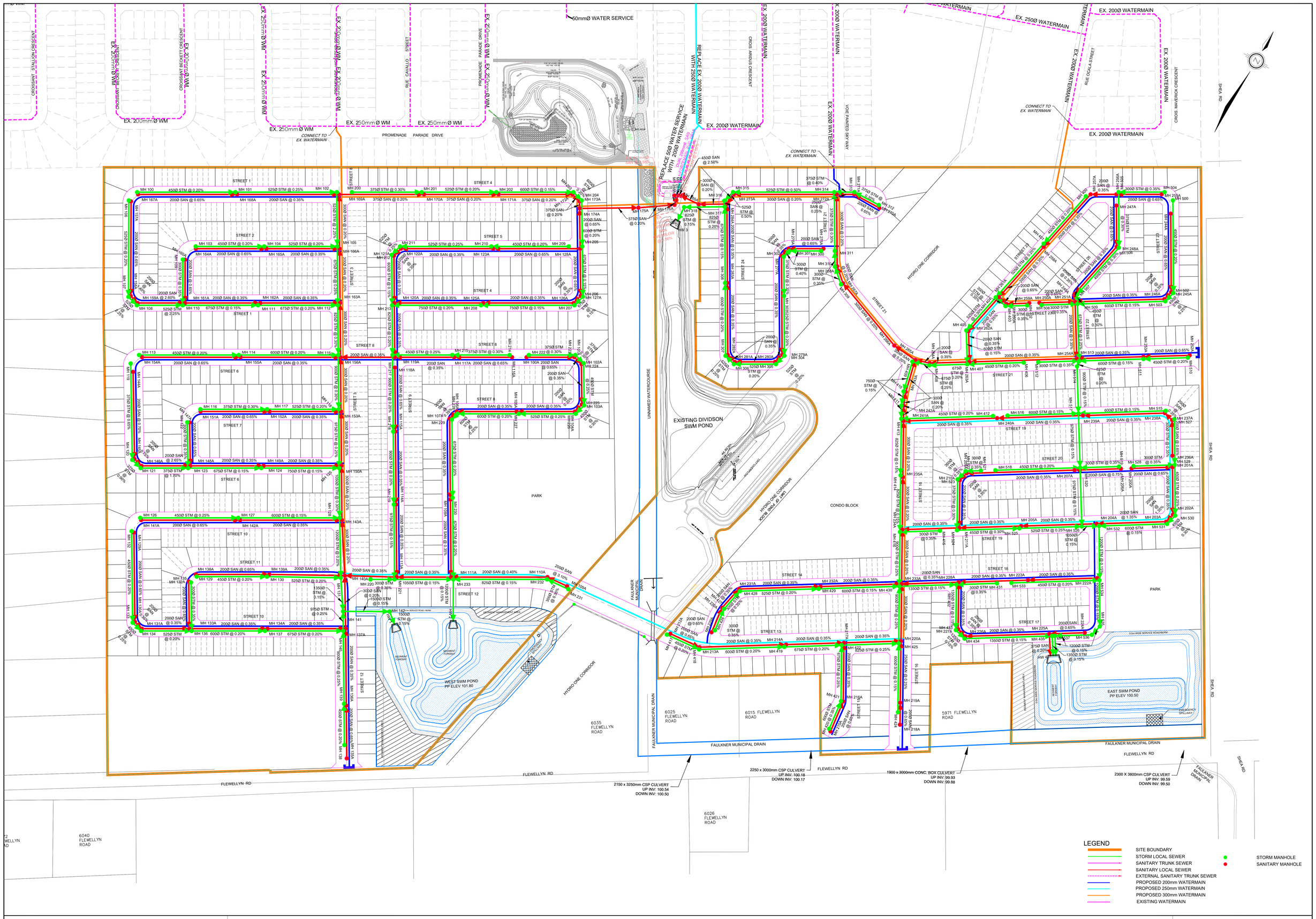
# STITTSVILLE SOUTH URBAN EXPANSION AREA
## CONCEPTUAL PARK BLOCKS 96 AND 97 GRADING PLAN
## CITY OF OTTAWA

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

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# DRAWINGS

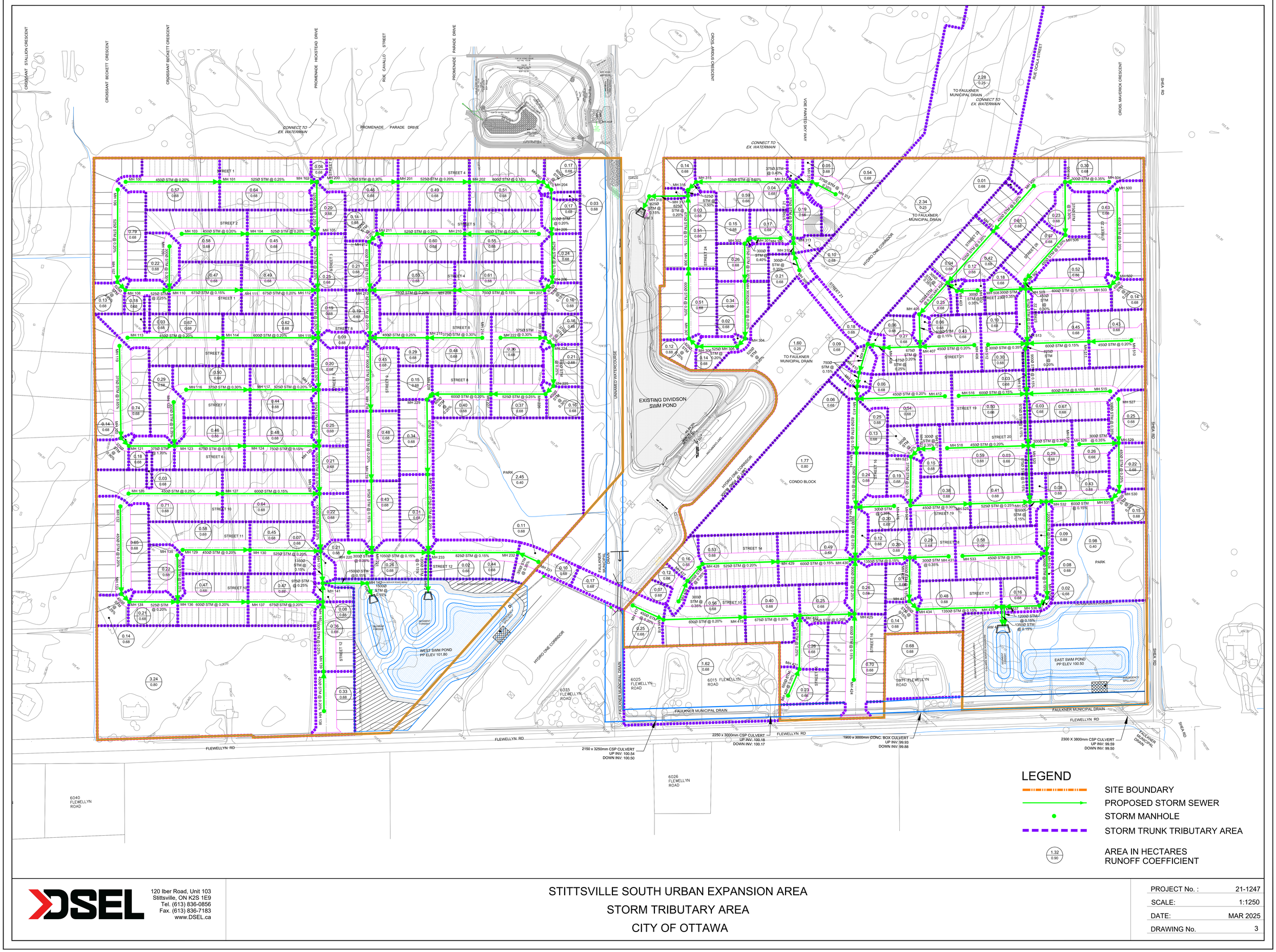

PROMENADE PARADE DRIVE
PROMENADE HICKSTEAD DRIVE
PROMENADE HICKSTEAD DRIVE
VOIE ORVIETO WAY
CROISSANT STALLION CRESCENT
CROISSANT BECKETT CRESCENT
CROISSANT BECKETT CRESCENT
PROMENADE HICKSTEAD DRIVE
RUE CAVALLO STREET
PROMENADE PARADE DRIVE
PROMENADE PARADE DRIVE
CROIS. APPALOOSA CRESCENT
VOIE SECRETARIAT WAY
RUE OCALA STREET
CROIS. MAVERICK CRESCENT
SHEA RD
MATCH EXISTING
STREET 1
STREET 2
STREET 3
STREET 4
STREET 5
STREET 6
STREET 7
STREET 8
STREET 9
STREET 10
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STREET 16
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STREET 19
STREET 20
STREET 21
STREET 22
STREET 23
STREET 24
EXISTING DIVIDSON SWM POND
UNNAMED WATERCOURSE
PARK
CONDO BLOCK
HYDRO ONE CORRIDOR
HYDRO ONE CORRIDOR
CUT-OFF SWALE
CUT-OFF SWALE
CUT-OFF SWALE




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# STITTSVILLE SOUTH URBAN EXPANSION AREA
## CONCEPTUAL SERVICING PLAN
## CITY OF OTTAWA

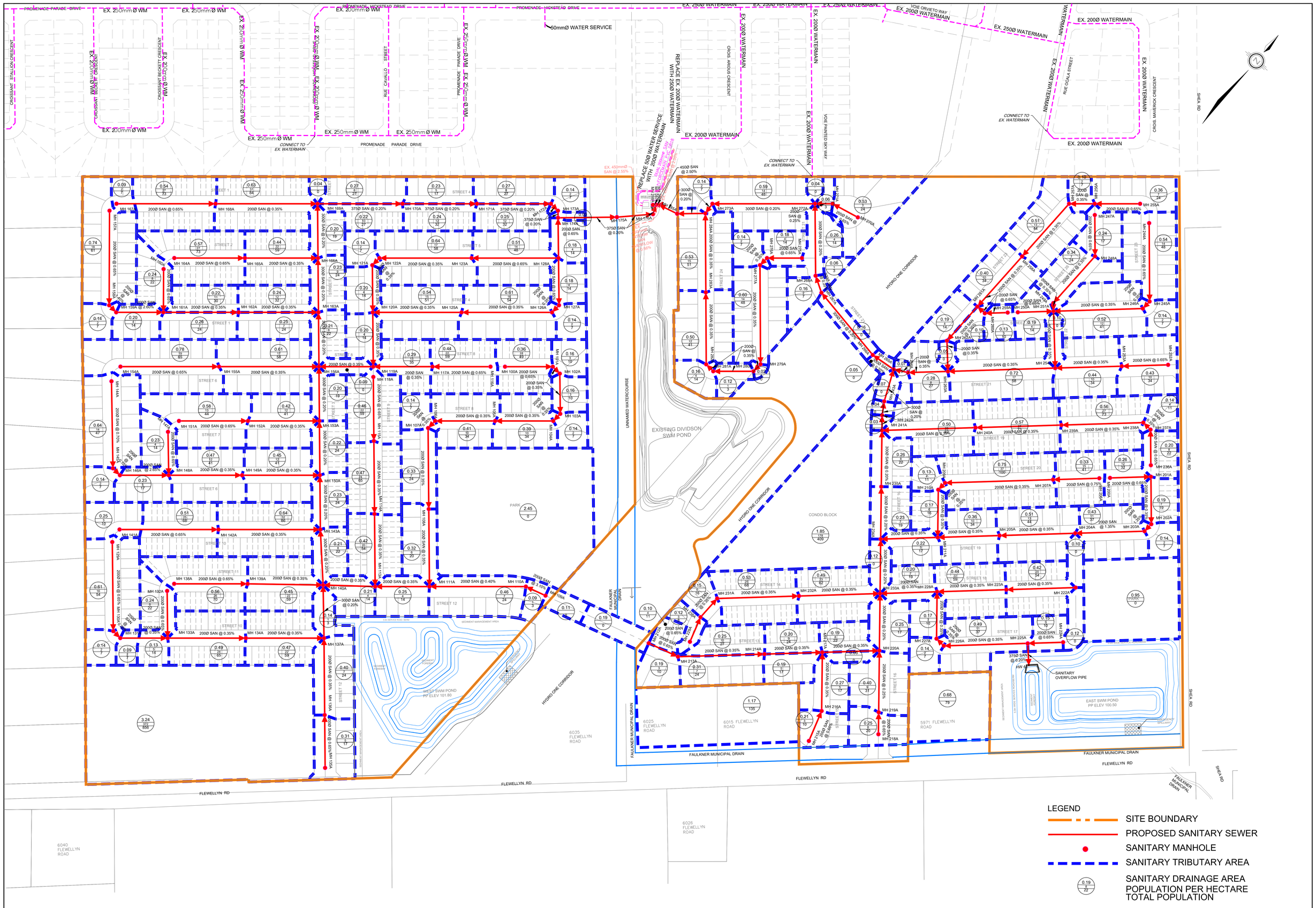
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| DATE: | MAR 2025 |
| DRAWING No. | 2 |




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# STITTSVILLE SOUTH URBAN EXPANSION AREA
## STORM TRIBUTARY AREA
## CITY OF OTTAWA

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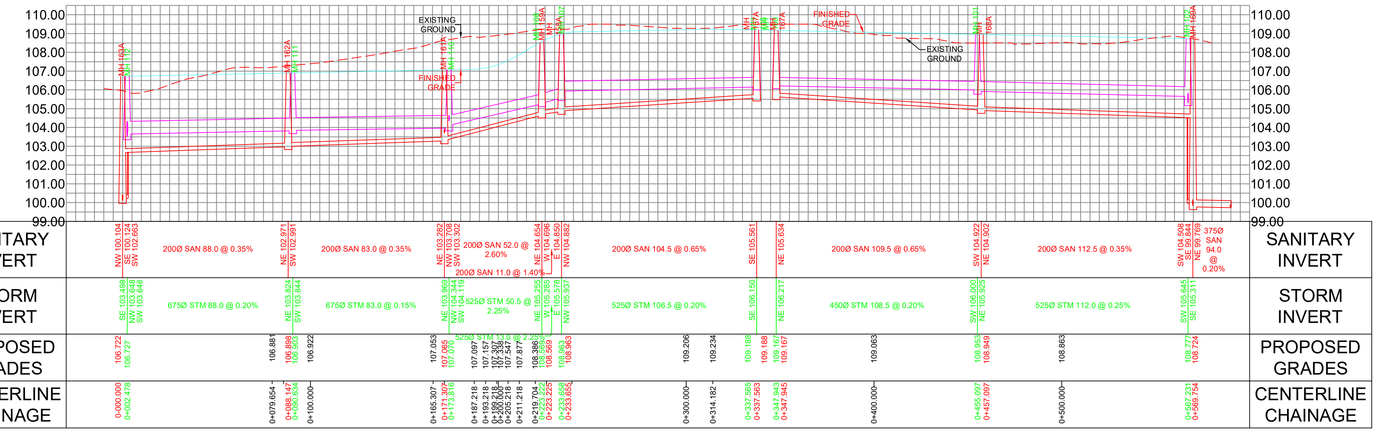

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# STITTSVILLE SOUTH URBAN EXPANSION AREA
## SANITARY SERVICING PLAN
## CITY OF OTTAWA

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| SCALE: | 1:1250 |
| DATE: | MAR 2025 |
| DRAWING No. | 4 |

## STREET 01

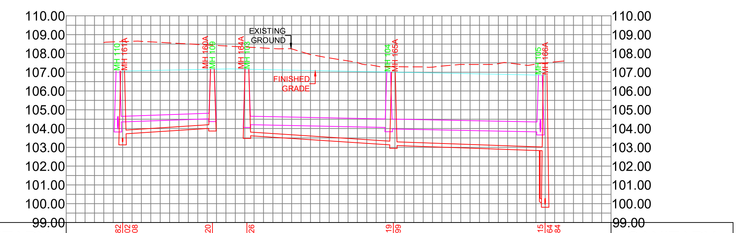
1




| | |
|---|---|
| SANITARY INVERT | 200Ø SAN 88.0 @ 0.35% · 200Ø SAN 83.0 @ 0.35% · 300Ø SAN 52.0 @ 2.60% · 200Ø SAN 11.0 @ 1.40% · 200Ø SAN 104.5 @ 0.65% · 200Ø SAN 109.5 @ 0.65% · 200Ø SAN 112.5 @ 0.35% · 375Ø SAN 94.0 @ 0.20% |
| 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% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+000.000 · 0+022.474 · 0+079.654 · 0+088.881 · 0+100.000+ · 0+165.307 · 0+171.307 · 0+177.307 · 0+187.216 · 0+193.216 · 0+199.216 · 0+205.216 · 0+211.216 · 0+219.754 · 0+229.222 · 0+233.802 · 0+300.000+ · 0+314.182+ · 0+337.595 · 0+337.595 · 0+347.845 · 0+347.845 · 0+400.000+ · 0+457.097 · 0+457.097 · 0+500.000+ · 0+560.754 · 0+560.754 |

## STREET 02

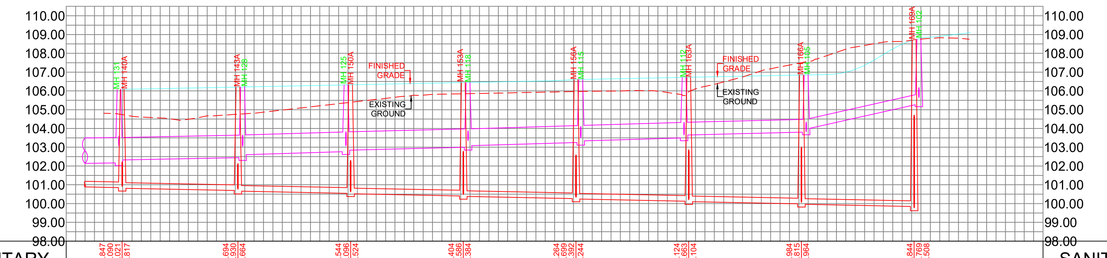
2




| | |
|---|---|
| SANITARY INVERT | 200Ø SAN 48.0 @ 0.65% · 200Ø SAN 78.0 @ 0.65% · 200Ø SAN 81.0 @ 0.35% |
| STORM INVERT | 300Ø STM 50.5 @ 0.35% · 450Ø STM 75.5 @ 0.20% · 525Ø STM 81.0 @ 0.20% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+022.000 · 0+050.000 · 0+057.297 · 0+067.864 · 0+076.187 · 0+079.187 · 0+085.187 · 0+091.187 · 0+100.000+ · 0+107.092 · 0+141.640 · 0+144.166 · 0+200.000+ · 0+222.402 · 0+224.924 |

## STREET 03

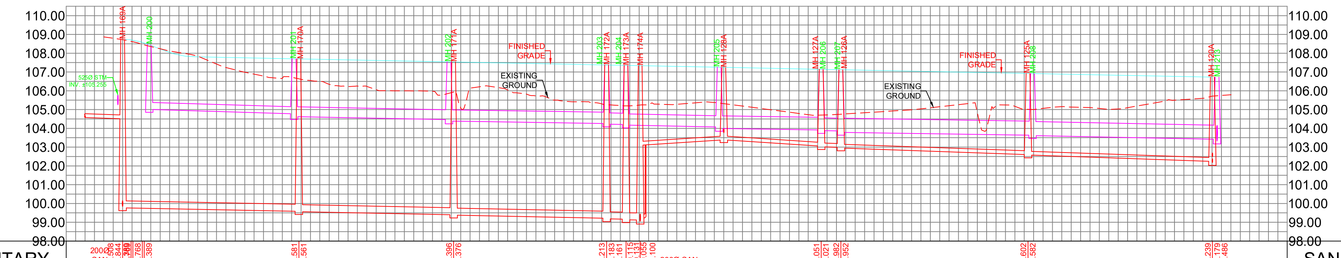
3




| | |
|---|---|
| SANITARY INVERT | 300Ø SAN 61.5 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% · 300Ø SAN 60.0 @ 0.20% |
| STORM INVERT | 1350Ø STM 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% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+021.000 · 0+050.000 · 0+055.380 · 0+061.380 · 0+067.380 · 0+100.000+ · 0+115.382 · 0+121.382 · 0+127.382 · 0+133.382 · 0+175.385 · 0+181.385 · 0+187.385 · 0+200.000+ · 0+228.091 · 0+241.387 · 0+247.387 · 0+256.389 · 0+262.389 · 0+268.389 · 0+300.000+ · 0+355.387 · 0+361.387 · 0+367.387 · 0+379.221 · 0+385.221 · 0+391.221 · 0+397.221 · 0+400.221 · 0+409.394 · 0+415.394 · 0+421.394 · 0+433.394 · 0+451.316 · 0+457.316 · 0+463.316 |

## STREET 04

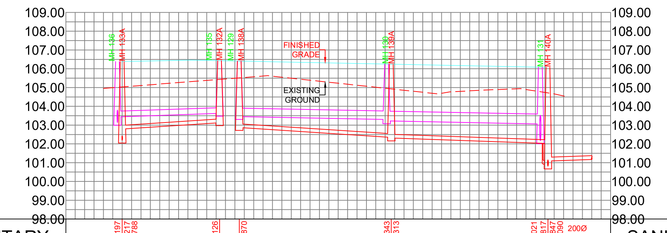
4




| | |
|---|---|
| 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% |
| 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% · 750Ø STM 103.5 @ 0.15% · 750Ø STM 98.0 @ 0.20% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+022.000 · 0+050.000 · 0+057.297 · 0+067.864 · 0+076.187 · 0+079.187 · 0+085.187 · 0+091.187 · 0+100.000+ · 0+160.033 · 0+173.739 · 0+176.231 · 0+200.000+ · 0+240.045 · 0+248.045 · 0+257.969 · 0+263.969 · 0+275.969 · 0+300.000+ · 0+327.296 · 0+333.296 · 0+339.296 · 0+371.640 · 0+377.640 · 0+383.640 · 0+400.000+ · 0+426.762 · 0+432.762 · 0+452.016 · 0+458.016 · 0+464.016 · 0+480.154 · 0+486.154 · 0+492.154 · 0+500.000+ |

## STREET 11

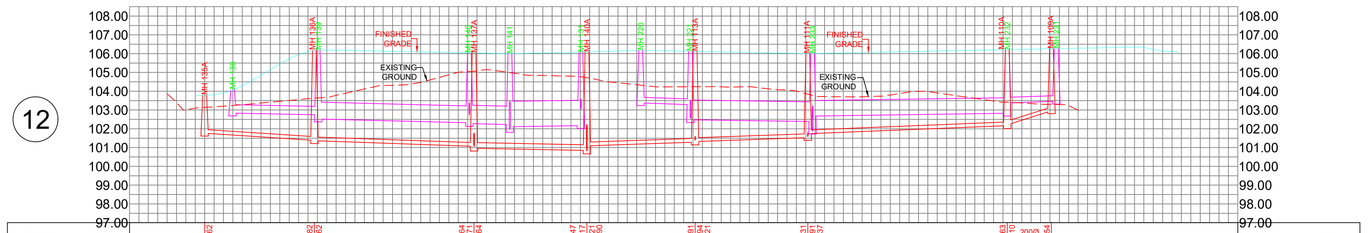
11




| | |
|---|---|
| SANITARY INVERT | 200Ø SAN 52.0 @ 0.65% · 200Ø SAN 81.0 @ 0.65% · 200Ø SAN 83.5 @ 0.35% · 200Ø SAN 37.5 @ 0.35% |
| STORM INVERT | 300Ø STM 53.5 @ 0.35% · 450Ø STM 77.5 @ 0.20% · 525Ø STM 81.5 @ 0.20% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+000.000 · 0+036.995 · 0+051.888 · 0+057.888 · 0+063.888 · 0+075.129 · 0+081.129 · 0+100.000+ · 0+143.256 · 0+149.256 · 0+155.257 · 0+200.000+ · 0+225.666 · 0+231.666 |

## STREET 12

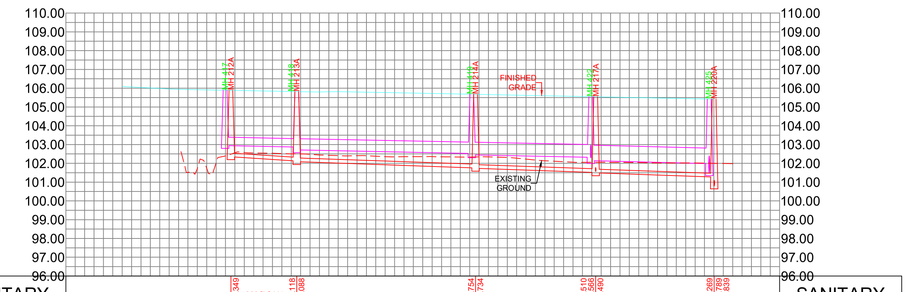
12




| | |
|---|---|
| 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% |
| 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% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+000.000 · 0+026.495 · 0+033.595 · 0+050.000+ · 0+056.000 · 0+058.447 · 0+068.447 · 0+076.702 · 0+082.702 · 0+100.000+ · 0+145.957 · 0+151.957 · 0+172.295 · 0+200.000+ · 0+206.227 · 0+212.227 · 0+213.509 · 0+247.707 · 0+248.125 · 0+268.614 · 0+277.082 · 0+300.000+ · 0+331.095 · 0+333.017 · 0+400.000+ · 0+409.275 · 0+437.201 · 0+443.278 · 0+465.376 · 0+475.464 · 0+481.464 · 0+500.000+ · 0+518.564 |

## STREET 13

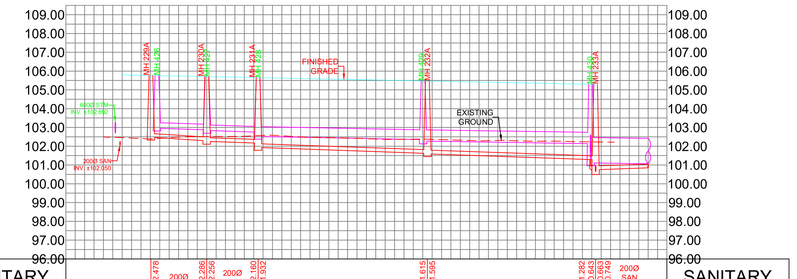
13




| | |
|---|---|
| SANITARY INVERT | 200Ø SAN 35.5 @ 0.65% · 200Ø SAN 95.5 @ 0.35% · 200Ø SAN 64.0 @ 0.35% · 200Ø SAN 63.0 @ 0.35% |
| 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% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+000.000 · 0+028.121 · 0+034.121 · 0+052.789 · 0+058.789 · 0+064.789 · 0+092.931 · 0+098.931 · 0+104.931 · 0+114.798 · 0+177.895 · 0+183.895 · 0+189.895 · 0+200.000+ · 0+249.477 · 0+255.478 · 0+261.478 · 0+300.000+ · 0+312.133 · 0+318.133 |

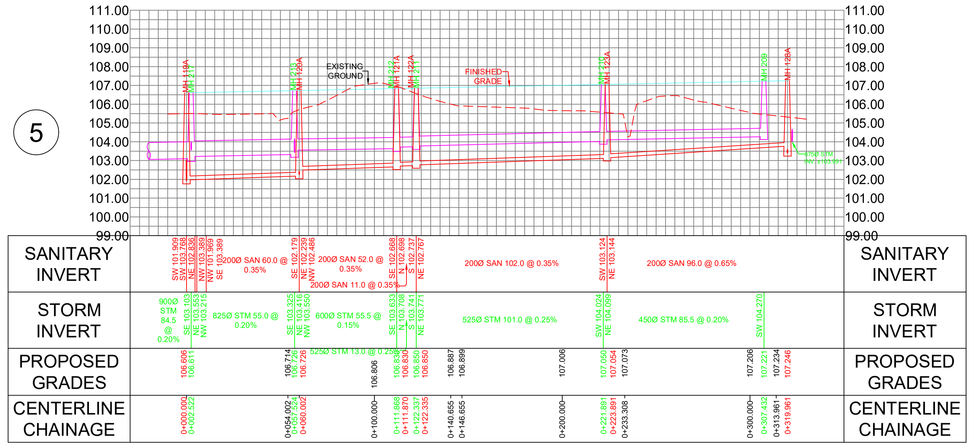
## STREET 14

14

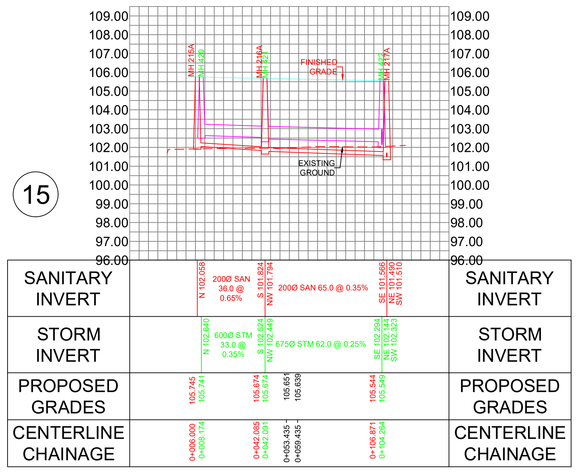



| | |
|---|---|
| SANITARY INVERT | 200Ø SAN 29.5 @ 0.65% · 200Ø SAN 27.5 @ 0.35% · 200Ø SAN 90.5 @ 0.35% · 200Ø SAN 89.5 @ 0.35% · 200Ø SAN 63.0 @ 0.35% |
| STORM INVERT | 300Ø STM 29.0 @ 0.35% · 300Ø STM 26.0 @ 0.35% · 525Ø STM 87.0 @ 0.20% · 600Ø STM 89.0 @ 0.15% · 1350Ø STM 63.0 @ 0.15% |
| PROPOSED GRADES | |
| CENTERLINE CHAINAGE | 0+000.000 · 0+006.000 · 0+011.996 · 0+017.996 · 0+023.996 · 0+029.996 · 0+035.996 · 0+041.996 · 0+047.996 · 0+053.996 · 0+059.996 · 0+065.996 · 0+071.996 · 0+077.996 · 0+083.996 · 0+089.996 · 0+095.996 · 0+101.996 · 0+107.996 · 0+113.996 · 0+119.996 · 0+125.996 · 0+131.996 · 0+137.996 · 0+143.996 · 0+149.996 · 0+155.996 · 0+161.996 · 0+167.996 · 0+174.017 · 0+180.017 · 0+186.017 · 0+192.017 · 0+198.017 · 0+204.017 · 0+210.017 · 0+216.017 · 0+222.017 · 0+228.017 · 0+234.017 · 0+240.017 · 0+246.017 · 0+252.017 · 0+258.017 · 0+264.017 · 0+270.017 · 0+276.017 · 0+282.017 · 0+288.017 · 0+294.017 · 0+300.000+ · 0+305.996 · 0+311.996 · 0+317.996 · 0+323.996 · 0+329.996 · 0+335.996 · 0+341.996 · 0+347.996 · 0+353.996 · 0+359.996 · 0+365.996 · 0+371.996 · 0+377.996 · 0+383.996 · 0+389.996 · 0+395.996 · 0+401.996 · 0+407.996 · 0+413.996 · 0+419.996 · 0+425.996 · 0+431.996 · 0+437.996 · 0+443.996 · 0+449.996 · 0+455.996 · 0+461.996 · 0+467.996 · 0+473.996 · 0+479.996 · 0+485.996 · 0+491.996 · 0+497.996 · 0+500.000+ · 0+503.996 · 0+509.996 · 0+515.996 · 0+521.996 · 0+527.996 · 0+533.996 · 0+539.996 · 0+545.996 · 0+551.996 · 0+557.996 · 0+563.996 · 0+569.996 · 0+575.996 · 0+581.996 · 0+587.996 · 0+593.996 · 0+599.996 · 0+605.996 · 0+611.996 · 0+617.996 ·

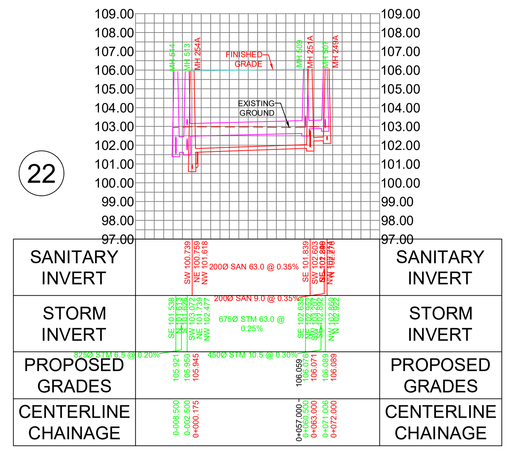
## STREET 05



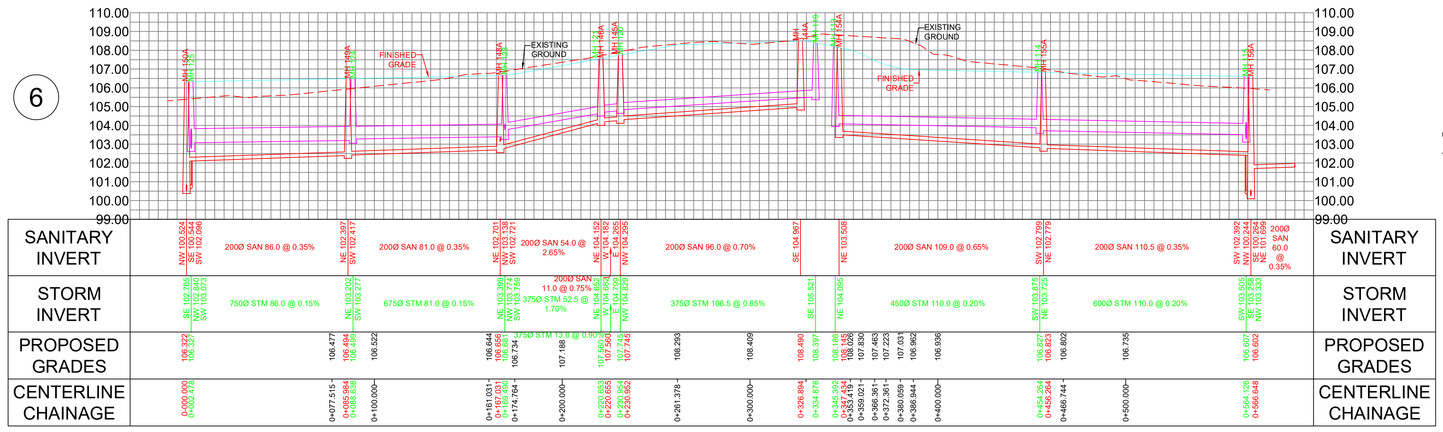

## STREET 15



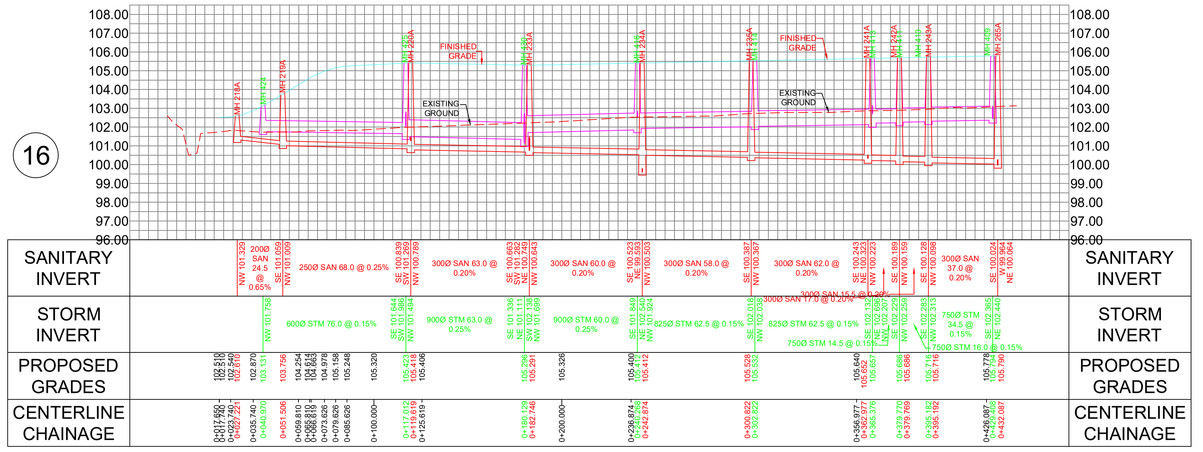

## STREET 22



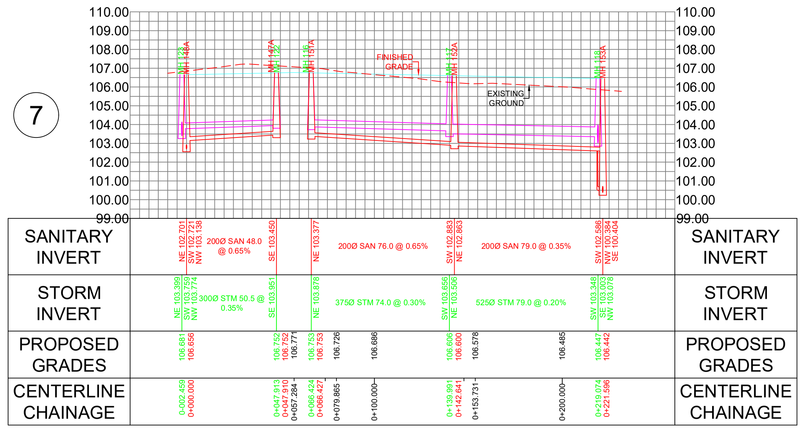

## STREET 06



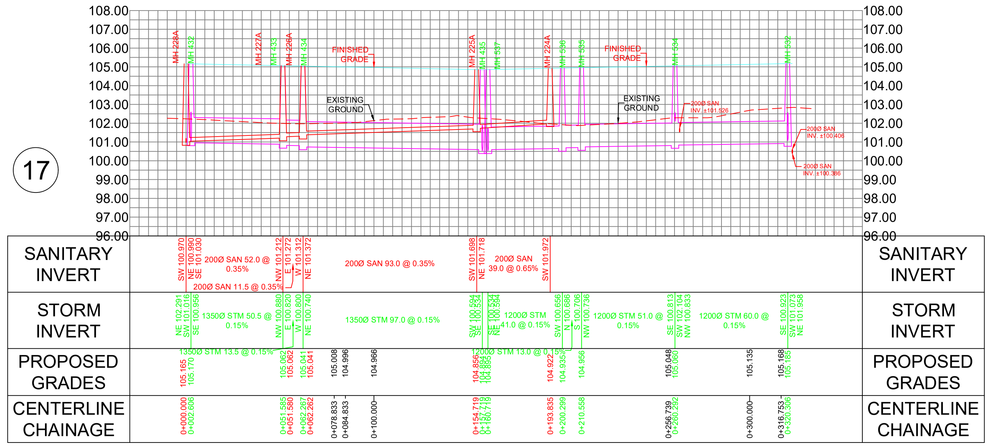

## STREET 16



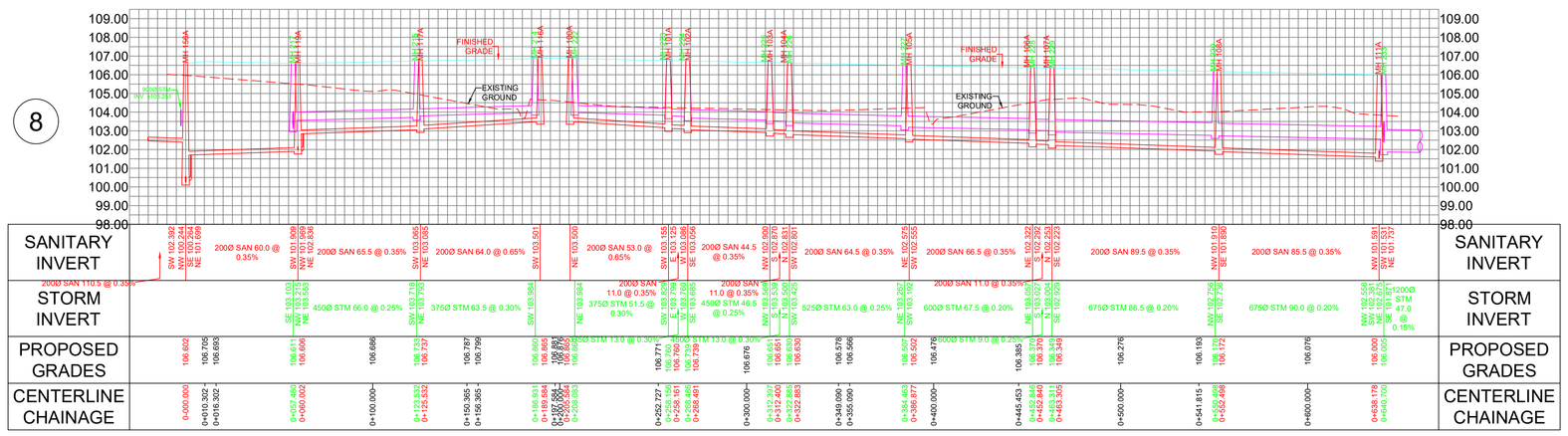

## STREET 07



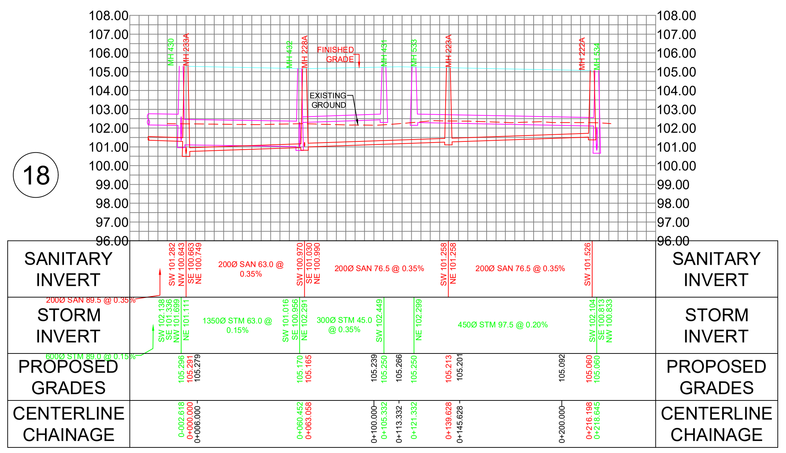

## STREET 17




## STREET 08




## STREET 18





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

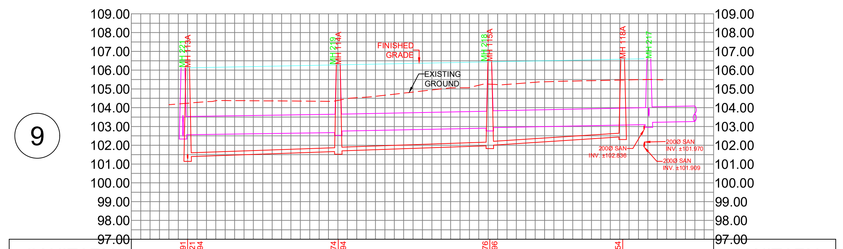

STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

CITY OF OTTAWA

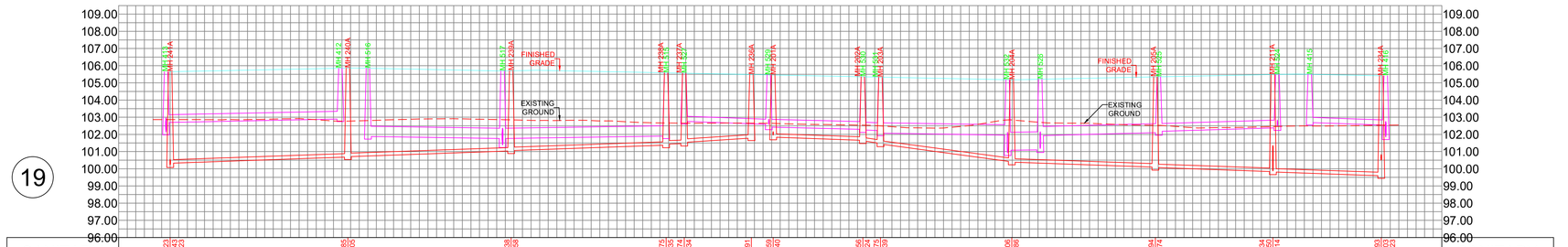
| | |
|---|---|
| PROJECT No. : | 21-1247 |
| SCALE: VER= 1:150 HOR= 1:1500 | |
| DATE: | MAR 2025 |
| DRAWING No. | 6 |

## STREET 09



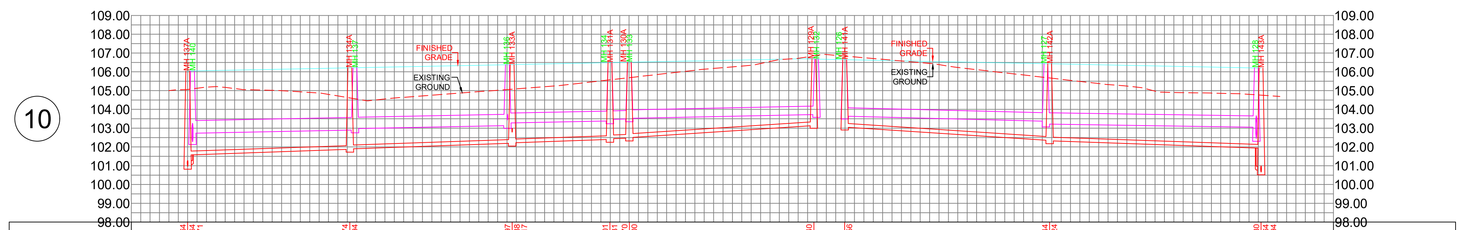

| | | |
|---|---|---|
| SANITARY INVERT | 200Ø SAN 80.0 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 975Ø STM 82.5 @ 0.15% / 900Ø STM 80.5 @ 0.20% / 900Ø STM 84.5 @ 0.20% / 825Ø STM 55.0 @ 0.20% | STORM INVERT |
| PROPOSED GRADES | | PROPOSED GRADES |
| CENTERLINE CHAINAGE | 0+000.000 / 0+080.192 / 0+100.000 / 0+115.950 / 0+131.500 / 0+169.852 / 0+188.852 / 0+200.000 / 0+231.594 / 0+237.009 / 0+245.531 | CENTERLINE CHAINAGE |

## STREET 19



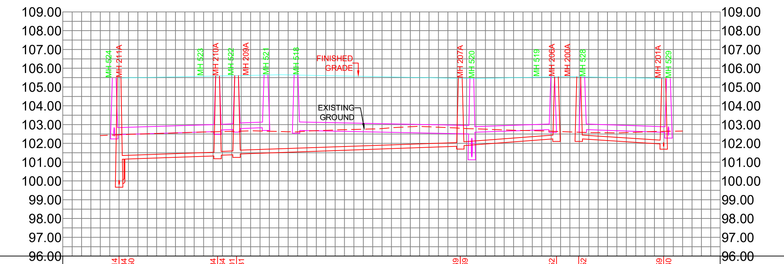

| | | |
|---|---|---|
| SANITARY INVERT | 200Ø SAN 103.5 @ 0.35% / 200Ø SAN 95.0 @ 0.35% / 200Ø SAN 90.5 @ 0.35% / 200Ø SAN 39.5 @ 0.65% / 200Ø SAN 52.5 @ 0.35% / 200Ø SAN 76.5 @ 1.35% / 200Ø SAN 83.5 @ 0.35% / 200Ø SAN 68.5 @ 0.35% / 200Ø SAN 63.0 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 450Ø STM 101.5 @ 0.20% / 600Ø STM 78.5 @ 0.15% / 600Ø STM 96.5 @ 0.15% / 300Ø STM 50.5 @ 0.35% / 450Ø STM 56.0 @ 0.25% / 600Ø STM 75.5 @ 0.15% / 525Ø 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 | 0+000.000 / 0+080.723 / 0+099.409 / 0+107.060 / 0+115.009 / 0+169.446 / 0+198.413 / 0+213.328 / 0+272.170 / 0+278.170 / 0+288.856 / 0+299.144 / 0+309.144 / 0+338.232 / 0+356.894 / 0+400.000 / 0+411.000 / 0+423.331 / 0+426.331 / 0+449.216 / 0+473.216 / 0+500.000 / 0+535.707 / 0+544.131 / 0+565.146 / 0+583.139 / 0+600.000 | CENTERLINE CHAINAGE |

## STREET 10



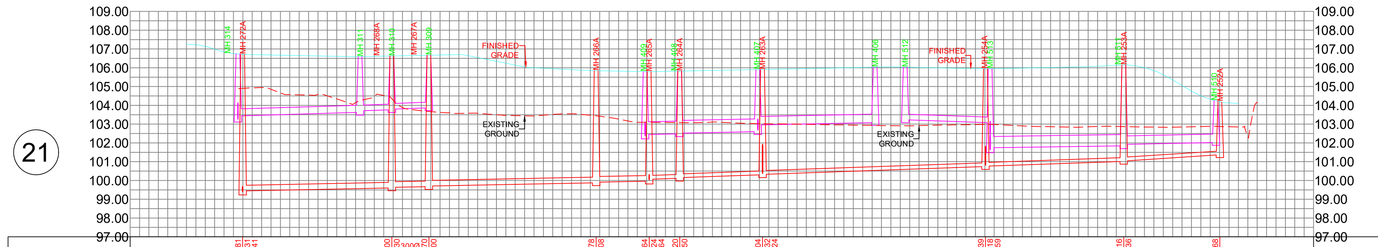

| | | |
|---|---|---|
| SANITARY INVERT | 200Ø SAN 86.5 @ 0.35% / 200Ø SAN 86.5 @ 0.35% / 200Ø SAN 52.5 @ 0.35% / 200Ø SAN 98.5 @ 0.65% / 200Ø SAN 109.5 @ 0.65% / 200Ø SAN 112.5 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 675Ø STM 86.5 @ 0.20% / 600Ø STM 81.0 @ 0.20% / 525Ø STM 56.0 @ 0.20% / 450Ø STM 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 | 0+000.000 / 0+050.000 / 0+068.374 / 0+085.374 / 0+100.000 / 0+150.000 / 0+167.748 / 0+179.748 / 0+200.000 / 0+254.818 / 0+258.818 / 0+278.151 / 0+294.423 / 0+307.423 / 0+320.000 / 0+365.792 / 0+383.792 / 0+400.000 / 0+449.766 / 0+472.766 / 0+495.420 / 0+515.447 / 0+520.000 / 0+550.000 | CENTERLINE CHAINAGE |

## STREET 20



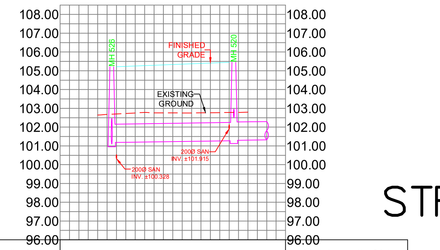

| | | |
|---|---|---|
| SANITARY INVERT | 200Ø SAN 52.5 @ 0.35% / 200Ø SAN 119.5 @ 0.35% / 200Ø SAN 51.0 @ 0.75% / 200Ø SAN 45.0 @ 0.65% / 200Ø SAN 10.5 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 375Ø STM 56.5 @ 0.30% / 450Ø STM 93.5 @ 0.20% / 300Ø STM 43.0 @ 0.30% / 300Ø STM 45.5 @ 0.35% / 300Ø STM 12.5 @ 0.35% / 300Ø STM 12.0 @ 0.35% | STORM INVERT |
| PROPOSED GRADES | | PROPOSED GRADES |
| CENTERLINE CHAINAGE | 0+000.000 / 0+020.000 / 0+021.402 / 0+040.402 / 0+052.038 / 0+071.199 / 0+086.199 / 0+100.000 / 0+141.833 / 0+157.790 / 0+200.000 / 0+231.830 / 0+244.830 / 0+289.898 / 0+300.000 | CENTERLINE CHAINAGE |

## STREET 21



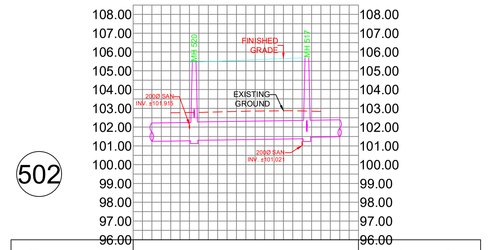

| | | |
|---|---|---|
| SANITARY INVERT | 300Ø SAN 79.5 @ 0.20% / 300Ø SAN 89.0 @ 0.20% / 200Ø SAN 118.5 @ 0.35% / 200Ø SAN 73.5 @ 0.35% / 200Ø SAN 51.0 @ 0.65% / 200Ø SAN 44.0 @ 0.35% / 200Ø SAN 18.0 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 375Ø STM 65.0 @ 0.30% / 975Ø STM 19.0 @ 0.20% / 975Ø STM 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 | 0+000.000 / 0+006.000 / 0+027.994 / 0+054.994 / 0+080.822 / 0+100.000 / 0+146.906 / 0+181.253 / 0+200.000 / 0+213.828 / 0+219.828 / 0+244.183 / 0+262.689 / 0+280.000 / 0+300.000 / 0+324.674 / 0+343.674 / 0+365.033 / 0+385.033 / 0+400.000 / 0+425.344 / 0+443.344 / 0+479.933 / 0+498.988 / 0+508.000 / 0+511.000 / 0+523.000 / 0+534.800 / 0+543.800 / 0+560.126 / 0+580.126 / 0+600.120 | CENTERLINE CHAINAGE |

## STREET 501



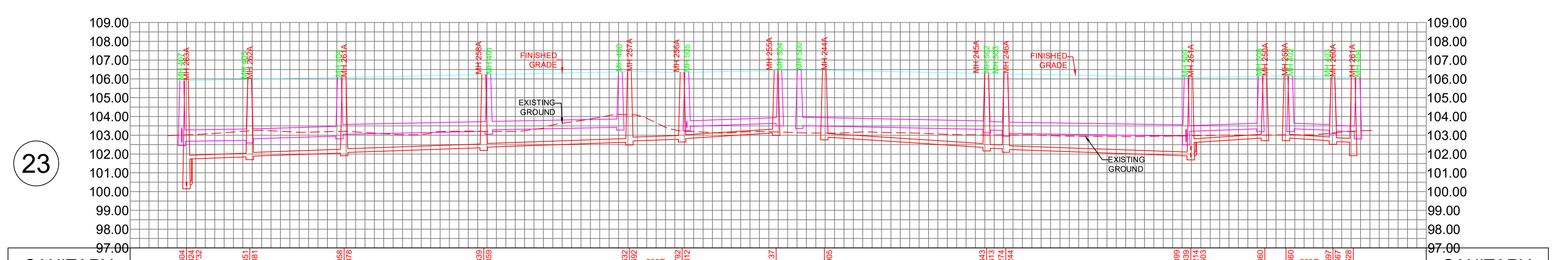

| | | |
|---|---|---|
| SANITARY INVERT | | SANITARY INVERT |
| STORM INVERT | 975Ø STM 65.0 @ 0.15% | STORM INVERT |
| PROPOSED GRADES | | PROPOSED GRADES |
| CENTERLINE CHAINAGE | 0+000.000 / 0+022.000 | CENTERLINE CHAINAGE |

## STREET 502



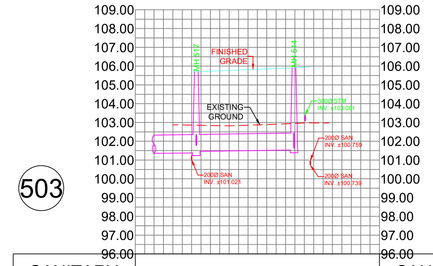

| | | |
|---|---|---|
| SANITARY INVERT | | SANITARY INVERT |
| STORM INVERT | 975Ø STM 60.0 @ 0.15% / 900Ø STM 42.0 @ 0.15% | STORM INVERT |
| PROPOSED GRADES | | PROPOSED GRADES |
| CENTERLINE CHAINAGE | 0+000.000 / 0+022.000 | CENTERLINE CHAINAGE |

## 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 25.0 @ 0.65% / 200Ø SAN 11.0 @ 0.35% / 200Ø SAN 34.5 @ 0.35% / 200Ø SAN 50.5 @ 0.35% | SANITARY INVERT |
| STORM INVERT | 600Ø STM 97.5 @ 0.15% / 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 | 0+000.000 / 0+020.000 / 0+031.646 / 0+052.646 / 0+077.919 / 0+088.919 / 0+100.000 / 0+156.390 / 0+167.444 / 0+178.444 / 0+200.000 / 0+220.947 / 0+229.700 / 0+260.809 / 0+288.809 / 0+300.000 / 0+313.887 / 0+315.887 / 0+330.379 / 0+332.379 / 0+358.512 / 0+400.000 / 0+426.856 / 0+429.856 / 0+439.396 / 0+448.045 / 0+500.000 / 0+532.153 / 0+534.653 / 0+577.772 / 0+579.772 / 0+585.330 / 0+602.000 / 0+621.117 / 0+625.617 | CENTERLINE CHAINAGE |

## STREET 503




| | | |
|---|---|---|
| SANITARY INVERT | | SANITARY INVERT |
| STORM INVERT | 900Ø STM 52.0 @ 0.15% | STORM INVERT |
| PROPOSED GRADES | | PROPOSED GRADES |
| CENTERLINE CHAINAGE | 0+000.000 / 0+022.000 / 0+041.000 / 0+063.000 | CENTERLINE CHAINAGE |


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STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

CITY OF OTTAWA

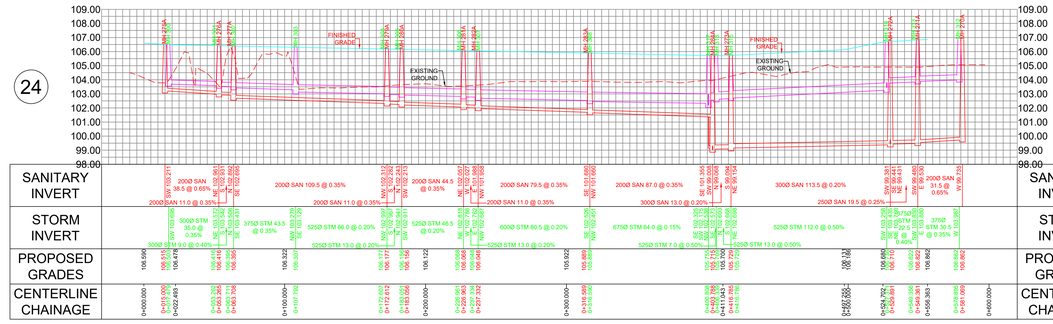
PROJECT No. : 21-1247

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

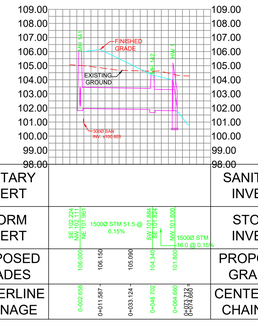
DATE: MAR 2025

DRAWING No. 7

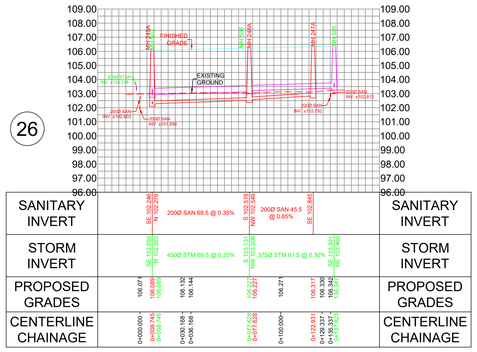
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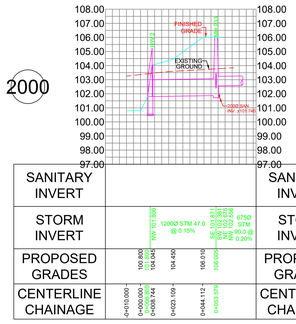

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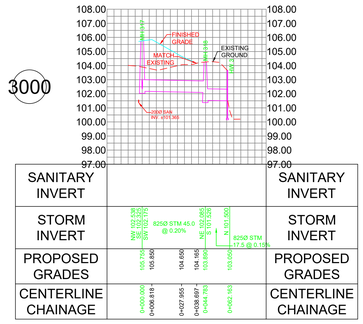

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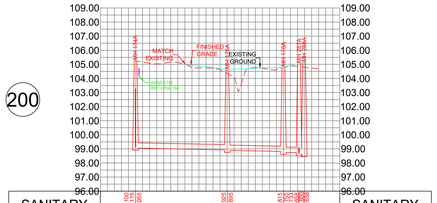

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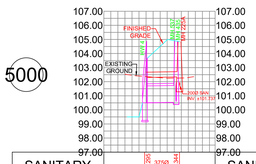

## STREET 3000



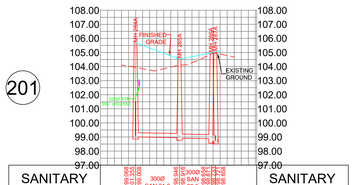

## STREET 200




## STREET 5000




## STREET 201





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STITTSVILLE SOUTH URBAN EXPANSION AREA

SERVICING PROFILES

CITY OF OTTAWA

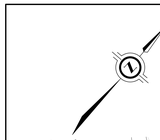
| | |
|---|---|
| PROJECT No. : | 21-1247 |
| SCALE: VER= 1:150 HOR= 1:1500 | |
| DATE: | MAR 2025 |
| DRAWING No. | 8 |

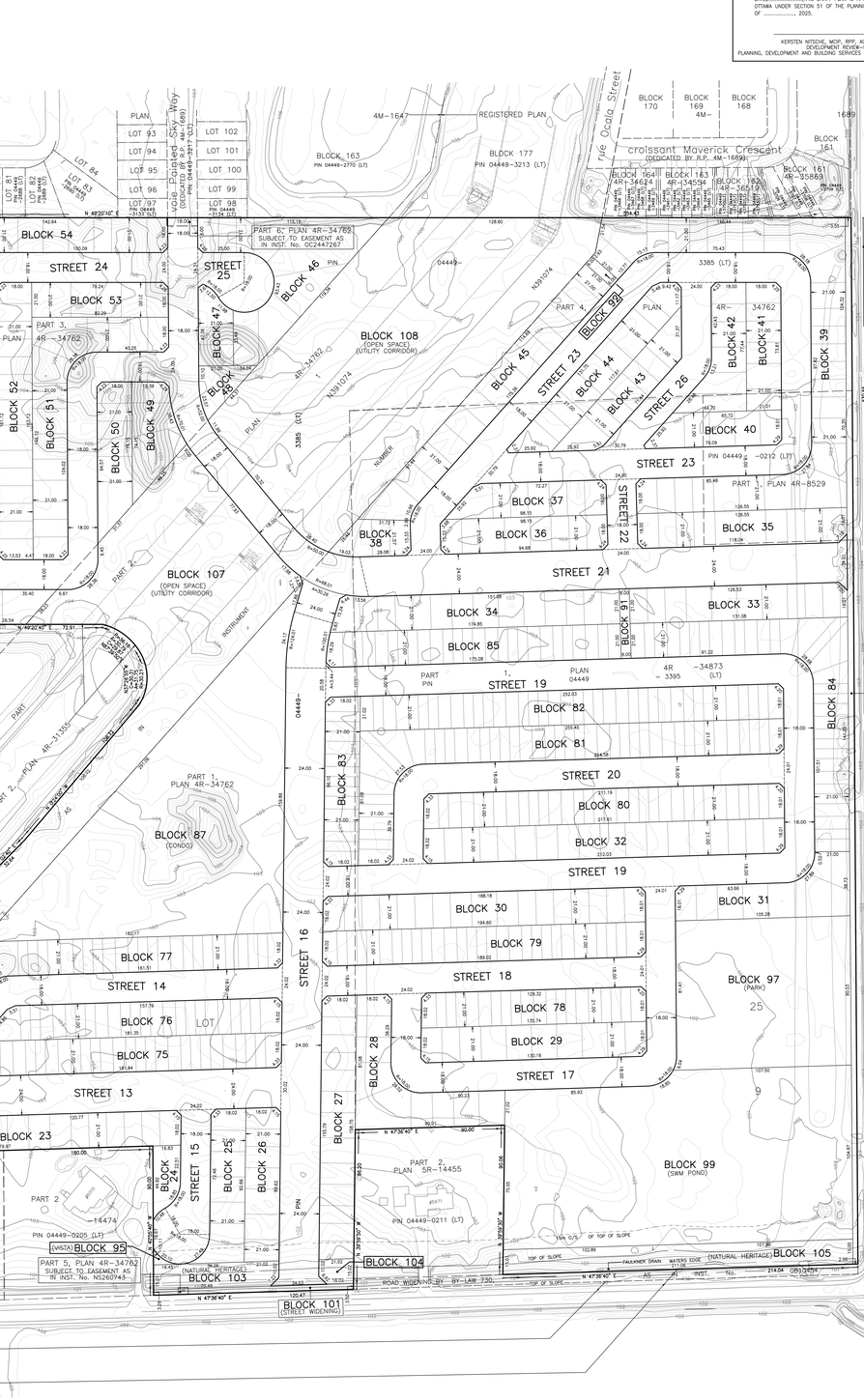
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120 Iber Road, Suite 103
Stittsville, ON K2S 1E9
613-836-0856
dsel.ca

# 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

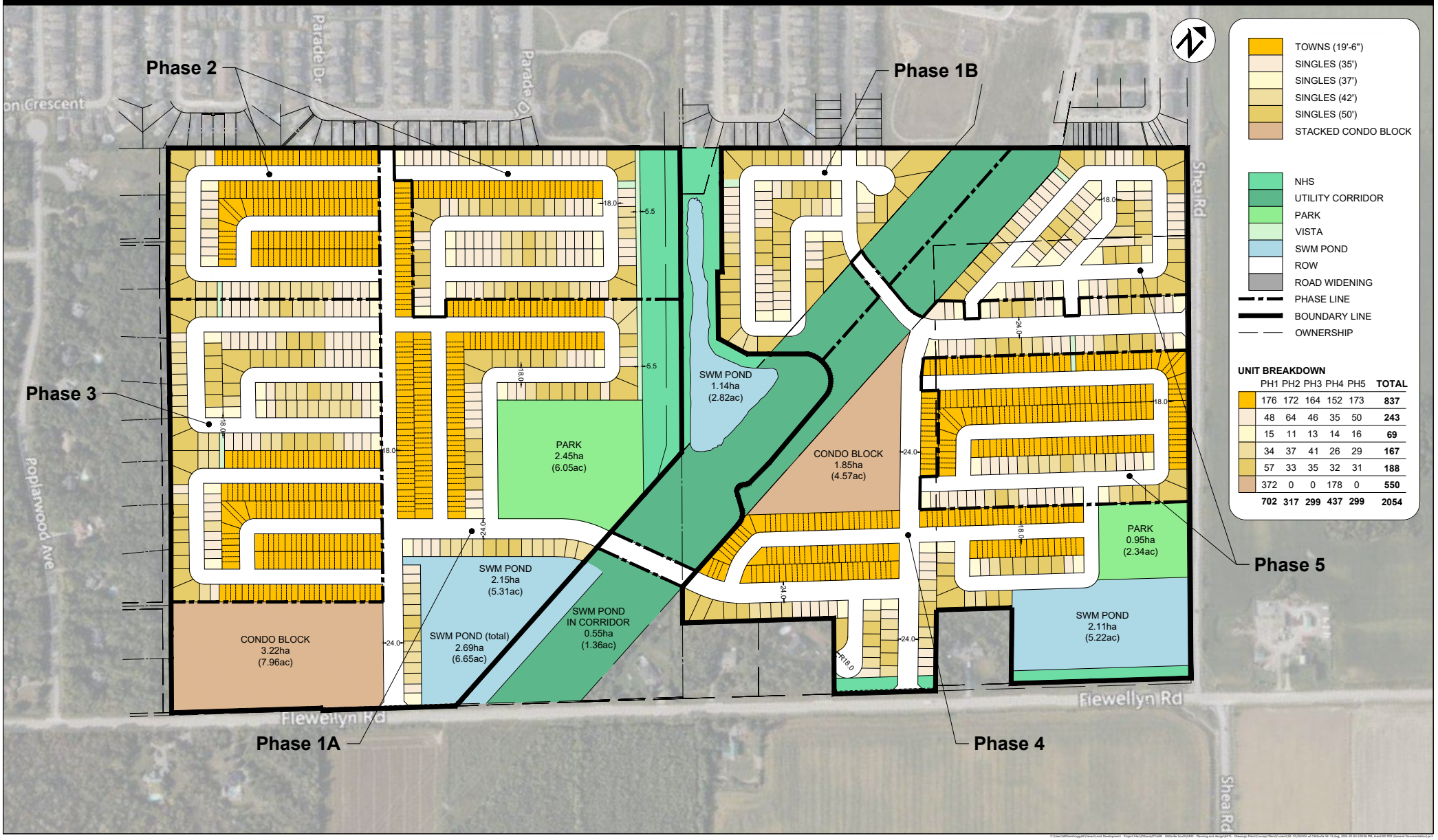




REGISTERED PLAN
PART 53, PLAN 4R-30473
PART 54, PLAN 4R-30473
PART 109, PLAN 4R-30473 SUBJECT TO EASEMENT AS IN INST. No. OC1921888
4M-1589
BLOCK 164 PIN 04449-2771 (LT)
BLOCK 364 PIN 04449-2264 (LT)
BLOCK 363 PIN 04449-2263 (LT)
LOT 76
LOT 77
LOT 84
PART 3, PLAN 4R-30450
PIN 04449-2384 (LT)
4M-1647
BLOCK 163 PIN 04449-2770 (LT)
BLOCK 177 PIN 04449-3213 (LT)
Ivie Ocala Street
Croissant Maverick Crescent (DEDICATED BY R.P. 4M-1689)
BLOCK 170
BLOCK 169 4M-
BLOCK 168
BLOCK 164 4R-34624
BLOCK 163 4R-34594
BLOCK 162 4R-34619
BLOCK 161 4R-35863
1689
BLOCK 161
LOT 93
LOT 94
LOT 95
LOT 96
LOT 97
LOT 98
LOT 102
LOT 101
LOT 100
LOT 99
PART 6, PLAN 4R-34762 SUBJECT TO EASEMENT AS IN INST. No. OC2447267
BLOCK 54
BLOCK 56
BLOCK 22
STREET 1
STREET 4
BLOCK 57
BLOCK 58
BLOCK 73
BLOCK 21
STREET 2
STREET 5
BLOCK 59
BLOCK 60
BLOCK 20
BLOCK 19
BLOCK 88
BLOCK 3
BLOCK 4
BLOCK 18
BLOCK 71
STREET 6
STREET 8
BLOCK 7
BLOCK 8
BLOCK 70
STREET 7
BLOCK 9
BLOCK 10
BLOCK 17
BLOCK 89
BLOCK 11
BLOCK 61
STREET 10
BLOCK 62
BLOCK 63
STREET 11
BLOCK 64
BLOCK 65
BLOCK 66
BLOCK 96 (PARK)
STREET 12
BLOCK 15
BLOCK 98 (SWM POND)
BLOCK 86 (CONDO)
PART 1, PLAN 5R-11035 PIN 04449-0189 (LT)
PART 2, PLAN 5R-11035 PIN 04449-0190 (LT)
BLOCK 100 (STREET WIDENING)
PART 3, PLAN 5R-11035 PIN 04449-0341 (LT)
BLOCK 47 (0.3m RESERVE) PIN 04449-0784 (LT)
(EXISTING SWM POND) (OWNED BY CITY OF OTTAWA)
BLOCK 90
BLOCK 93
BLOCK 94
BLOCK 55
BLOCK 24
BLOCK 52
BLOCK 51
BLOCK 50
BLOCK 49
BLOCK 53
BLOCK 107 (OPEN SPACE) (UTILITY CORRIDOR)
BLOCK 108 (OPEN SPACE) (UTILITY CORRIDOR)
BLOCK 46
BLOCK 47
BLOCK 48
BLOCK 45
BLOCK 44
BLOCK 43
BLOCK 42
BLOCK 41
BLOCK 40
BLOCK 39
STREET 23
STREET 26
STREET 25
STREET 24
PART 4, PLAN 4R-34762
PART 5, PLAN 4R-34762
PART 1, PLAN 4R-8529
PIN 04449-0212 (LT)
BLOCK 37
BLOCK 36
BLOCK 38
BLOCK 35
STREET 22
STREET 21
BLOCK 34
BLOCK 33
BLOCK 85
STREET 19
BLOCK 82
BLOCK 81
STREET 20
BLOCK 80
BLOCK 32
BLOCK 83
BLOCK 84
BLOCK 102 (STREET WIDENING)
ROAD ALLOWANCE BETWEEN LOTS 25 AND 26 ALSO KNOWN AS SHEA ROAD PIN 04449-0207 (LT)
BLOCK 30
BLOCK 31
BLOCK 79
STREET 18
BLOCK 78
BLOCK 29
BLOCK 97 (PARK)
STREET 17
BLOCK 28
BLOCK 27
BLOCK 77
STREET 14
BLOCK 76
BLOCK 75
STREET 13
BLOCK 23
BLOCK 24
BLOCK 15
BLOCK 25
BLOCK 26
BLOCK 16
BLOCK 87 (CONDO)
PART 1, PLAN 4R-34762
PART 2, PLAN 4R-31355
PART 2, PLAN 5R-14455
PIN 04449-0211 (LT)
BLOCK 99 (SWM POND)
PART 1, PLAN 5R-10589 EXPROPRIATION PLAN N391074 PIN 04449-0209 (LT)
PART 2, PLAN 5R-11515
PART 1, PLAN 5R-11515 PIN 04449-0203 (LT)
PART 3, PLAN 5R-10589 EXPROPRIATION PLAN N391074 PIN 04449-0208 (LT)
PART 1, PLAN 5R-10589 EXPROPRIATION PLAN N391074 PIN 04449-0204 (LT)
PART 2, PLAN 5R-14474
PIN 04449-0205 (LT)
BLOCK 95 (VISTA)
PART 5, PLAN 4R-34762 SUBJECT TO EASEMENT AS IN INST. No. NS260743
BLOCK 103 (NATURAL HERITAGE)
BLOCK 104
BLOCK 105 (NATURAL HERITAGE)
BLOCK 101 (STREET WIDENING)
ROAD ALLOWANCE BETWEEN CONCESSIONS 8 AND 9 KNOWN AS FLEWELLYN ROAD PIN 04449 – 0341 (LT)
ROAD WIDENING BY-LAW-730
TOP OF SLOPE
FAULKNER DRAIN
WATERS EDGE (NATURAL HERITAGE)
0.3m RESERVE
INST. No. 214.04
OB(3)4.56
PART 1, PLAN 4R-34762
PART 2, PLAN 4R-31355
PART 3, PLAN 4R-30450
PART 1, PLAN 4R-34762
PART 2, PLAN 4R-34762
PART 3, PLAN 4R-34762
PART 4, PLAN 4R-34762
PART 5, PLAN 4R-34762
PART 6, PLAN 4R-34762

# 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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# APPENDIX B

EXISTING 400mm WM. CONSTRUCTED AS PART OF THE EDENWYLDE SUBDIVISION.

FERNBANK ROAD

FERNBANK RD

GHERARY DR

JAMES LEWIS AVE

STITTSVILLE MAIN ST

WEST RIDGE DRIVE

BAYWOOD DR

MONTEROSSA ST

UPCOUNTRY DR

ALLGROVE WAY

ARROWWOOD DR

BRIGHTSIDE AVE

HOPETOWN ST

HARTSMERE DR

SHINING STAR CIR

FRIENDLY CR

VOIE DALMATION WAY

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 MASTERS WAY

RUE OCALA STREET

CROIS MAVERICK CRESCENT

SHEA RD

EXISTING RESIDENTIAL

RUE FALABELLA STREET

RUE QUARTER HORSE STREET

RUE LIPIZZANER STREET

PROMENADE PARADE DRIVE

VOIE CAMPOLINA WAY

CROISSANT STALLION CRESCENT

RUE PEDIGREE STREET

RUE MANEGE STREET

CROISSANT BECKETT CRESCENT

PROMENADE HICKSTEAD DRIVE

RUE CAVALLO STREET

PROMENADE PARADE DRIVE

EX. 2000 WATERMAIN

EX. 3000 WATERMAIN

EX. 250mmØ WM

400Ø WATERMAIN

150mmØ WATER SERVICE

EXISTING RESIDENTIAL

REGIONAL ROAD 5

BRAD'S COURT

FOREST GROVE DR

POPLAR GROVE AVE

EXISTING RURAL ESTATE LOT SUBDIVISION (WOODSIDE ACRES)

Hydro One Corridor

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

CAIVAN COMMUNITIES LANDHOLDINGS BOUNDARY

FAULKNER MUNICIPAL DRAIN

GREENWAY CORRIDOR

6025 FLEWELLYN ROAD

6015 FLEWELLYN ROAD

597 FLEWELLYN ROAD

6026 FLEWELLYN ROAD

6072 FLEWELLYN ROAD

6040 FLEWELLYN ROAD

FLEWELLYN RD

OVERALL SUBJECT AREA BOUNDARY

DSEL

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Fax. (613) 836-7183
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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# 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

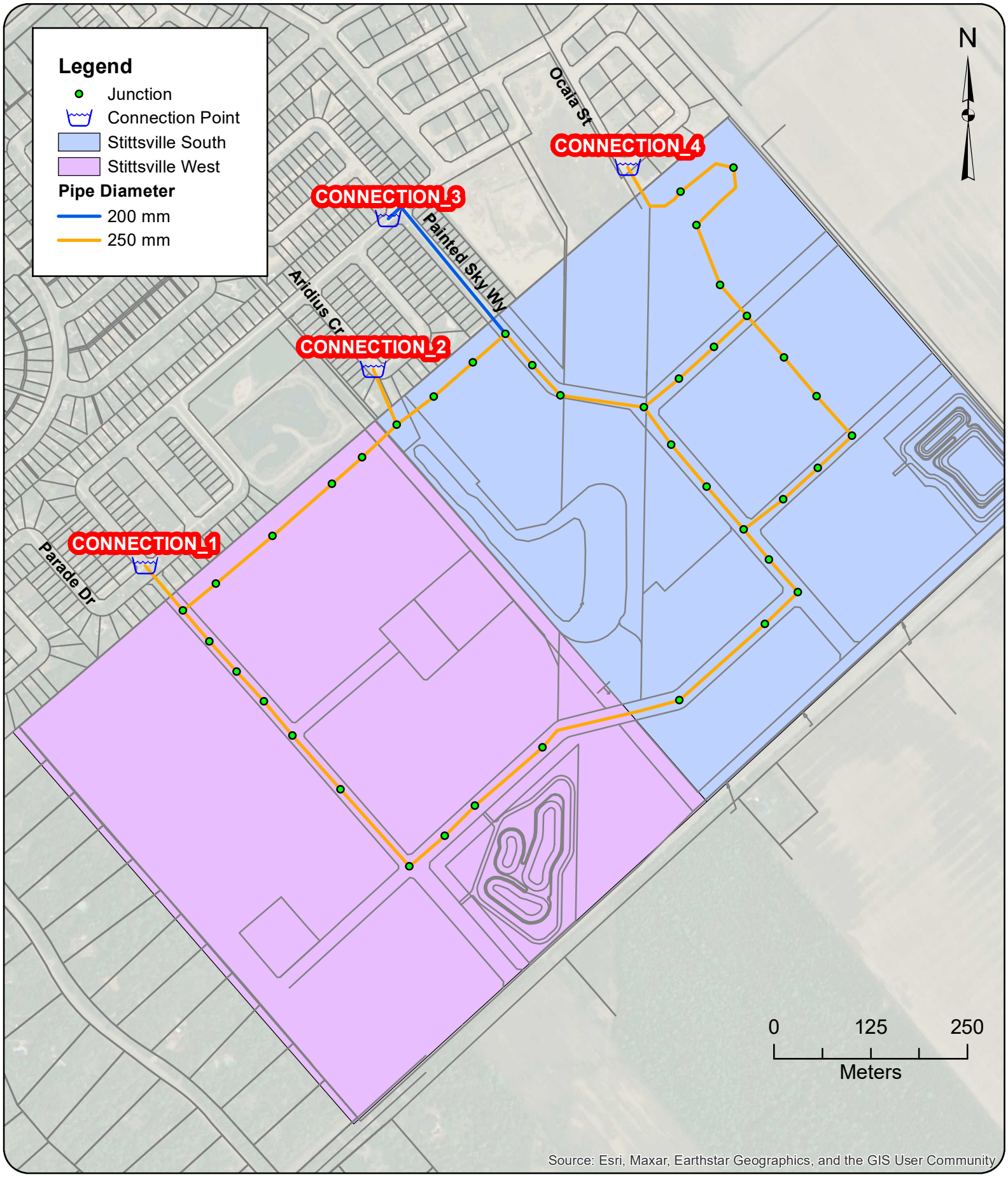
GeoAdvice Engineering Inc. ("GeoAdvice") was retained by David Schaeffer Engineering Ltd. ("DSEL") to size the proposed trunk water main network for the Stittsville South Urban Expansion Area (SSUEA) development ("Development") in the City of Ottawa, ON ("City").

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** |

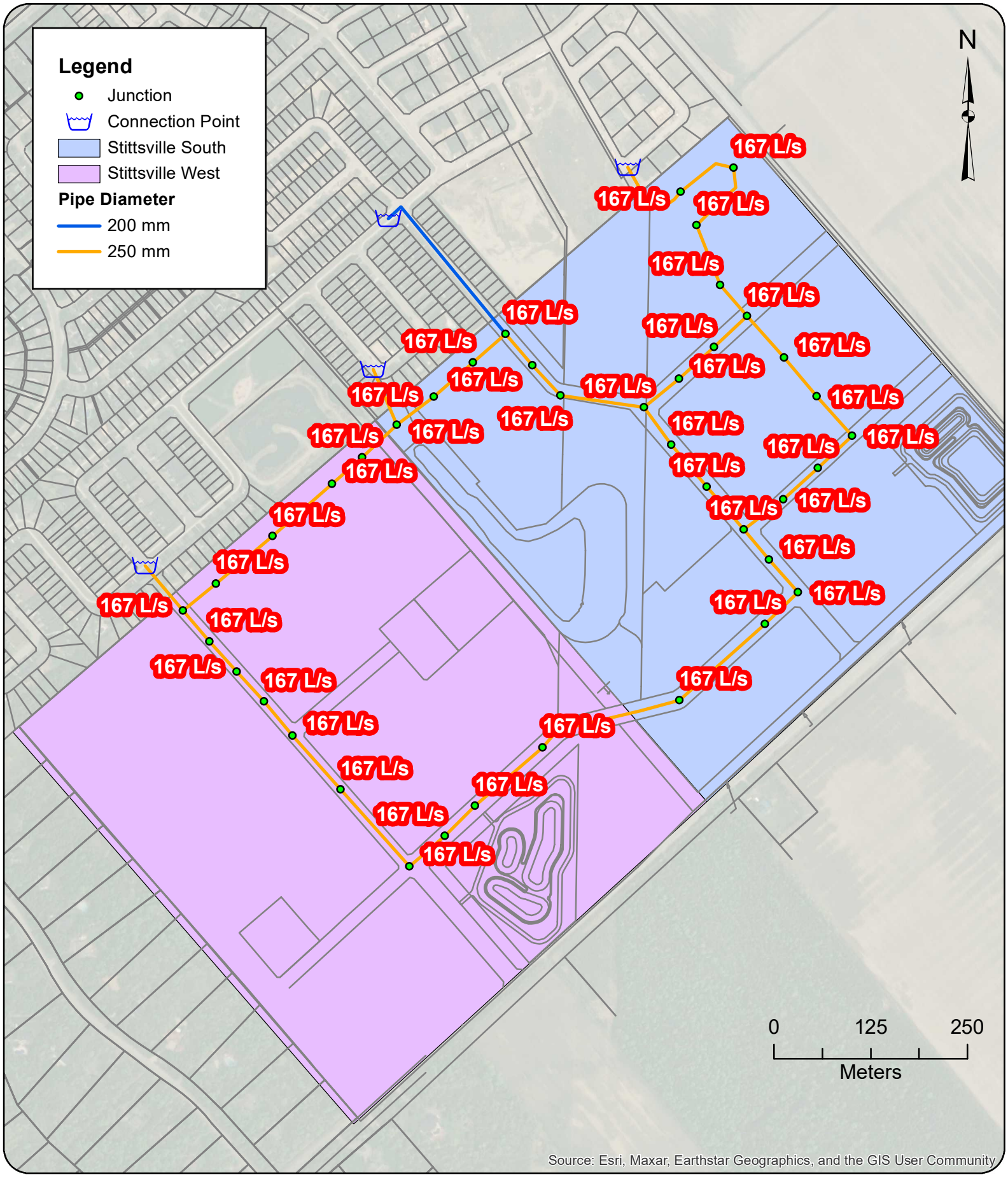
| | | Average Day | Max Day | Peak Hour |
|---|---|---|---|---|
| **Stittsville West** | | **9.15** | **14.56** | **29.15** |
| **Stittsville South** | | **7.57** | **11.64** | **23.09** |

*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**

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**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 |

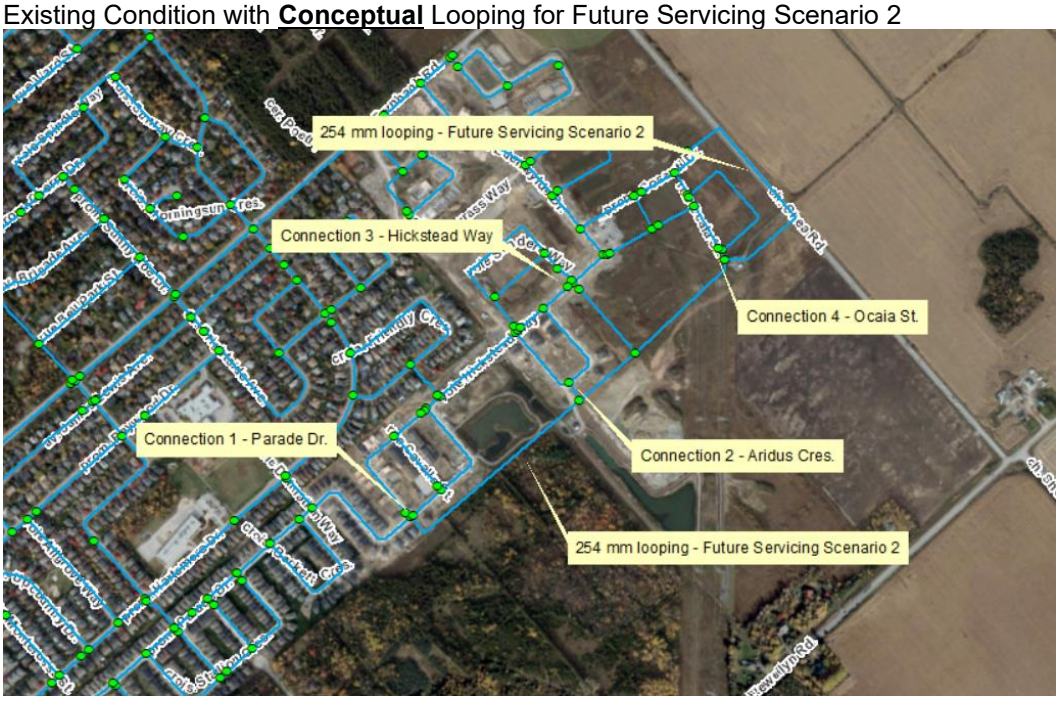
**Location**




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

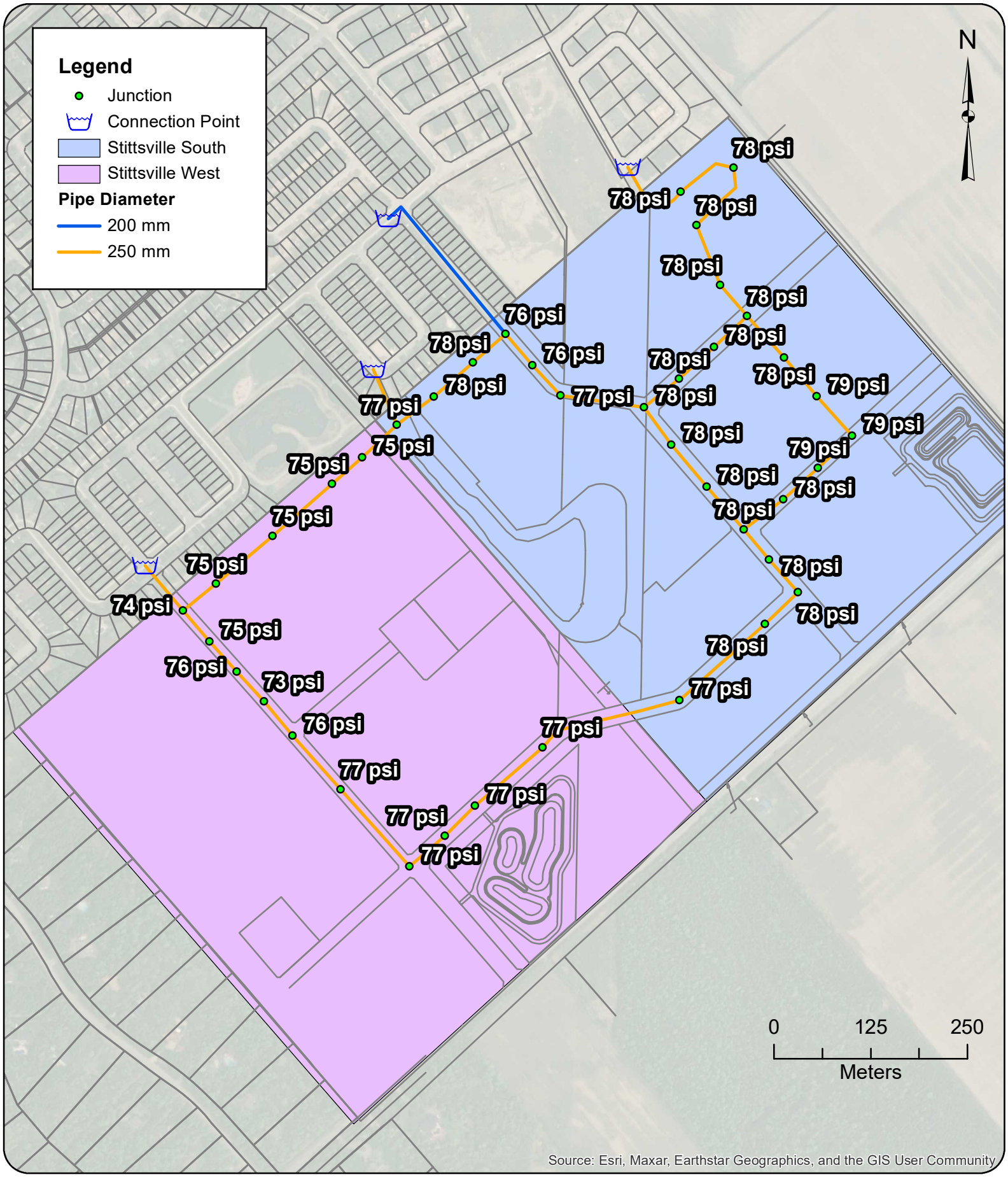
**Notes**

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



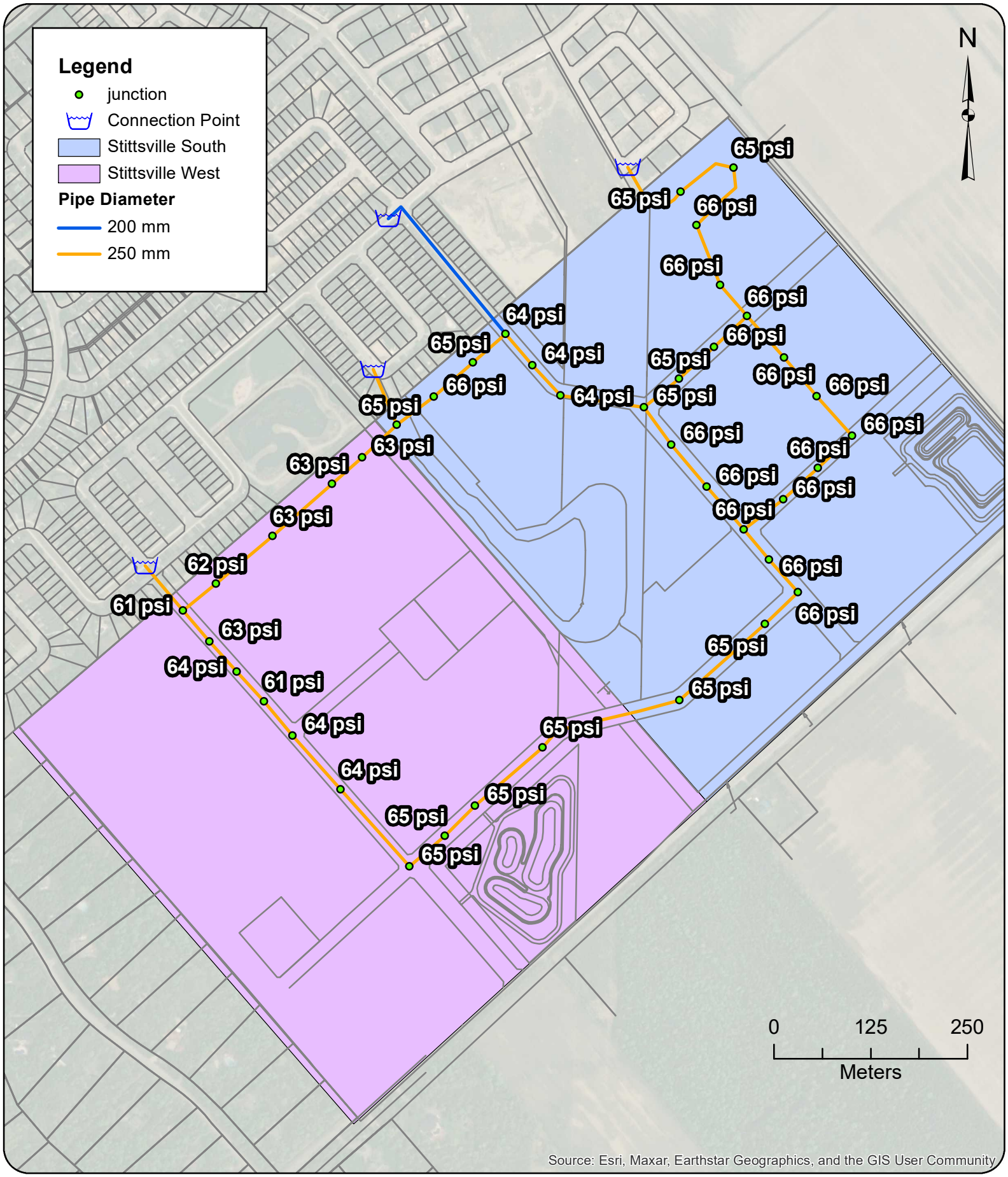

GeoAdvice Engineering Inc.

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

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**ADD Pressure Modeling Results**

**Figure D.1**




GeoAdvice Engineering Inc.

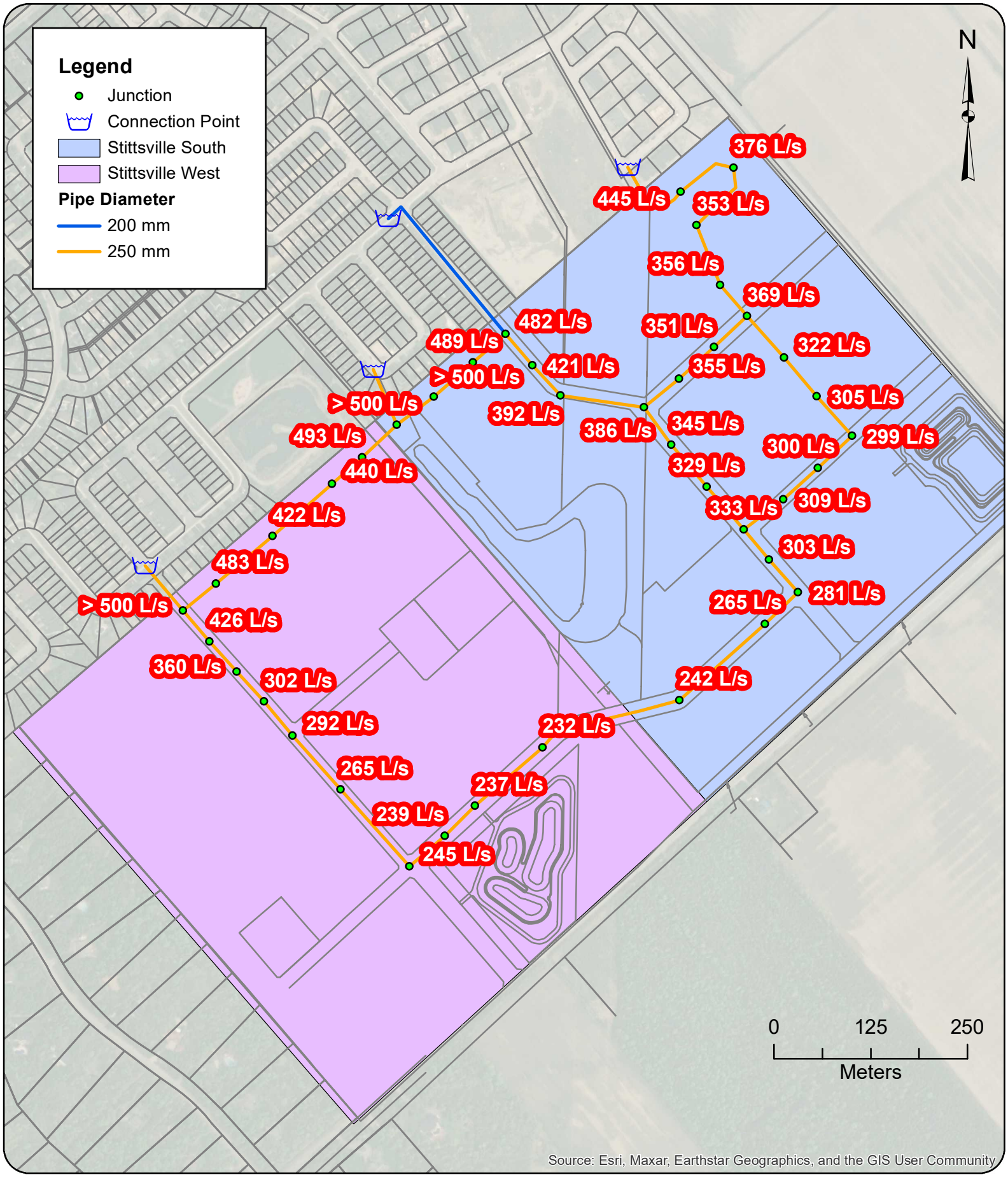
Project: **Hydraulic Capacity and Modeling Analysis**
**SSUEA**
**2022-018-DSE**
Client: **David Schaeffer Engineering Ltd.**
Date: **January 2025**
Created by: **JL**
Reviewed by: **WdS**

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**PHD Pressure Modeling Results**

**Figure D.2**

# Appendix E MDD+FF Model Results




GeoAdvice Engineering Inc.

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

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**Available Fire Flow Modeling Results**

**Figure E.1**

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

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.

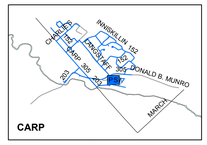
[2] Apply a rate of 17,000 l/h/day if employment totals are unknown. The rate represents the average demand for ICI areas at the 90th percentile.

[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.

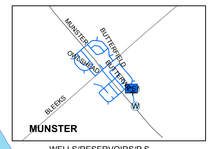
[5] The 1.5 multiplier represents the additional outdoor water demand associated with employment areas.

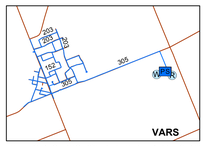
# City of Ottawa - Water Distribution System
# Facilities & Feedermains



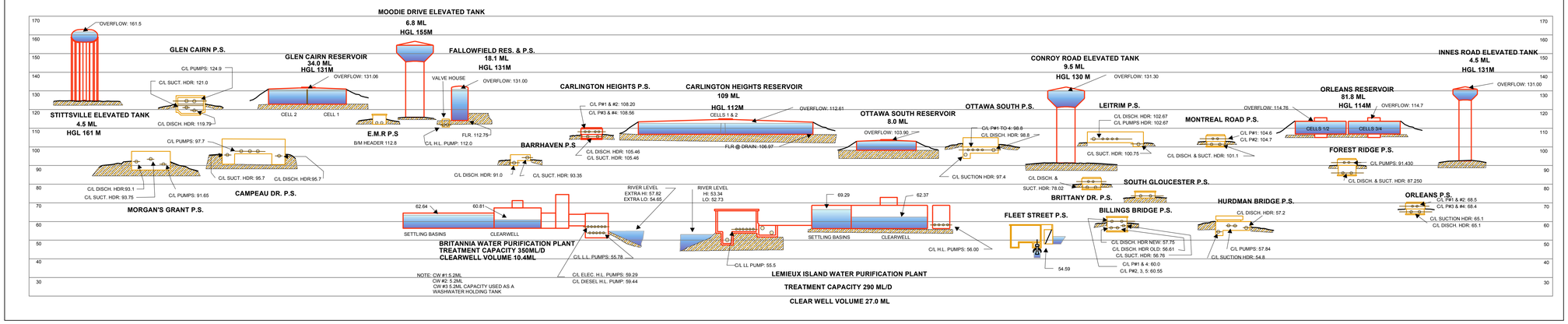







ORLEANS P.S.
FOREST RIDGE P.S
Ogilvie Rd. Backup P.S.
ORLEANS RES.
MONTREAL ROAD P.S.
BRITTANY DRIVE P.S.
INNES RD ELEVATED TANK
FLEET STREET P.S.
LEMIEUX ISLAND PURIFICATION PLANT & P.S. & RES.
HURDMAN P.S.
Innes Rd Backup P.S.
Innes Rd/BearBrook Rd Backup P.S.
BRITANNIA PURIFICATION PLANT & P.S. & RES.
BILLINGS BRIDGE P.S.
MORGAN'S GRANT P.S.
CARLINGTON HEIGHTS P.S. & RES.
CONROY RD ELEVATED TANK
CAMPEAU DR. P.S.
ENERGY MINES & RESOURCES P.S.
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

HARTSMERE

HOPETOWN ST

SHINING STAR CIR

BRIGHTSIDE AVE

FRIENDLY CR

FRIENDLY CR

HARTSMERE DR

HARTSMERE DR

VOIE DALMATION WAY

WEST RIDGE DRIVE

RUE FALABELLA STREET

RUE QUARTER HORSE STREET

RUE LIPIZZANER STREET

PROMENADE PARADE DRIVE

VOIE CAMPOLINA WAY

VOIE CAMPOLINA WAY

CROISSANT STALLION CRESCENT

PROMENADE PARADE DRIVE

RUE PEDIGREE STREET

RUE MANEGE STREET

CROISSANT STALLION CRESCENT

CROISSANT STALLION CRESCENT

CROISSANT BECKETT CRESCENT

CROISSANT BECKETT CRESCENT

PROMENADE HICKSTEAD DRIVE

PROMENADE HICKSTEAD DRIVE

RUE CAVALLO STREET

PROMENADE PARADE DRIVE

PROMENADE HICKSTEAD DRIVE

PROMENADE PARADE DRIVE

RUE JARDINIERE STREET

RUE KAYENTA STREET

RUE JARDINIERE 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 HAMPTON SPA WAY

RUE OCALA STREET

CROIS. MAVERICK CRESCENT

SHEA RD

SHEA RD

SHEA RD

SHEA RD

REGIONAL ROAD 5

BRAD'S COURT

FOREST GROVE DR

POPLAR GROVE

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

# 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 | | |
| 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. | 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. 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

# 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 | | | 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. 5 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) |
| | 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 | | | 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. 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 |

NOVATECH
Engineers, Planners & Landscape Architects

# M E M O R A N D U M

**DATE:** **MAY 26, 2023**

**TO:** **KEVIN MURPHY**

**FROM:** **SAM BAHIA, BEN SWEET**

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

**CC:** **CARL SCIUK**

## Introduction

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

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

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

## Background and Infrastructure Status

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

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



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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** | **84 L/s SHEA PUMP STATION CURRENT FIRM CAPACITY.** |
| | **Stage 3 Friendly PS Decommissioned** | **3821.3** | **820.4** | **4641.7** | **2.6** | **62.96** | **4.03** | **11.50** | **2.08** | **23.94** | **0.44** | **21.36** | **4.06** | **49.80** | |
| | Stage 4 W4 Partial Buildout (Maguire & Faulkner only) | 3821.3 | 3841.1 | 7662.4 | 2.6 | 62.96 | 38.42 | 21.29 | 2.15 | 45.75 | 0.44 | 30.99 | 5.78 | 82.96 | |
| | Stage 5 W4 Full Buildout (Davidson & Eder added) | 3821.3 | 6309.3 | 10130.6 | 2.6 | 62.96 | 68.24 | 29.29 | 2.14 | 62.59 | 0.44 | 39.34 | 7.27 | 109.64 | **128 L/s SHEA PUMP STATION PROPOSED FIRM CAPACITY** |

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

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

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

**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 | 88.7% |
| 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 | 40.96 | 600 CONC | 0.610 | 0.013 | 0.27 | 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(ci) + 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(ci) = 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)
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(ci) = Industrial / Commercial / Institutional Flow (L/sec)
Q(A) = Peak Annual Flow (L/sec)
Q(R) = Peak Rare 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 = | Std ICI --> | 1.0 | 1.5 | * ICI Peak = 1.0 Default, 1.5 if ICI in contributing area is >20% (design only) |
| Annual / Rare = | | 1.0 | | |

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

**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 perimeter (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
MAGUIRE
FAULKNER
DAVIDSON
EDER
HOLDOUT 4
EXTERNAL 1
EXTERNAL 2
EXT 3
HYDRO CORRIDOR
TRIBUTARY TO FAULKNER DRAIN
EXISTING EMERGENCY OVERFLOW
EXISTING SWM
PROPOSED EMERGENCY OVERFLOW
PROPOSED SWM
DUAL FORCEMAIN
DISCHARGE CHAMBER
FLOW ALLOWANCE = 40 L/s TO EXISTING LIARD PUMP STATION FERNBANK TRUNK SEWER
LAIRD PUMP STATION (TO BE DECOMMISSIONED WITH FLOWS DIRECTED TO FUTURE SANITARY TRUNK SEWER - BY OTHERS)
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)
SHEA PUMP STATION CURRENT CAPACITY = 84 L/s UPGRADED CAPACITY = 125 L/s

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

## 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**

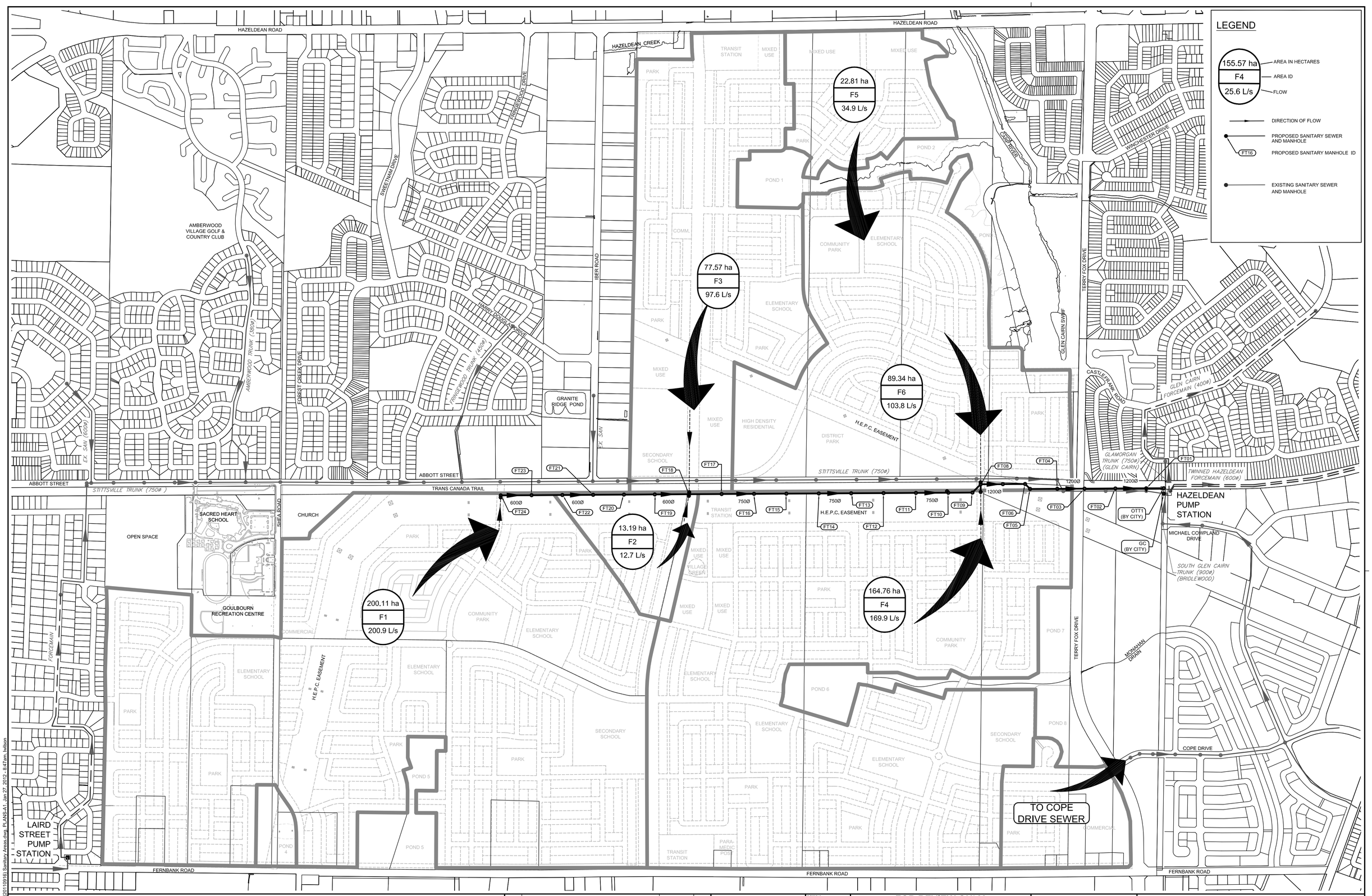
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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

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 — JAN. 26/12 — PROVINCE OF ONTARIO

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

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Telephone (613) 254-9643
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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, Nelson

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.

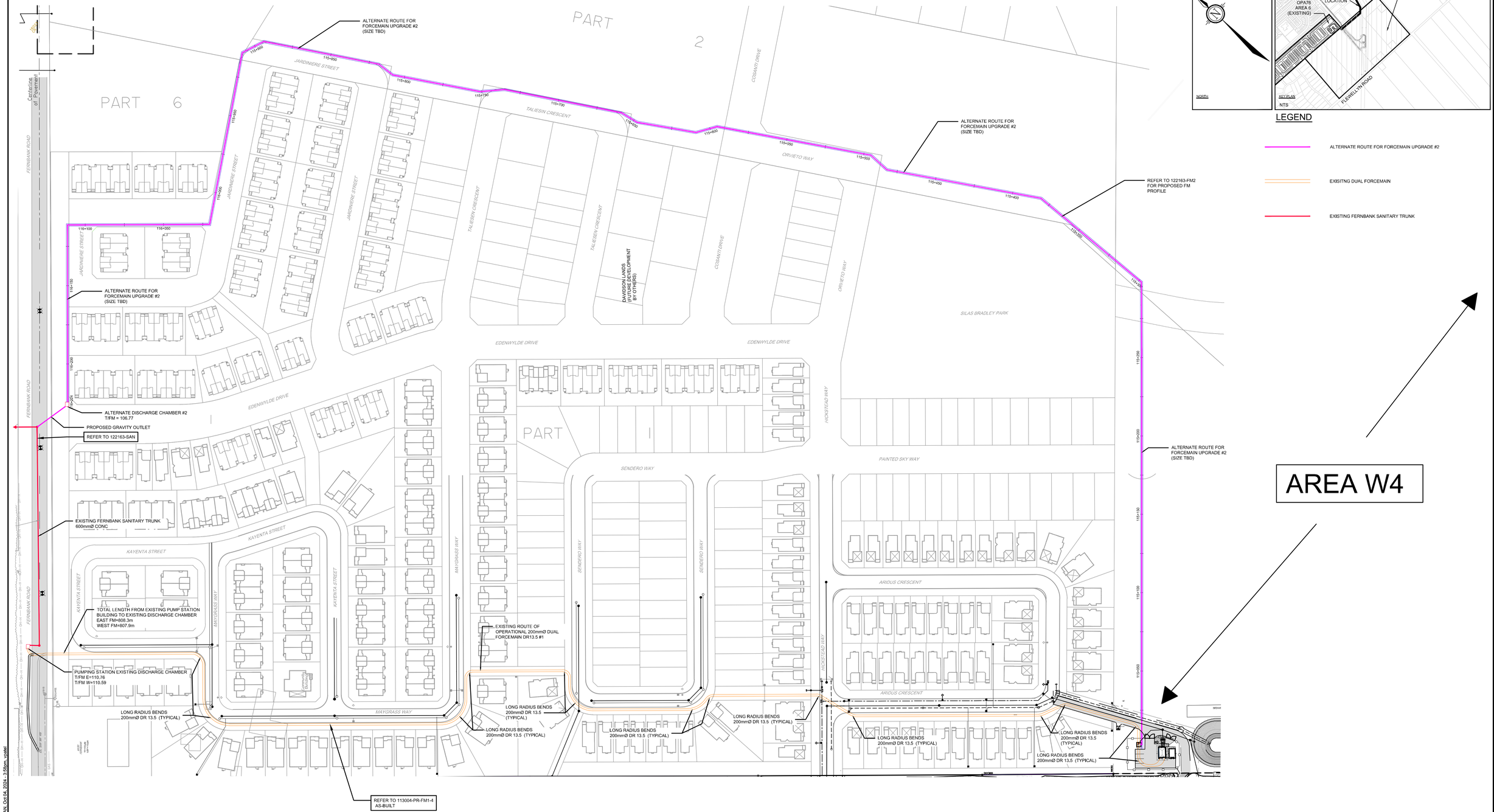
Option 3 is the best option with respect to ease of design and approvals, ease and flexibility of construction, ease and flexibility of operation and maintenance, level of service, and capital costs. Option 2 is the most undesirable option largely due to the significant challenges related to ease and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



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




M:\2022\122163\CAD\Civil\Addsht\122163-FM1-ALTERNATE\113004-PR-FM_Addsht.dwg, PR-New+FMP+Alt, Oct 04, 2024 - 3:56pm, rpatel

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

SCALE: 1 : 1000

1:1000
0 10 20 30 40

DESIGN: GJM/BHB
CHECKED: GJM
DRAWN: BSm
CHECKED: BRN
APPROVED: BHB


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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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# Transient Analysis Report

## Shea Road and Forcemain System Upgrades
## City of Ottawa, ON

ARCADIS
Prepared for NOVATECH Engineers, Planners & Landscape Architects
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# Document Control Page

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# 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

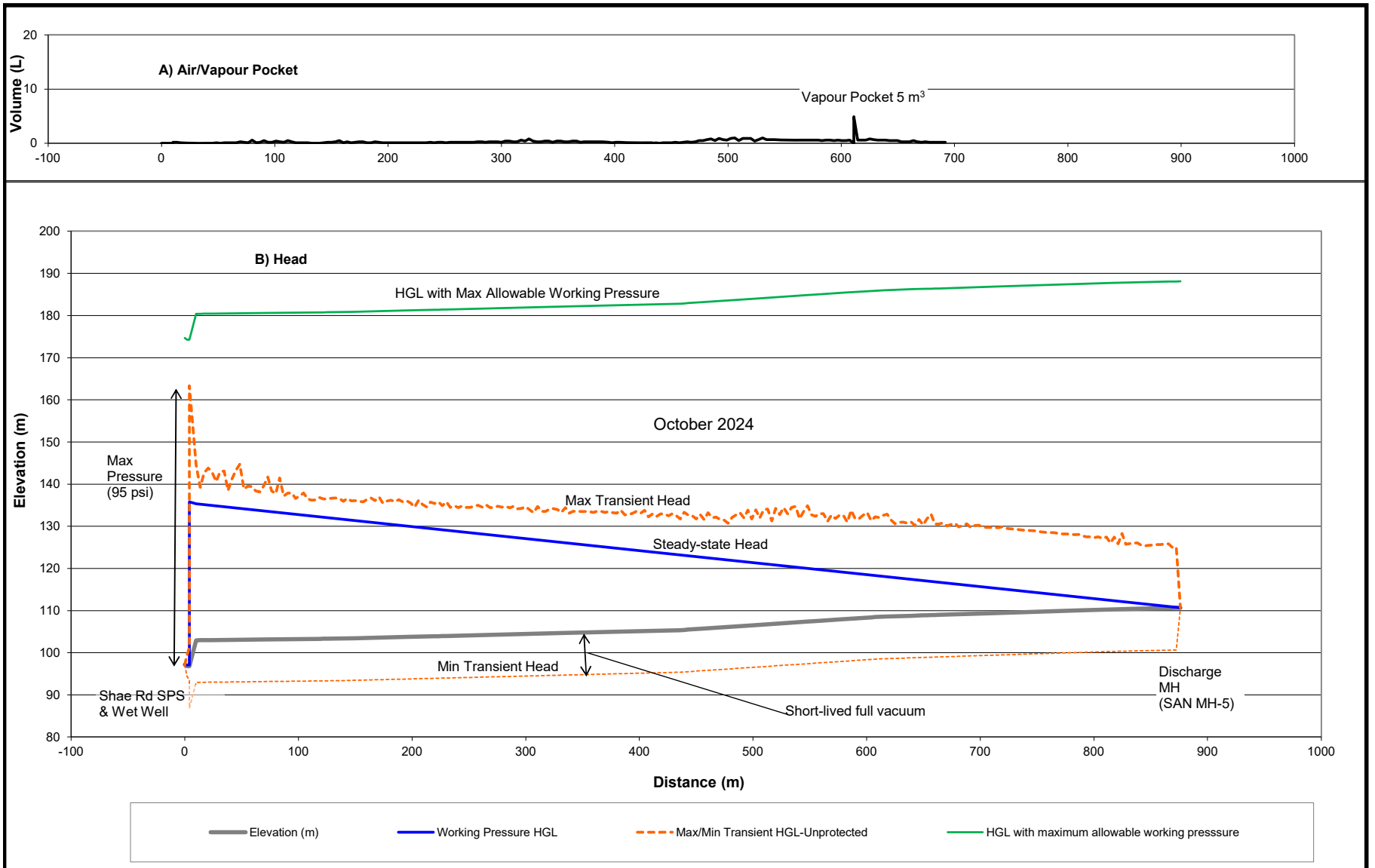
Based on the HAMMER model simulation results, the following conclusions and recommendations can be drawn:

- 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.

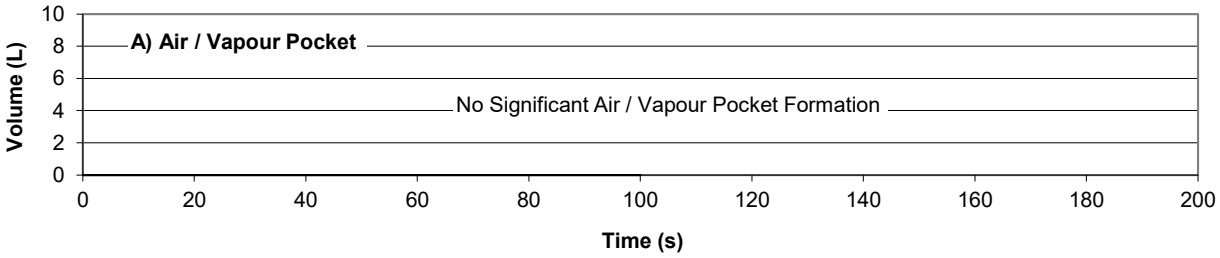
# ATTACHMENTS

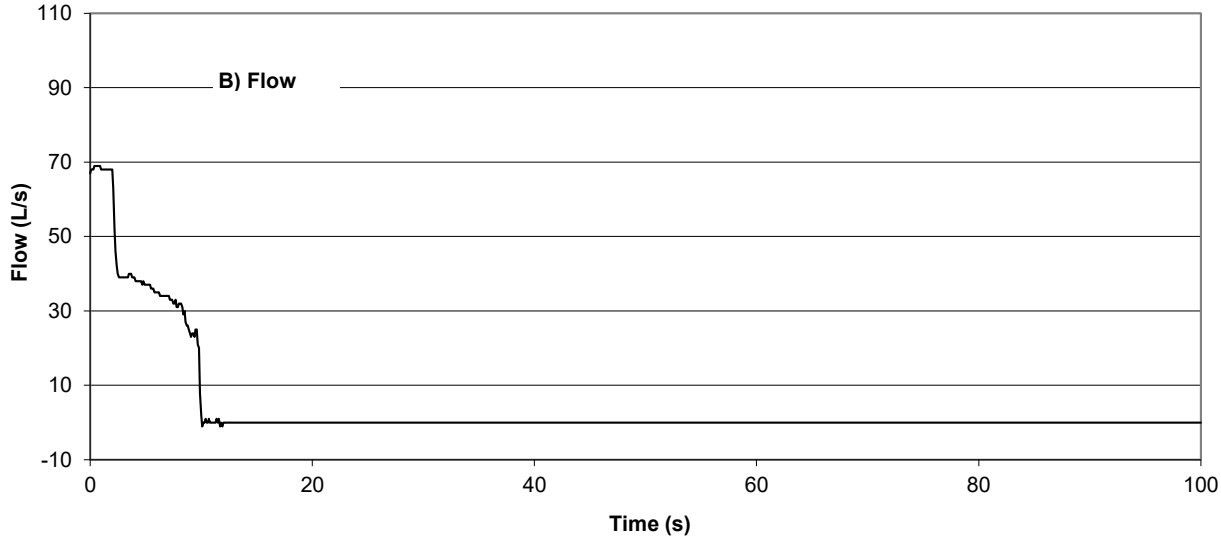


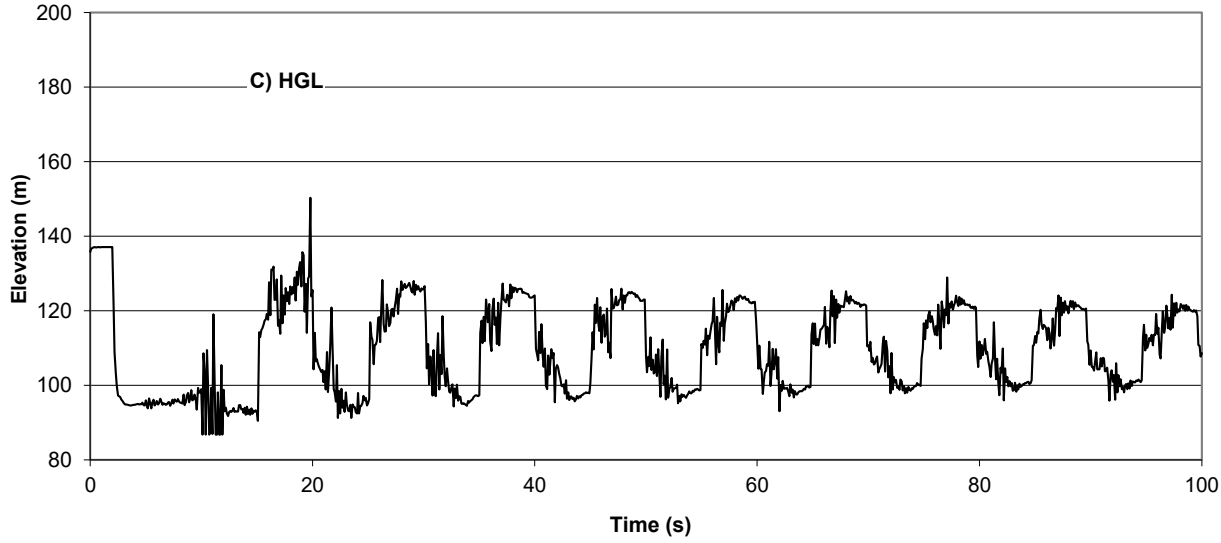

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| | ARCADIS | Attachment 1 |

**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**

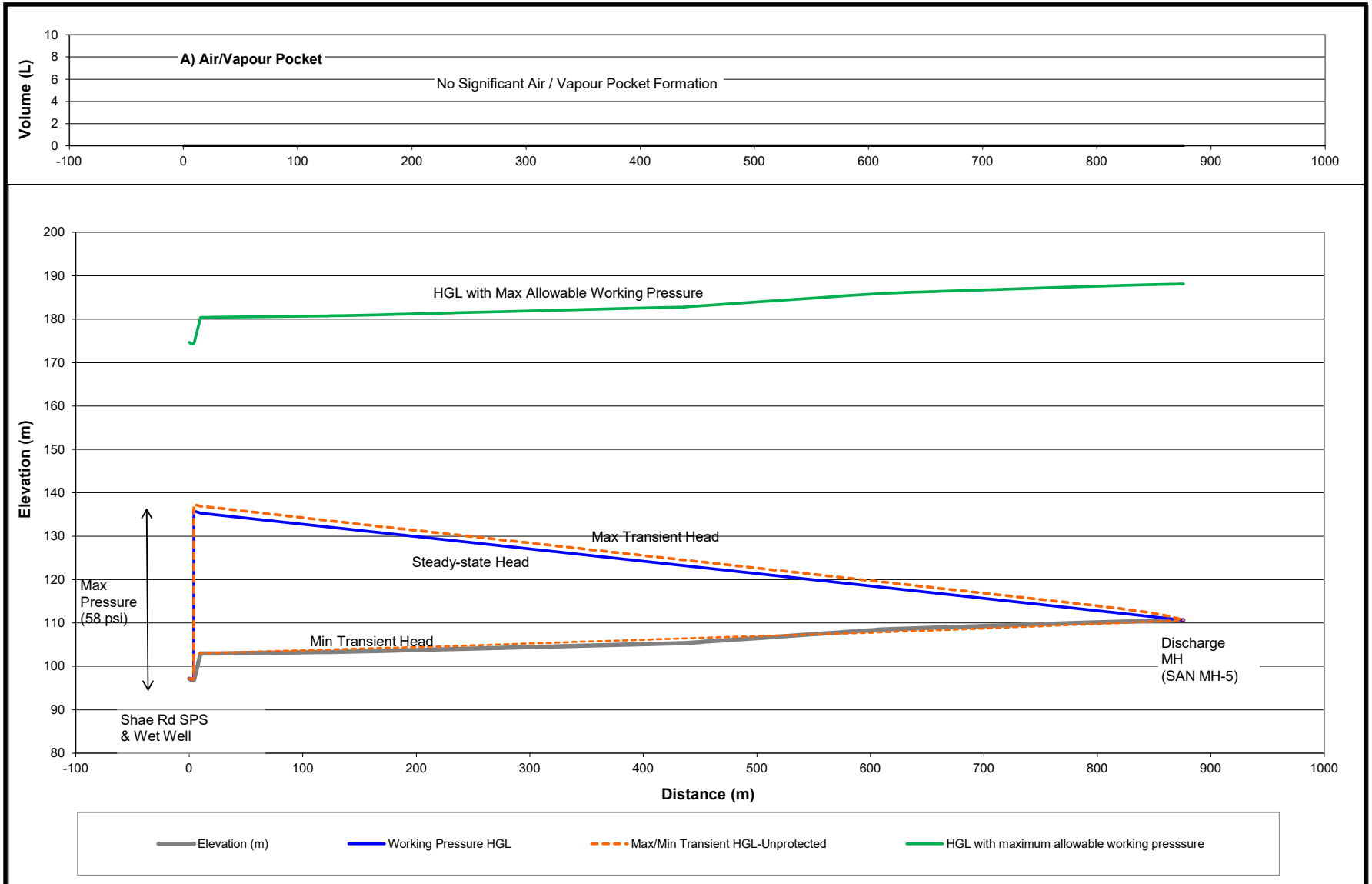
Transient Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Emergency Pump Shutdown** without Surge Protection



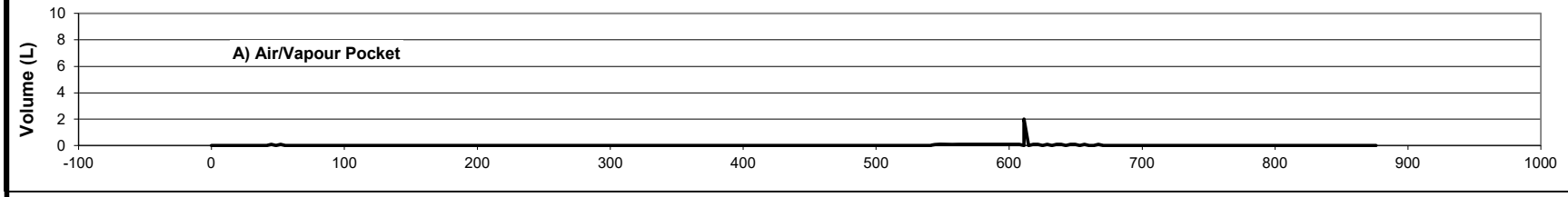

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| | Project: 147554 | October 2024 | **Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains** |
| | ARCADIS | Attachment 1A | Transient History at the Proposed Shea SPS upon Emergency Pump Shutdown without Surge Protection |

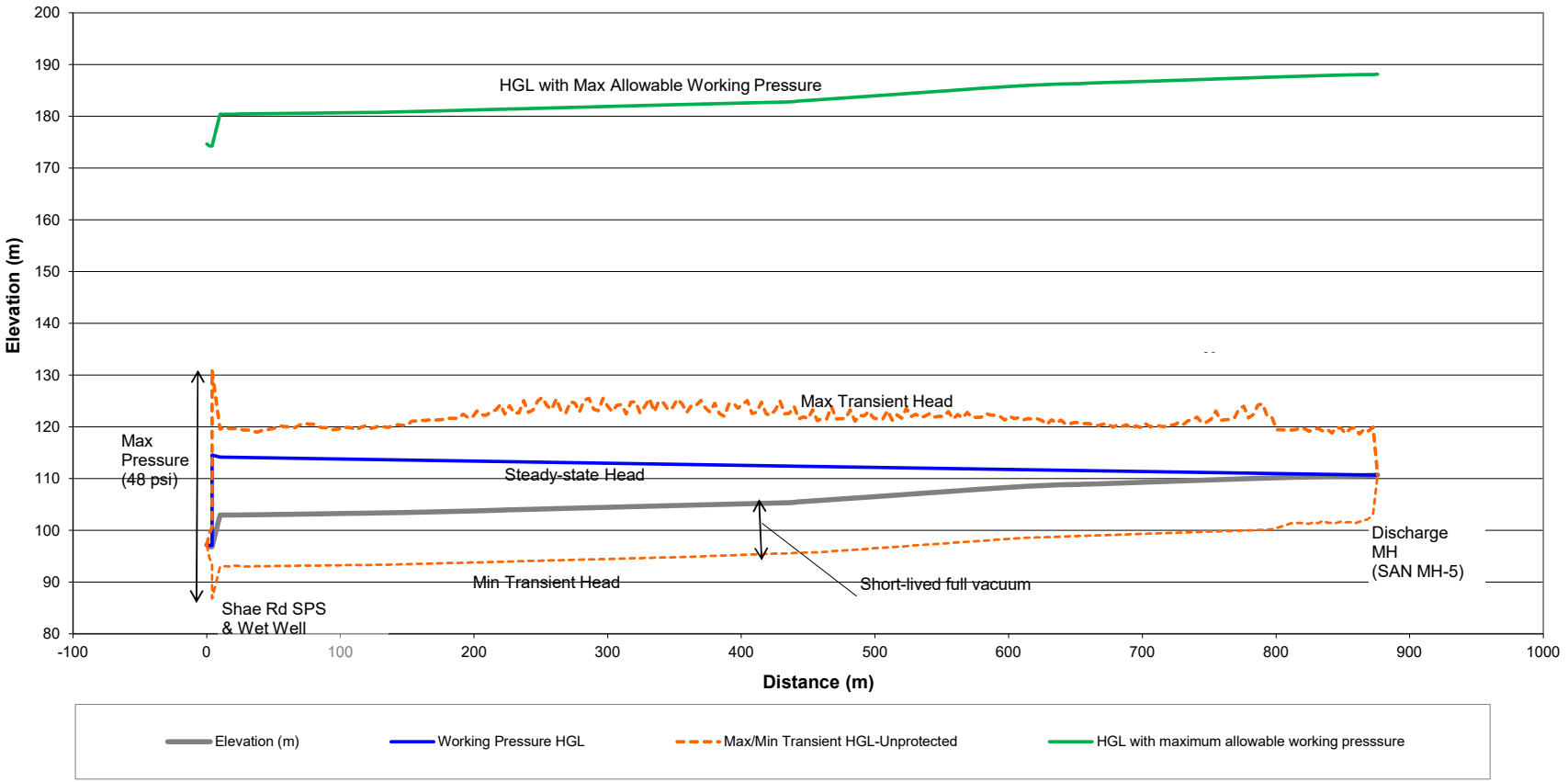



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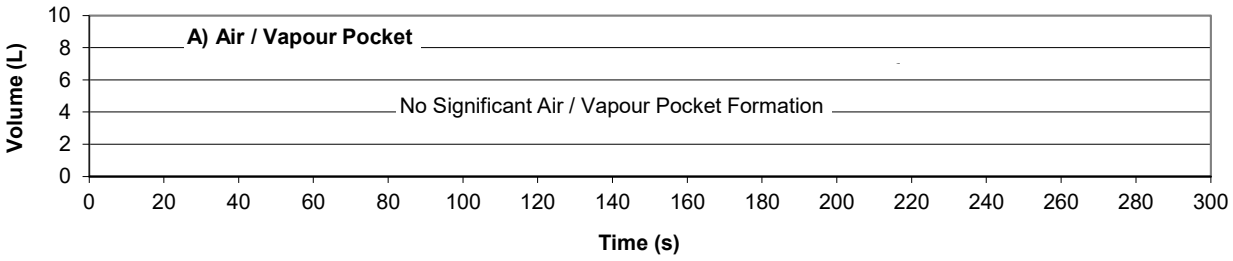
**Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains**

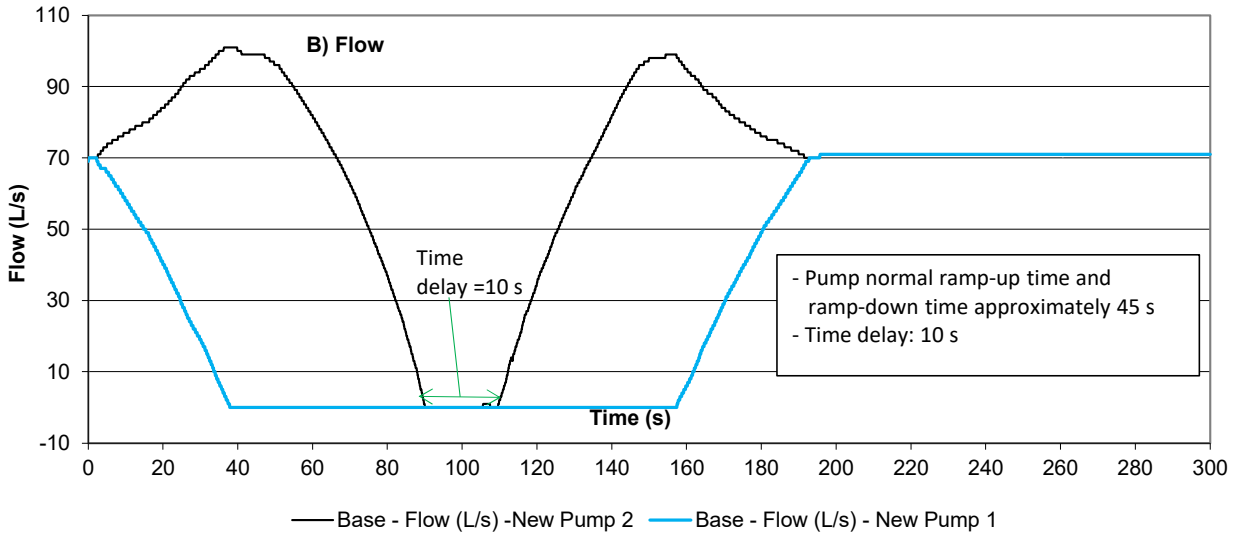
Envelopes for Existing Dual Forcemains from Shae Road SPS to Discharge MH (SAN MH-5) upon **Normal Pump Shutdown and Re-start** without Surge Protection

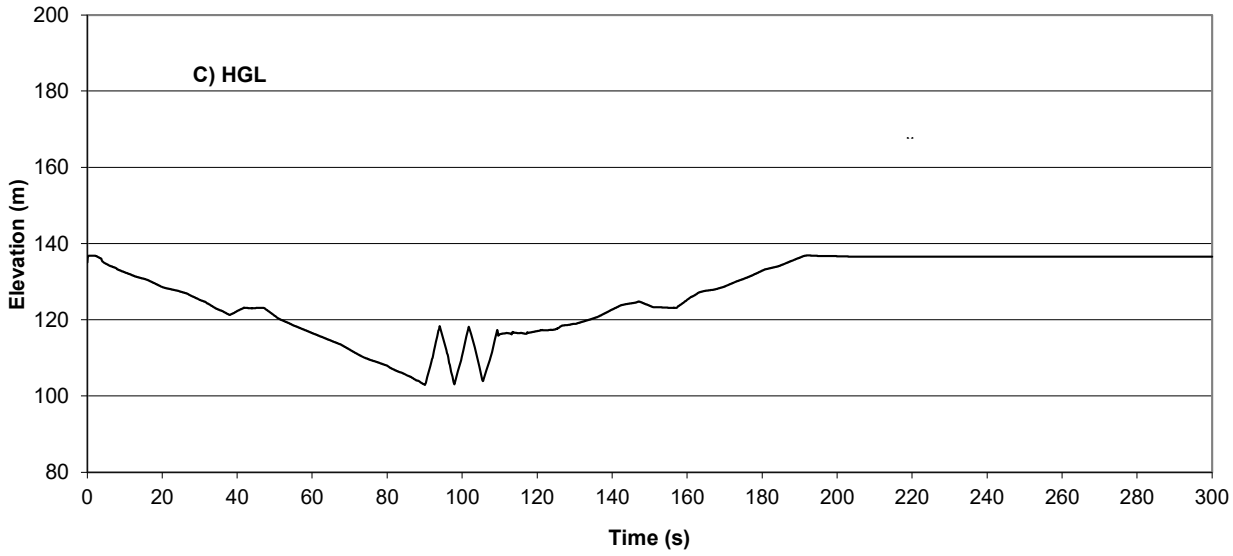


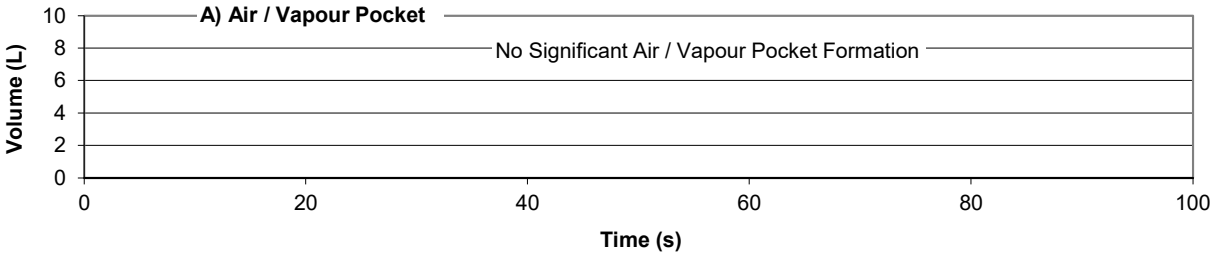

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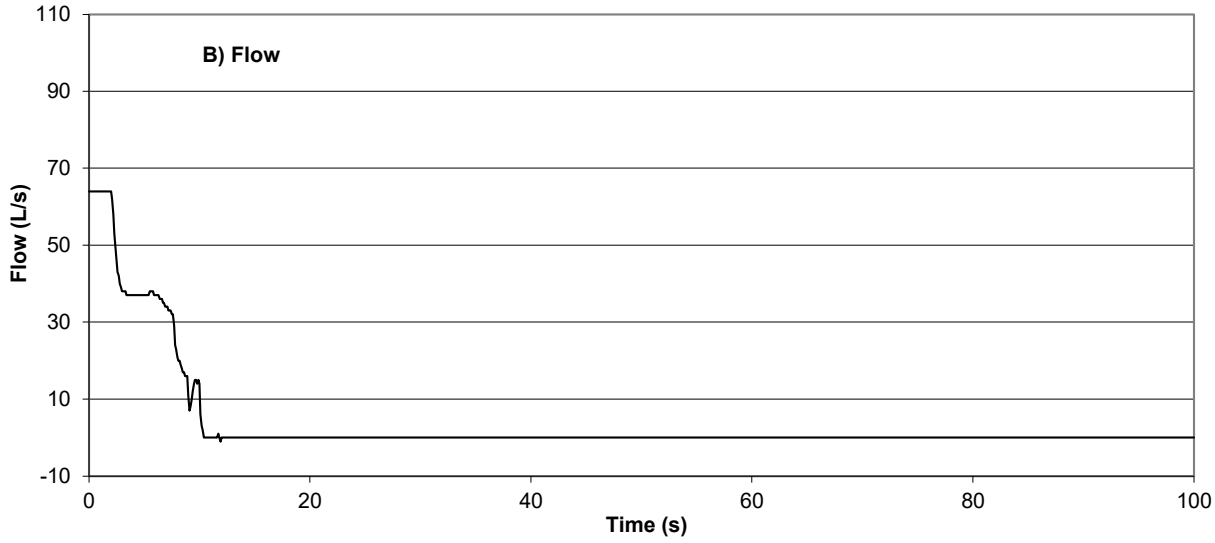


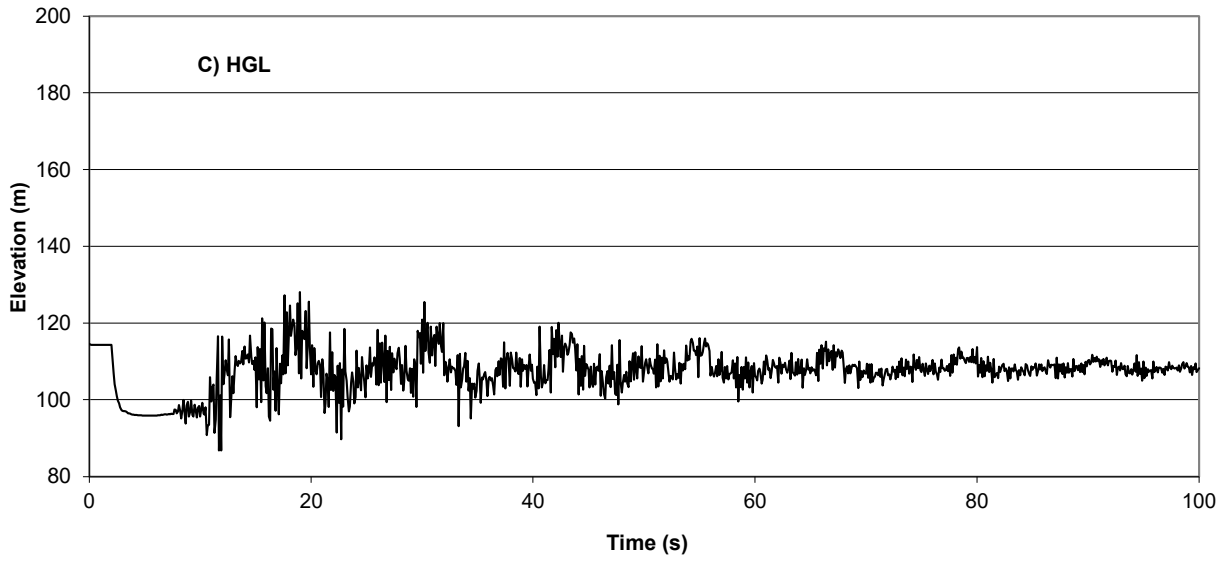



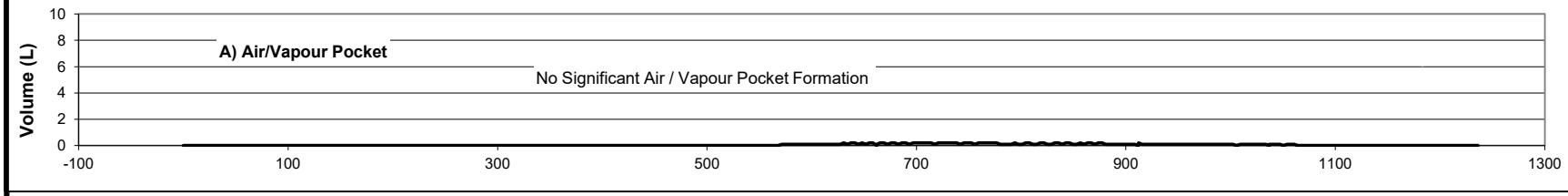

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| | Project: 147554 | October 2024 | **Scenario 1 – Pumping Station Upgrades with Existing Dual Forcemains** |
| | ARCADIS | Attachment 2A | Transient History at the Proposed Shea SPS under Normal Pump Shutdown and Re-start without Surge Protection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

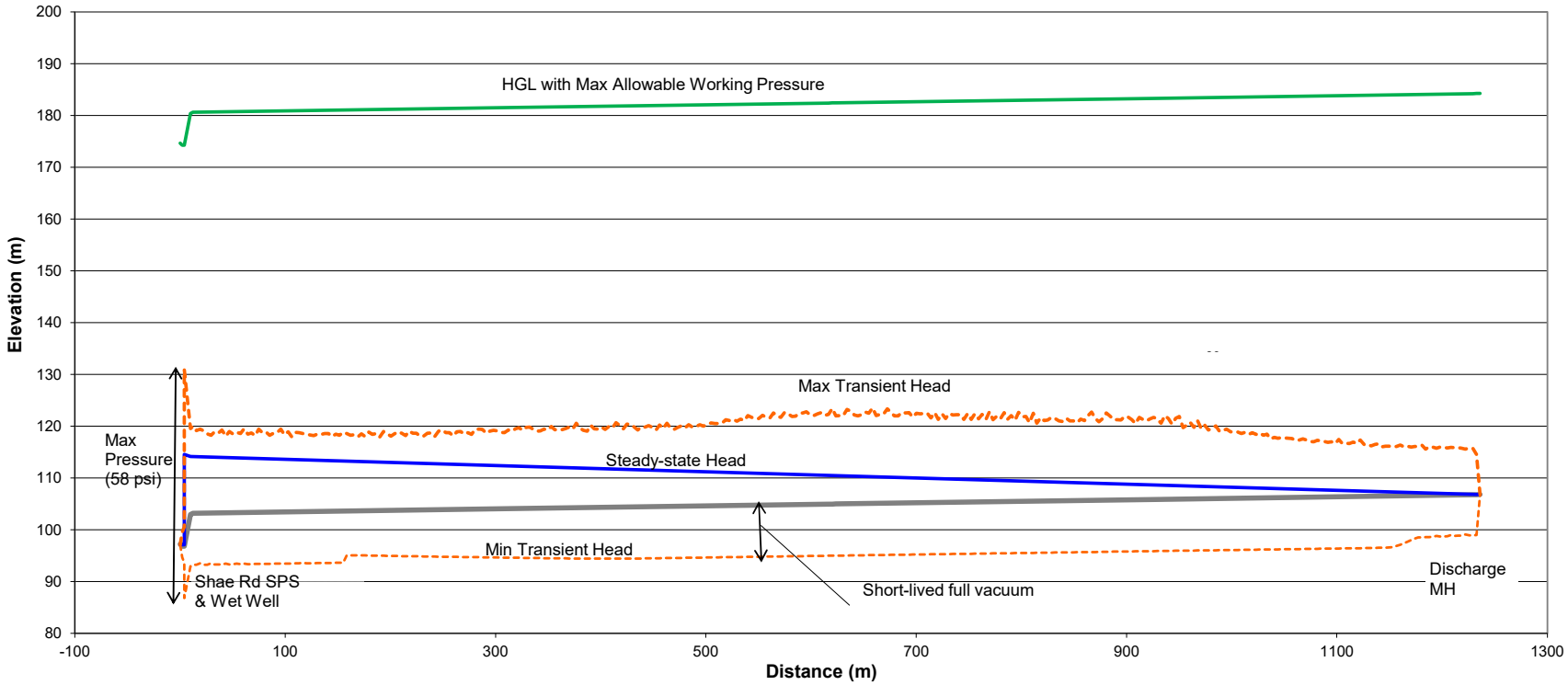


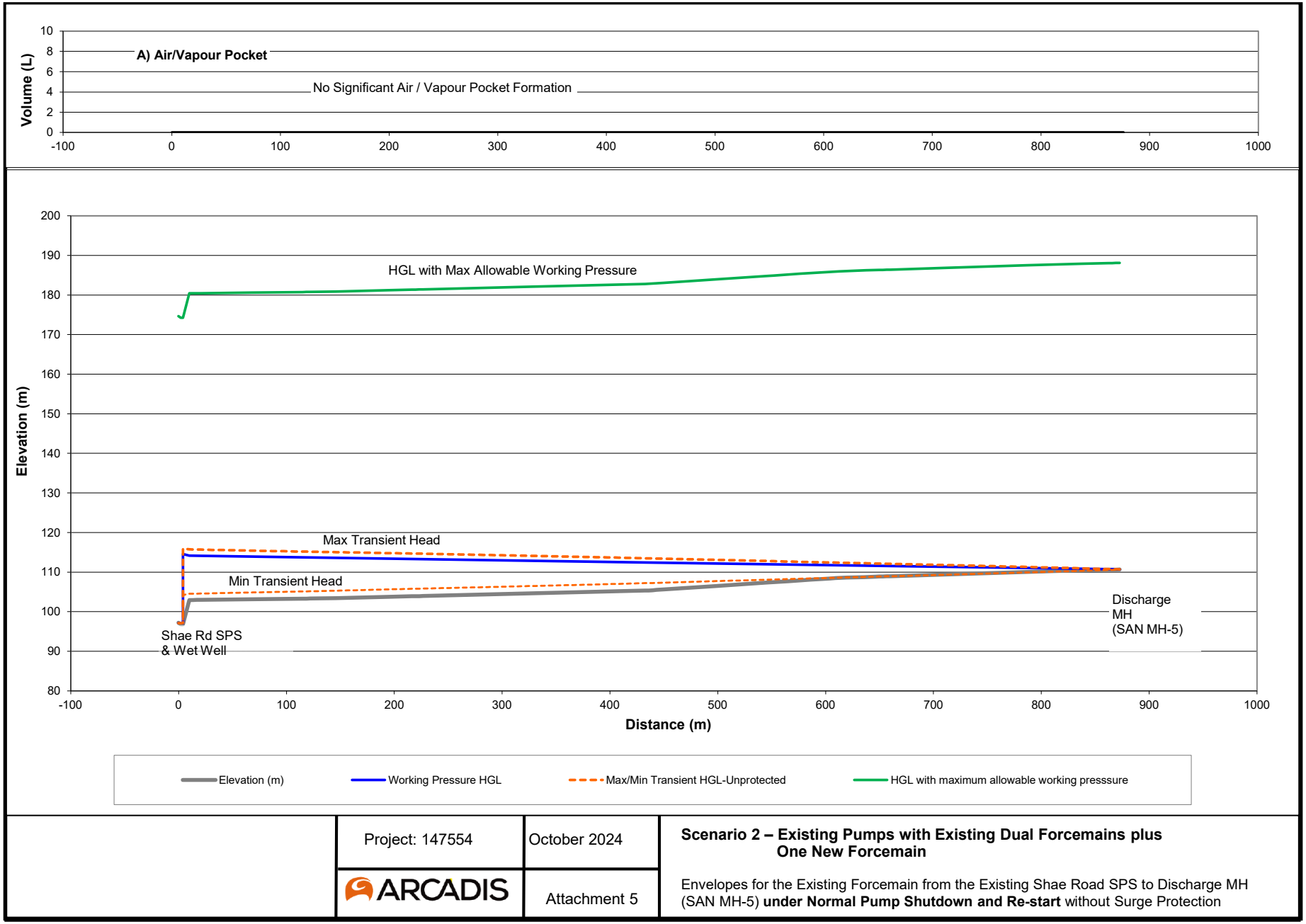




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| | Project: 147554 | October 2024 | **Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain** |
| | ARCADIS | Attachment 3A | Transient History at the Existing Shea SPS upon Emergency Pump Shutdown without Surge Protection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

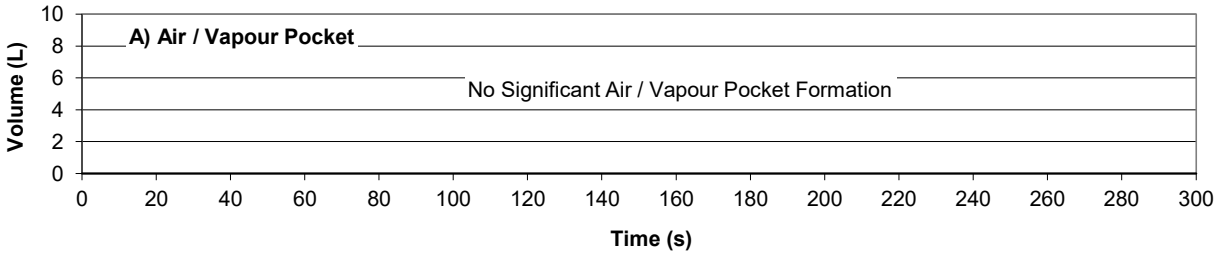


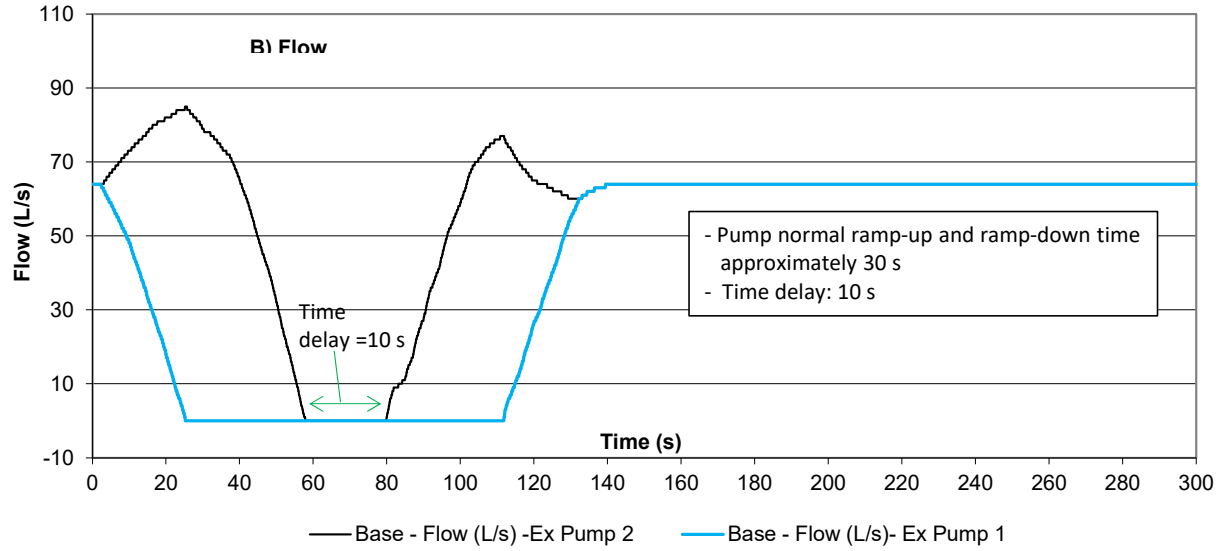



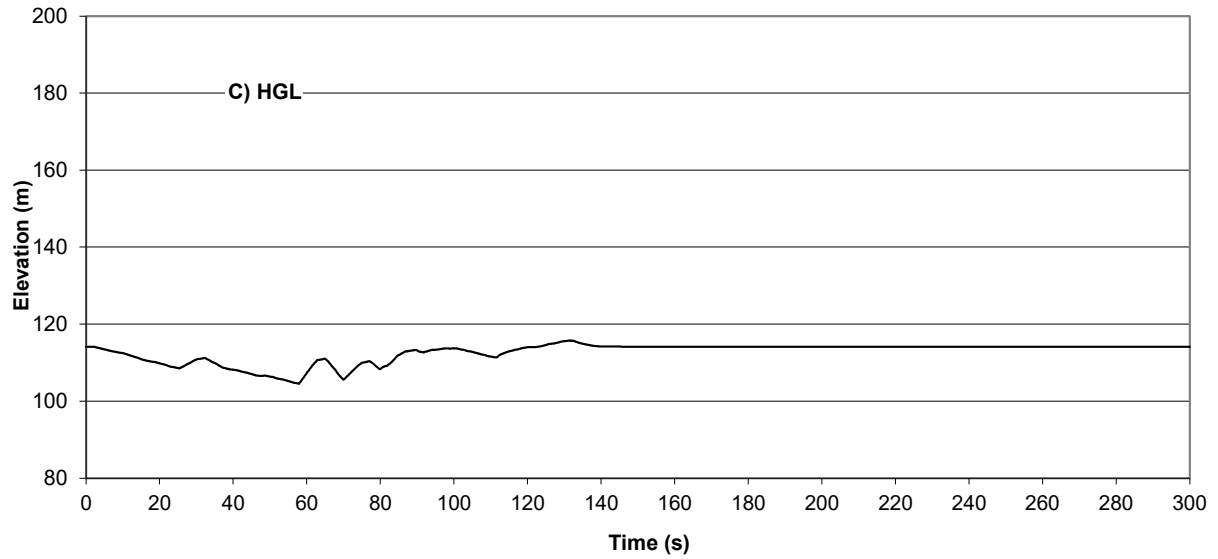

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|---|---|---|
| | Project : 147554 | **Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain** |
| | ARCADIS Attachment 4 | Envelopes for the New Forcemain from Shae Road SPS to Discharge MH upon **Emergency Pump Shutdown** without Surge Protection |



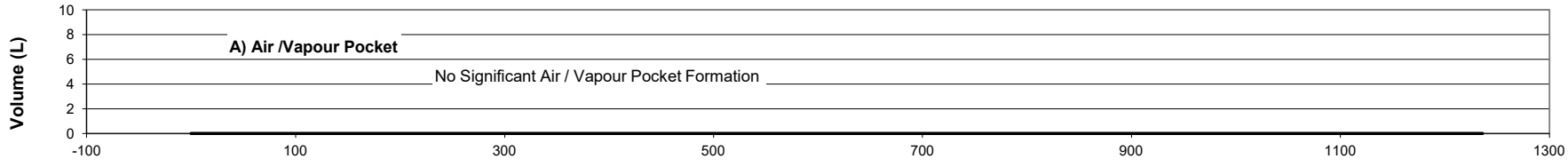

| | | | |
|---|---|---|---|
| | Project: 147554 | October 2024 | **Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain** |
| | ARCADIS | Attachment 5 | Envelopes for the Existing Forcemain from the Existing Shae Road SPS to Discharge MH (SAN MH-5) **under Normal Pump Shutdown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

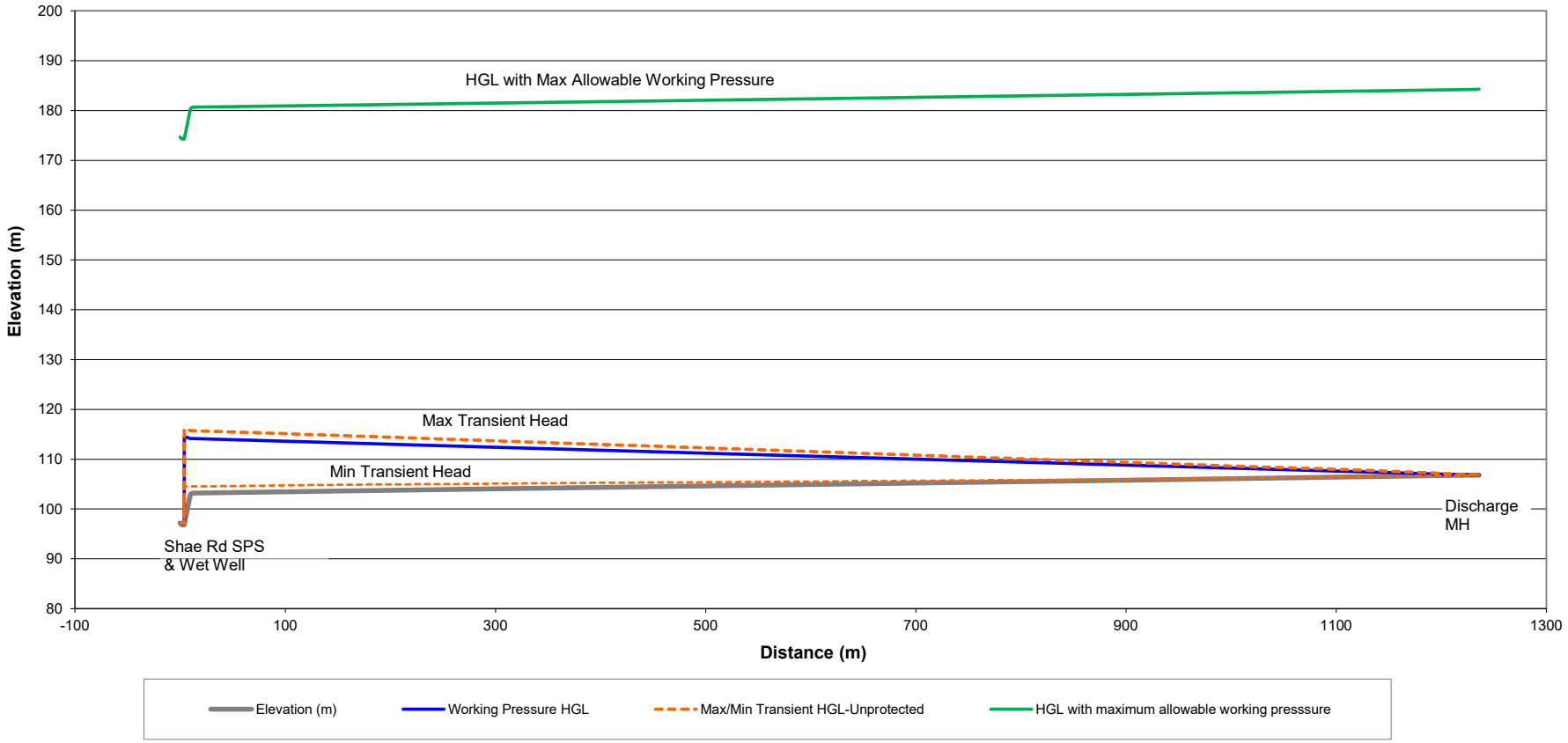


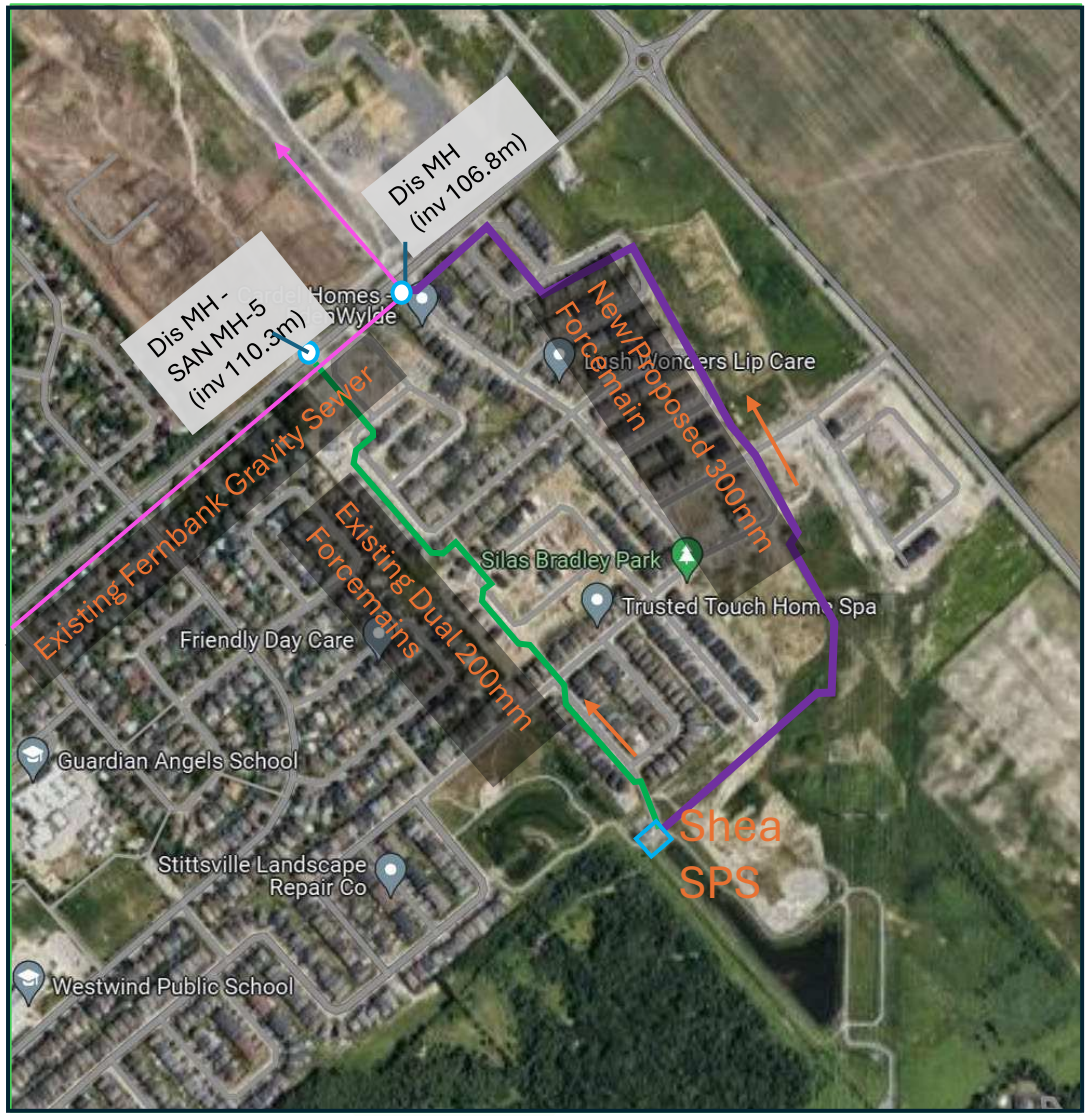

| | | | |
|---|---|---|---|
| | Project:147554 | October 2024 | **Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain** |
| | ARCADIS | Attachment 5A | Transient History at the Existing Shea SPS under Normal Pump Shutdown and Re-start without Surge Protection |



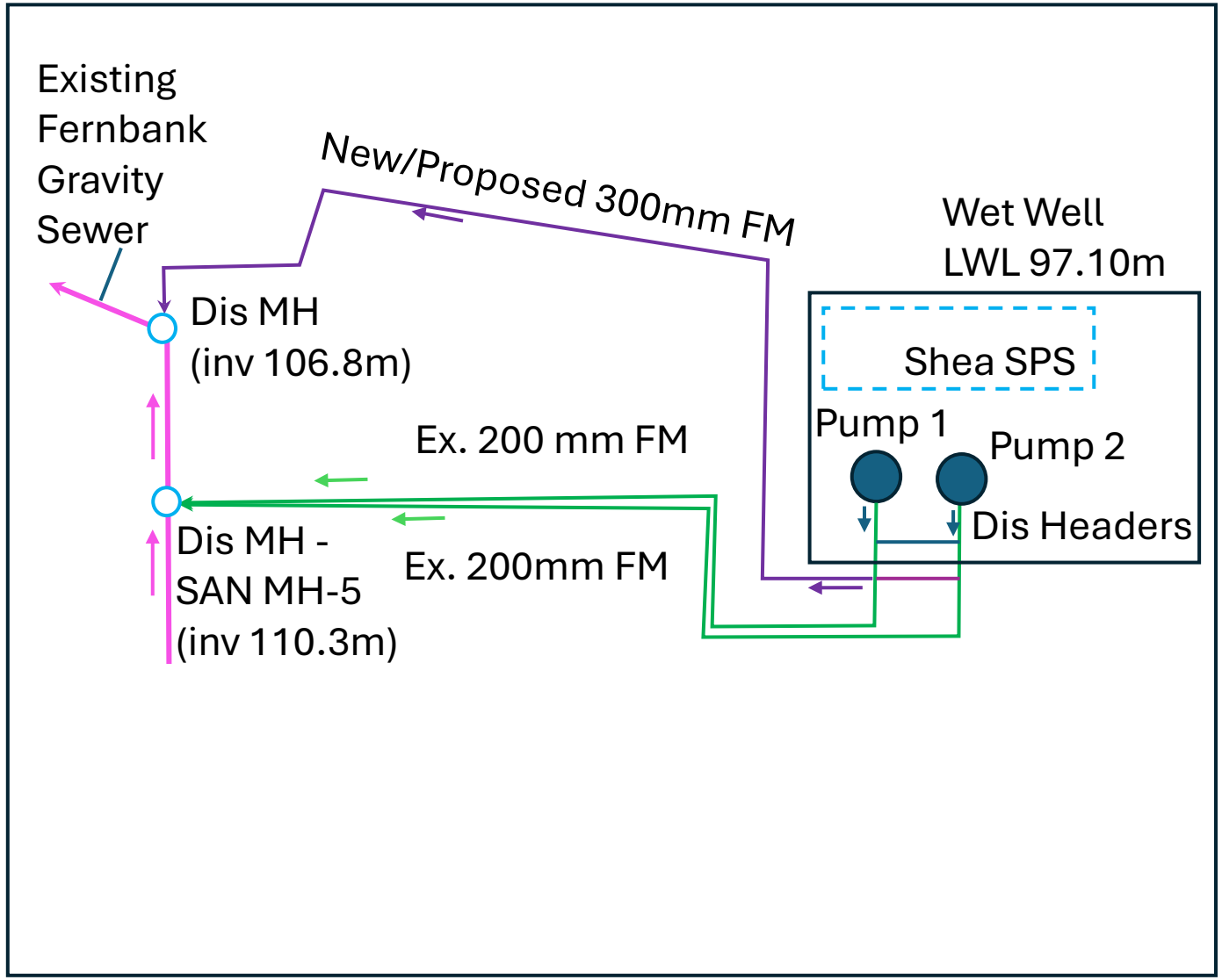




| | | | |
|---|---|---|---|
| | Project: 147554 | October 2024 | **Scenario 2 – Existing Pumps with Existing Dual Forcemains plus One New Forcemain** |
| | ARCADIS | Attachment 6 | Envelopes for the New Forcemain from the Existing Shae Road SPS to Discharge MH under **Normal Pump Shutdown and Re-start**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

# APPENDIX A
# Location Map




Plan View of Shea SPS and Forcemain System



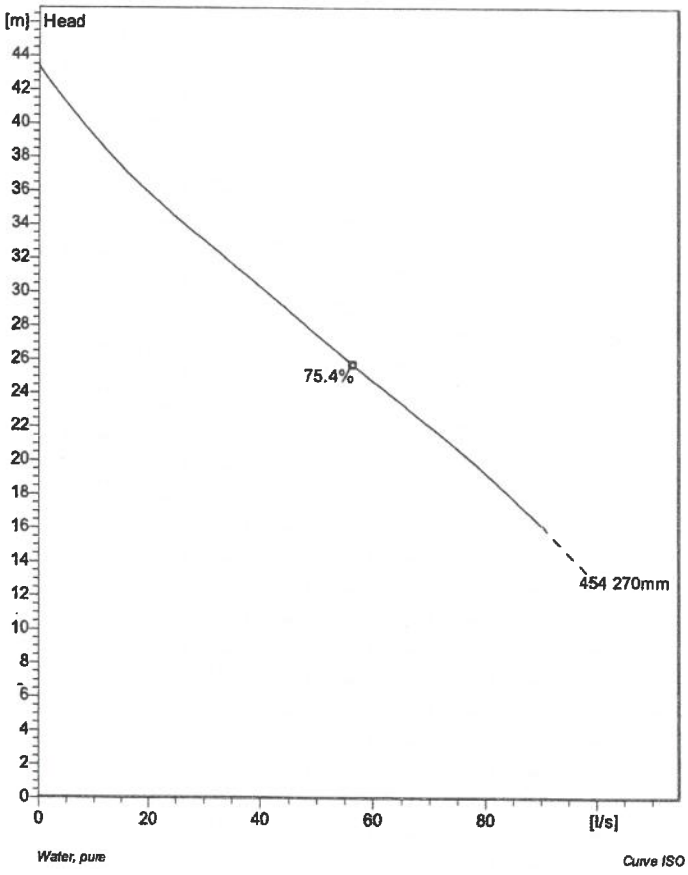

Schematic of Shea SPS and Forcemain System

# APPENDIX B
# Background Information

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.

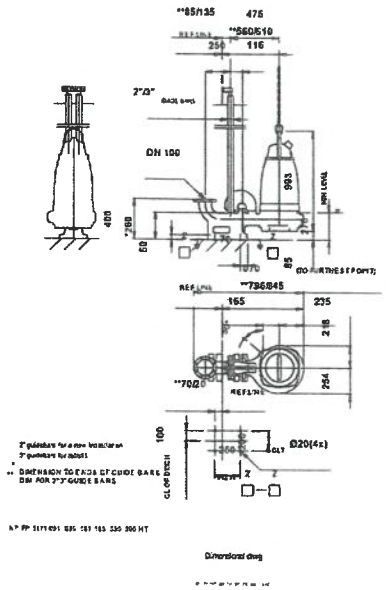
**Impeller**

| | |
|---|---|
| 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 | |

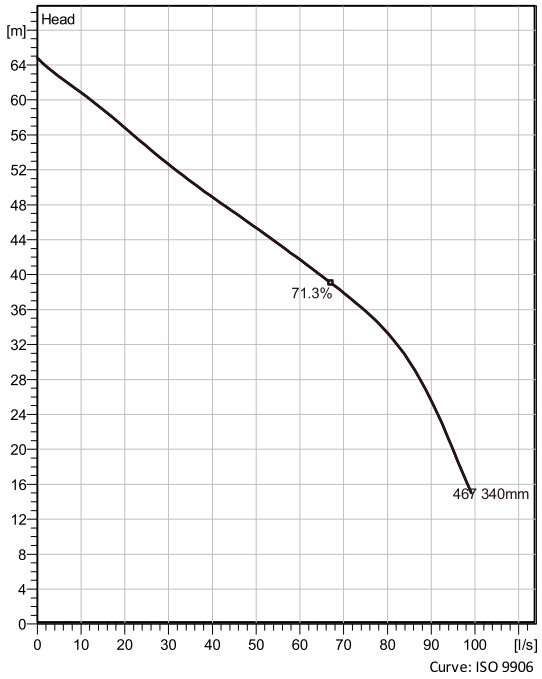
# NP 3202 HT 3~ 467

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

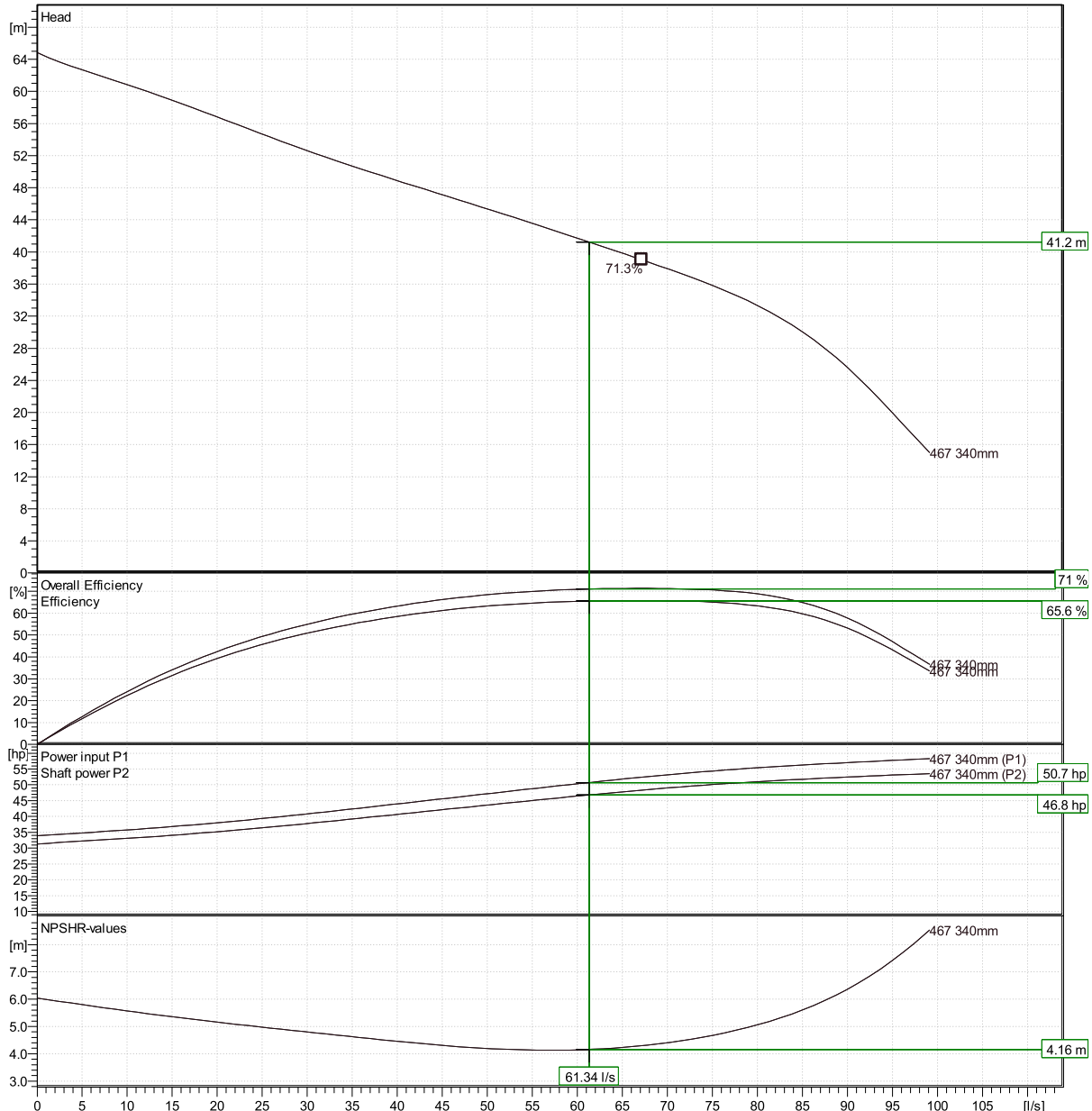
## Performance curve

FLYGT
a xylem brand

### 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.

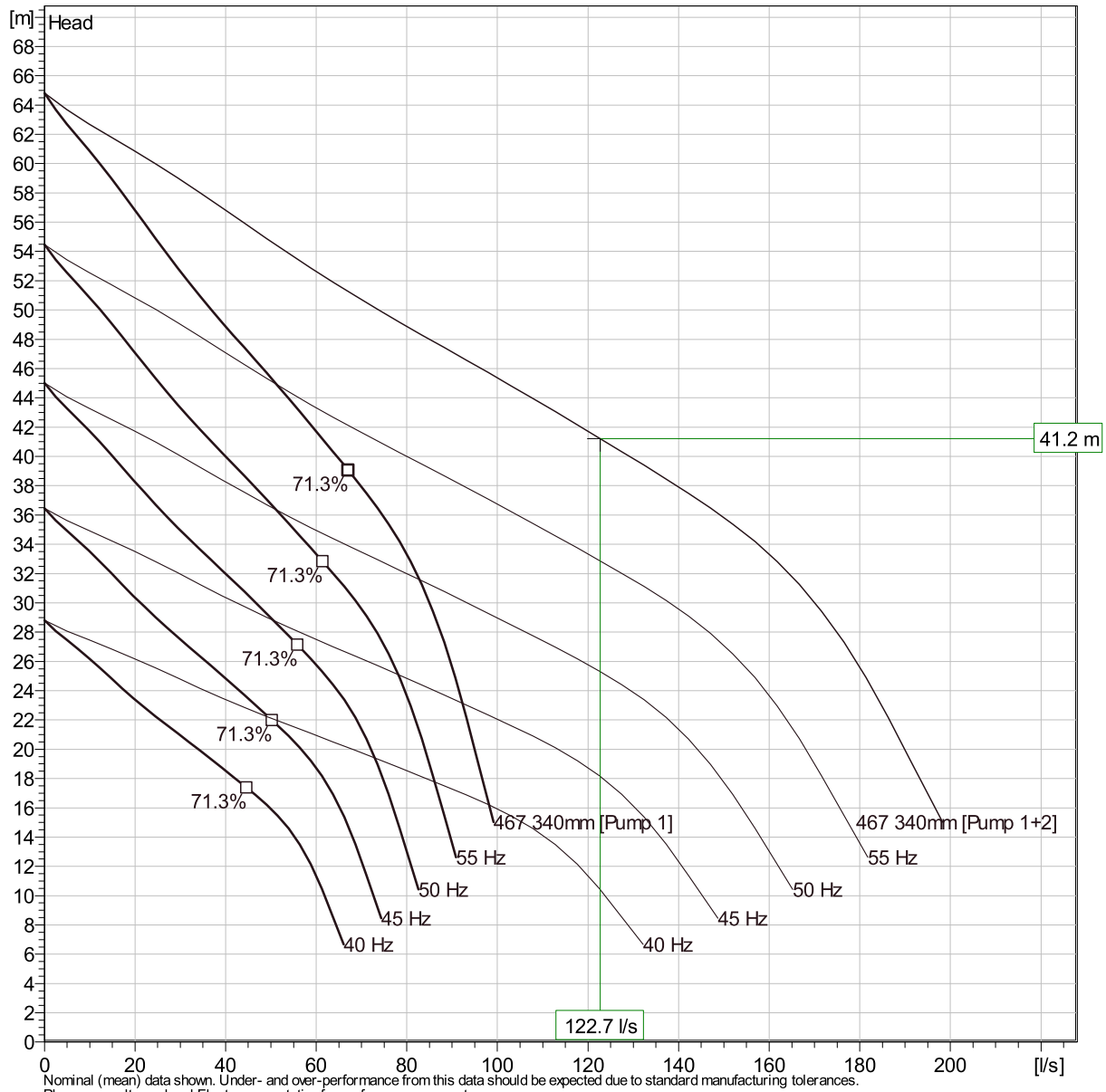
Curve: ISO 9906

| | | | |
|---|---|---|---|
| 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

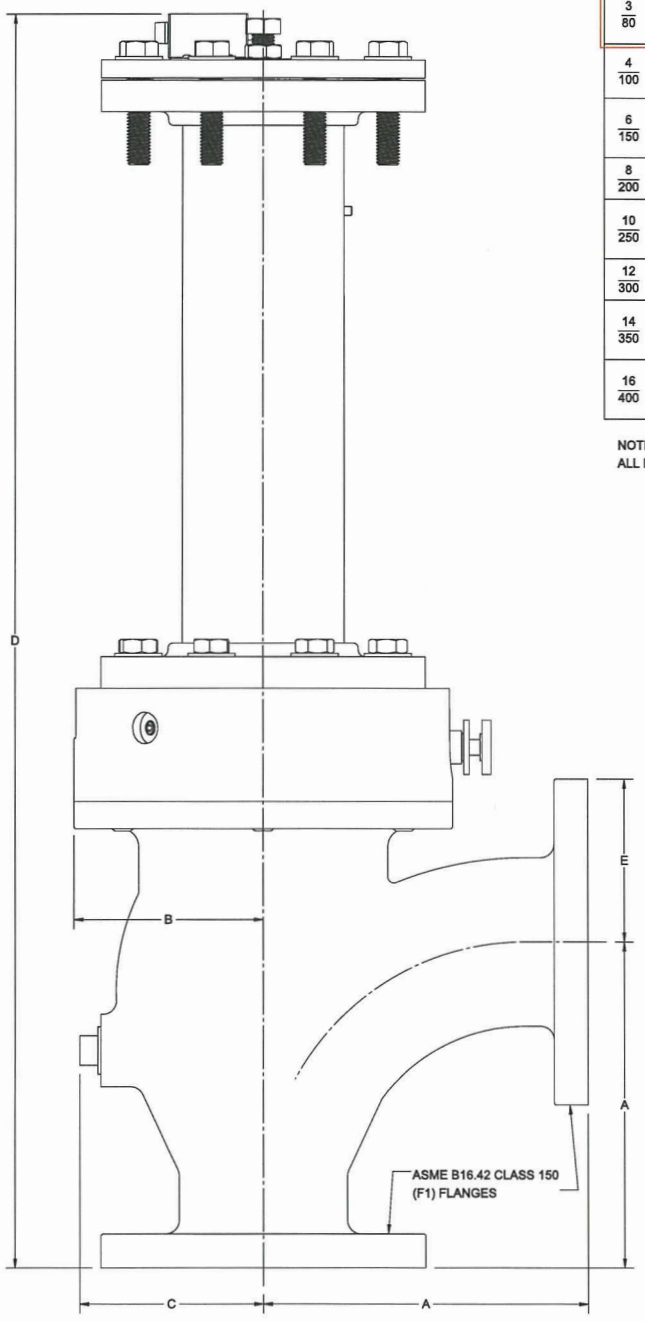
# DRAWINGS SUBMITTAL

| | |
|---|---|
| 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 | |

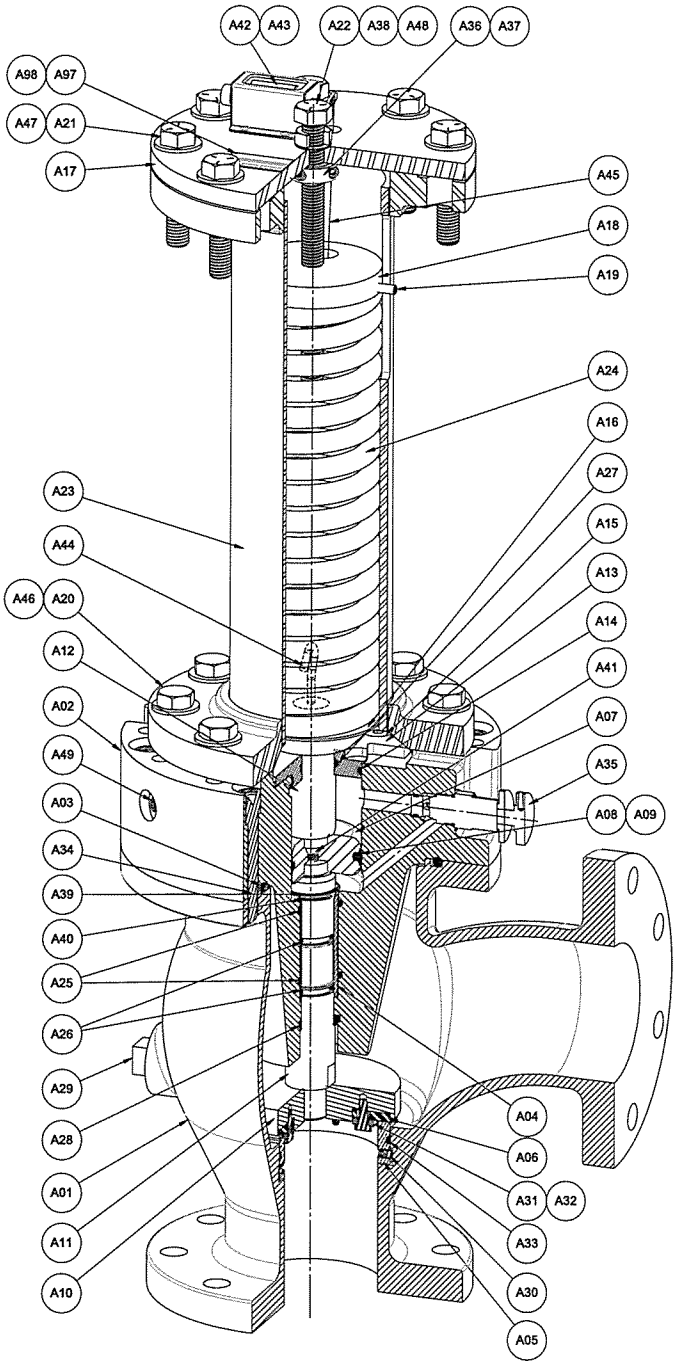
NOTE:
ALL DIMENSIONS ARE SHOWN IN INCHES/MILLIMETERS.

DeZURIK
APCO | HILTON

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

| DOCT CODE | DRAWN | APPROVED |
|---|---|---|
| C1 | JPD | TMO |
| | CHECKED: TMO | DATE: 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.

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.<br>- Design reliability (ie. emergency scenarios).<br>- 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.<br>- Option 2 would have flexibility for future upgrades. Upgrades could achieve 130L/s. Designing around existing utilities and service laterals could be challenging.<br>- Option 3 would have flexibility for future upgrades. Upgrades could achieve 130L/s. Designing around existing utilities could be challenging.<br>- 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.<br>- Potential for encountering utility conflict.<br>- Potential for encountering poor soils/rock conditions.<br>- 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.<br>- 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.<br>- Option 3 would allow for continued operation of the existing forcemains while the installation of a new forcemain is being completed.<br>- Potential for encountering utility conflicts low risk for Option 1.<br>- Potential for encountering utility conflicts medium risk for Option 2, as new forcemains utilizing existing forcemains routing.<br>- Potential for encountering utility conflicts high risk for Option 3, as new forcemain using new routing.<br>- Based on Geotech, potential for encountering poor soils is not likely. Rock could be encountered.<br>- 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.<br>- Amount of maintenance intensive infrastructure required. | - Option 1 and 2 would have similar flexibilty of operation and maintenance due to the two forcemains.<br>- Option 3 would have the best flexibility of operation and maintenance due to the three forcemains.<br>- 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.<br>- Option 1 and 2 would have similar maintenance costs due to the two forcemains.<br>- 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.<br>- 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.<br>- 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.<br>- Potential of excessive noise, vibration, and air pollution, caused by construction operations. | - All options would have minimal impact on fish/wildlife habitat.<br>- 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.<br>- 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.<br>- 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.<br>- Impact on future infrastructure.<br>- 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.<br>- 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.<br>- Option 1 and 2 would have a similar level of service/redundancy as there will be two forcemains.<br>- 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.<br>- Soft costs.<br>- Potential of unforeseen costs. | - Refer to the Class 'C' Cost Estimate.<br>- Option 1 is marginally above the lowest capital costs of Option 3.<br>- Option 2 has the highest capital costs.<br>- 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.

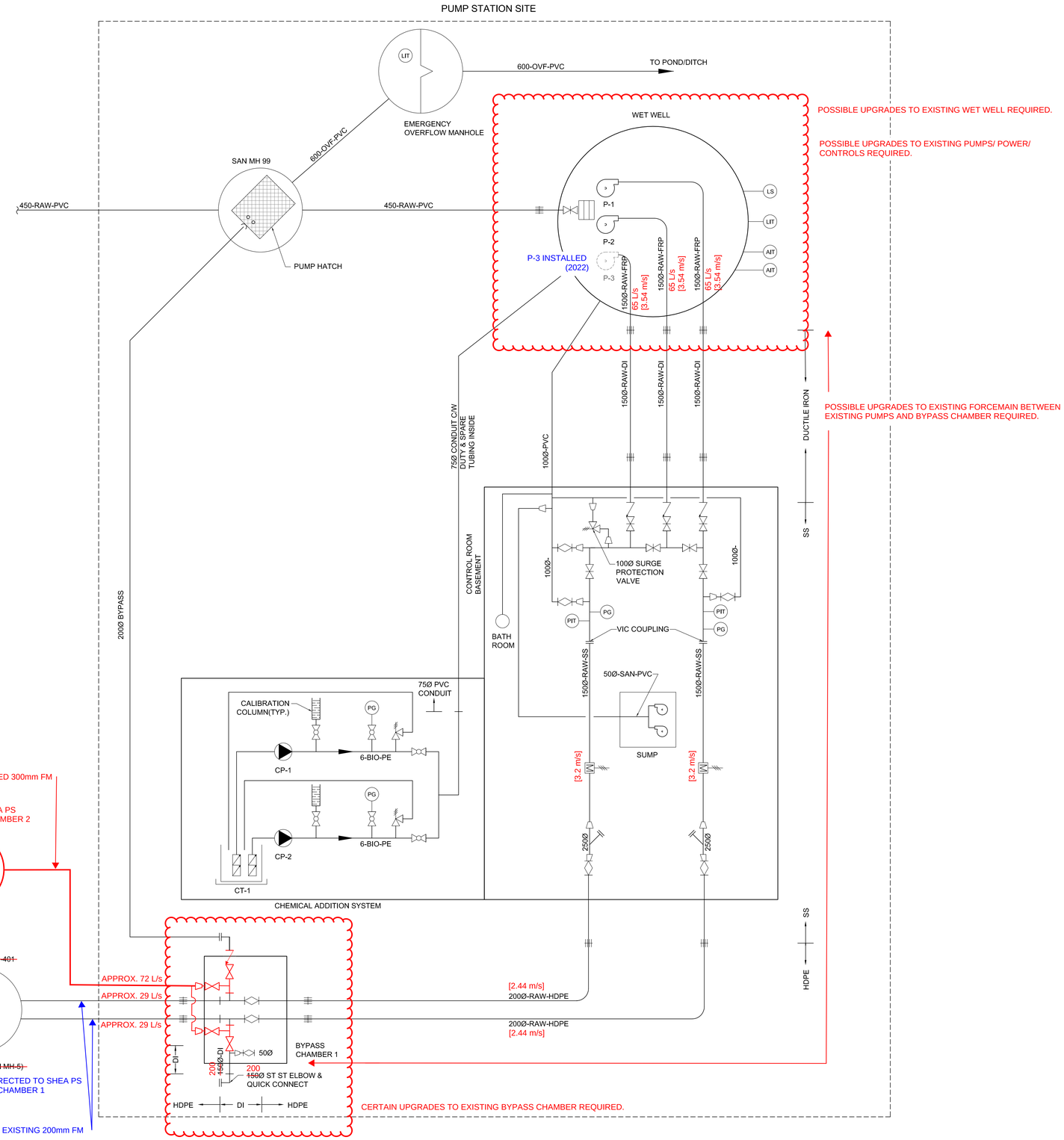
**Possible Upgrades:**

- 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
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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com


LOCATION
CITY OF OTTAWA
SHEA ROAD SANITARY PUMP STATION

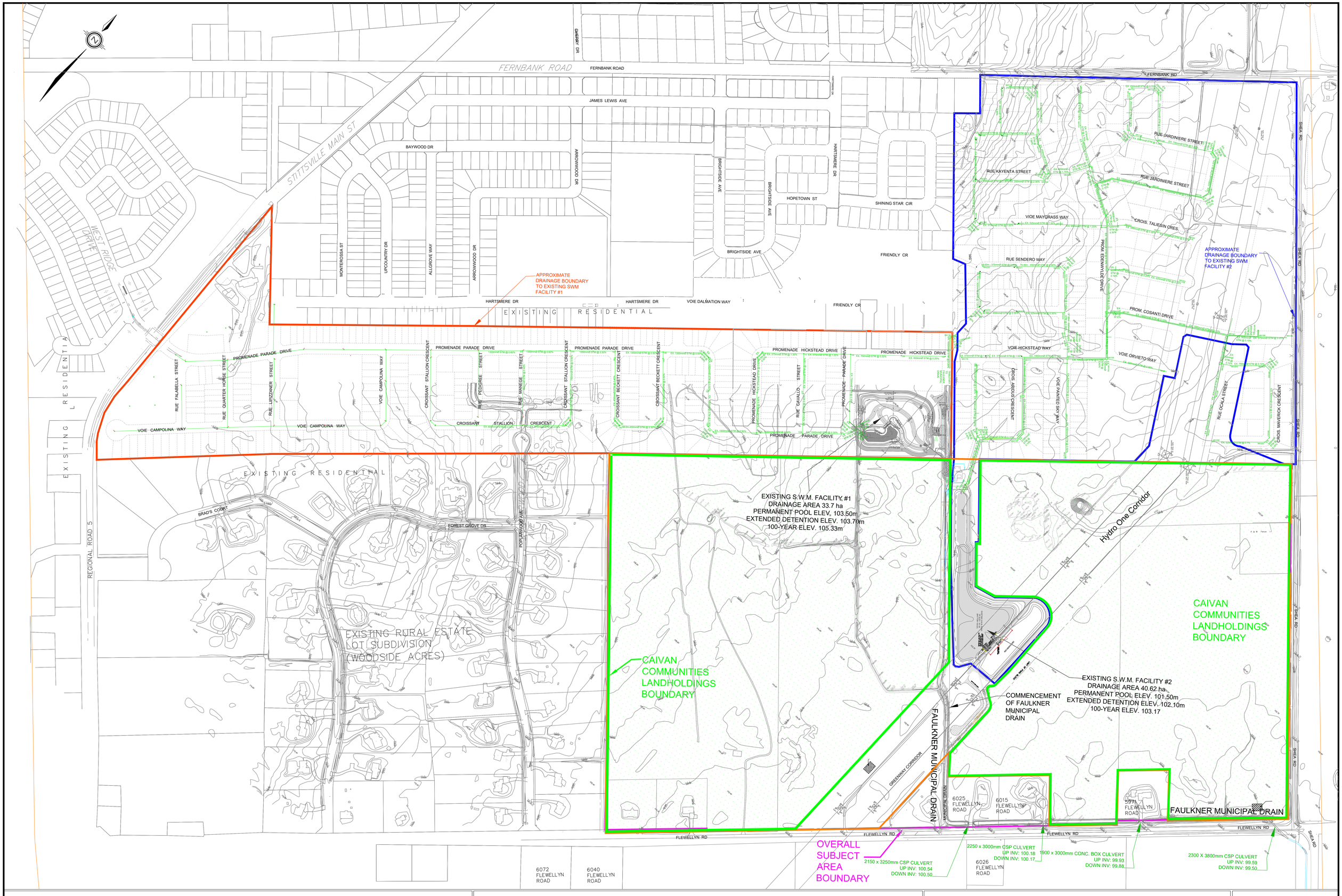
DRAWING NAME
PROCESS SCHEMATICS
NOVATECH MARKUP
CJS, MAR 26/25

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


M:\2013\113004\CAD\Design\Drawings\Sheets\113004-PS1.dwg, PS1, Sep 11, 2018 - 10:33am, lbalam

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) 2 YEAR | | | | AREA (Ha) 5 YEAR | | | | AREA (Ha) 10 YEAR | | | | AREA (Ha) 100 YEAR | | | | FLOW | | | | | | SEWER DATA | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AREA | R | Indiv. | Accum. | AREA | R | Indiv. | Accum. | AREA | R | Indiv. | Accum. | AREA | R | Indiv. | Accum. | Time of | Intensity | Intensity | Intensity | Intensity | Peak Flow | DIA. (mm) | DIA. (mm) | TYPE | SLOPE | LENGTH | INV | OBV | T/G | CAPACITY | VELOCITY | TIME OF | RATIO |
| | | | | | | | | | | | | | | | | | | | 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 | | | | | | | | | | | | | | | | | | | |
| | | | AREA | | Indiv. | Accum. | AREA | | Indiv. | Accum. | AREA | | Indiv. | Accum. | AREA | | Indiv. | Accum. | Time of | Intensity | Intensity | Intensity | Intensity | Peak Flow | DIA. (mm) | DIA. (mm) | TYPE | SLOPE | LENGTH | INV | OBV | T/G | CAPACITY | VELOCITY | TIME OF | RATIO |
| | | | | | | | | | | | | | | | | | | Conc. | 2 Year | 5 Year | 10 Year | 100 Year | | | | | | | UPS | UPS | UPS | | | | |
| Location | From Node | To Node | (Ha) | R | 2.78 AC | 2.78 AC | (Ha) | R | 2.78 AC | 2.78 AC | (Ha) | R | 2.78 AC | 2.78 AC | (Ha) | R | 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 |