

# 200 Codd's Road (Wateridge Blocks 22-23)

Site Servicing and Stormwater Management Report



Prepared for:  
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Date:  
August 31, 2026

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## Revision Schedule

| Revision | Description                           | Author/<br>Revised By    | Date           | Quality<br>Check | Date           | Independent<br>Review | Date           |
|----------|---------------------------------------|--------------------------|----------------|------------------|----------------|-----------------------|----------------|
| 0        | 1 <sup>st</sup> Submission<br>for SPC | Michael W.               | 2026-<br>02-20 | Dustin T.        | 2026-<br>03-20 | Peter M.              | 2026-<br>03-23 |
| 1        | 2 <sup>nd</sup> Submission<br>for SPC | Michael W./<br>Alyssa G. | 2026-<br>08-17 | Dustin T.        | 2026-<br>08-31 | Peter M.              | 2026-<br>08-28 |
|          |                                       |                          |                |                  |                |                       |                |

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# 1 Introduction

Mattamy (Rockcliffe II) Inc. has commissioned Stantec Consulting Ltd. to prepare this Servicing and Stormwater Management Report for their development site identified as Blocks 22 and 23 with a block address of 200 Codd's Road within Phase 7 of the Wateridge Village Subdivision in the City of Ottawa.

The subject site is zoned R5Y [2312] and [2313] – Residential Fifth Density Zone, and is bound by open greenspace to the north, proposed parks to the west and east, and the future extension of Codd's Road to the south and will be constructed as part of Phase 7 of the Wateridge Subdivision development. The site location is outlined in Figure 1 below.

Per the site plan provided by Korsiak Urban Planning on August 28, 2026, the proposed 3.69 ha residential development will consist of 17 row townhome blocks, 8 back-to-back townhome blocks, for a total of 185 townhouse units, and associated private access roads. The objective of this report is to provide a servicing scenario for the site that is free of conflicts, provides on-site servicing in accordance with City of Ottawa design guidelines, and utilizes the existing local infrastructure in accordance with the various background studies outlined in **Section 2**.

*Figure 1.1: Site Location*



## 2 References

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

- Former CFB Rockcliffe Master Servicing Study, Report 32952-5.2.2, IBI, Revised June 2020
- Design Brief Wateridge Village at Rockcliffe Phases 6 and 7, Arcadis, August 2025
- Former CFB Rockcliffe Redevelopment Stormwater Management Existing Conditions & LID Pilot Project Scoping, Aquafor Beech Limited, Final Report, August 2015
- *City of Ottawa Design Guidelines – Water Distribution*, Infrastructure Services Department, City of Ottawa, Second Edition, December 2025, and all subsequent Technical Bulletins
- *City of Ottawa Sewer Design Guidelines*, Fourth Edition, City of Ottawa, December 2025
- *Environmental Compliance Approval No. 0824-A8CR5H*, Ministry of the Environment and Climate Change, April 2016
- *Geotechnical Investigation – Proposed Residential Development – Wateridge Village Phases 6, 7 & 8, Ottawa, Ontario*, Revision 5, Paterson Group, December 10, 2024
- *Geotechnical Investigation – Proposed Residential Development – Wateridge Village, Blocks 22 & 23 – Codd's Road, Ottawa, Ontario*, File PG7793-1, Paterson Group, Revision 1, August 26, 2026
- *Geotechnical Review & Recommendation - Proposed Foundations Adjacent to Underground Stormwater Chambers - Proposed Residential Development Wateridge Village, Blocks 22 & 23 – Codd's Road, Ottawa, Ontario*, File PG7793-MEMO.07, Paterson Group, August 26, 2026
- *Geotechnical and Hydrogeological Responses to CLC Comments - Proposed Residential Development Wateridge Village, Blocks 22 & 23 – Codd's Road, Ottawa, Ontario*, File PG7793-MEMO.08, Paterson Group, August 26, 2026
- *Low Impact Development Technical Guidance Report (Draft) – City of Ottawa*, prepared by Dillon Consulting and Aquafor Beech Ltd., November 2019
- *Wateridge Village Phases 6 & 7 Developer Checklist – Draft Memorandum*, prepared by Aquafor Beech Ltd., Ref#66945, Dated November 2024
- *Wateridge Village Phases 6 & 7 LID Monitoring Plan – Third Submission*, prepared by Aquafor Beech Ltd., Dated December 2024
- *Stormwater Management Planning and Design Manual*, Ministry of the Environment, Conservation, and Parks (MECP), March 2003
- *Stormwater Best Management Practice – Grassed Swales*, United States Environmental Protection Agency (US EPA) NPDES document EPA-832-F-21-031P, December 2021
- *The Effectiveness of Grass-Lined Highway Embankments and Ditches in Improving Water Quality*, Ministry of Transportation Ontario (MTO), Prepared by McCormik Rankin Corporation, June 2007



### 3 Water Servicing

#### 3.1 Background

The proposed site is within the MONT pressure zone of the City of Ottawa’s water distribution network. The site is expected to be serviced through 200mm diameter watermain within Codd’s Road to be installed as part of Wateridge Phase 7. The 200mm mains are supplied by multiple connections to distribution mains within the adjacent phases of the Wateridge subdivision.

#### 3.2 Design Criteria

##### 3.2.1 Water Demand and Allowable Pressure

The domestic water demand and allowable water pressure are assessed using the City of Ottawa Water Distribution Guidelines (2025) and the ISTB 2026-01 Technical Bulletin.

**Residential Apartment Population Density**

|           |                    |
|-----------|--------------------|
| Townhouse | 2.7 persons / unit |
|-----------|--------------------|

**Residential Apartment Demand**

|                      |               |
|----------------------|---------------|
| Average Daily (AVDY) | 280 L/cap/day |
| Maximum Daily (MXDY) | 2.5 × AVDY    |
| Peak Hour (PKHR)     | 2.2 × MXDY    |

**Allowable Water Pressure**

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| MXDY Flow                           | 345 kPa (50 psi) to 552 kPa (80 psi) |
| PKHR Flow Minimum                   | 276 kPa (40 psi)                     |
| MXDY + Fire Flow                    | 140 kPa (20 psi)                     |
| Maximum Allowable for Occupied Area | 552 kPa (80 psi)                     |

##### 3.2.2 Fire Flow and Hydrant Capacity

Detailed fire flow requirements are assessed using the Fire Underwriters Survey (FUS) methodology (2020). Site specific criteria considered are noted in Section 2.3.2.

Table 18.5.4.3 of the National Fire Protection Agency (NFPA) 1 Fire Code document specifies the maximum water flow contribution from a single fire hydrant when considering its distance from a building. A building’s RFF must be met by the sum of the flow contributions from one or multiple hydrants within 305 m of the building face.



NFPA Table 18.5.4.3 provides the maximum fire flow capacity for which an individual fire hydrant can be credited based on the unobstructed distance from the hydrant to the building.

*Table 3.1: NFPA Table 18.5.4.3 - Maximum Fire Hydrant Fire Flow Capacity*

| Distance to Building<br>(m) | Maximum Capacity<br>(L/min) |
|-----------------------------|-----------------------------|
| ≤76                         | 5,678                       |
| >76 and ≤152                | 3,785                       |
| >152 and ≤305               | 2,839                       |

### 3.3 Proposed Watermain Sizing and Layout

The proposed development will be serviced by a looped private watermain network fed by two connections to the existing 200 mm diameter watermain in Codd's Road.

#### 3.3.1 Water Demands

Based on the site layout, the proposed development is estimated to have a total population of 500 persons. The estimated demand for the proposed development is summarized in **Table 3.2** and detailed in **Appendix A.1**.

*Table 3.2: Estimated Domestic Water Demands*

| Population | AVDY (L/s) | MXDY (L/s) | PKHR (L/s) |
|------------|------------|------------|------------|
| 500        | 1.6        | 4.0        | 8.9        |

#### 3.3.2 Fire Flow Demands

The fire flow requirements for the residential properties were determined using the 2020 Fire Underwriters Survey (FUS), in combination with requirements for Part 9 buildings within the Ontario Building Code (OBC), which caps the building area of the residential blocks at 600 m<sup>2</sup>. To accomplish the building area reduction for the purposes of the fire flow analysis, firewalls with a minimum two-hour fire-resistance rating that comply with OBC Div. B, Subsection 3.1.10, are constructed to separate the townhouses and meet the 600 m<sup>2</sup> cap in building area.

Additional fire walls have been incorporated within on-site structures to ensure required fire flows (RFFs) do not exceed 15,000 L/min available capacity determined by the hydraulic analysis within the Design Brief for Wateridge Subdivision Phases 6-7. Based on the FUS calculations, Block 17 has the worst-case fire flow demand of 233 L/s (14,000 L/min). All 12-unit and 14-unit back-to-back dwellings, and all 7 row dwellings within the development will be built with 2-hr fire separation wall(s) to reduce the effective floor



area and RFF below the worst-case 233 L/s for each building portion. Refer to drawing **SSP-1** or **GP-1** for firewall and hydrant locations.

### 3.3.3 Boundary Conditions

A hydraulic model was built by Arcadis (2025) for the Wateridge Subdivision Phase 6 and 7 to assess the anticipated pressures to meet the minimum servicing requirements and perform a fire flow analysis under maximum day conditions. This model has been provided for Arcadis and forms the basis for the boundary conditions along Codd's Road, where two connections are made to service Block 23.

## 3.4 Hydraulic Assessment

The hydraulic model built by Arcadis (2025) was extended to include Block 23. The domestic water demands, fire flow demand under maximum day conditions, and residual pressures have been assessed in the proposed water network to confirm the servicing design criteria have been met.

### 3.4.1 Model Development

The Block 23 watermain was added to the Arcadis hydraulic model to simulate the proposed distribution system. Hazen-Williams coefficients ("C-Factors") were applied to the new watermain in accordance with the City of Ottawa's Water Distribution Design Guidelines (**Table 3.3**).

*Table 3.3: C-Factors Applied Based on Watermain Diameter*

| Pipe Diameter (mm) | C-Factor |
|--------------------|----------|
| 150                | 100      |
| 200 to 250         | 110      |
| 300 to 600         | 120      |
| > 600              | 130      |

### 3.4.2 Hydraulic Modeling Results

PCSWMM by Computational Hydraulics Inc. (CHI) was used to conduct the watermain hydraulic analysis. The model was tested for AVDY, PKHR and MXDY+FF demands under the boundary conditions provided by the City of Ottawa.

#### 3.4.2.1 Average Day & Peak Hour

The hydraulic model results show that the maximum pressures (AVDY condition) are anticipated to be approximately 523 to 531 kPa (75.8 to 77.0 psi), while minimum pressures during PKHR are anticipated to be approximately 515 to 523 kPa (74.6 to 75.9 psi). These pressures are within the City of Ottawa normal servicing pressure range of 276 kPa to 552 kPa (40 psi to 80 psi). The pressures are summarized in **Figure 3.1** and **Figure 3.2**.





**200 Codd's Road (Wateridge Blocks 22-23)**  
3 Water Servicing



*Figure 3.1: Maximum Pressures During AVDY Conditions*



*Figure 3.2: Minimum Pressures During PKHR Conditions*





### 3.4.2.2 Maximum Day & Fire Flow

An analysis was carried out using the hydraulic model to determine if the development, under maximum day demands, can achieve a fire flow of 15,000 L/min (250 L/s) in the site. This was accomplished using a steady-state maximum day demand scenario along with the automated fire flow simulation feature of the software.

Results of the modeling analysis indicate that adequate flows are available under emergency fire demand conditions while still maintaining a residual pressure of 140 kPa (20 psi). The residual pressures and available flows for the fire flow analysis are demonstrated in. Results of the hydraulic modeling are included in **Appendix A.4**.



Figure 3.3: Residual Pressures and Available Fire Flows during MXDY Conditions.

### 3.4.2.3 Fire Hydrant Coverage

There are ten fire hydrants proposed to deliver fire flow to the site. The full site falls under the coverage of all eight proposed hydrants. , Each building portion is located within 76 m of three fire hydrants. According to the NFPA 1 Table 18.5.4.3, the fire flow at each building is at least 17,034 L/min (284 L/s), which is also sufficient fire flow for the worst-case RFF building, Block 17 (233 L/s). See **Appendix A.5** for fire hydrant coverage table calculations, NFPA 1 Table 18.5.4.3, and the fire hydrant coverage figure.



### **3.5 Proposed Water Servicing**

Based on the findings of the hydraulic analysis, the proposed network is capable of servicing the development area and is expected to meet all servicing requirements as per the City of Ottawa standards under typical demand conditions (average day and peak hour conditions) as well as under emergency fire demand conditions (maximum day + fire flow). Results of the subdivision analysis are to be reassessed once revised boundary conditions have been received from City of Ottawa staff.

Adequate fire hydrant coverage has been provided throughout the subdivision. Fire walls will be required for the back-to-back blocks that are over 600 m<sup>2</sup> in area to meet OBC requirements and to ensure required fire flows do not exceed 15,000 L/min per FUS 2020. Fire hydrants have been sited such that two to three hydrants can provide the required fire flow to each building.

A 19mm diameter water service is proposed to each townhouse unit. A 200mm diameter watermain network is proposed for water distribution within the development. A water boundary DMA chamber complete with gate valve has been provided on this site as per City Standard Drawing W3, in accordance with Section 4.4.8.2 of the 2025 WDG. Refer to the **Site Servicing Plan (SSP-1)** at Codd's Road and Street 4.



## 4 Wastewater Servicing

### 4.1 Background

The Phases 6 and 7 Servicing Brief for the Wateridge Subdivision indicates that wastewater flows from Blocks 22 and 23 are to be directed to the Ottawa Interceptor Trunk Sewer via a connection to the municipal sanitary sewer within Codd's Road. Under the Servicing Brief's drainage area plan, Blocks 22 and 23 (Areas MH3A and MH8A) are to contribute a total of 21.1 L/s of sanitary peak flow based on an assumed total population of 1,021 persons over an area of 3.7 ha. The Phases 6 and 7 Servicing Brief Sanitary Drainage Area Plan has been included in **Appendix B.2**.

### 4.2 Design Criteria

As outlined in the City's Sewer Design Guidelines, the following design parameters were used to calculate estimated wastewater flow rates and to size on-site sanitary sewers for the proposed development:

- Minimum Full Flow Velocity – 0.6 m/s
- Maximum Full Flow Velocity – 3.0 m/s
- Manning's roughness coefficient for all smooth walled pipes – 0.013
- Population Persons per unit – 2.7
- Extraneous Flow Allowance – 0.33 L/s/ha
- Residential Average Flows – 280 L/cap/day
- Manhole Spacing – 120 m
- Minimum Cover – 2.5 m

### 4.3 Proposed Wastewater Servicing

As shown on **Drawing SA-1** and detailed in the sanitary sewer design sheet attached in **Appendix B.1**, the development will be serviced by a network of 200 mm diameter sanitary sewers discharging to the existing 250 mm diameter sanitary sewers within Codd's Road and Bareille Snow Street, the latter which will in turn direct wastewater flows south to Mikinak Way and west to the Codd's Road Shaft.

Peak design flows from the site are calculated to be 6.7 L/s. Details of the peak flow calculations are included in the sanitary sewer design sheet attached in **Appendix B.1**, while the background report excerpts are attached in **Appendix B.2**.

A 135mm diameter sanitary service lateral is to be provided for each townhouse unit. Full port backwater valves are to be installed on all sanitary services within the site to prevent any surcharge in the downstream sewer main from impacting the proposed development. Backwater valves are to be in the building internal plumbing, as designed by the mechanical engineer at a later phase of design.



## 5 Stormwater Management

### 5.1 Objectives

The goal of this servicing and stormwater management (SWM) plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed development to meet the design criteria established for the site, and to provide the details required for approval and construction.

### 5.2 Existing Conditions

Stormwater generated on the site is subject to the requirements outlined in the former CFB Rockcliffe Master Servicing Study (MSS 2015) and the Phases 6 and 7 Design Brief for the Wateridge Subdivision (Arcadis, 2025). The Phases 6 and 7 Servicing Brief outlines that minor system stormwater from the site is to be directed to the Eastern Stormwater Management Facility (Eastern Wet Pond). Minor system contributions are to be restricted to the 5-year storm event. Runoff in excess of the minor system capture rate is to be directed overland over the downstream street ROW segments and conveyed to the Eastern Pond. Drainage area plans from the MSS and the 2025 Design Brief are included in **Appendix C**.

As detailed in the Design Brief, minor system flows from the site will be directed to a proposed 1200 mm diameter concrete storm sewer flowing east to west on Codd's Road, ultimately discharging to the Eastern Pond via an outlet sewer in Kishkabika Park. The major system flows will be directed east to the Eastern Dry Pond in Phase 8.

The stormwater management design for the site shall also meet the Low Impact Development (LID) design criteria outlined in the Aquafor Beech Former CFB Rockcliffe Redevelopment Stormwater Management Existing Conditions & LID Pilot Project Scoping Report (2015).

### 5.3 SWM Criteria and Constraints

The following summarizes the SWM criteria and constraints that will govern the detailed design of the proposed site as per the latest revision of the City of Ottawa Sewer Design Guidelines as well as the conclusions made in the MSS and Design Brief.

- Design using the dual drainage principle. (City of Ottawa SDG)
- Where there is footing drainage connected to the storm collection system, separation of at least 0.3 m between the 100-year storm hydraulic grade line (HGL) and building under side of footing (USF) must be provided. (City)
- Where there is footing drainage connected to the storm collection system, maximum 'climate change' HGL to be lower than proposed basement elevations. (City)
- Total maximum depth of flow under static and dynamic conditions shall be less than 0.35 m. (City)



- Design storm sewers along local roadways to convey the 2-year peak flow respectively under free-flow conditions using 2004 City of Ottawa I-D-F parameters and an inlet time of 10 minutes. (City)
- Assess impact of 2-year storm, and the worst case 100-year storm events, on the major & minor drainage system. (City)
- Building openings to be above the 100-year water level. (City)
- There must be at least 30 cm of vertical clearance between the spill elevation on the private street and the lowest building opening that is in the proximity of the flow route or ponding area. (City)
- Minimum roadway profile grades at 0.5 %. (City)
- Minimum roadway slope of 0.1 % from crest-to-crest for overland flow route. (City)
- Provide adequate emergency overflow conveyance off-site. (City)

Per the 2025 Design Brief, minor system outflow to the Codd's Road sewer is defined by subareas B5 and B8A, which have a 5-year allowable discharge rate of 338L/s and 299L/s respectively, for a total minor system allotment of **637L/s** for all events up to and including the 100-year storm event. Major system allowable flows are identified as 287L/s and 254L/s (total 541L/s) under the 100-year storm event, and 437L/s and 386L/s (total 823L/s) under the climate change 100-year +20% event.

#### LID Requirements

As per the Phase 6 & 7 Developer Checklist (2024) Table 2-1 the Block 22-23 Site is subject to the following low impact development (LID) design targets:

- 4mm LID Infiltration Target: LID lot-level and conveyance controls shall infiltrate an equivalent volume a 4mm event applied to the full catchment area.
- 4mm LID Erosion Control Target: the infiltration targets shall be considered the erosion control targets for LID controls.
- 15mm Water Quality Target: LID controls shall treat the runoff from a 15mm event through filtration, detention, evapotranspiration, detention and release and infiltration. Drainage areas which achieve the minimum 15mm water quality target shall be required to discharge to another LID in the treatment train and or an end-of-pipe pond to achieve the full enhanced level of control per the MOE SWMPD.

## **5.4 Design Methodology**

The design methodology for the SWM component of the development is as follows:

- Create a PCSWMM model that generates major and minor system hydrographs and assesses the minor system hydraulic grade line and the major system flow depths.
- Size inlet control devices for the proposed catch basins to avoid surface ponding during the 2-year storm while meeting the required 0.3 m 100-year HGL to USF clearance.
- Ensure that total dynamic and static surface ponding depths do not exceed 0.35 m during the 100-year storm scenario.
- Confirm that climate change storm simulation does not result in flooding of properties.



The site is designed using the “dual drainage” principle, whereby the minor (pipe) system is designed to convey the peak rate of runoff from the 2-year design storm and runoff from larger events is conveyed by both minor (pipe) and major (overland) channels, such as roadways and walkways, safely to the appropriate outlet without impacting proposed or existing downstream properties.

**Drawing SD-1** outlines the proposed storm sewer alignment, drainage divides, and labels. The storm sewer design sheet is included in **Appendix C.1**.

## 5.5 Modeling Rationale

A comprehensive hydrologic modeling exercise was completed with PCSWMM, accounting for the estimated major and minor systems to evaluate the storm sewer infrastructure and major system segments. The use of PCSWMM for modeling of the site hydrology and hydraulics allowed for an analysis of the systems' response during various storm events. The following assumptions were applied to the detailed model:

- Hydrologic parameters as per Ottawa Sewer Design Guidelines, including Horton infiltration, Manning's 'n', and depression storage values.
- 3-hour Chicago Storm distribution for the 2-year, 5-year and 100-year analysis.
- To 'stress test' the system a 'climate change' scenario was created by adding 20% of the individual intensity values of the 100-year storm at their specified time step.
- Percent imperviousness calculated based on actual soft and hard surfaces for the proposed catchments and converted to equivalent Runoff Coefficient using the relationship  $C = (\text{Imp.} \times 0.7) + 0.2$ .
- Subcatchment areas are defined from high-point to high-point where sags occur.
- Width parameter was taken as twice the length of the street/swale segment for two-sided catchments and as the length of the street/swale segment for one-sided catchments. Irregular shaped catchments were calculated by measuring the flow length on the drawing and the width parameter was calculated respectively or alternatively set at 225 x subcatchment area per recommendations of the OSDG.
- Surface storage in road sags calculated based on grading plans (**Drawing SD-1**).

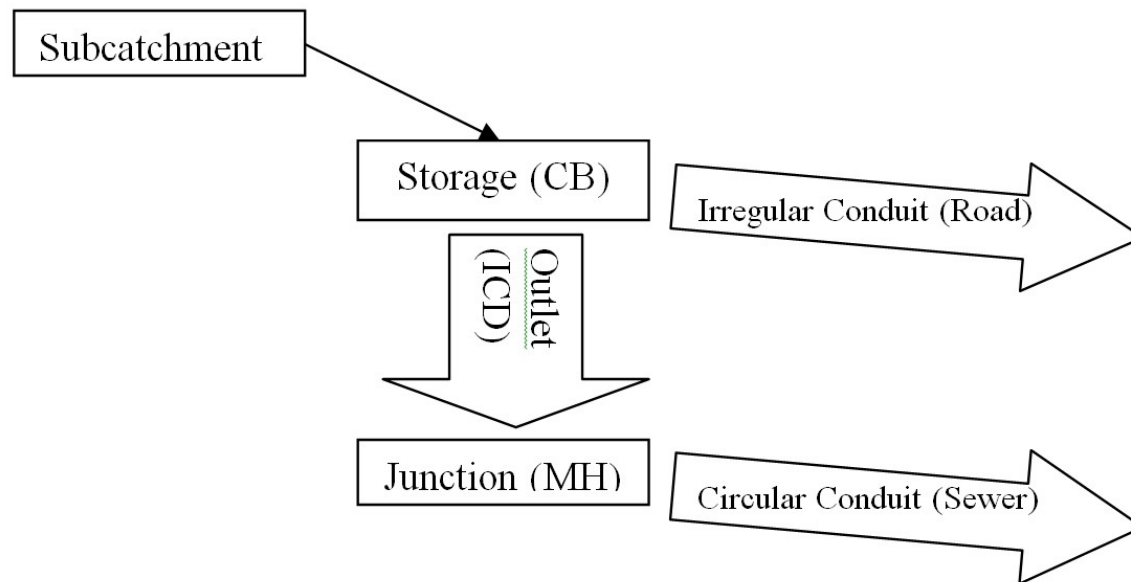
### 5.5.1 SWMM Dual Drainage Methodology

The proposed development is modeled in one modeling program as a dual conduit system (see **Figure 5.1**), with: 1) circular conduits representing the sewers & storage nodes representing manholes and the underground LID infiltration facility; 2) irregular conduits using street-shaped cross-sections to represent the approximate overland road network and storage nodes representing catchbasins. The dual drainage systems are connected via orifice link objects from storage node (i.e. CB) to storage node (i.e. MH) and represent catch basin leads. Subcatchments are linked to the storage node on the surface so that generated hydrographs are directed there firstly.





Figure 5.1: Schematic Representing Model Object Roles



Storage nodes are used in the model to represent catch basins as well as major system junctions. For storage nodes representing catch basins (CBs), the invert of the storage node represents the invert of the control orifice for the CB and the rim of the storage node represents the top of grate elevation plus allowable flow depth on the segment. For the purpose of this SWM plan, an additional fixed depth has been added to rim elevations to allow routing from one surface storage to the next.

Storage nodes that represent catch basins at sags, are connected by irregular conduits with cross-sections set to correspond to proposed roadway design for the subject area. Surface storage is determined within PCSWMM based on the typical roadway section and using grading from high-point to low-point.

Inlet control devices, as represented by orifice links, have been used to represent the proposed vertical circular orifices sized to restrict minor system capture rates to the 2-year storm runoff for proposed roadways.

## 5.5.2 Design Storms

The 3-hour Chicago distribution was selected to estimate the 2-year capture rates for the proposed subcatchments, and to assess the 100-year HGL across the proposed development.

To 'stress test' the system a 'climate change' scenario was created by adding 20% of the individual intensity values of the 100-year storm at their specified time step.



### 5.5.3 Boundary Conditions

The detailed PCSWMM hydrology and the proposed storm sewers were used to assess the peak inflows and hydraulic grade line (HGL) in the proposed site. Fixed boundary conditions in the form of backwater elevations were obtained from the Arcadis Phases 6 and 7 Design Brief from the outlet for Block 23 (Node MH3) and attached in **Appendix C.3**.

### 5.5.4 Modeling Parameters

**Table 5.1** presents the general subcatchment parameters used:

*Table 5.1: General Subcatchment Parameters*

| Subcatchment Parameter   | Value  |
|--------------------------|--------|
| Infiltration Method      | Horton |
| Max. Infil. Rate (mm/hr) | 76.2   |
| Min. Infil. Rate (mm/hr) | 13.2   |
| Decay Constant (1/hr)    | 4.14   |
| N Imperv                 | 0.013  |
| N Perv                   | 0.25   |
| Dstore Imperv (mm)       | 1.57   |
| Dstore Perv (mm)         | 4.67   |

**Table 5.2** presents the individual parameters that vary for each of the subcatchments tributary to the storm outlet.

*Table 5.2: Subcatchment Parameters*

| Area ID | Area (ha) | Width (m) | Slope (%) | % Impervious | Runoff Coefficient |
|---------|-----------|-----------|-----------|--------------|--------------------|
| C103AA  | 0.14      | 13.9      | 2.0       | 92.9         | 0.85               |
| C105AA  | 0.15      | 10.8      | 2.0       | 85.7         | 0.80               |
| C106A   | 0.02      | 6.6       | 2.0       | 78.6         | 0.75               |
| C107A   | 0.06      | 11.3      | 2.0       | 85.7         | 0.80               |
| C108A   | 0.10      | 12.5      | 2.0       | 50.0         | 0.55               |
| C110A   | 0.19      | 21.9      | 2.0       | 78.6         | 0.75               |
| C110B   | 0.15      | 28.5      | 2.0       | 78.6         | 0.75               |
| C110C   | 0.16      | 19.2      | 2.0       | 38.6         | 0.47               |
| C114A   | 0.24      | 24.0      | 2.0       | 78.6         | 0.75               |
| C115A   | 0.13      | 22.6      | 2.0       | 80.0         | 0.76               |
| C115B   | 0.17      | 23.0      | 2.0       | 78.6         | 0.75               |
| C117A   | 0.24      | 42.7      | 2.0       | 78.6         | 0.75               |



| Area ID | Area (ha) | Width (m) | Slope (%) | % Impervious | Runoff Coefficient |
|---------|-----------|-----------|-----------|--------------|--------------------|
| C117B   | 0.19      | 24.1      | 2.0       | 78.6         | 0.75               |
| C119A   | 0.15      | 16.6      | 2.0       | 90.0         | 0.83               |
| C119CA  | 0.28      | 16.6      | 2.0       | 50.0         | 0.55               |
| C121A   | 0.16      | 17.4      | 2.0       | 80.0         | 0.76               |
| C122A   | 0.14      | 20.5      | 2.0       | 80.0         | 0.76               |
| C123A   | 0.15      | 16.2      | 2.0       | 90.0         | 0.83               |
| C123B   | 0.16      | 30.6      | 2.0       | 78.6         | 0.75               |
| C124A   | 0.14      | 23.7      | 2.0       | 78.6         | 0.75               |
| C124B   | 0.19      | 34.7      | 2.0       | 78.6         | 0.75               |
| TANK-1  | 0.11      | 12.5      | 2.0       | 42.9         | 0.50               |
| UNC-1   | 0.14      | 31.1      | 2.0       | 57.1         | 0.60               |
| UNC-2   | 0.06      | 14.1      | 2.0       | 57.1         | 0.60               |
| UNC-3   | 0.07      | 15.1      | 2.0       | 42.9         | 0.50               |

### 5.5.5 Hydraulic Parameters

As per the City of Ottawa Sewer Design Guidelines, 2012, Manning's roughness values of 0.013 were used for sewer modeling and overland flow corridors representing roadways.

Storm sewers were modeled to confirm flow capacities, assess hydraulic grade lines (HGLs) and to determine minor system peak outflows to the outlet. The detailed storm sewer design sheet is included in **Appendix C.1**. Exit losses at manholes were set for all pipe segments based on the flow angle through the structure. Exit losses were assigned as per City guidelines (Appendix 6b), see **Table 5.3** below.

*Table 5.3: Exit Loss Coefficients for Bends at Manholes*

| Degrees | Coefficient |
|---------|-------------|
| 11      | 0.060       |
| 22      | 0.140       |
| 30      | 0.210       |
| 45      | 0.390       |
| 60      | 0.640       |
| 90      | 1.320       |
| 180     | 0.020       |

The table below present the parameters for the outlet and orifice link objects in the model, which represent ICDs. All IPEX tempest orifices were assigned a discharge coefficient of 0.572. It should be noted that the proposed ICDs will consist of slide type vertical circular orifices. A coefficient of 0.572 was



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applied when using orifices to conform to head/discharge curves as supplied by the manufacturer for IPEX Tempest HF model ICDs.

*Table 5.4: Orifice Parameters for Proposed Catchments*

| Orifice Name | Catchbasin ID | Tributary Area ID | Minor System Node | ICD Type       |
|--------------|---------------|-------------------|-------------------|----------------|
| OL5          | CB 103A-1     | C103AA            | 103A              | 108 mm Orifice |
| OL13         | CB 105A       | C105A             | 105A              | 102 mm Orifice |
| OL15         | CB 106A       | C106A             | 106               | 83 mm Orifice  |
| OL16         | CB 107A       | C107A             | 107               | 83 mm Orifice  |
| OL17         | CB 108A       | C108A             | 108               | 83 mm Orifice  |
| OL19         | CB 110A       | C110A             | 110               | 83 mm Orifice  |
| OR15         | CB 110A       | C110A             | 110               | 83 mm Orifice  |
| OL21         | CB 110B       | C110B             | 110               | 95 mm Orifice  |
| OR14         | CB 110B       | C110B             | 110               | 95 mm Orifice  |
| OL23         | CB 110C       | C110C             | 110               | 95 mm Orifice  |
| OL18         | CB 114A       | C114A             | 114               | 95 mm Orifice  |
| OR13         | CB 114A       | C114A             | 114               | 95 mm Orifice  |
| OL22         | CB 115A       | C115A             | 115               | 83 mm Orifice  |
| OR12         | CB 115A       | C115A             | 115               | 83 mm Orifice  |
| OL20         | CB 115B       | C115B             | 115               | 83 mm Orifice  |
| OR11         | CB 115B       | C115B             | 115               | 83 mm Orifice  |
| OL12         | CB 117A       | C117A             | 117               | 127 mm Orifice |
| OR10         | CB 117A       | C117A             | 117               | 127 mm Orifice |
| OL11         | CB 117B       | C117B             | 117               | 83 mm Orifice  |
| OR9          | CB 117B       | C117B             | 117               | 83 mm Orifice  |
| OL2          | CB 119A       | C119A             | 119               | 83 mm Orifice  |
| OR6          | CB 119A       | C119A             | 119               | 83 mm Orifice  |
| OL1          | CB 119C       | C119C             | 119C              | 152 mm Orifice |
| OL9          | CB 121A       | C121A             | 121               | 83 mm Orifice  |
| OR7          | CB 121A       | C121A             | 121               | 83 mm Orifice  |
| OL10         | CB 122A       | C122A             | 122               | 83 mm Orifice  |
| OR8          | CB 122A       | C122A             | 122               | 83 mm Orifice  |
| OL3          | CB 123A       | C123A             | 123               | 83 mm Orifice  |
| OR4          | CB 123A       | C123A             | 123               | 83 mm Orifice  |
| OL4          | CB 123B       | C123B             | 123               | 83 mm Orifice  |
| OR5          | CB 123B       | C123B             | 123               | 83 mm Orifice  |
| OL7          | CB 124A       | C124A             | 124               | 83 mm Orifice  |



| Orifice Name | Catchbasin ID | Tributary Area ID | Minor System Node | ICD Type      |
|--------------|---------------|-------------------|-------------------|---------------|
| OR3          | CB 124A       | C124A             | 124               | 83 mm Orifice |
| OL8          | CB 124B       | C124B             | 124               | 83 mm Orifice |
| OR2          | CB 124B       | C124B             | 124               | 83 mm Orifice |

## 5.6 Modeling Results and Discussion

The following sections summarize the key hydrologic and hydraulic model results. For detailed model results or inputs please refer to the electronic model files.

### 5.6.1 Proposed Inlet Control Devices

**Table 5.5** summarizes the orifice link maximum flow rates and heads across the proposed development.

*Table 5.5: Proposed Phase Orifice Link Results*

| Orifice Name | Catchbasin ID | Tributary Area ID | ICD Type       | 2yr Head (m) | 100yr Head (m) | 2yr Flow (L/s) | 100yr Flow (L/s) |
|--------------|---------------|-------------------|----------------|--------------|----------------|----------------|------------------|
| OL5          | CB 103A-1     | C103AA            | 108 mm Orifice | 1.24         | 1.43           | 25.3           | 27.3             |
| OL13         | CB 105A       | C105A             | 102 mm Orifice | 1.38         | 1.52           | 23.9           | 25.1             |
| OL15         | CB 106A       | C106A             | 83 mm Orifice  | 0.09         | 0.66           | 3.0            | 10.8             |
| OL16         | CB 107A       | C107A             | 83 mm Orifice  | 0.61         | 1.42           | 10.3           | 16.1             |
| OL17         | CB 108A       | C108A             | 83 mm Orifice  | 0.66         | 0.90           | 10.8           | 12.7             |
| OL19         | CB 110A       | C110A             | 83 mm Orifice  | 1.32         | 1.57           | 15.5           | 16.9             |
| OR15         | CB 110A       | C110A             | 83 mm Orifice  | 1.32         | 1.57           | 15.5           | 16.9             |
| OL21         | CB 110B       | C110B             | 95 mm Orifice  | 0.53         | 1.51           | 12.5           | 21.7             |
| OR14         | CB 110B       | C110B             | 95 mm Orifice  | 0.53         | 1.51           | 12.5           | 21.7             |
| OL23         | CB 110C       | C110C             | 95 mm Orifice  | 0.58         | 1.66           | 13.1           | 22.8             |
| OL18         | CB 114A       | C114A             | 95 mm Orifice  | 1.25         | 1.67           | 19.7           | 22.9             |
| OR13         | CB 114A       | C114A             | 95 mm Orifice  | 1.25         | 1.67           | 19.7           | 22.9             |
| OL22         | CB 115A       | C115A             | 83 mm Orifice  | 0.73         | 1.54           | 11.4           | 16.8             |
| OR12         | CB 115A       | C115A             | 83 mm Orifice  | 0.73         | 1.54           | 11.4           | 16.8             |
| OL20         | CB 115B       | C115B             | 83 mm Orifice  | 1.12         | 1.56           | 14.3           | 16.9             |
| OR11         | CB 115B       | C115B             | 83 mm Orifice  | 1.12         | 1.56           | 14.3           | 16.9             |
| OL12         | CB 117A       | C117A             | 127 mm Orifice | 0.47         | 1.51           | 20.5           | 38.6             |
| OR10         | CB 117A       | C117A             | 127 mm Orifice | 0.47         | 1.51           | 20.5           | 38.6             |
| OL11         | CB 117B       | C117B             | 83 mm Orifice  | 1.34         | 1.59           | 15.6           | 17.1             |



| Orifice Name | Catchbasin ID | Tributary Area ID | ICD Type       | 2yr Head (m) | 100yr Head (m) | 2yr Flow (L/s) | 100yr Flow (L/s) |
|--------------|---------------|-------------------|----------------|--------------|----------------|----------------|------------------|
| OR9          | CB 117B       | C117B             | 83 mm Orifice  | 1.34         | 1.59           | 15.6           | 17.1             |
| OL2          | CB 119A       | C119A             | 83 mm Orifice  | 1.03         | 1.43           | 13.6           | 16.2             |
| OR6          | CB 119A       | C119A             | 83 mm Orifice  | 1.03         | 1.43           | 13.6           | 16.2             |
| OL1          | CB 119C       | C119C             | 152 mm Orifice | 0.56         | 1.59           | 28.5           | 53.0             |
| OL9          | CB 121A       | C121A             | 83 mm Orifice  | 1.00         | 1.52           | 13.5           | 16.7             |
| OR7          | CB 121A       | C121A             | 83 mm Orifice  | 1.00         | 1.52           | 13.5           | 16.7             |
| OL10         | CB 122A       | C122A             | 83 mm Orifice  | 0.74         | 1.52           | 11.4           | 16.7             |
| OR8          | CB 122A       | C122A             | 83 mm Orifice  | 0.74         | 1.52           | 11.4           | 16.7             |
| OL3          | CB 123A       | C123A             | 83 mm Orifice  | 1.04         | 1.56           | 13.7           | 16.9             |
| OR4          | CB 123A       | C123A             | 83 mm Orifice  | 1.04         | 1.56           | 13.7           | 16.9             |
| OL4          | CB 123B       | C123B             | 83 mm Orifice  | 0.97         | 1.56           | 13.2           | 16.9             |
| OR5          | CB 123B       | C123B             | 83 mm Orifice  | 0.97         | 1.56           | 13.2           | 16.9             |
| OL7          | CB 124A       | C124A             | 83 mm Orifice  | 0.74         | 1.54           | 11.5           | 16.8             |
| OR3          | CB 124A       | C124A             | 83 mm Orifice  | 0.74         | 1.54           | 11.5           | 16.8             |
| OL8          | CB 124B       | C124B             | 83 mm Orifice  | 1.38         | 1.59           | 15.9           | 17.1             |
| OR2          | CB 124B       | C124B             | 83 mm Orifice  | 1.38         | 1.59           | 15.9           | 17.1             |

## 5.6.2 Proposed Development Hydraulic Grade Line Analysis

The 100-year hydraulic grade line (HGL) elevation across the proposed development was estimated using the PCSWMM model for the worst-case HGL using the 3-hour Chicago storm for the 100-year runoff.

The climate change scenario was assessed using the 100-year runoff intensities (worst-case HGL) increased by 20%. **Table 5.6** presents the clearance between the proposed storm sewers worst case HGL and the nearest proposed under side of footing (USF). The storm sewer design sheet is included in **Appendix C.1**.

*Table 5.6: Worst-Case 100-Year HGL Results*

| STM MH | USF (m) | 100-Year, 3hr Chicago Storm |               | 100-year+20%, 3hr Chicago Storm |               |
|--------|---------|-----------------------------|---------------|---------------------------------|---------------|
|        |         | HGL (m)                     | Clearance (m) | HGL (m)                         | Clearance (m) |
| 100    | 88.02   | 86.37                       | 1.65          | 86.38                           | 1.64          |
| 100A   | 88.02   | 86.24                       | 1.78          | 86.25                           | 1.77          |
| 100B   | 88.02   | 86.04                       | 1.98          | 86.05                           | 1.97          |





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| STM MH | USF (m) | 100-Year, 3hr Chicago Storm |               | 100-year+20%, 3hr Chicago Storm |               |
|--------|---------|-----------------------------|---------------|---------------------------------|---------------|
|        |         | HGL (m)                     | Clearance (m) | HGL (m)                         | Clearance (m) |
| 101    | 88.02   | 86.42                       | 1.60          | 86.43                           | 1.59          |
| 102    | 88.02   | 86.51                       | 1.51          | 86.52                           | 1.50          |
| 103    | 88.02   | 86.56                       | 1.46          | 86.57                           | 1.45          |
| 104    | 88.14   | 86.64                       | 1.50          | 86.66                           | 1.48          |
| 105    | 87.55   | 86.70                       | 0.85          | 86.72                           | 0.83          |
| 106    | 87.55   | 86.78                       | 0.77          | 86.79                           | 0.76          |
| 107    | 87.61   | 86.82                       | 0.79          | 86.83                           | 0.78          |
| 108    | 88.33   | 86.86                       | 1.47          | 86.86                           | 1.47          |
| 109    | 87.61   | 86.90                       | 0.71          | 86.90                           | 0.71          |
| 110    | 87.64   | 87.04                       | 0.60          | 87.05                           | 0.59          |
| 111    | 87.75   | 87.13                       | 0.62          | 87.13                           | 0.62          |
| 112    | 87.75   | 86.86                       | 0.89          | 86.86                           | 0.89          |
| 113    | 87.55   | 86.92                       | 0.63          | 86.93                           | 0.62          |
| 114    | 87.61   | 87.19                       | 0.42          | 87.19                           | 0.42          |
| 115    | 87.75   | 87.30                       | 0.45          | 87.30                           | 0.45          |
| 116    | 87.55   | 86.78                       | 0.77          | 86.79                           | 0.76          |
| 117    | 87.59   | 87.19                       | 0.40          | 87.19                           | 0.40          |
| 118    | 88.21   | 86.50                       | 1.71          | 86.51                           | 1.70          |
| 119    | 88.06   | 86.77                       | 1.29          | 86.79                           | 1.27          |
| 119A   | 88.06   | 86.8                        | 1.26          | 86.82                           | 1.24          |
| 120    | 87.82   | 86.91                       | 0.91          | 86.92                           | 0.90          |
| 121    | 87.76   | 87.01                       | 0.75          | 87.01                           | 0.75          |
| 122    | 87.76   | 87.18                       | 0.58          | 87.18                           | 0.58          |
| 123    | 87.78   | 87.14                       | 0.64          | 87.14                           | 0.64          |
| 124    | 87.78   | 87.31                       | 0.47          | 87.32                           | 0.46          |

The model results indicate that there is sufficient clearance between the worst-case HGL and the proposed USFs within Blocks 22-23. Detailed grading of the site has been completed to ensure that the maximum hydraulic grade line is kept at least 0.30 m below the underside-of-footing (USF) of the adjacent units connected to the storm sewer during the worst case 100-year storm event and below proposed basement elevations during the 'climate change' event.



### 5.6.3 Overland Flow

**Table 5.7** presents the maximum total surface water depths (static ponding depth + dynamic flow) above the top-of-grate of the proposed catch basins for the 100-year, 3-hr Chicago storm and the 'climate change' storm. Based on the model results, the total ponding depth (static + dynamic) does not exceed the required 0.35 m maximum during the 100-year event.

*Table 5.7: Proposed Maximum Static and Dynamic Surface Water Depths*

| Storage node ID | Structure ID | Top of Grate Elevation (m) | 2-year, 3-hour Chicago |                               | 100-year, 3-hour Chicago |                               | 100-year, 3-hour Chicago+20% |                               |
|-----------------|--------------|----------------------------|------------------------|-------------------------------|--------------------------|-------------------------------|------------------------------|-------------------------------|
|                 |              |                            | Max HGL (m)            | Total Surface Water Depth (m) | Max HGL (m)              | Total Surface Water Depth (m) | Max HGL (m)                  | Total Surface Water Depth (m) |
| CB103A1         | CB 103A-1    | 89.39                      | 89.25                  | -                             | 89.44                    | 0.05                          | 89.45                        | 0.06                          |
| CB105A1         | CB 105A      | 89.32                      | 89.32                  | -                             | 89.46                    | 0.14                          | 89.46                        | 0.14                          |
| CB106A          | CB 106A      | 89.48                      | 88.19                  | -                             | 88.76                    | -                             | 89.28                        | -                             |
| CB107A          | CB 107A      | 89.76                      | 88.98                  | -                             | 89.79                    | 0.03                          | 89.80                        | 0.04                          |
| CB108A          | CB 108A      | 89.02                      | 88.30                  | -                             | 88.54                    | -                             | 88.56                        | -                             |
| CB110A          | CB 110A      | 89.63                      | 89.57                  | -                             | 89.82                    | 0.19                          | 89.84                        | 0.21                          |
| CB110B          | CB 110B      | 89.54                      | 88.69                  | -                             | 89.67                    | 0.13                          | 89.70                        | 0.16                          |
| CB110C          | CB 110C      | 89.16                      | 88.36                  | -                             | 89.44                    | 0.28                          | 89.47                        | 0.31                          |
| CB114A          | CB 114A      | 89.47                      | 89.17                  | -                             | 89.59                    | 0.12                          | 89.64                        | 0.17                          |
| CB115A          | CB 115A      | 89.51                      | 88.86                  | -                             | 89.67                    | 0.16                          | 89.70                        | 0.19                          |
| CB115B          | CB 115B      | 89.46                      | 89.20                  | -                             | 89.64                    | 0.18                          | 89.70                        | 0.24                          |
| CB117A          | CB 117A      | 89.26                      | 88.35                  | -                             | 89.39                    | 0.13                          | 89.45                        | 0.19                          |
| CB117B          | CB 117B      | 89.38                      | 89.34                  | -                             | 89.59                    | 0.21                          | 89.62                        | 0.24                          |
| CB119A          | CB 119A      | 89.73                      | 89.38                  | -                             | 89.78                    | 0.05                          | 89.79                        | 0.06                          |
| CB119C          | CBMH 119C    | 88.05                      | 87.23                  | -                             | 88.26                    | 0.21                          | 88.30                        | 0.25                          |
| CB121A          | CB 121A      | 89.56                      | 89.18                  | -                             | 89.70                    | 0.14                          | 89.71                        | 0.15                          |
| CB122A          | CB 122A      | 89.49                      | 88.85                  | -                             | 89.63                    | 0.14                          | 89.65                        | 0.16                          |
| CB123A          | CB 123A      | 89.46                      | 89.12                  | -                             | 89.64                    | 0.18                          | 89.66                        | 0.20                          |
| CB123B          | CB 123B      | 89.46                      | 89.05                  | -                             | 89.64                    | 0.18                          | 89.68                        | 0.22                          |
| CB124A          | CB 124A      | 89.44                      | 88.80                  | -                             | 89.60                    | 0.16                          | 89.64                        | 0.20                          |
| CB124B          | CB 124B      | 89.41                      | 89.41                  | -                             | 89.62                    | 0.21                          | 89.65                        | 0.24                          |

### 5.6.4 Results

The following section summarizes the key hydrologic and hydraulic model results for the proposed site. For detailed model results or inputs please refer to the example input file in **Appendix C.2** and the



electronic model files. Minor system flows are identified from the outfall J7 and major system flows include all uncontrolled runoff and roadway conveyance to Codd's Road.

*Table 5.8: Target and Resultant Major and Minor System Release Rates*

| Storm event                  | Minor System (L/s) | Major System (L/s) | Total Proposed (L/s) | Total Allowable (L/s) |
|------------------------------|--------------------|--------------------|----------------------|-----------------------|
| 2-year, 3-hour Chicago       | 494                | 31                 | 525                  | 637                   |
| 5-year, 3-hour Chicago       | 619                | 62                 | 682                  | 637                   |
| 100-year, 3-hour Chicago     | 712                | 266                | 977                  | 1178                  |
| 100-year, 3-hour Chicago+20% | 726                | 370                | 1095                 | 1460                  |

## 5.6.5 Low Impact Development (LID) Practices

### 5.6.5.1 Water Balance and Erosion Control

The water balance and erosion control targets for the site (retention of 4mm of runoff as defined by background reports) are proposed to be met via retention within a proposed Cultec underground storage and infiltration system. Table 35 of the former CFB Rockcliffe Stormwater Management Existing Conditions & LID Pilot Project Scoping Report by Aquafor Beech specifies design targets at the LIDs to infiltrate the equivalent volume of a 4 mm event applied to the total development area.

Upon collection from the site within roadway/rear yard catch basins, captured stormwater from the development is directed into the underground storage and allowed to infiltrate into the surrounding soil. A bypass pipe for direct discharge into the existing storm manhole in the future Codd's Road extension has been provided for captured outflow that exceeds the storage capacity of the proposed Cultec unit.

A 4 mm storm event scenario was set up within the supplied PCSWMM model iteratively to size the underground storage unit to ensure no flows exit from the bypass pipe or relief sewer provided at the top of the storage system. This 4mm event volume was determined to be approximately 66m<sup>3</sup>. As per the Developer Checklist (Aquafor Beech 2024) the 4mm infiltration target is the 4mm event applied to the full catchment area. However, due to grading restrictions along the north side of Codd's Road, a portion of the site drains uncontrolled into the ROW. It is not possible for the 4mm volume to be routed from these uncontrolled areas to an LID facility. As a best management practice, roof downspouts are directed into vegetated areas where enhanced topsoil reduces runoff, provides additional retention storage, and improves transpiration losses. From the PCSWMM model results, during the 4mm event, flow from the uncontrolled areas sums to 4m<sup>3</sup> volume.



The MECP SWM Planning Design Manual (2003) and the City of Ottawa Draft Low Impact Development Technical Guidance Report (2019) provide design guidance for LIDs and physical constraints for SWMP types. For an infiltration basin/gallery, these considerations include:

- Drainage Area: < 5ha
- Minimum soil percolation rate: loam (infiltration rate  $\geq 60$  mm/hr)
- Bedrock: situated  $\geq 1.0$ m below the bottom of the infiltration bed
- Groundwater: situated  $\geq 1.0$ m below the bottom of the infiltration bed

Supporting geotechnical studies (Paterson 2024) have identified the following properties in the region encompassing the infiltration gallery, located at the southwest corner of the site:

- Boreholes: BH 11-22, BH 2-23 and BH 12-22
  - Bedrock elevation: 81.9 to 82.2m
  - Groundwater elevation: 83 to 83.5m
- Permeameter Tests: PT 10-23, PT 11-23 and PT 12-23
  - Unfactored infiltration rates: 50 to 100 mm/hr
  - Elevations of tests: 87.97m to 88.92m

As discussed in the Paterson Memo (PG7793-MEMO.08, 2026), a reduction factor (factor of safety) of 2.5 was applied to the average unfactored infiltration rate (75mm/hr), to find a design infiltration rate of 30 mm/hr. Utilizing a porosity of 0.4 for the clear stone infiltration layer, a factored infiltration rate of 30mm/hr, the maximum drawdown time of 48 hours, and Equation 4.3 from the MECP Stormwater Design Manual, the minimum infiltration bed area is approximately 115m<sup>2</sup>.

$$A = 1000V \div Pn\Delta t$$

[Equation 4.3 MECP SMPDM 2023]

Where:

*A = bottom area of the infiltration bed (m<sup>2</sup>)*

*V = runoff volume to be infiltrated (m<sup>3</sup>)*

*P = design/factored percolation rate of the surrounding native soil (mm/hr)*

*n = porosity of the storage media*

*$\Delta t$  = retention time (24 to 48 hours)*

Consequently, 66m<sup>3</sup> of infiltration storage and a minimum bed area of 115m<sup>2</sup> were the principal design criteria for the infiltration gallery design. Additional constraints included the width and length of the unit to fit within the designated SWM parcel and ensure a minimum 4m offset from proposed building



foundations. Utilizing the Cultec StormGenie online design tool, a model Cultec Recharger 360 HD Legend was selected for this site to meet the criteria. The Cultec Design Sheets and Stage-Storage Curve are included in **Appendix C.4** and summarized in **Table 5.9**.

*Table 5.9: Cultec 360HD System - Infiltration Gallery Design*

| System Parameter                                     | Value                |
|------------------------------------------------------|----------------------|
| Total Storage Required                               | 66 m <sup>3</sup>    |
| Total Storage Provided                               | 110.7 m <sup>3</sup> |
| Clearstone Porosity (n)                              | 0.4                  |
| System Area                                          | 133.2 m <sup>2</sup> |
| Depth of Embedment Stone (above chambers)            | 152 mm               |
| Depth of Bedding Stone (below chambers)              | 300 mm               |
| System Elevations                                    | Elevation (m)        |
| Maximum Allowable Grade (top of pavement or unpaved) | 89.872               |
| Minimum Allowable Grade (unpaved traffic)            | 86.824               |
| Top of Stone Elevation                               | 86.367               |
| Top of Chamber Elevation                             | 86.214               |
| 450 mm x 450 mm Top Manifold Invert                  | 85.630               |
| 600 mm Bottom Connection Invert                      | 85.351               |
| Bottom of Chamber Elevation                          | 85.300               |
| Bottom of Stone Elevation                            | 85.000               |
| 300 mm Incoming Pipe Invert                          | 85.36                |
| 300 mm Outgoing Pipe Invert                          | 85.90                |

Other Cultec units could have been selected for this design; however, the 360HD model provided the best maximum allowable grade over the unit to increase the useable amenity space in the landscaped area above, provide accessible pathways and optimize soil volumes for planting. The total storage provided exceeds the 4mm infiltration volume (66m<sup>3</sup>) to ensure the bed area exceeded 115m<sup>2</sup>. Utilizing equation 4.3, the drawdown time for this design is anticipated to be 41.3 hours, which is within the allowable time range. The invert elevation of the infiltration bed is 85.00m, which provides more than 1.0m clearance above the surface of the bedrock and the seasonal high groundwater table. Demonstrating the Cultec unit design is adequate to meet the 4mm water balance and erosion control LID infiltration requirements for this site.

Inputting the design criteria and storage curve of this Cultec unit design to the PCSWMM model, it was found that the maximum HGL in the Cultec unit during the 4mm event was 85.5m. Since this HGL is below the outgoing pipe elevation, the 4mm event for this site is shown to be infiltrated. Referring to the unit's stage-storage curve (see **Appendix C.4**) the chamber has an additional volume available between the HGL and the spill elevation of the outgoing pipe (85.90m). This excess capacity volume effectively offsets the 4mm event runoff from the uncontrolled areas that can't be routed to the SWMF.



### **5.6.5.2 Water Quality Control**

In the background documents, this site was assumed to be at an overall 86% imperviousness level, and downstream quality control was designed to accommodate this level of imperviousness. The current SWM model identifies an overall runoff rate of at roughly 73%. Consequently, runoff from the development block is not assumed to have deleterious effects on downstream systems, as noted within the 2025 Design Brief.

Minor system flows from the development site will be conveyed to the Eastern Wet Pond through the proposed 1200 mm diameter concrete storm sewer flowing east to west through the future Codd's Road extension and Kishkaika Park. Per the background Design Brief, the wet pond will provide end-of-pipe quality treatment for the site runoff. Combined with onsite LID quality controls, an enhanced level of protection can be achieved for the noted site.

The LID water quality targets for the site is the retention of 15mm of runoff as defined by background reports, due to the downstream wet pond which provides end-of-pipe quality control. Due to the variable bedrock and groundwater levels throughout this site, there are no other suitable locations (apart from the SWMF infiltration gallery) for LID facilities that meet all the infiltration design requirements. Consequently, the water quality targets for this site are proposed to be met with a varied approach, which supports the intent of the onsite LID quality target and supplements the downstream quality control in the pond.

1. All landscaped areas (turf or garden) of this site are to utilize enhanced/amended topsoil as per the Wateridge Phases 6 & 7 LID Developer's Checklist. The amended topsoil will improve the stormwater retention throughout the site. Refer to the landscape plans for the extent and details of the topsoil amendments.
2. Surface runoff along the east, north, and west perimeter of the site drains to grassed swales and subdrain systems (entrenched in clearstone as per City Standard Drawing S29) and is conveyed by the rear yard drainage systems to the minor system or directly to the centralized SWMF infiltration gallery. Vegetated swales have been shown to provide sediment removal through vegetation and granular filtration (refer to the MTO 2007 report) and contribute to the overall stormwater quality treatment train.
3. An oil-grit separator (OGS) has been designed to provide quality treatment for the minor system flows on this site. A stormceptor EF08 model has been sized as an example product, as specified in **Appendix C.5**. The OGS is to be located upstream of the Contec infiltration gallery as shown in **Drawing SSP-1** and **SD-1** which will contribute to the overall treatment train, provide pre-treatment to improve the longevity of the infiltration gallery, and allow for an easily accessible and maintainable structure for solids removals.
4. The Cultec 360HD System includes a separator row/ADS isolation row which serves several purposes. It slows and dissipates the incoming minor system flows, evenly distributes the incoming flows throughout the chamber system and it forces the inflows to filter down through a granular layer and into the central chamber system. The isolator row provides additional quality control in the overall treatment train.



## 6 Grading

The proposed Block 23 development site measures approximately 3.69 ha in area. The topography across the site under existing conditions slopes towards the northwest corner of the site in the direction of the Eastern Stormwater Management Pond and the Rockcliffe Parkway. A detailed grading plan (Drawing GP-1) has been provided to satisfy the stormwater management requirements, adhere to any geotechnical restrictions for the site, and provide for minimum cover requirements for storm and sanitary sewers where possible. Site grading has been established to provide emergency overland flow routes required for stormwater management in accordance with City of Ottawa requirements. The subject site maintains emergency overland flow routes for flows deriving from storm events in excess of the maximum design event to Codd's Road.

There were no silty clay or marine clay deposits encountered within the subject site, consequently permissible grade raise restrictions were not required by the Geotechnical Report. The grading plan Drawing GP-1 has been reviewed by Paterson, as explicated in the Geotechnical Review and Recommendation Memo dated August 26, 2026.

There are significant grading differentials between the proposed site and the adjacent parks to the west (Kishkabika Park) and to the east (Tanakiwin Natural Park). The grading solution along the western site limits will be revised and finalized once the design and grading plans for Kishkabika Park are provided by City Parks Planning Staff. In the interim, grading at the property limits to the City Park lands on the east and west sides of the site are shown as terracing at 3:1 slopes to transition between the proposed site grades and the existing park topography. Terraced slopes are to match adjacent park grades and maintain existing drainage patterns and positive overland flow conditions. Embankments are to be vegetated immediately post-construction to match existing park conditions and provide erosion protection.

The grades in Tanakiwin Natural Park form an embankment adjacent to the north and east property lines of the site. The 3:1 terracing into the Park is to provide drainage to the low side of the embankment. An interceptor swale is proposed within the Park lands as shown in Drawing GP-1 to provide positive drainage between the proposed site terracing and the existing elevated grades of the Park embankment. The proposed swale drains to the northwest following the existing drainage patterns. Grades beyond the limit of the work remain unchanged for the site.

A 0.8m high retaining wall is proposed in the rear yard between Block 4 and Block 5 to accommodate the grading and provide positive drainage for the proposed infiltration trench and subdrain system along the northeast perimeter.





## 7 Utilities

As the subject site is an extension of a new residential development community, Hydro, Bell, Gas, and Cable servicing for the proposed site will be readily available within subsurface infrastructure within the neighbouring rights-of-way. Exact size, location and routing of hydro utilities will be finalized after design circulation.

At the northeast corner of the site, Hydro Ottawa has an easement that requires site access. A 5.0m wide hydro corridor has been provided for access which connects to the northeast portion of Street 1. Within the corridor, the pathway surface is proposed to be heavy-duty asphalt, and the grassed surfaces are to be reinforced turf. Refer to Landscape Drawings for access corridor and reinforced turf details.

## 8 Approvals

The onsite sewers and stormwater management system are all common elements and will fall under single ownership managed by the Condominium Corporation, and will outlet to an approved, separated storm sewer and thus will not be subject to requirements for an Ontario Ministry of Environment, Conservation, and Parks (MECP) Environmental Compliance Approval (ECA), under the *Ontario Water Resources Act* as per O. Reg. 525/98 Section 3. The SWM storage systems, rear yard drains, the ROW and related infrastructure will be incorporated into the Common Elements Agreement managed by the Condominium Corporation. Access and maintenance easements shall be provided for all infrastructure as identified in the R-Plan.

A Ministry of Environment Conservation and Parks (MECP) Permit to Take Water (PTTW) or reporting on the Environmental Activity and Sector Registry (EASR) for construction excavations may be required for the site as some of the proposed works may be below the groundwater elevation shown in the geotechnical report. The geotechnical investigation report has confirmed that the PTTW may be required if more than 400,000 L/day of ground and/or surface water are to be pumped during the construction phase. For ground or surface water volumes pumped at between 50,000 to 400,000 L/day during construction, it is required to register on the EASR.



## 9 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

1. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
2. Limit the extent of the exposed soils at any given time.
3. Re-vegetate exposed areas as soon as possible.
4. Minimize the area to be cleared and grubbed.
5. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
6. Install silt barriers/fencing around the perimeter of the site as indicated in **Drawing ECDS-1** to prevent the migration of sediment offsite.
7. Install trackout control mats (mud mats) at the entrance/egress to prevent migration of sediment into the public ROW.
8. Provide sediment traps and basins during dewatering works.
9. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
10. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

The Contractor will also be required to take special precautions regarding infiltration areas. Infiltration trenches and infiltration gallery are to be protected throughout construction. Vehicular travel on or across the infiltration areas shall be strictly prohibited.

Refer to **Drawing ECDS-1** for the proposed location of silt fences, sediment traps, and other erosion control measures.



## 10 Geotechnical Investigation

A geotechnical investigation for the development was completed by Paterson Group Inc. in December 2024. Several reports and memoranda have been prepared by Paterson to support this development. See **Section 2** of this report for a listing of all reference documents. Paterson identifies the existing soil conditions within Phases 6, 7, and 8 of the subdivision and provides construction recommendations. Key excerpts of the 2024 report have been provided in **Appendix D**. For details please see the complete Paterson reports and memos included in the submission package.

Subsurface soil conditions within the study area were determined through field investigations conducted from October 12, 2022, to November 9, 2022, in addition to supplemental field programs carried out from April 12, 2023, to April 14, 2023, December 21, 2023, and the previous investigations, completed by others within the subdivision between 2013 and 2014. In total, sixty-nine (69) boreholes were drilled in the 2022 investigation, in addition to the thirteen (13) boreholes that were drilled in the April 2023 field program and the nine (9) test pits advanced in the December 2023 field program.

In general, soil stratigraphy consisted of fill underlain by silty sand, silty clay, glacial till, and/or bedrock surface. Bedrock was estimated to occur between depths of 1 to 4 m. Based on moisture levels and colour of the recovered soil samples, the long-term groundwater table is expected to be at a geodetic elevation of around 78.6 to 90.3 m, though as groundwater levels fluctuate seasonally, they could vary at the time of construction.

Based on the observed soil conditions, the site is deemed suitable for the proposed development. The buildings are anticipated to be founded over conventional shallow footings placed on an undisturbed very stiff to stiff brown silty clay, compact to dense silty sand, compact to very dense glacial till, or clean, surface-sounded bedrock bearing surface. No permissible grade raise restriction nor tree planting setback limits foundation walls at adjacent buildings with USFs with at least 2.1 m of cover applies to the Blocks 22 and 23 site.

The December 2024 report included infiltration testing procedures, results, and the in-situ infiltration testing location plan PG6331-5. The permeameter testing locations (PT-XX) and borehole locations (BH-XX) have also been shown on **Drawing SD-1**. The recommended rigid pavement structure is further presented in



**Table 10.1.**

The Paterson reports (PG7793-1, Rev.1, 2026) included a review of the subsurface conditions based on the existing boreholes, and new information regarding the slope stability assessment and further construction considerations impacting design. It was found that no stable slope setback was required for this site. In addition, this report provided recommendations for the Hydro Access corridor reinforced turf structure as shown in **Table 10.2.**



*Table 10.1: Recommended Pavement Structure*

| <b>Material</b>                                           | <b>Driveways and Car-only Parking Areas</b> | <b>Local Residential Roadways</b> |
|-----------------------------------------------------------|---------------------------------------------|-----------------------------------|
| Wear Course – HL-3 or Superpave 12.5 Asphaltic Concrete   | 50 mm                                       | 40 mm                             |
| Binder Course – HL-8 or Superpave 19.0 Asphaltic Concrete | -                                           | 50 mm                             |
| BASE – OPSS Granular A Crushed Stone                      | 150 mm                                      |                                   |
| SUBBASE – OPSS Granular B Type II                         | 300 mm                                      | 400 mm                            |

*Table 10.2: Access Road Structure*

| <b>Thickness (mm)</b> | <b>Material Description</b>                                         |
|-----------------------|---------------------------------------------------------------------|
| -                     | 100mm Topsoil and Grass Seed and/or Asphalt Paved or Gravel Surface |
| 150                   | Base – OPSS Granular A or OPSS Granular B Type II Crushed Stone     |
| 300                   | Subbase – OPSS Granular B Type II                                   |
| -                     | Bi-Axial Geogrid – Terrifix TBX1500 or approved other               |
| -                     | Woven Geotextile – Terrafix 200W or approved other                  |

The geotechnical memo PG7793-MEMO.07 provides specific recommendations for the Townhouse Blocks 9 and 10 foundations located adjacent to the proposed Cultec infiltration chambers. Lean concrete infilled trenches are recommended to extend the footing loads and lateral support zone for Block 9. Refer to the full memo for details.

The geotechnical memo PG7793-MEMO.08 provides further justification for the infiltration testing methods, infiltration rates, correction factors, and confirmed clearance to bedrock and groundwater used to design the Cultec infiltration chamber. Refer to the full memo for details.



## **11 Conclusion**

Based on the preceding information, the following conclusions are summarized below:

### **11.1 Potable Water Analysis**

A hydraulic model was developed to assess the available domestic flows, fire flows, and residual pressures in the proposed 200mm diameter water distribution system. The model was developed as an extension to the existing Phase 6-7 model provided by Arcadis and utilizes the boundary conditions from that model and report. Based on the findings, operating pressures for the watermain within the proposed development are expected to meet City of Ottawa standards under typical demand conditions (peak hour and average day conditions).

The results indicate that sufficient fire flows are available within the proposed watermain network under emergency fire demand conditions (maximum day + fire flow) while meeting the minimum pressure requirements as per City of Ottawa standards. Two-hour fire walls are proposed in some buildings to limit the RFF. Fire hydrants are proposed throughout the site such that the RFF of each building can be satisfied by two or three hydrants at a time.

### **11.2 Wastewater Servicing**

Block 23 will be serviced by a network of 200mm diameter gravity sewers which will direct wastewater flows to sanitary sewers within the Codd's Road extension. The receiving sewer system has sufficient available capacity to receive the design flows. Design guidelines for slope and velocity have been met within the proposed sewers.

### **11.3 Stormwater Management**

The proposed stormwater management plan and storm sewer system complies with the goals specified in the background reports and the 2025 City of Ottawa Sewer Design Guidelines.

- Underground storage is proposed within a Cultec 360HD System to allow for detention and infiltration of the 4 mm storm event to satisfy the water balance and erosion control targets for the site.
- Enhanced water quality control is achieved through onsite measures such as amended topsoil in all vegetated areas, the use of grass swales and rear yard subdrain systems, the implementation of an OGS treatment unit, further treatment within the Cultec separator row, in combination with the downstream quality control provided at the end-of-pipe SWM facility.
- All dynamic surface water depths are to be less than 0.35 m during all storm events up to the 100-year storm event.



- The storm sewer hydraulic grade line will be maintained at least 0.30 m below the underside of footing in the subdivision during design storm events.
- Minor system peak flows from the proposed site will be restricted to the 2-year rainfall event, and directed to the receiving sewer in Codd's Road and will ultimately discharge into the outlet at the Eastern Stormwater Management Pond.

## **11.4 Grading**

A grading plan has been prepared to account for the required overland flow conveyance, cover over sewers, hydraulic grade line requirements, and grade raise restrictions as identified in the geotechnical investigation. Transitional grading from the proposed development site into the adjacent parkland areas has been further developed and elucidated.

## **11.5 Utilities**

Electrical, gas, cable, and telephone infrastructure exist within the Wateridge subdivision development and has been designed by their respective utility providers to service the site plan blocks. Private utility servicing for Block 23 will be designed by the respective utilities. A 5.0m wide access corridor has been incorporated into the design to provide Hydro Ottawa access to their facilities.



# Appendices





## **Appendix A Water Servicing**

### **A.1 Domestic Water Demands**



**Wateridge Subdivision Block 23 - Domestic Water Demand Estimates**

Site Plan provided by Korsiak Urban Planning (2026-08-28)

Project No. 160402276

Designed by: MW

Date: 8/31/2026

Checked by: AG

Revision: 01

City File No.: PC2025-0305

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:

Townhomes

2.7

ppu

Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines and Technical Bulletin ISTB-2021-03:

Residential

280

L/cap/day



| Townhouse Types    | No. of Units | Population | Avg Day Demand |            | Max Day Demand <sup>1</sup> |            | Peak Hour Demand <sup>1</sup> |            |
|--------------------|--------------|------------|----------------|------------|-----------------------------|------------|-------------------------------|------------|
|                    |              |            | (L/min)        | (L/s)      | (L/min)                     | (L/s)      | (L/min)                       | (L/s)      |
| Row                | 91           | 246        | 47.8           | 0.8        | 119.4                       | 2.0        | 262.8                         | 4.4        |
| Back-to-Back       | 94           | 254        | 49.4           | 0.8        | 123.4                       | 2.1        | 271.4                         | 4.5        |
| <b>Total Site:</b> | <b>185</b>   | <b>500</b> | <b>97.1</b>    | <b>1.6</b> | <b>242.8</b>                | <b>4.0</b> | <b>534.2</b>                  | <b>8.9</b> |

<sup>1</sup> The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate

peak hour demand rate = 2.2 x maximum day demand rate (as per Technical Bulletin ISD-2010-02)

**Wateridge Block 23 - Domestic Water Demand Estimates**  
 Site Plan provided by Korsiak Urban Planning (2026-08-28)

Densities as per City of Ottawa Guidelines:

|            |     |     |
|------------|-----|-----|
| Singles    | 3.4 | ppu |
| Townhomes  | 2.7 | ppu |
| Apartments | 1.8 | ppu |

Demand conversion factors as per City of Ottawa Guidelines:

|                       |       |          |
|-----------------------|-------|----------|
| Residential           | 280   | L/p/day  |
| Commercial & Institut | 28000 | L/ha/day |

| Building ID         | Area ID | Model Node ID | Townhomes  | Population | Avg Day Demand |             | Max Day Demand <sup>1</sup> |             | Peak Hour Demand <sup>2</sup> |             |
|---------------------|---------|---------------|------------|------------|----------------|-------------|-----------------------------|-------------|-------------------------------|-------------|
|                     |         |               |            |            | (L/min)        | (L/s)       | (L/min)                     | (L/s)       | (L/min)                       | (L/s)       |
| Residential         |         | 0             | 3          | 8          | 1.6            | <b>0.03</b> | 3.94                        | <b>0.07</b> | 8.66                          | <b>0.14</b> |
| Residential         |         | 1             | 6          | 16         | 3.2            | <b>0.05</b> | 7.88                        | <b>0.13</b> | 17.33                         | <b>0.29</b> |
| Residential         |         | 2             | 6          | 16         | 3.2            | <b>0.05</b> | 7.88                        | <b>0.13</b> | 17.33                         | <b>0.29</b> |
| Residential         |         | 4             | 9          | 24         | 4.7            | <b>0.08</b> | 11.81                       | <b>0.20</b> | 25.99                         | <b>0.43</b> |
| Residential         |         | 6             | 4          | 11         | 2.1            | <b>0.04</b> | 5.25                        | <b>0.09</b> | 11.55                         | <b>0.19</b> |
| Residential         |         | 7             | 8          | 22         | 4.2            | <b>0.07</b> | 10.50                       | <b>0.18</b> | 23.10                         | <b>0.39</b> |
| Residential         |         | 8             | 16         | 43         | 8.4            | <b>0.14</b> | 21.00                       | <b>0.35</b> | 46.20                         | <b>0.77</b> |
| Residential         |         | 9             | 7          | 19         | 3.7            | <b>0.06</b> | 9.19                        | <b>0.15</b> | 20.21                         | <b>0.34</b> |
| Residential         |         | 10            | 13         | 35         | 6.8            | <b>0.11</b> | 17.06                       | <b>0.28</b> | 37.54                         | <b>0.63</b> |
| Residential         |         | 11            | 12         | 32         | 6.3            | <b>0.11</b> | 15.75                       | <b>0.26</b> | 34.65                         | <b>0.58</b> |
| Residential         |         | 15            | 12         | 32         | 6.3            | <b>0.11</b> | 15.75                       | <b>0.26</b> | 34.65                         | <b>0.58</b> |
| Residential         |         | 16            | 13         | 35         | 6.8            | <b>0.11</b> | 17.06                       | <b>0.28</b> | 37.54                         | <b>0.63</b> |
| Residential         |         | 19            | 13         | 35         | 6.8            | <b>0.11</b> | 17.06                       | <b>0.28</b> | 37.54                         | <b>0.63</b> |
| Residential         |         | 20            | 12         | 32         | 6.3            | <b>0.11</b> | 15.75                       | <b>0.26</b> | 34.65                         | <b>0.58</b> |
| Residential         |         | 21            | 7          | 19         | 3.7            | <b>0.06</b> | 9.19                        | <b>0.15</b> | 20.21                         | <b>0.34</b> |
| Residential         |         | 24            | 12         | 32         | 6.3            | <b>0.11</b> | 15.75                       | <b>0.26</b> | 34.65                         | <b>0.58</b> |
| Residential         |         | 25            | 22         | 59         | 11.6           | <b>0.19</b> | 28.88                       | <b>0.48</b> | 63.53                         | <b>1.06</b> |
| Residential         |         | 26            | 4          | 11         | 2.1            | <b>0.04</b> | 5.25                        | <b>0.09</b> | 11.55                         | <b>0.19</b> |
| Residential         |         | 27            | 6          | 16         | 3.2            | <b>0.05</b> | 7.88                        | <b>0.13</b> | 17.33                         | <b>0.29</b> |
| <b>Total Site :</b> |         |               | <b>185</b> | <b>500</b> | <b>97.1</b>    | <b>1.62</b> | <b>242.8</b>                | <b>4.05</b> | <b>534.2</b>                  | <b>8.90</b> |

1

The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:

maximum day demand rate = 2.5 x average day demand rate for residential

2

peak hour demand rate = 2.2 x maximum day demand rate for residential

Water demand criteria used to estimate peak demand rates for institutional and commercial/mixed use areas are as follows:

maximum day demand rate = 1.5 x average day demand rate

3

peak hour demand rate = 1.8 x maximum day demand rate

Average day water demand for residential areas: 280 L/cap/d

## **A.2 Fire Flow Demands (2020 FUS)**



## FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

### Block 17 with Firewall

Stantec Project #: 160402276

**Project Name: Wateridge Block 23**

Date: 2/19/2026

Fire Flow Calculation #: 13

**Description:** 14-unit back-to-back townhouse

Notes: Building footprint of 834 m<sup>2</sup>, per site plan provided by Korsiak Urban Planning, dated Feb 11, 2026. Firewall to split block into 6-unit and 8-unit clusters and reduce footprint to 463 m<sup>2</sup>.

| Step | Task                                        | Notes                                                           |                       |                    |                          |                                    |                               |                          |  |  |      | Value Used | Req'd Fire Flow (L/min) |
|------|---------------------------------------------|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------|-------------------------------|--------------------------|--|--|------|------------|-------------------------|
| 1    | Determine Type of Construction              | Type V - Wood Frame / Type IV-D - Mass Timber Construction      |                       |                    |                          |                                    |                               |                          |  |  |      | 1.5        | -                       |
| 2    | Determine Effective Floor Area              | Sum of All Floor Areas                                          |                       |                    |                          |                                    |                               |                          |  |  |      | NO         | -                       |
|      |                                             | 463                                                             | 463                   | 463                |                          |                                    |                               |                          |  |  | 1389 | -          |                         |
| 3    | Determine Required Fire Flow                | (F = 220 x C x A <sup>1/2</sup> ). Round to nearest 1000 L/min  |                       |                    |                          |                                    |                               |                          |  |  |      | -          | 12000                   |
| 4    | Determine Occupancy Charge                  | Limited Combustible                                             |                       |                    |                          |                                    |                               |                          |  |  |      | -15%       | 10200                   |
| 5    | Determine Sprinkler Reduction               | None                                                            |                       |                    |                          |                                    |                               |                          |  |  |      | 0%         | 0                       |
|      |                                             | Non-Standard Water Supply or N/A                                |                       |                    |                          |                                    |                               |                          |  |  |      | 0%         |                         |
|      |                                             | Not Fully Supervised or N/A                                     |                       |                    |                          |                                    |                               |                          |  |  |      | 0%         |                         |
|      |                                             | % Coverage of Sprinkler System                                  |                       |                    |                          |                                    |                               |                          |  |  |      | 0%         |                         |
| 6    | Determine Increase for Exposures (Max. 75%) | Direction                                                       | Exposure Distance (m) | Exposed Length (m) | Exposed Height (Stories) | Length-Height Factor (m x stories) | Construction of Adjacent Wall | Firewall / Sprinklered ? |  |  | -    | -          |                         |
|      |                                             | North                                                           | 3.1 to 10             | 18                 | 3                        | 41-60                              | Type V                        | NO                       |  |  | 17%  | 3672       |                         |
|      |                                             | East                                                            | 10.1 to 20            | 26                 | 3                        | 61-80                              | Type V                        | NO                       |  |  | 13%  |            |                         |
|      |                                             | South                                                           | 0 to 3                | 18                 | 3                        | 41-60                              | Type V                        | YES                      |  |  | 0%   |            |                         |
|      |                                             | West                                                            | 20.1 to 30            | 26                 | 3                        | 61-80                              | Type V                        | NO                       |  |  | 6%   |            |                         |
| 7    | Determine Final Required Fire Flow          | Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min |                       |                    |                          |                                    |                               |                          |  |  |      | 14000      |                         |
|      |                                             | Total Required Fire Flow in L/s                                 |                       |                    |                          |                                    |                               |                          |  |  |      | 233.3      |                         |
|      |                                             | Required Duration of Fire Flow (hrs)                            |                       |                    |                          |                                    |                               |                          |  |  |      | 3.00       |                         |
|      |                                             | Required Volume of Fire Flow (m³)                               |                       |                    |                          |                                    |                               |                          |  |  |      | 2520       |                         |

## FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

### Block 1 with Firewall

Stantec Project #: 160402276

Project Name: Wateridge Block 23

Date: 2/19/2026

Fire Flow Calculation #: 2

**Description:** 7-unit row townhouse

Notes: Building footprint of 630 m<sup>2</sup>, per site plan provided by Korsiak Urban Planning, dated Feb 11, 2026. Firewall to split block into 3-unit and 4-unit clusters and reduce effective floor area to 360 m<sup>2</sup>.

| Step | Task                                        | Notes                                                           |                       |                    |                          |                                    |                               |                          |  |  |     | Value Used | Req'd Fire Flow (L/min) |
|------|---------------------------------------------|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------|-------------------------------|--------------------------|--|--|-----|------------|-------------------------|
| 1    | Determine Type of Construction              | Type V - Wood Frame / Type IV-D - Mass Timber Construction      |                       |                    |                          |                                    |                               |                          |  |  |     | 1.5        | -                       |
| 2    | Determine Effective Floor Area              | Sum of All Floor Areas                                          |                       |                    |                          |                                    |                               |                          |  |  |     | NO         | -                       |
|      |                                             | 360                                                             | 360                   |                    |                          |                                    |                               |                          |  |  |     | 720        | -                       |
| 3    | Determine Required Fire Flow                | (F = 220 x C x A <sup>1/2</sup> ). Round to nearest 1000 L/min  |                       |                    |                          |                                    |                               |                          |  |  |     | -          | 9000                    |
| 4    | Determine Occupancy Charge                  | Limited Combustible                                             |                       |                    |                          |                                    |                               |                          |  |  |     | -15%       | 7650                    |
| 5    | Determine Sprinkler Reduction               | None                                                            |                       |                    |                          |                                    |                               |                          |  |  |     | 0%         | 0                       |
|      |                                             | Non-Standard Water Supply or N/A                                |                       |                    |                          |                                    |                               |                          |  |  |     | 0%         |                         |
|      |                                             | Not Fully Supervised or N/A                                     |                       |                    |                          |                                    |                               |                          |  |  |     | 0%         |                         |
|      |                                             | % Coverage of Sprinkler System                                  |                       |                    |                          |                                    |                               |                          |  |  |     | 0%         |                         |
| 6    | Determine Increase for Exposures (Max. 75%) | Direction                                                       | Exposure Distance (m) | Exposed Length (m) | Exposed Height (Stories) | Length-Height Factor (m x stories) | Construction of Adjacent Wall | Firewall / Sprinklered ? |  |  | -   | -          |                         |
|      |                                             | North                                                           | > 30                  | 0                  | 0                        | 0-20                               | Type V                        | NO                       |  |  | 0%  | 2142       |                         |
|      |                                             | East                                                            | 3.1 to 10             | 14                 | 2                        | 21-49                              | Type V                        | NO                       |  |  | 16% |            |                         |
|      |                                             | South                                                           | 10.1 to 20            | 26                 | 2                        | 41-60                              | Type V                        | NO                       |  |  | 12% |            |                         |
|      |                                             | West                                                            | 0 to 3                | 14                 | 2                        | 21-49                              | Type V                        | YES                      |  |  | 0%  |            |                         |
| 7    | Determine Final Required Fire Flow          | Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min |                       |                    |                          |                                    |                               |                          |  |  |     | 10000      |                         |
|      |                                             | Total Required Fire Flow in L/s                                 |                       |                    |                          |                                    |                               |                          |  |  |     | 166.7      |                         |
|      |                                             | Required Duration of Fire Flow (hrs)                            |                       |                    |                          |                                    |                               |                          |  |  |     | 2.00       |                         |
|      |                                             | Required Volume of Fire Flow (m³)                               |                       |                    |                          |                                    |                               |                          |  |  |     | 1200       |                         |

## FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

### Block 4 with Firewall

Stantec Project #: 160402276

Project Name: Wateridge Block 23

Date: 2/19/2026

Fire Flow Calculation #: 4

**Description:** 7-unit row townhouse

Notes: Building footprint of 630 m<sup>2</sup>, per site plan provided by Korsiak Urban Planning, dated Feb 11, 2026. Firewall to split block into 1-unit and 6-unit clusters and reduce effective floor area to 540 m<sup>2</sup>.

| Step | Task                                        | Notes                                                           |                       |                    |                          |                                    |                               |                          |     | Value Used | Req'd Fire Flow (L/min) |
|------|---------------------------------------------|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------|-------------------------------|--------------------------|-----|------------|-------------------------|
| 1    | Determine Type of Construction              | Type V - Wood Frame / Type IV-D - Mass Timber Construction      |                       |                    |                          |                                    |                               |                          |     | 1.5        | -                       |
| 2    | Determine Effective Floor Area              | Sum of All Floor Areas                                          |                       |                    |                          |                                    |                               |                          |     | NO         | -                       |
|      |                                             | 540                                                             | 540                   |                    |                          |                                    |                               |                          |     | 1080       | -                       |
| 3    | Determine Required Fire Flow                | (F = 220 x C x A <sup>1/2</sup> ). Round to nearest 1000 L/min  |                       |                    |                          |                                    |                               |                          |     | -          | 11000                   |
| 4    | Determine Occupancy Charge                  | Limited Combustible                                             |                       |                    |                          |                                    |                               |                          |     | -15%       | 9350                    |
| 5    | Determine Sprinkler Reduction               | None                                                            |                       |                    |                          |                                    |                               |                          |     | 0%         | 0                       |
|      |                                             | Non-Standard Water Supply or N/A                                |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | Not Fully Supervised or N/A                                     |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | % Coverage of Sprinkler System                                  |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
| 6    | Determine Increase for Exposures (Max. 75%) | Direction                                                       | Exposure Distance (m) | Exposed Length (m) | Exposed Height (Stories) | Length-Height Factor (m x stories) | Construction of Adjacent Wall | Firewall / Sprinklered ? | -   | -          |                         |
|      |                                             | North                                                           | > 30                  | 0                  | 0                        | 0-20                               | Type V                        | NO                       | 0%  | 2057       |                         |
|      |                                             | East                                                            | 3.1 to 10             | 14                 | 2                        | 21-49                              | Type V                        | NO                       | 16% |            |                         |
|      |                                             | South                                                           | 20.1 to 30            | 39                 | 2                        | 61-80                              | Type V                        | NO                       | 6%  |            |                         |
|      |                                             | West                                                            | 0 to 3                | 14                 | 2                        | 21-49                              | Type V                        | YES                      | 0%  |            |                         |
| 7    | Determine Final Required Fire Flow          | Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min |                       |                    |                          |                                    |                               |                          |     | 11000      |                         |
|      |                                             | Total Required Fire Flow in L/s                                 |                       |                    |                          |                                    |                               |                          |     | 183.3      |                         |
|      |                                             | Required Duration of Fire Flow (hrs)                            |                       |                    |                          |                                    |                               |                          |     | 2.00       |                         |
|      |                                             | Required Volume of Fire Flow (m³)                               |                       |                    |                          |                                    |                               |                          |     | 1320       |                         |

## FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

### Block 8 with Firewall

Stantec Project #: 160402276

**Project Name: Wateridge Block 23**

Date: 2/19/2026

Fire Flow Calculation #: 8

**Description:** 8-unit back-to-back townhouse

Notes: Building footprint of 488 m<sup>2</sup>, per site plan provided by Korsiak Urban Planning, dated Feb 11, 2026. Firewall to split block into 2-unit and 6-unit clusters and reduce footprint to 366 m<sup>2</sup>.

| Step | Task                                        | Notes                                                           |                       |                    |                          |                                    |                               |                          |     | Value Used | Req'd Fire Flow (L/min) |
|------|---------------------------------------------|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------|-------------------------------|--------------------------|-----|------------|-------------------------|
| 1    | Determine Type of Construction              | Type V - Wood Frame / Type IV-D - Mass Timber Construction      |                       |                    |                          |                                    |                               |                          |     | 1.5        | -                       |
| 2    | Determine Effective Floor Area              | Sum of All Floor Areas                                          |                       |                    |                          |                                    |                               |                          |     | NO         | -                       |
|      |                                             | 366                                                             | 366                   | 366                |                          |                                    |                               |                          |     | 1098       | -                       |
| 3    | Determine Required Fire Flow                | (F = 220 x C x A <sup>1/2</sup> ). Round to nearest 1000 L/min  |                       |                    |                          |                                    |                               |                          |     | -          | 11000                   |
| 4    | Determine Occupancy Charge                  | Limited Combustible                                             |                       |                    |                          |                                    |                               |                          |     | -15%       | 9350                    |
| 5    | Determine Sprinkler Reduction               | None                                                            |                       |                    |                          |                                    |                               |                          |     | 0%         | 0                       |
|      |                                             | Non-Standard Water Supply or N/A                                |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | Not Fully Supervised or N/A                                     |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | % Coverage of Sprinkler System                                  |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
| 6    | Determine Increase for Exposures (Max. 75%) | Direction                                                       | Exposure Distance (m) | Exposed Length (m) | Exposed Height (Stories) | Length-Height Factor (m x stories) | Construction of Adjacent Wall | Firewall / Sprinklered ? | -   | -          |                         |
|      |                                             | North                                                           | 10.1 to 20            | 18                 | 3                        | 41-60                              | Type V                        | NO                       | 12% | 3273       |                         |
|      |                                             | East                                                            | 10.1 to 20            | 19                 | 3                        | 41-60                              | Type V                        | NO                       | 12% |            |                         |
|      |                                             | South                                                           | 0 to 3                | 18                 | 3                        | 41-60                              | Type V                        | YES                      | 0%  |            |                         |
|      |                                             | West                                                            | 10.1 to 20            | 19                 | 2                        | 21-49                              | Type V                        | NO                       | 11% |            |                         |
| 7    | Determine Final Required Fire Flow          | Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min |                       |                    |                          |                                    |                               |                          |     | 13000      |                         |
|      |                                             | Total Required Fire Flow in L/s                                 |                       |                    |                          |                                    |                               |                          |     | 216.7      |                         |
|      |                                             | Required Duration of Fire Flow (hrs)                            |                       |                    |                          |                                    |                               |                          |     | 2.50       |                         |
|      |                                             | Required Volume of Fire Flow (m³)                               |                       |                    |                          |                                    |                               |                          |     | 1950       |                         |



## FUS Fire Flow Calculation Sheet - 2020 FUS Guidelines

### Block 9 with Firewall

Stantec Project #: 160402276

**Project Name: Wateridge Block 23**

Date: 2/19/2026

Fire Flow Calculation #: 10

**Description:** 12-unit back-to-back townhouse

Notes: Building footprint of 707 m<sup>2</sup>, per site plan provided by Korsiak Urban Planning, dated Feb 11, 2026. Firewall to split block into two 6-unit clusters and reduce footprint to 354 m<sup>2</sup>.

| Step | Task                                        | Notes                                                           |                       |                    |                          |                                    |                               |                          |     | Value Used | Req'd Fire Flow (L/min) |
|------|---------------------------------------------|-----------------------------------------------------------------|-----------------------|--------------------|--------------------------|------------------------------------|-------------------------------|--------------------------|-----|------------|-------------------------|
| 1    | Determine Type of Construction              | Type V - Wood Frame / Type IV-D - Mass Timber Construction      |                       |                    |                          |                                    |                               |                          |     | 1.5        | -                       |
| 2    | Determine Effective Floor Area              | Sum of All Floor Areas                                          |                       |                    |                          |                                    |                               |                          |     | NO         | -                       |
|      |                                             | 354                                                             | 354                   | 354                |                          |                                    |                               |                          |     | 1062       | -                       |
| 3    | Determine Required Fire Flow                | (F = 220 x C x A <sup>1/2</sup> ). Round to nearest 1000 L/min  |                       |                    |                          |                                    |                               |                          |     | -          | 11000                   |
| 4    | Determine Occupancy Charge                  | Limited Combustible                                             |                       |                    |                          |                                    |                               |                          |     | -15%       | 9350                    |
| 5    | Determine Sprinkler Reduction               | None                                                            |                       |                    |                          |                                    |                               |                          |     | 0%         | 0                       |
|      |                                             | Non-Standard Water Supply or N/A                                |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | Not Fully Supervised or N/A                                     |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
|      |                                             | % Coverage of Sprinkler System                                  |                       |                    |                          |                                    |                               |                          |     | 0%         |                         |
| 6    | Determine Increase for Exposures (Max. 75%) | Direction                                                       | Exposure Distance (m) | Exposed Length (m) | Exposed Height (Stories) | Length-Height Factor (m x stories) | Construction of Adjacent Wall | Firewall / Sprinklered ? | -   | -          |                         |
|      |                                             | North                                                           | 0 to 3                | 18                 | 3                        | 41-60                              | Type V                        | YES                      | 0%  | 3834       |                         |
|      |                                             | East                                                            | 10.1 to 20            | 19                 | 3                        | 41-60                              | Type V                        | NO                       | 12% |            |                         |
|      |                                             | South                                                           | 3.1 to 10             | 18                 | 3                        | 41-60                              | Type V                        | NO                       | 17% |            |                         |
|      |                                             | West                                                            | 10.1 to 20            | 19                 | 3                        | 41-60                              | Type V                        | NO                       | 12% |            |                         |
| 7    | Determine Final Required Fire Flow          | Total Required Fire Flow in L/min, Rounded to Nearest 1000L/min |                       |                    |                          |                                    |                               |                          |     | 13000      |                         |
|      |                                             | Total Required Fire Flow in L/s                                 |                       |                    |                          |                                    |                               |                          |     | 216.7      |                         |
|      |                                             | Required Duration of Fire Flow (hrs)                            |                       |                    |                          |                                    |                               |                          |     | 2.50       |                         |
|      |                                             | Required Volume of Fire Flow (m³)                               |                       |                    |                          |                                    |                               |                          |     | 1950       |                         |

## **A.3 Hydraulic Boundary Conditions**



Canada Lands Company

# Design Brief

## Wateridge Village at Rockcliffe Phases 6 and 7

August 2025

|                  |                                                                                                                                                                                                                                                                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Minimum Pressure | Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi)                                                                                                                                                                                                                                                       |
| Fire Flow        | During the period of maximum day demand, the system pressure shall not be less than 138 kPa (20 psi) during a fire flow event.                                                                                                                                                                                                                          |
| Maximum Pressure | Maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code, the maximum pressure should not exceed 552 kPa (80 psi). Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa. |

### 2.3.3 Fire Flow Rate

Fire flow calculations have been conducted using the Fire Underwriters Survey (FUS) method for representative buildings shown on the conceptual site plan. A calculation was performed for a townhouse on Block 10 and 31, a 8-storey mixed-use building on Block 30, a 8-storey mixed-use building on Block 29, a 9-storey apartment building on Block 35, a 9-storey apartment building on Block 34, a townhouse on Block 35/44, and a townhouse in Phase 8. Results of the analysis result in fire flows of 216.7 l/s, 200.0 l/s, 150.0 l/s, 150.0 l/s, 183.3 l/s, 166.7 l/s, and 216.7 l/s respectively. To be conservative, a fire flow demand of 250.0 l/s has been added to all the nodes in the InfoWater model. A copy of the FUS calculations is included in **Appendix B**.

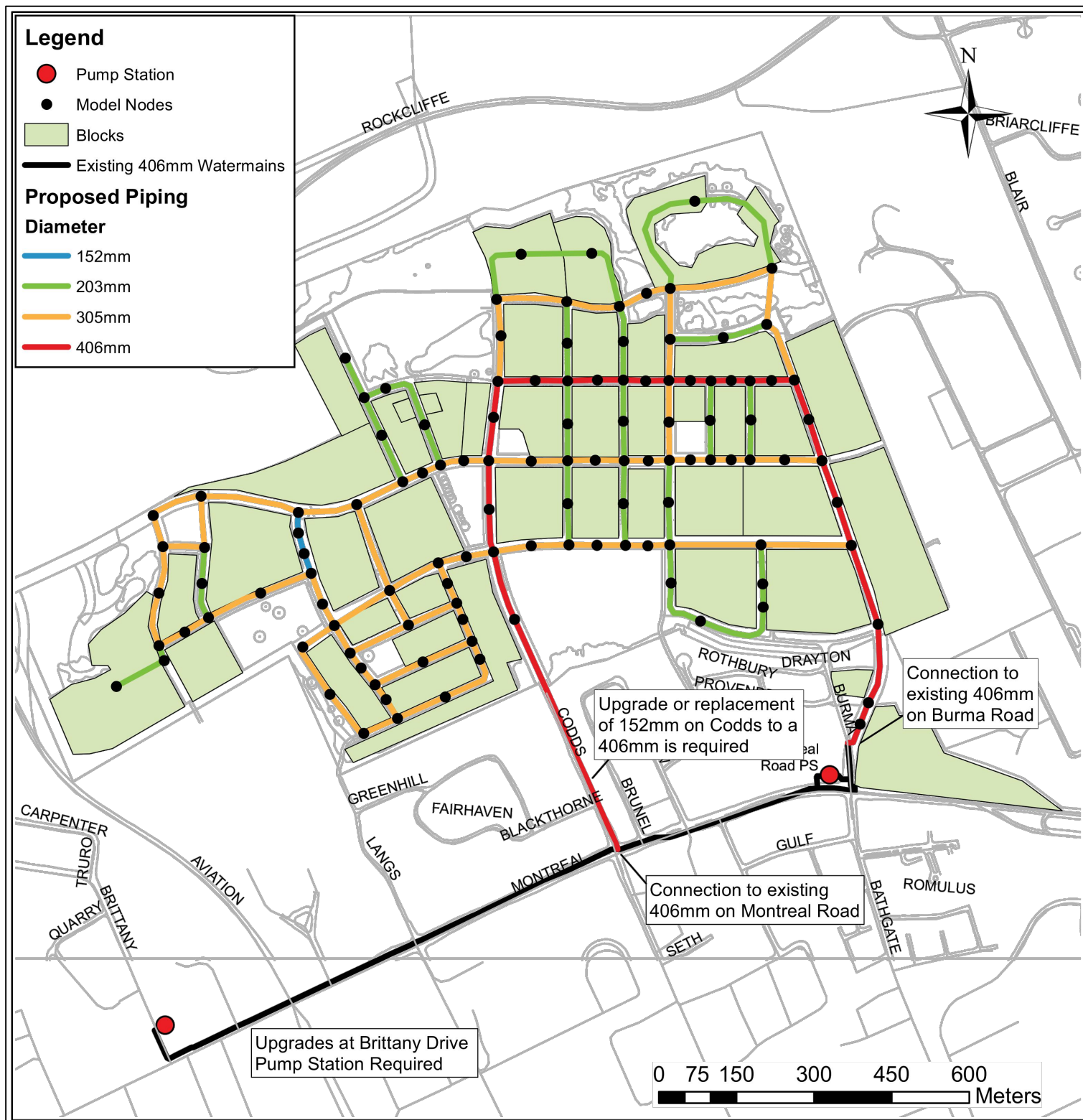
### 2.3.4 Boundary Conditions

The City of Ottawa has provided hydraulic boundary conditions on Tawadina Road for the five watermain connections to Phases 6 and 7.

A copy of the updated boundary conditions contained in a February 18, 2025 email is included in **Appendix B** and summarized as follows:

|                                     | Connection 1 | Connection 2 | Connection 3 | Connection 4 | Connection 5 |
|-------------------------------------|--------------|--------------|--------------|--------------|--------------|
| <b>Min HGL (m)</b>                  | 143.0        | 143.0        | 143.0        | 143.0        | 143.0        |
| <b>Max HGL (m)</b>                  | 143.6        | 143.6        | 143.6        | 143.6        | 143.6        |
| <b>Max Day + FF<br/>(150 L/s)</b>   | 141.7        | 139.2        | 139.2        | 141.7        | 141.7        |
| <b>Max Day + FF<br/>(183.3 L/s)</b> | 141.2        | 137.6        | 137.6        | 141.2        | 141.2        |
| <b>Max Day + FF<br/>(216.7 L/s)</b> | 140.7        | 135.7        | 135.7        | 140.6        | 140.6        |
| <b>Max Day + FF<br/>(250 L/s)</b>   | 140.0        | 133.7        | 133.7        | 139.9        | 140.0        |

J:\32952-RockcliffeRedev\5.9 Drawings\59civil\current\Report Figures\MSS 2015\Section 4\FIGURE4.4 Proposed Pipe alignment and Diameters-REV.dwg Layout Name: FIGURE4.4



Stantec

Project Title

Drawing Title

Sheet No.



FORMER CFB ROCKCLIFFE  
MASTER SERVICING STUDY

PROPOSED PIPE ALIGNMENT  
AND DIAMETERS

FIGURE 4.4

## Labadie, Sam

**From:** Whelan, Amy <amy.whelan@ottawa.ca>  
**Sent:** February 18, 2025 1:30 PM  
**To:** Labadie, Sam  
**Cc:** Moffatt, Jim; O'Connell, Erin; Taylor Marquis  
**Subject:** RE: Wateridge Phase 6-7 Registration Comments on December 20th submission  
**Attachments:** Wateridge Development Phase 6, 7 and 8 February 2025.pdf; RE: Wateridge Phases 6 and 7 - Boundary Condition Request

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

**Arcadis Warning:** Exercise caution with email messages from external sources such as this message. Always verify the sender and avoid clicking on links or scanning QR codes unless certain of their authenticity.

Good afternoon Sam,

Please add the not that a cap is to be installed on the temporary outlet.

Additionally, please find the boundary condition request results below, initial request email attached for consistency:

**\*\*\*\*The following information may be passed on to the consultant, but do NOT forward this e-mail directly.\*\*\*\***

The following are boundary conditions, HGL, for hydraulic analysis for Wateridge Development Phase 6, 7 and 8, (zone MONT) assumed to be connected to the public watermain at locations shown on the attached PDF figure.

|                             | Connection 1<br>305mm on<br>Codd's Rd | Connection 2<br>203mm on<br>Bareille-Snow | Connection 3<br>203mm on<br>Codd's Rd | Connection 4<br>305mm<br>on Moses<br>Tennisco | Connection 5<br>305mm<br>on Wanaki Rd |
|-----------------------------|---------------------------------------|-------------------------------------------|---------------------------------------|-----------------------------------------------|---------------------------------------|
| Min HGL (m)                 | 143.0                                 | 143.0                                     | 143.0                                 | 143.0                                         | 143.0                                 |
| Max HGL (m)                 | 143.6                                 | 143.6                                     | 143.6                                 | 143.6                                         | 143.6                                 |
| Max Day + FF (150<br>L/s)   | 141.7                                 | 139.2                                     | 139.2                                 | 141.7                                         | 141.7                                 |
| Max Day + FF<br>(183.3 L/s) | 141.2                                 | 137.6                                     | 137.6                                 | 141.2                                         | 141.2                                 |
| Max Day + FF<br>(216.7 L/s) | 140.7                                 | 135.7                                     | 135.7                                 | 140.6                                         | 140.6                                 |
| Max Day + FF (250<br>L/s)   | 140.0                                 | 133.7                                     | 133.7                                 | 139.9                                         | 140.0                                 |

Boundary Conditions for Wateridge Development - Phase 6 and 7



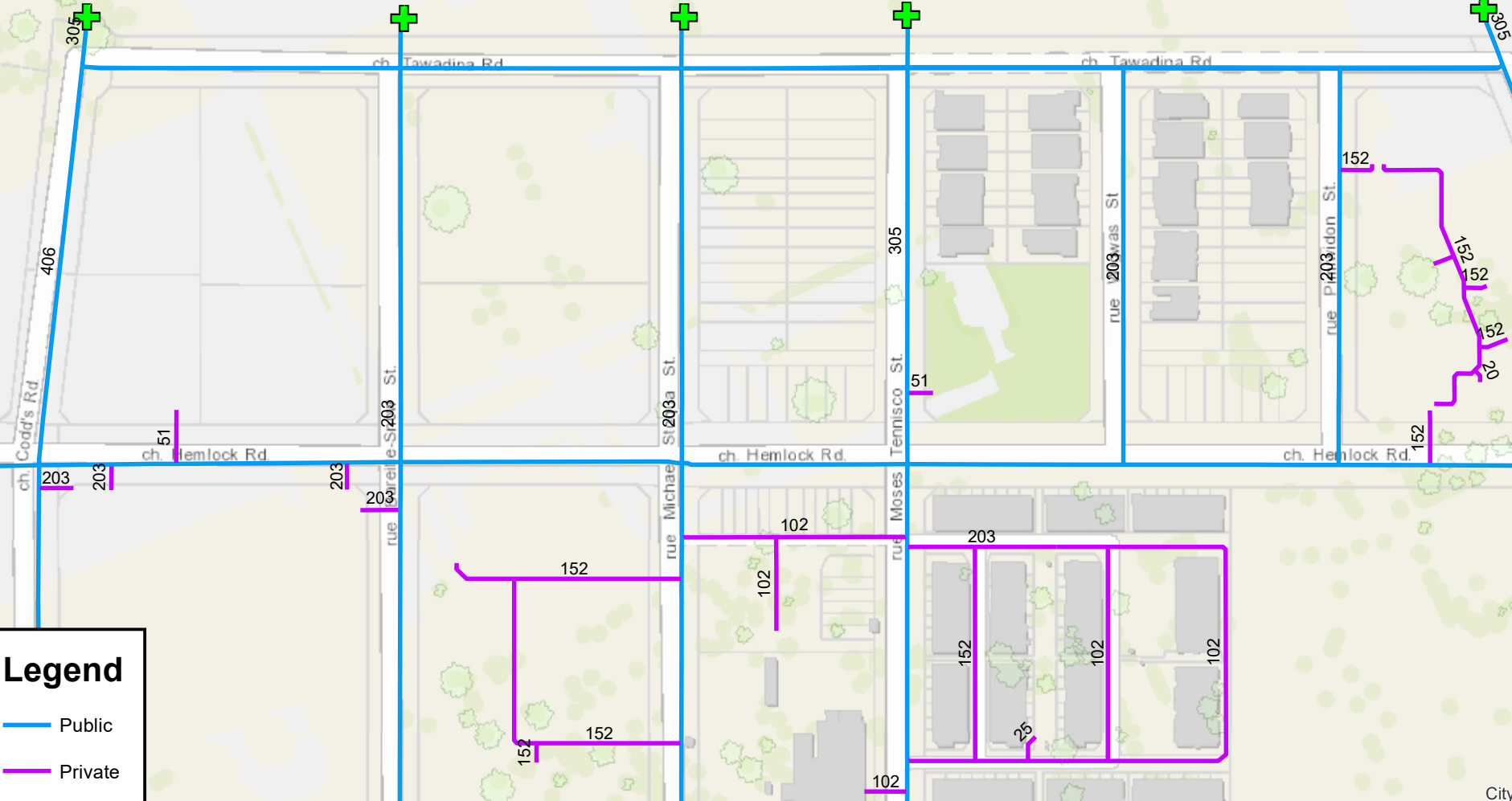
Connection 1

Connection 2

Connection 3

Connection 4

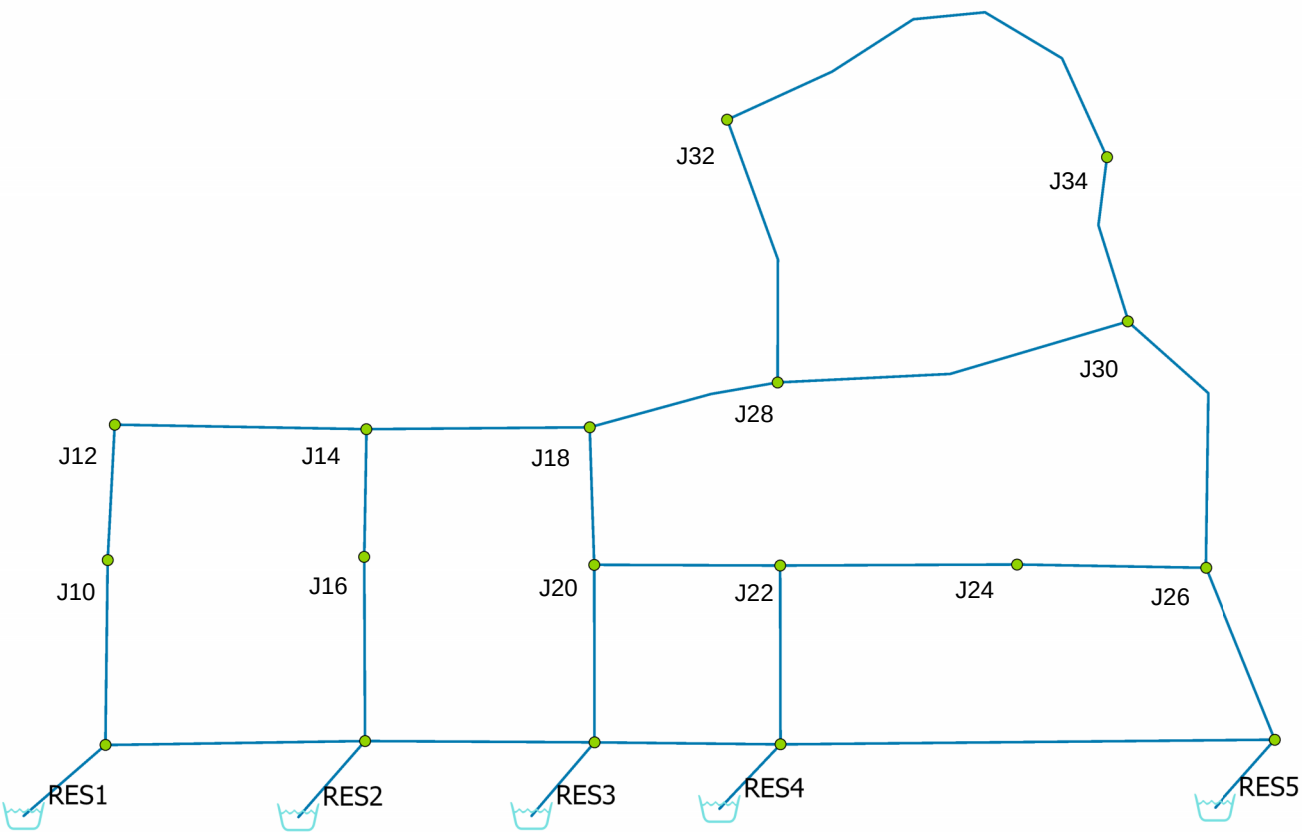
Connection 5



Legend

- Public
- Private

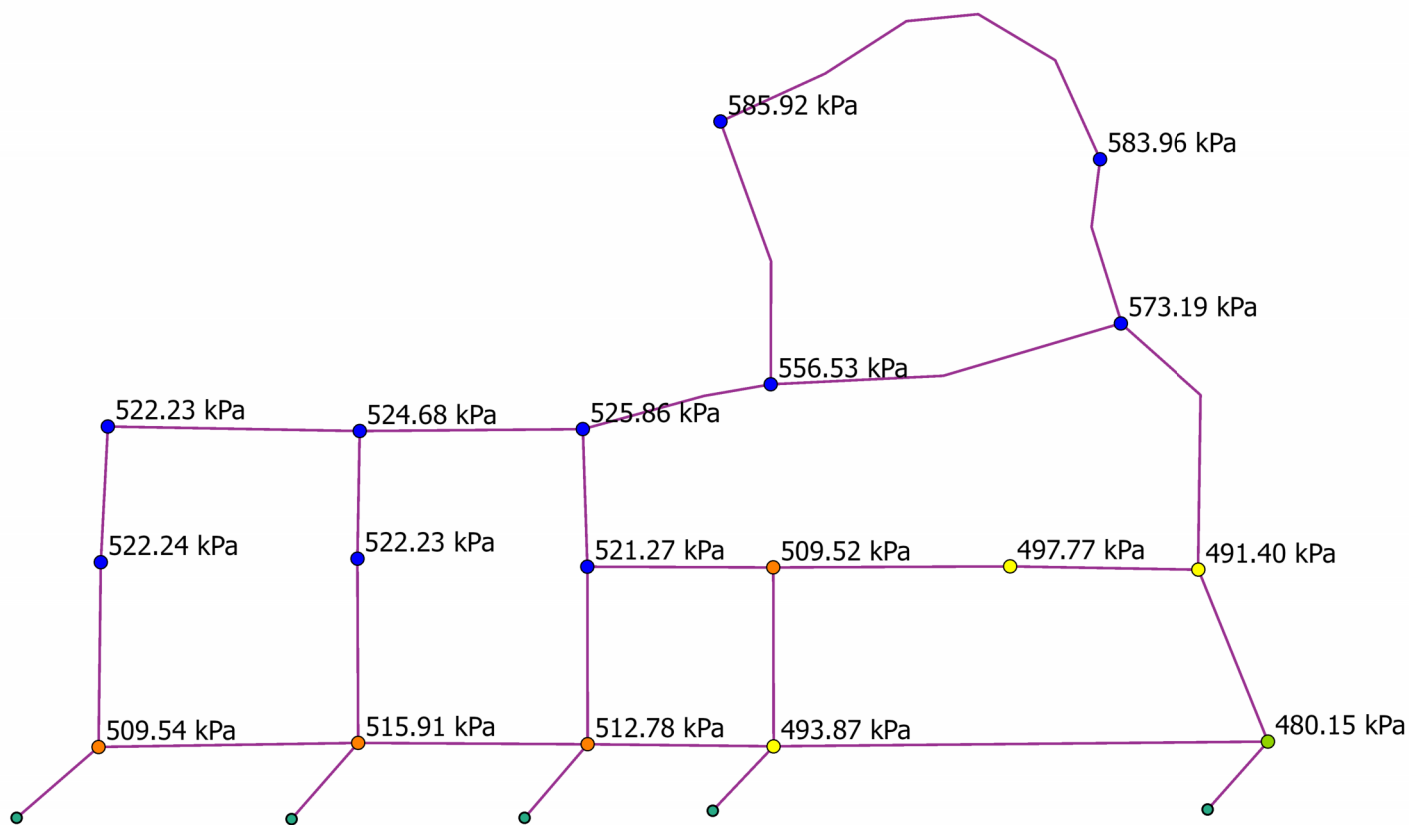
Node IDs





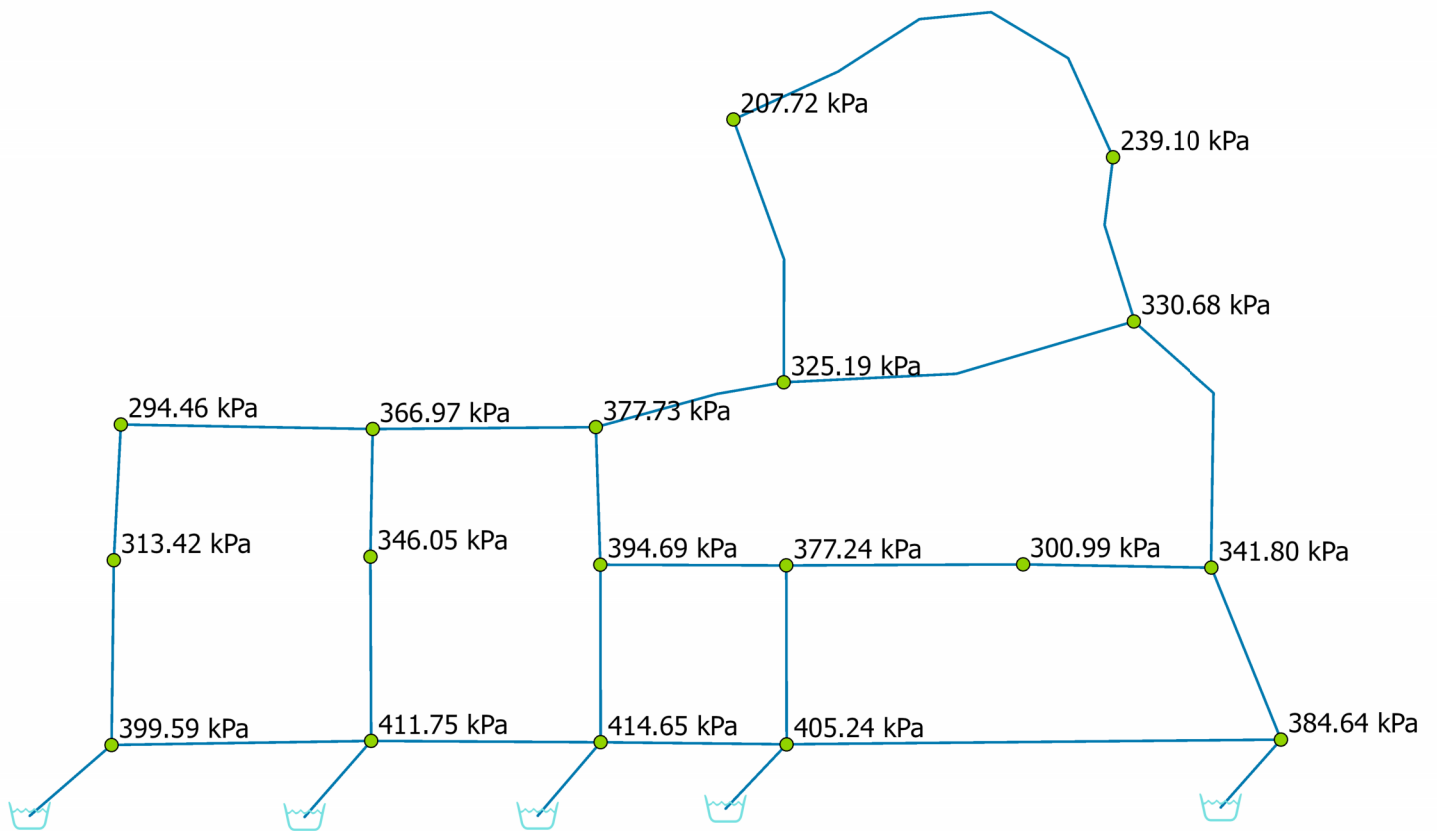
Average Day

|    |                          | ID    | Demand<br>(L/s) | Elevation<br>(m) | Head<br>(m) | Pressure<br>(kPa) |
|----|--------------------------|-------|-----------------|------------------|-------------|-------------------|
| 1  | <input type="checkbox"/> | CONN1 | 0.00            | 91.00            | 143.00      | 509.54            |
| 2  | <input type="checkbox"/> | CONN2 | 0.00            | 90.35            | 143.00      | 515.91            |
| 3  | <input type="checkbox"/> | CONN3 | 0.00            | 90.67            | 143.00      | 512.78            |
| 4  | <input type="checkbox"/> | CONN4 | 0.00            | 92.60            | 143.00      | 493.87            |
| 5  | <input type="checkbox"/> | CONN5 | 0.00            | 94.00            | 143.00      | 480.15            |
| 6  | <input type="checkbox"/> | J10   | 1.16            | 89.70            | 142.99      | 522.24            |
| 7  | <input type="checkbox"/> | J12   | 1.13            | 89.70            | 142.99      | 522.23            |
| 8  | <input type="checkbox"/> | J14   | 0.00            | 89.45            | 142.99      | 524.68            |
| 9  | <input type="checkbox"/> | J16   | 2.30            | 89.70            | 142.99      | 522.23            |
| 10 | <input type="checkbox"/> | J18   | 1.04            | 89.33            | 142.99      | 525.86            |
| 11 | <input type="checkbox"/> | J20   | 1.19            | 89.80            | 143.00      | 521.27            |
| 12 | <input type="checkbox"/> | J22   | 0.37            | 91.00            | 143.00      | 509.52            |
| 13 | <input type="checkbox"/> | J24   | 0.00            | 92.20            | 143.00      | 497.77            |
| 14 | <input type="checkbox"/> | J26   | 0.17            | 92.85            | 143.00      | 491.40            |
| 15 | <input type="checkbox"/> | J28   | 0.65            | 86.20            | 142.99      | 556.53            |
| 16 | <input type="checkbox"/> | J30   | 0.00            | 84.50            | 142.99      | 573.19            |
| 17 | <input type="checkbox"/> | J32   | 0.78            | 83.20            | 142.99      | 585.92            |
| 18 | <input type="checkbox"/> | J34   | 0.48            | 83.40            | 142.99      | 583.96            |



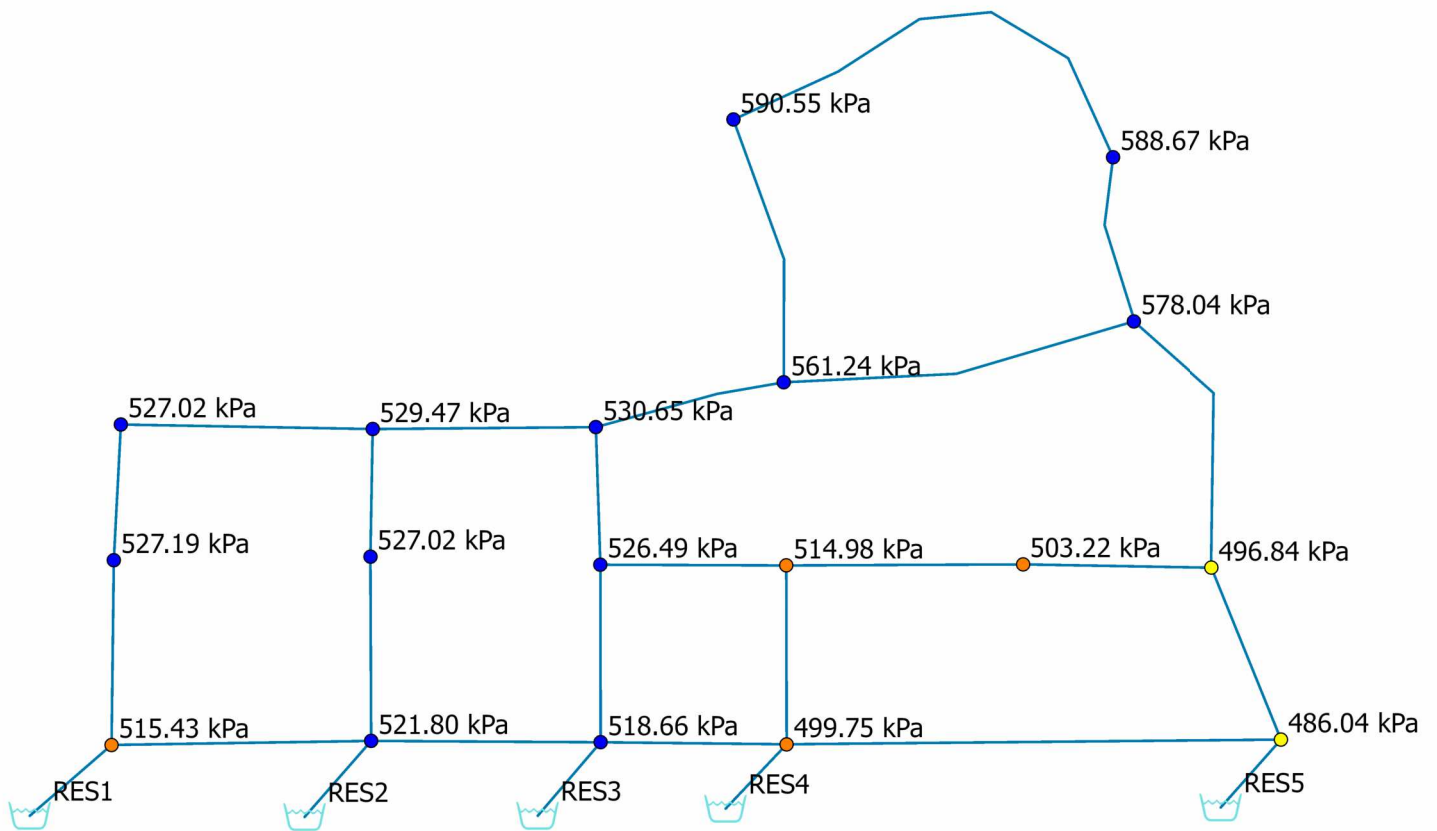
Fireflow - 15000 L/min

|    |                          | ID    | Static Demand<br>(L/s) | Static Pressure<br>(kPa) | Static Head<br>(m) | Fire-Flow Demand<br>(L/s) | Residual Pressure<br>(kPa) | Hydrant Available Flow<br>(L/s) | Hydrant Pressure at Available Flow<br>(kPa) |
|----|--------------------------|-------|------------------------|--------------------------|--------------------|---------------------------|----------------------------|---------------------------------|---------------------------------------------|
| 1  | <input type="checkbox"/> | CONN1 | 0.00                   | 461.60                   | 138.11             | 250.00                    | 399.59                     | 666.63                          | 149.96                                      |
| 2  | <input type="checkbox"/> | CONN2 | 0.00                   | 447.64                   | 136.03             | 250.00                    | 411.75                     | 875.37                          | 149.96                                      |
| 3  | <input type="checkbox"/> | CONN3 | 0.00                   | 445.64                   | 136.15             | 250.00                    | 414.65                     | 970.98                          | 149.96                                      |
| 4  | <input type="checkbox"/> | CONN4 | 0.00                   | 449.66                   | 138.49             | 250.00                    | 405.24                     | 907.26                          | 149.96                                      |
| 5  | <input type="checkbox"/> | CONN5 | 0.00                   | 442.14                   | 139.12             | 250.00                    | 384.64                     | 677.95                          | 149.96                                      |
| 6  | <input type="checkbox"/> | J10   | 2.91                   | 469.92                   | 137.65             | 250.00                    | 313.42                     | 385.35                          | 149.96                                      |
| 7  | <input type="checkbox"/> | J12   | 2.81                   | 467.27                   | 137.38             | 250.00                    | 294.46                     | 362.42                          | 149.96                                      |
| 8  | <input type="checkbox"/> | J14   | 0.00                   | 465.85                   | 136.99             | 250.00                    | 366.97                     | 500.35                          | 149.96                                      |
| 9  | <input type="checkbox"/> | J16   | 5.73                   | 458.73                   | 136.51             | 250.00                    | 346.05                     | 455.76                          | 149.96                                      |
| 10 | <input type="checkbox"/> | J18   | 2.61                   | 468.31                   | 137.12             | 250.00                    | 377.73                     | 532.79                          | 149.96                                      |
| 11 | <input type="checkbox"/> | J20   | 2.97                   | 463.56                   | 137.11             | 250.00                    | 394.69                     | 627.02                          | 149.96                                      |
| 12 | <input type="checkbox"/> | J22   | 0.92                   | 460.79                   | 138.02             | 250.00                    | 377.24                     | 567.81                          | 149.96                                      |
| 13 | <input type="checkbox"/> | J24   | 0.00                   | 450.40                   | 138.16             | 250.00                    | 300.99                     | 377.30                          | 149.96                                      |
| 14 | <input type="checkbox"/> | J26   | 0.42                   | 445.12                   | 138.27             | 250.00                    | 341.80                     | 470.73                          | 149.96                                      |
| 15 | <input type="checkbox"/> | J28   | 1.63                   | 501.67                   | 137.39             | 250.00                    | 325.19                     | 374.44                          | 149.96                                      |
| 16 | <input type="checkbox"/> | J30   | 0.00                   | 521.09                   | 137.68             | 250.00                    | 330.68                     | 367.48                          | 149.96                                      |
| 17 | <input type="checkbox"/> | J32   | 1.96                   | 531.62                   | 137.45             | 250.00                    | 207.72                     | 276.26                          | 149.96                                      |
| 18 | <input type="checkbox"/> | J34   | 1.20                   | 531.19                   | 137.61             | 250.00                    | 239.10                     | 292.01                          | 149.96                                      |



Peak Hour

|    |                          | ID    | Demand<br>(L/s) | Elevation<br>(m) | Head<br>(m) | Pressure<br>(kPa) |
|----|--------------------------|-------|-----------------|------------------|-------------|-------------------|
| 1  | <input type="checkbox"/> | CONN1 | 0.00            | 91.00            | 143.60      | 515.43            |
| 2  | <input type="checkbox"/> | CONN2 | 0.00            | 90.35            | 143.60      | 521.80            |
| 3  | <input type="checkbox"/> | CONN3 | 0.00            | 90.67            | 143.60      | 518.66            |
| 4  | <input type="checkbox"/> | CONN4 | 0.00            | 92.60            | 143.60      | 499.75            |
| 5  | <input type="checkbox"/> | CONN5 | 0.00            | 94.00            | 143.60      | 486.04            |
| 6  | <input type="checkbox"/> | J10   | 6.36            | 89.70            | 143.50      | 527.19            |
| 7  | <input type="checkbox"/> | J12   | 6.19            | 89.70            | 143.48      | 527.02            |
| 8  | <input type="checkbox"/> | J14   | 0.00            | 89.45            | 143.48      | 529.47            |
| 9  | <input type="checkbox"/> | J16   | 12.58           | 89.70            | 143.48      | 527.02            |
| 10 | <input type="checkbox"/> | J18   | 5.74            | 89.33            | 143.48      | 530.65            |
| 11 | <input type="checkbox"/> | J20   | 6.53            | 89.80            | 143.53      | 526.49            |
| 12 | <input type="checkbox"/> | J22   | 2.02            | 91.00            | 143.55      | 514.98            |
| 13 | <input type="checkbox"/> | J24   | 0.00            | 92.20            | 143.55      | 503.22            |
| 14 | <input type="checkbox"/> | J26   | 0.91            | 92.85            | 143.55      | 496.84            |
| 15 | <input type="checkbox"/> | J28   | 3.59            | 86.20            | 143.47      | 561.24            |
| 16 | <input type="checkbox"/> | J30   | 0.00            | 84.50            | 143.49      | 578.04            |
| 17 | <input type="checkbox"/> | J32   | 4.32            | 83.20            | 143.47      | 590.55            |
| 18 | <input type="checkbox"/> | J34   | 2.65            | 83.40            | 143.47      | 588.67            |



## **A.4 Water Model Analysis Results**



# Junction Results - Basic Day

| ID | Demand (L/s) | Elevation (m) | Head (m) | Pressure (m) | Pressure (psi)2 | Pressure (kPa) |
|----|--------------|---------------|----------|--------------|-----------------|----------------|
| 29 | 0.00         | 90.28         | 143.59   | 53.32        | 75.81           | 522.71         |
| 8  | 0.14         | 90.14         | 143.59   | 53.45        | 76.01           | 524.05         |
| 0  | 0.03         | 90.04         | 143.59   | 53.55        | 76.15           | 525.05         |
| 12 | 0.00         | 89.93         | 143.59   | 53.66        | 76.30           | 526.10         |
| 1  | 0.05         | 89.92         | 143.59   | 53.67        | 76.31           | 526.16         |
| 31 | 0.00         | 89.88         | 143.59   | 53.71        | 76.37           | 526.56         |
| 26 | 0.04         | 89.85         | 143.59   | 53.74        | 76.42           | 526.88         |
| 11 | 0.11         | 89.83         | 143.59   | 53.76        | 76.45           | 527.07         |
| 9  | 0.06         | 89.76         | 143.59   | 53.83        | 76.55           | 527.79         |
| 7  | 0.07         | 89.73         | 143.59   | 53.87        | 76.59           | 528.10         |
| 13 | 0.00         | 89.72         | 143.59   | 53.87        | 76.61           | 528.18         |
| 2  | 0.05         | 89.71         | 143.59   | 53.88        | 76.61           | 528.20         |
| 22 | 0.00         | 89.70         | 143.59   | 53.90        | 76.64           | 528.39         |
| 17 | 0.00         | 89.69         | 143.59   | 53.90        | 76.64           | 528.42         |
| 21 | 0.06         | 89.67         | 143.59   | 53.92        | 76.67           | 528.63         |
| 6  | 0.04         | 89.67         | 143.59   | 53.93        | 76.68           | 528.69         |
| 10 | 0.11         | 89.65         | 143.59   | 53.94        | 76.70           | 528.80         |
| 30 | 0.00         | 89.65         | 143.59   | 53.94        | 76.70           | 528.83         |
| 4  | 0.08         | 89.65         | 143.59   | 53.94        | 76.70           | 528.84         |
| 5  | 0.00         | 89.64         | 143.59   | 53.95        | 76.72           | 528.96         |
| 25 | 0.19         | 89.64         | 143.59   | 53.95        | 76.72           | 528.96         |
| 3  | 0.00         | 89.61         | 143.59   | 53.98        | 76.76           | 529.27         |
| 28 | 0.00         | 89.61         | 143.59   | 53.98        | 76.76           | 529.27         |
| 27 | 0.05         | 89.59         | 143.59   | 54.00        | 76.78           | 529.38         |
| 16 | 0.11         | 89.59         | 143.59   | 54.00        | 76.79           | 529.46         |
| 23 | 0.00         | 89.53         | 143.59   | 54.06        | 76.87           | 530.02         |
| 14 | 0.00         | 89.53         | 143.59   | 54.06        | 76.88           | 530.05         |
| 15 | 0.11         | 89.50         | 143.59   | 54.09        | 76.91           | 530.27         |
| 24 | 0.11         | 89.49         | 143.59   | 54.10        | 76.93           | 530.44         |
| 20 | 0.11         | 89.46         | 143.59   | 54.13        | 76.97           | 530.67         |
| 19 | 0.11         | 89.41         | 143.59   | 54.18        | 77.04           | 531.19         |

# Link Results - Basic Day

| ID     | FROM | TO | Length (m) | Diameter (mm) | Roughness | Flow (L/s) | Velocity (m/s) |
|--------|------|----|------------|---------------|-----------|------------|----------------|
| 1015_1 | 19   | 3  | 17.78      | 204           | 110       | -0.335     | 0.010          |
| 1004_1 | 5    | 22 | 35.34      | 204           | 110       | 0.178      | 0.005          |
| 1001   | 2    | 1  | 38.98      | 204           | 110       | 0.193      | 0.006          |
| 1000_1 | 1    | 12 | 2.18       | 204           | 110       | 0.143      | 0.004          |
| 1003   | 4    | 3  | 35.49      | 204           | 110       | -0.182     | 0.006          |
| 1022_1 | 28   | 5  | 37.51      | 204           | 110       | 0.692      | 0.021          |
| 1005   | 6    | 5  | 25.13      | 204           | 110       | -0.256     | 0.008          |
| 1006   | 7    | 6  | 9.01       | 204           | 110       | -0.216     | 0.007          |
| 1007   | 8    | 7  | 59.59      | 204           | 110       | -0.146     | 0.004          |
| 1008   | 10   | 9  | 3.27       | 204           | 110       | -0.107     | 0.003          |
| 1009   | 11   | 10 | 90.82      | 204           | 110       | 0.003      | 0.000          |
| 1010   | 12   | 11 | 4.93       | 204           | 110       | 0.113      | 0.003          |
| 1011   | 14   | 13 | 10.09      | 204           | 110       | -0.041     | 0.001          |
| 1012   | 15   | 14 | 8.05       | 204           | 110       | -0.041     | 0.001          |
| 1013   | 16   | 15 | 84.65      | 204           | 110       | 0.069      | 0.002          |
| 1014   | 17   | 16 | 3.57       | 204           | 110       | 0.179      | 0.005          |
| 1002_1 | 3    | 17 | 43.72      | 204           | 110       | 0.421      | 0.013          |
| 1016   | 20   | 19 | 75.68      | 204           | 110       | -0.225     | 0.007          |
| 1017   | 21   | 20 | 16.00      | 204           | 110       | -0.115     | 0.004          |
| 1018   | 23   | 22 | 6.84       | 204           | 110       | -0.280     | 0.009          |
| 1019   | 24   | 23 | 6.91       | 204           | 110       | -0.280     | 0.009          |
| 1020   | 25   | 24 | 75.99      | 204           | 110       | -0.170     | 0.005          |
| 1021   | 27   | 26 | 72.34      | 204           | 110       | 0.207      | 0.006          |
| 1023_1 | 30   | 25 | 45.74      | 204           | 110       | -0.154     | 0.005          |
| 1024_1 | 31   | 9  | 4.19       | 204           | 110       | 0.000      | 0.000          |
| P15_1  | J12  | 28 | 46.15      | 204           | 110       | 0.278      | 0.009          |



|        |    |     |       |     |     |        |       |
|--------|----|-----|-------|-----|-----|--------|-------|
| P15_2  | 28 | J14 | 76.24 | 204 | 110 | -0.413 | 0.013 |
| 1015_2 | 3  | J14 | 37.82 | 204 | 110 | -0.938 | 0.029 |
| 1002_2 | 17 | 2   | 3.90  | 204 | 110 | 0.243  | 0.007 |
| 1000_2 | 12 | 0   | 19.38 | 204 | 110 | 0.030  | 0.001 |
| 1004_2 | 22 | 4   | 7.61  | 204 | 110 | -0.102 | 0.003 |
| 1022_2 | 5  | 27  | 4.02  | 204 | 110 | 0.257  | 0.008 |
| 1023_2 | 8  | 29  | 22.62 | 204 | 110 | 0.000  | 0.000 |
| 1023_4 | 26 | 8   | 29.75 | 204 | 110 | -0.006 | 0.000 |
| 1023_5 | 25 | 26  | 34.79 | 204 | 110 | -0.174 | 0.005 |
| 1024_2 | 21 | 30  | 6.65  | 204 | 110 | -0.154 | 0.005 |
| 1024_4 | 13 | 21  | 38.39 | 204 | 110 | -0.209 | 0.006 |
| 1024_5 | 9  | 13  | 41.91 | 204 | 110 | -0.167 | 0.005 |

# Junction Results - Peak Hour

| ID | Demand (L/s) | Elevation (m) | Head (m) | Pressure (m) | Pressure (psi)2 | Pressure (kPa) |
|----|--------------|---------------|----------|--------------|-----------------|----------------|
| 29 | 0.00         | 90.28         | 142.76   | 52.48        | 74.62           | 514.52         |
| 8  | 0.77         | 90.14         | 142.76   | 52.62        | 74.82           | 515.86         |
| 0  | 0.14         | 90.04         | 142.75   | 52.72        | 74.96           | 516.85         |
| 12 | 0.00         | 89.93         | 142.75   | 52.83        | 75.12           | 517.90         |
| 1  | 0.29         | 89.92         | 142.75   | 52.83        | 75.13           | 517.97         |
| 31 | 0.00         | 89.88         | 142.75   | 52.87        | 75.18           | 518.36         |
| 26 | 0.19         | 89.85         | 142.76   | 52.91        | 75.23           | 518.70         |
| 11 | 0.58         | 89.83         | 142.75   | 52.92        | 75.26           | 518.87         |
| 9  | 0.34         | 89.76         | 142.75   | 53.00        | 75.36           | 519.59         |
| 7  | 0.39         | 89.73         | 142.76   | 53.03        | 75.41           | 519.92         |
| 13 | 0.00         | 89.72         | 142.75   | 53.04        | 75.42           | 519.99         |
| 2  | 0.29         | 89.71         | 142.75   | 53.04        | 75.42           | 520.01         |
| 22 | 0.00         | 89.70         | 142.76   | 53.06        | 75.45           | 520.22         |
| 17 | 0.00         | 89.69         | 142.75   | 53.06        | 75.45           | 520.24         |
| 21 | 0.34         | 89.67         | 142.75   | 53.08        | 75.48           | 520.43         |
| 6  | 0.19         | 89.67         | 142.76   | 53.09        | 75.49           | 520.51         |
| 10 | 0.63         | 89.65         | 142.75   | 53.10        | 75.51           | 520.60         |
| 30 | 0.00         | 89.65         | 142.76   | 53.10        | 75.51           | 520.64         |
| 4  | 0.43         | 89.65         | 142.76   | 53.11        | 75.52           | 520.66         |
| 25 | 1.06         | 89.64         | 142.76   | 53.12        | 75.53           | 520.78         |
| 5  | 0.00         | 89.64         | 142.76   | 53.12        | 75.53           | 520.79         |
| 3  | 0.00         | 89.61         | 142.76   | 53.15        | 75.58           | 521.09         |
| 28 | 0.00         | 89.61         | 142.76   | 53.16        | 75.58           | 521.14         |
| 27 | 0.29         | 89.59         | 142.76   | 53.16        | 75.59           | 521.21         |
| 16 | 0.63         | 89.59         | 142.75   | 53.17        | 75.60           | 521.28         |
| 23 | 0.00         | 89.53         | 142.76   | 53.23        | 75.69           | 521.84         |
| 14 | 0.00         | 89.53         | 142.75   | 53.23        | 75.69           | 521.86         |
| 15 | 0.58         | 89.50         | 142.75   | 53.25        | 75.72           | 522.08         |
| 24 | 0.58         | 89.49         | 142.76   | 53.27        | 75.75           | 522.27         |
| 20 | 0.58         | 89.46         | 142.76   | 53.29        | 75.78           | 522.48         |
| 19 | 0.63         | 89.41         | 142.76   | 53.35        | 75.86           | 523.01         |

# Link Results - Peak Hour

| ID     | FROM | TO | Length (m) | Diameter (mm) | Roughness | Flow (L/s) | Velocity (m/s) |
|--------|------|----|------------|---------------|-----------|------------|----------------|
| 1015_1 | 19   | 3  | 17.78      | 204           | 110       | -1.852     | 0.057          |
| 1004_1 | 5    | 22 | 35.34      | 204           | 110       | 0.984      | 0.030          |
| 1001   | 2    | 1  | 38.98      | 204           | 110       | 1.048      | 0.032          |
| 1000_1 | 1    | 12 | 2.18       | 204           | 110       | 0.758      | 0.023          |
| 1003   | 4    | 3  | 35.49      | 204           | 110       | -0.965     | 0.030          |
| 1022_1 | 28   | 5  | 37.51      | 204           | 110       | 3.790      | 0.116          |
| 1005   | 6    | 5  | 25.13      | 204           | 110       | -1.386     | 0.042          |
| 1006   | 7    | 6  | 9.01       | 204           | 110       | -1.196     | 0.037          |
| 1007   | 8    | 7  | 59.59      | 204           | 110       | -0.806     | 0.025          |
| 1008   | 10   | 9  | 3.27       | 204           | 110       | -0.592     | 0.018          |
| 1009   | 11   | 10 | 90.82      | 204           | 110       | 0.038      | 0.001          |
| 1010   | 12   | 11 | 4.93       | 204           | 110       | 0.618      | 0.019          |
| 1011   | 14   | 13 | 10.09      | 204           | 110       | -0.226     | 0.007          |
| 1012   | 15   | 14 | 8.05       | 204           | 110       | -0.226     | 0.007          |
| 1013   | 16   | 15 | 84.65      | 204           | 110       | 0.354      | 0.011          |
| 1014   | 17   | 16 | 3.57       | 204           | 110       | 0.984      | 0.030          |
| 1002_1 | 3    | 17 | 43.72      | 204           | 110       | 2.322      | 0.071          |
| 1016   | 20   | 19 | 75.68      | 204           | 110       | -1.222     | 0.037          |
| 1017   | 21   | 20 | 16.00      | 204           | 110       | -0.642     | 0.020          |
| 1018   | 23   | 22 | 6.84       | 204           | 110       | -1.519     | 0.046          |
| 1019   | 24   | 23 | 6.91       | 204           | 110       | -1.519     | 0.046          |
| 1020   | 25   | 24 | 75.99      | 204           | 110       | -0.939     | 0.029          |
| 1021   | 27   | 26 | 72.34      | 204           | 110       | 1.131      | 0.035          |
| 1023_1 | 30   | 25 | 45.74      | 204           | 110       | -0.856     | 0.026          |
| 1024_1 | 31   | 9  | 4.19       | 204           | 110       | 0.000      | 0.000          |
| P15_1  | J12  | 28 | 46.15      | 204           | 110       | 1.538      | 0.047          |

|        |    |     |       |     |     |        |       |
|--------|----|-----|-------|-----|-----|--------|-------|
| P15_2  | 28 | J14 | 76.24 | 204 | 110 | -2.252 | 0.069 |
| 1015_2 | 3  | J14 | 37.82 | 204 | 110 | -5.140 | 0.157 |
| 1002_2 | 17 | 2   | 3.90  | 204 | 110 | 1.338  | 0.041 |
| 1000_2 | 12 | 0   | 19.38 | 204 | 110 | 0.140  | 0.004 |
| 1004_2 | 22 | 4   | 7.61  | 204 | 110 | -0.535 | 0.016 |
| 1022_2 | 5  | 27  | 4.02  | 204 | 110 | 1.421  | 0.043 |
| 1023_2 | 8  | 29  | 22.62 | 204 | 110 | 0.000  | 0.000 |
| 1023_4 | 26 | 8   | 29.75 | 204 | 110 | -0.036 | 0.001 |
| 1023_5 | 25 | 26  | 34.79 | 204 | 110 | -0.976 | 0.030 |
| 1024_2 | 21 | 30  | 6.65  | 204 | 110 | -0.856 | 0.026 |
| 1024_4 | 13 | 21  | 38.39 | 204 | 110 | -1.158 | 0.035 |
| 1024_5 | 9  | 13  | 41.91 | 204 | 110 | -0.932 | 0.029 |

Fire Flow Results - Max Day + 250 L/s

| ID | Static Demand<br>(L/s) | Static Pressure<br>(m) | Static Pressure<br>(psi) | Static Pressure<br>(kPa) | Static Head<br>(m) | Fire Flow<br>Demand (L/s) | Residual<br>Pressure (m) | Residual<br>Pressure (psi) | Available<br>Flow (L/s) | Available<br>Pressure (psi) |
|----|------------------------|------------------------|--------------------------|--------------------------|--------------------|---------------------------|--------------------------|----------------------------|-------------------------|-----------------------------|
| 0  | 0.07                   | 46.90                  | 66.69                    | 459.81                   | 136.94             | 250.00                    | 16.27                    | 23.14                      | 260.20                  | 20                          |
| 1  | 0.13                   | 47.01                  | 66.85                    | 460.92                   | 136.94             | 250.00                    | 22.61                    | 32.15                      | 297.30                  | 20                          |
| 2  | 0.13                   | 47.22                  | 67.15                    | 462.96                   | 136.94             | 250.00                    | 27.32                    | 38.84                      | 336.27                  | 20                          |
| 3  | 0.00                   | 47.33                  | 67.30                    | 464.02                   | 136.94             | 250.00                    | 33.24                    | 47.27                      | 415.40                  | 20                          |
| 4  | 0.20                   | 47.30                  | 67.25                    | 463.69                   | 136.95             | 250.00                    | 31.58                    | 44.90                      | 388.07                  | 20                          |
| 5  | 0.00                   | 47.32                  | 67.29                    | 463.95                   | 136.96             | 250.00                    | 32.84                    | 46.69                      | 408.45                  | 20                          |
| 6  | 0.09                   | 47.29                  | 67.25                    | 463.67                   | 136.96             | 250.00                    | 29.07                    | 41.34                      | 354.86                  | 20                          |
| 7  | 0.18                   | 47.23                  | 67.16                    | 463.07                   | 136.96             | 250.00                    | 28.28                    | 40.21                      | 346.27                  | 20                          |
| 8  | 0.35                   | 46.82                  | 66.57                    | 458.99                   | 136.95             | 250.00                    | 27.34                    | 38.88                      | 338.28                  | 20                          |
| 9  | 0.15                   | 47.18                  | 67.09                    | 462.56                   | 136.94             | 250.00                    | 22.70                    | 32.27                      | 297.59                  | 20                          |
| 10 | 0.28                   | 47.28                  | 67.23                    | 463.56                   | 136.94             | 250.00                    | 22.57                    | 32.10                      | 296.53                  | 20                          |
| 11 | 0.26                   | 47.11                  | 66.98                    | 461.83                   | 136.94             | 250.00                    | 22.21                    | 31.58                      | 294.33                  | 20                          |
| 12 | 0.00                   | 47.01                  | 66.84                    | 460.86                   | 136.94             | 250.00                    | 22.44                    | 31.91                      | 296.14                  | 20                          |
| 13 | 0.00                   | 47.22                  | 67.15                    | 462.95                   | 136.94             | 250.00                    | 27.46                    | 39.05                      | 337.75                  | 20                          |
| 14 | 0.00                   | 47.41                  | 67.42                    | 464.82                   | 136.94             | 250.00                    | 26.56                    | 37.76                      | 328.21                  | 20                          |
| 15 | 0.26                   | 47.43                  | 67.45                    | 465.04                   | 136.94             | 250.00                    | 25.90                    | 36.83                      | 322.23                  | 20                          |
| 16 | 0.28                   | 47.35                  | 67.33                    | 464.23                   | 136.94             | 250.00                    | 27.64                    | 39.30                      | 338.95                  | 20                          |
| 17 | 0.00                   | 47.24                  | 67.18                    | 463.19                   | 136.94             | 250.00                    | 28.02                    | 39.84                      | 343.44                  | 20                          |
| 19 | 0.28                   | 47.53                  | 67.58                    | 465.94                   | 136.94             | 250.00                    | 30.54                    | 43.43                      | 371.57                  | 20                          |
| 20 | 0.26                   | 47.47                  | 67.51                    | 465.44                   | 136.94             | 250.00                    | 28.83                    | 41.00                      | 351.14                  | 20                          |
| 21 | 0.15                   | 47.27                  | 67.21                    | 463.41                   | 136.94             | 250.00                    | 29.86                    | 42.45                      | 364.56                  | 20                          |
| 22 | 0.00                   | 47.25                  | 67.19                    | 463.27                   | 136.95             | 250.00                    | 31.85                    | 45.29                      | 392.66                  | 20                          |
| 23 | 0.00                   | 47.42                  | 67.43                    | 464.89                   | 136.95             | 250.00                    | 31.12                    | 44.25                      | 380.32                  | 20                          |
| 24 | 0.26                   | 47.46                  | 67.49                    | 465.31                   | 136.95             | 250.00                    | 30.45                    | 43.30                      | 370.88                  | 20                          |
| 25 | 0.48                   | 47.31                  | 67.27                    | 463.83                   | 136.95             | 250.00                    | 30.75                    | 43.73                      | 376.11                  | 20                          |
| 26 | 0.09                   | 47.10                  | 66.98                    | 461.81                   | 136.95             | 250.00                    | 30.17                    | 42.90                      | 369.66                  | 20                          |
| 27 | 0.13                   | 47.37                  | 67.35                    | 464.37                   | 136.96             | 250.00                    | 32.09                    | 45.63                      | 395.51                  | 20                          |
| 28 | 0.00                   | 47.39                  | 67.39                    | 464.65                   | 137.00             | 250.00                    | 35.06                    | 49.85                      | 452.53                  | 20                          |
| 29 | 0.00                   | 46.68                  | 66.38                    | 457.65                   | 136.95             | 250.00                    | 20.13                    | 28.63                      | 281.47                  | 20                          |
| 30 | 0.00                   | 47.29                  | 67.24                    | 463.62                   | 136.94             | 250.00                    | 29.61                    | 42.10                      | 361.34                  | 20                          |
| 31 | 0.00                   | 47.06                  | 66.91                    | 461.33                   | 136.94             | 250.00                    | 21.26                    | 30.23                      | 288.10                  | 20                          |

## **A.5 Fire Hydrant Coverage Table and Figure**



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2026/08/28 11:09 AM By: Wu, Michael



BIKA PARK

ORIGINAL SHEET - ANSI B

Legend

Notes

**PRELIMINARY**  
NOT TO BE USED FOR CONSTRUCTION

|                                                                                                 |                                                 |                           |           |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------|-----------|
|  <b>Stantec</b> | Project:                                        | <b>Wateridge Block 23</b> | 160402276 |
|                                                                                                 | <b>TABLE 1:<br/>FIRE HYDRANT COVERAGE TABLE</b> |                           |           |
|                                                                                                 | Revision: 01                                    | Prepared By: MW           |           |
|                                                                                                 | Revision Date: 2026-08-28                       | Checked By:               |           |

| Description                                     | Hydrants <sup>1</sup> |        |        | Total Available<br>Fire Flow<br>(L/min) | Total Required<br>Fire Flow <sup>2</sup><br>(L/min) |
|-------------------------------------------------|-----------------------|--------|--------|-----------------------------------------|-----------------------------------------------------|
|                                                 | HYD-01                | HYD-02 | HYD-03 |                                         |                                                     |
| Block 17                                        |                       |        |        |                                         |                                                     |
| Distance from building (m)                      | 5.4                   | 4.1    | 4.4    | -                                       | -                                                   |
| Maximum fire flow capacity <sup>3</sup> (L/min) | 5,678                 | 5,678  | 5,678  | 17,034                                  | 15,000                                              |
|                                                 |                       |        |        |                                         |                                                     |

| NFPA 1 Table 18.5.4.3    |                          |
|--------------------------|--------------------------|
| Distance to Building (m) | Maximum Capacity (L/min) |
| ≤ 76                     | 5,678                    |
| > 76 and ≤ 152           | 3,785                    |
| > 152 and ≤ 305          | 2,839                    |

- Notes:
- Hydrant locations as per Drawing SSP-1. Refer to fire hydrant coverage sketch (Appendix A.5).
  - See FUS Calculations, Appendix A.2 for fire flow requirements.
  - See NFPA 1 Table 18.5.4.3 for maxiumim fire flow capacity of hydrants by distance to building.

## **Appendix B Wastewater Servicing**

### **B.1 Sanitary Sewer Design Sheet**





| <div></div> | SUBDIVISION:       |         | <div>SANITARY SEWER<br/>DESIGN SHEET<br/>(City of Ottawa)</div> |        |                        |     |      |                      |      |            |                 |           | DESIGN PARAMETERS |           |                                |           |                                      |           |                              |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------|--------------------|---------|-----------------------------------------------------------------|--------|------------------------|-----|------|----------------------|------|------------|-----------------|-----------|-------------------|-----------|--------------------------------|-----------|--------------------------------------|-----------|------------------------------|-----------|-----------------|-----------------|-----------------|-----------------|--------------------|------------|----------------|----------|----------------------------------|--------|----------------------------|-------------------|---------------------------|-------------------|--|--|--|--|--|--|--|
|                                                                                             | Wateridge Block 23 |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           |                                |           |                                      |           |                              |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
|                                                                                             | DATE: 2026-08-28   |         | 1                                                               |        | FILE NUMBER: 160402276 |     |      |                      |      |            |                 |           |                   |           | MAX PEAK FACTOR (RES.):= 4.0   |           | AVG. DAILY FLOW / PERSON 280 l/p/day |           | MINIMUM VELOCITY 0.60 m/s    |           | REVISION: 1     |                 | DESIGNED BY: JP |                 | MANNINGS n 0.013   |            | CHECKED BY: MW |          | PEAKING FACTOR (INDUSTRIAL): 2.4 |        | COMMERCIAL 28,000 l/ha/day |                   | MAXIMUM VELOCITY 3.00 m/s |                   |  |  |  |  |  |  |  |
|                                                                                             |                    |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           | PEAKING FACTOR (ICI >20%): 1.5 |           | INDUSTRIAL (HEAVY) 55,000 l/ha/day   |           | BEDDING CLASS B              |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
|                                                                                             |                    |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           | PERSONS / SINGLE 3.4           |           | INSTITUTIONAL 28,000 l/ha/day        |           | MINIMUM COVER 2.50 m         |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
|                                                                                             |                    |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           | PERSONS / TOWNHOME 2.7         |           | INFILTRATION 0.33 l/s/Ha             |           | HARMON CORRECTION FACTOR 0.8 |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
|                                                                                             |                    |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           | PERSONS / APARTMENT 1.8        |           |                                      |           |                              |           |                 |                 |                 |                 |                    |            |                |          |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
| LOCATION                                                                                    |                    |         | RESIDENTIAL AREA AND POPULATION                                 |        |                        |     |      |                      |      |            |                 |           | COMMERCIAL        |           | INDUSTRIAL (L)                 |           | INDUSTRIAL (H)                       |           | INSTITUTIONAL                |           | GREEN / UNUSED  |                 | C+H             | INFILTRATION    |                    |            | TOTAL          | PIPE     |                                  |        |                            |                   |                           |                   |  |  |  |  |  |  |  |
| AREA ID NUMBER                                                                              | FROM M.H.          | TO M.H. | AREA (ha)                                                       | SINGLE | UNITS TOWN             | APT | POP. | CUMULATIVE AREA (ha) | POP. | PEAK FACT. | PEAK FLOW (l/s) | AREA (ha) | ACCU. AREA (ha)   | AREA (ha) | ACCU. AREA (ha)                | AREA (ha) | ACCU. AREA (ha)                      | AREA (ha) | ACCU. AREA (ha)              | AREA (ha) | ACCU. AREA (ha) | PEAK FLOW (l/s) | TOTAL AREA (ha) | ACCU. AREA (ha) | INFILT. FLOW (l/s) | FLOW (l/s) | LENGTH (m)     | DIA (mm) | MATERIAL                         | CLASS  | SLOPE (%)                  | CAP. (FULL) (l/s) | CAP. V PEAK FLOW (%)      | VEL. (FULL) (m/s) |  |  |  |  |  |  |  |
| R17B                                                                                        | 17                 | 12      | 0.22                                                            | 0      | 7                      | 0   | 19   | 0.22                 | 19   | 3.71       | 0.2             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.00            | 0.0             | 0.22            | 0.22            | 0.1                | 0.3        | 48.3           | 200      | PVC                              | SDR 35 | 0.70                       | 28.0              | 1.07%                     | 0.88              |  |  |  |  |  |  |  |
|                                                                                             | 12                 | 8       | 0.00                                                            | 0      | 0                      | 0   | 0    | 0.22                 | 19   | 3.71       | 0.2             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.00            | 0.22            | 0.1             | 0.3                | 5.1        | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 1.51%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R23A                                                                                        | 23                 | 10      | 0.19                                                            | 0      | 10                     | 0   | 27   | 0.19                 | 27   | 3.69       | 0.3             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.19            | 0.19            | 0.1             | 0.4                | 77.3       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 1.95%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R11A                                                                                        | 11                 | 10      | 0.24                                                            | 0      | 8                      | 0   | 22   | 0.24                 | 22   | 3.70       | 0.3             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.24            | 0.24            | 0.1             | 0.3                | 50.1       | 200            | PVC      | SDR 35                           | 0.65   | 27.0                       | 1.25%             | 0.85                      |                   |  |  |  |  |  |  |  |
| R10A                                                                                        | 10                 | 9       | 0.14                                                            | 0      | 5                      | 0   | 14   | 0.57                 | 62   | 3.64       | 0.7             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.14            | 0.57            | 0.2             | 0.9                | 40.6       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 4.64%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R22A                                                                                        | 22                 | 9       | 0.31                                                            | 0      | 22                     | 0   | 59   | 0.31                 | 59   | 3.64       | 0.7             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.31            | 0.31            | 0.1             | 0.8                | 89.1       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 4.05%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R9A                                                                                         | 9                  | 8       | 0.17                                                            | 0      | 6                      | 0   | 16   | 1.04                 | 138  | 3.56       | 1.6             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.17            | 1.04            | 0.3             | 1.9                | 38.4       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 9.78%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R8A                                                                                         | 8                  | 7       | 0.32                                                            | 0      | 22                     | 0   | 59   | 1.58                 | 216  | 3.51       | 2.5             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.32            | 1.58            | 0.5             | 3.0                | 95.3       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 15.05%            | 0.62                      |                   |  |  |  |  |  |  |  |
| R7A                                                                                         | 7                  | 2       | 0.05                                                            | 0      | 3                      | 0   | 8    | 1.63                 | 224  | 3.50       | 2.5             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.05            | 1.63            | 0.5             | 3.1                | 19.1       | 200            | PVC      | SDR 35                           | 0.35   | 19.7                       | 15.61%            | 0.62                      |                   |  |  |  |  |  |  |  |
| R6A                                                                                         | 6                  | 5       | 0.27                                                            | 0      | 17                     | 0   | 46   | 0.27                 | 46   | 3.66       | 0.5             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.27            | 0.27            | 0.1             | 0.6                | 50.7       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 3.20%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R5A                                                                                         | 5                  | 4       | 0.10                                                            | 0      | 2                      | 0   | 5    | 0.37                 | 51   | 3.65       | 0.6             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.10            | 0.37            | 0.1             | 0.7                | 10.9       | 200            | PVC      | SDR 35                           | 0.40   | 21.2                       | 3.44%             | 0.67                      |                   |  |  |  |  |  |  |  |
| R4A                                                                                         | 4                  | 3       | 0.19                                                            | 0      | 8                      | 0   | 22   | 0.56                 | 73   | 3.62       | 0.9             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.19            | 0.56            | 0.2             | 1.0                | 69.0       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 5.27%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R3A                                                                                         | 3                  | 2       | 0.09                                                            | 0      | 3                      | 0   | 8    | 0.65                 | 81   | 3.61       | 0.9             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.09            | 0.65            | 0.2             | 1.2                | 34.4       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 5.88%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R20A                                                                                        | 20                 | 19      | 0.44                                                            | 0      | 25                     | 0   | 68   | 0.44                 | 68   | 3.63       | 0.8             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.44            | 0.44            | 0.1             | 0.9                | 88.9       | 200            | PVC      | SDR 35                           | 0.36   | 20.0                       | 4.69%             | 0.63                      |                   |  |  |  |  |  |  |  |
| R19A                                                                                        | 19                 | 18      | 0.01                                                            | 0      | 0                      | 0   | 0    | 0.45                 | 68   | 3.63       | 0.8             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.01            | 0.45            | 0.1             | 0.9                | 9.5        | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 4.76%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R21A                                                                                        | 21                 | 18      | 0.09                                                            | 0      | 3                      | 0   | 8    | 0.09                 | 8    | 3.74       | 0.1             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.09            | 0.09            | 0.0             | 0.1                | 24.0       | 200            | PVC      | SDR 35                           | 0.65   | 27.0                       | 0.47%             | 0.85                      |                   |  |  |  |  |  |  |  |
| R18A                                                                                        | 18                 | 14      | 0.14                                                            | 0      | 6                      | 0   | 16   | 0.67                 | 92   | 3.60       | 1.1             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.14            | 0.67            | 0.2             | 1.3                | 38.1       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 6.54%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R13A                                                                                        | 13                 | 17A     | 0.08                                                            | 0      | 1                      | 0   | 3    | 0.08                 | 3    | 3.76       | 0.0             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.08            | 0.08            | 0.0             | 0.1                | 8.6        | 200            | PVC      | SDR 35                           | 0.65   | 27.0                       | 0.21%             | 0.85                      |                   |  |  |  |  |  |  |  |
| R17AA                                                                                       | 17A                | 17      | 0.15                                                            | 0      | 6                      | 0   | 16   | 0.23                 | 19   | 3.71       | 0.2             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.15            | 0.23            | 0.1             | 0.3                | 36.5       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 1.53%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R17A                                                                                        | 17                 | 16      | 0.04                                                            | 0      | 2                      | 0   | 5    | 0.27                 | 24   | 3.69       | 0.3             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.04            | 0.27            | 0.1             | 0.4                | 19.4       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 1.92%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R16A                                                                                        | 16                 | 15      | 0.30                                                            | 0      | 23                     | 0   | 62   | 0.57                 | 86   | 3.61       | 1.0             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.30            | 0.57            | 0.2             | 1.2                | 84.7       | 200            | PVC      | SDR 35                           | 0.35   | 19.7                       | 6.09%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R15A                                                                                        | 15                 | 14      | 0.01                                                            | 0      | 0                      | 0   | 0    | 0.58                 | 86   | 3.61       | 1.0             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.01            | 0.58            | 0.2             | 1.2                | 8.0        | 200            | PVC      | SDR 35                           | 0.35   | 19.7                       | 6.10%             | 0.62                      |                   |  |  |  |  |  |  |  |
| R14A                                                                                        | 14                 | 2       | 0.12                                                            | 0      | 6                      | 0   | 16   | 1.37                 | 194  | 3.52       | 2.2             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.12            | 1.37            | 0.5             | 2.7                | 47.8       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 13.50%            | 0.62                      |                   |  |  |  |  |  |  |  |
| R2A                                                                                         | 2                  | 1       | 0.05                                                            | 0      | 0                      | 0   | 0    | 3.70                 | 500  | 3.38       | 5.5             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.05            | 3.70            | 1.2             | 6.7                | 19.3       | 200            | PVC      | SDR 35                           | 0.35   | 19.8                       | 33.87%            | 0.62                      |                   |  |  |  |  |  |  |  |
|                                                                                             | 1                  | MH 5A   | 0.00                                                            | 0      | 0                      | 0   | 0    | 3.70                 | 500  | 3.38       | 5.5             | 0.00      | 0.00              | 0.00      | 0.00                           | 0.00      | 0.00                                 | 0.00      | 0.00                         | 0.00      | 0.0             | 0.00            | 3.70            | 1.2             | 6.7                | 12.9       | 200            | PVC      | SDR 35                           | 0.35   | 19.9                       | 33.68%            | 0.63                      |                   |  |  |  |  |  |  |  |
|                                                                                             |                    |         |                                                                 |        |                        |     |      |                      |      |            |                 |           |                   |           |                                |           |                                      |           |                              |           |                 |                 |                 |                 |                    |            |                |          | 200                              |        |                            |                   |                           |                   |  |  |  |  |  |  |  |

## **B.2 Background Report Excerpts**



Canada Lands Company

# Design Brief

## **Wateridge Village at Rockcliffe Phases 6 and 7**

August 2025

### 3.3 Design Criteria

The City of Ottawa recently revised its wastewater design criteria in 2018. The MSS Report, which was completed in 2015, recommended that the wastewater system proposed for the re-development of the Rockcliffe Airbase site be designed with the City's criteria in effect in 2015. However, because of the recent changes, the Phase 6 and 7 sanitary sewers are proposed to be designed with the current criteria. The below table shows a comparison of the two criteria. Because the new criteria predicts less wastewater flows, the existing downstream sewers will have sufficient capacity for predicted flows from Phases 6 and 7.

*Table 3-1 Comparison of City of Ottawa Wastewater Criteria*

|                                         | City of Ottawa Design Criteria |                 |
|-----------------------------------------|--------------------------------|-----------------|
|                                         | Pre 2018                       | 2018            |
| Minimum Velocity                        | 0.60 m/s                       | 0.60 m/s        |
| Maximum Velocity                        | 3.00 m/s                       | 3.00 m/s        |
| Roughness Coefficient                   | 0.013                          | 0.013           |
| Average Residential Flow                | 350 l/c/r                      | 280 l/c/d       |
| Residential Peaking Factor              | Harmon (2.00 – 4.00)           | Modified Harmon |
| Commercial Flow                         | 50,000 l/ha/d                  | 28,000 l/ha/d   |
| Institutional Flow                      | 50,000 l/ha/d                  | 23,000 l/ha/d   |
| Commercial/Institutional Peaking Factor | 1.5                            | 1.5             |
| Infiltration Rate                       | 0.28 l/s/ha                    | 0.33 l/s/ha     |

Minimum allowable slopes remain unchanged and are as listed below.

*Table 3-2 Minimum Allowable Slopes*

| Diameter (mm)  | Slope (%) |
|----------------|-----------|
| 250            | 0.240     |
| 300            | 0.186     |
| 375            | 0.140     |
| 450            | 0.111     |
| 525 and larger | 0.100     |

Where practical and where there are fewer than 10 residential connections, the first lengths of sanitary sewers are designed with a minimum slope of 0.65%.

The population densities identified in the CFB Rockcliffe MSS are:

- Single Family Units 3.4 ppu
- Semi Detached Units 2.7 ppu
- Freehold Townhouses 2.7 ppu
- Apartments 1.8 ppu

### 3.4 Proposed Wastewater Plan

The recommended wastewater plan for Phases 6 and 7 is shown on **Figure 3.1** which is included in **Appendix C**. In accordance with the recommendations discussed in Section 3.2, all wastewater flows from Phases 6 and 7 will be directed and connected to the downstream sewers which are presently terminated in Phase 2 in Bareille-Snow Street. Additionally, MH8A will have a secondary plugged outlet for future redirection per Section 3.2. All new sanitary sewers proposed for the subject site will be 250 mm diameter.

Clay seals have been proposed in sensitive soil areas per the geotechnical report prepared by Paterson.

The new sewers are proposed to be fitted with a temporary Inlet Control Device (ICD) at MH 20A on Bareille-Snow Street. The ICD is intended to ensure that existing downstream sewers are not accidentally flooded during construction. The ICD will remain in place until the time of preliminary acceptance, at which time it will be removed. The location is shown on **Figure 3.1** and on the working drawings and the detail sizing calculations are included in **Appendix C**.

### 3.5 Local Extraneous Flows

Ground water levels are expected to be in a clay or rock stratum. All new sanitary sewers will be tested to the City of Ottawa standards prior to being put into service. For the subject site, there are no unusual local conditions that are expected to contribute to extraneous flows that are higher than those noted in the City's guidelines.

### 3.6 Wastewater Outlet

As stated above, the wastewater outlet for the subject site will be the Ottawa Interceptor Sewer. That sewer bisects the CLC property and previously accepted combined flows from the site and wastewater from the Thorncliffe Village Community. The Phase 1A, 1B, 2 and 4 wastewater plans included new local sewers that were routed through the redevelopment to the reconstructed Codd's Road Shaft. Wastewater flows from Phases 6 and 7 are proposed to connect to the upper reaches of the Phase 2 sewer system. When construction of Phase 8 begins, a temporary plug will be removed from MH8A to allow flows from Wanaki Road and Moses Tennisco Street to outlet to the RCAF Pullback Sewer per the MSS (see Section 3.2 of this report).



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**SANITARY SEWER DESIGN SHEET**

Wateridge Village Phase 6, 7  
CITY OF OTTAWA  
Canada Lands Company

| LOCATION              |                      |           |           | RESIDENTIAL                                                                                                                                                                                                                                                                                                     |            |       |     |  |                     |            |        |                 |                 | ICI AREAS                  |     |                  |                 |           |     |       |      | INFILTRATION ALLOWANCE |       |      | FIXED FLOW (L/s) |            | TOTAL FLOW | PROPOSED SEWER DESIGN |        |           |                |            |          |           |                       |                    |     |
|-----------------------|----------------------|-----------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|-----|--|---------------------|------------|--------|-----------------|-----------------|----------------------------|-----|------------------|-----------------|-----------|-----|-------|------|------------------------|-------|------|------------------|------------|------------|-----------------------|--------|-----------|----------------|------------|----------|-----------|-----------------------|--------------------|-----|
| STREET                | AREA ID              | FROM MH   | TO MH     | AREA w/ Units (Ha)                                                                                                                                                                                                                                                                                              | UNIT TYPES |       |     |  | AREA w/o Units (Ha) | POPULATION |        | RES PEAK FACTOR | PEAK FLOW (L/s) | AREA (Ha)                  |     | ICI PEAK FACTOR  | PEAK FLOW (L/s) | AREA (Ha) |     | IND   | CUM  | IND                    | CUM   | IND  | CUM              | IND        | CUM        | IND                   | CUM    | L/s       | CAPACITY (L/s) | LENGTH (m) | DIA (mm) | SLOPE (%) | VELOCITY (full) (m/s) | AVAILABLE CAPACITY |     |
|                       |                      |           |           |                                                                                                                                                                                                                                                                                                                 | SF         | TH/SD | APT |  |                     | IND        | CUM    |                 |                 | IND                        | CUM |                  |                 | IND       | CUM |       |      |                        |       |      |                  |            |            |                       |        |           |                |            |          |           |                       | IND                | CUM |
|                       |                      |           |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 |                            |     |                  |                 |           |     |       |      |                        |       |      |                  |            |            |                       |        |           |                |            |          |           |                       |                    |     |
| CODDS ROAD            | MH1A, Blk21W         | MH1A      | MH2A      | 0.84                                                                                                                                                                                                                                                                                                            |            |       | 192 |  |                     | 345.6      | 345.6  | 3.44            | 3.85            |                            | 0.0 | 0.15             | 0.15            |           | 0.0 | 1.00  | 0.05 | 0.99                   | 0.99  | 0.33 |                  | 0.0        | 4.23       | 52.06                 | 106.79 | 250       | 0.70           | 1.027      | 47.83    | 91.87%    |                       |                    |     |
| CODDS ROAD            | MH2A                 | MH2A      | MH3A      | 0.03                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 345.6  | 3.44            | 3.85            |                            | 0.0 | 0.15             | 0.15            |           | 0.0 | 1.00  | 0.05 | 0.03                   | 1.02  | 0.34 |                  | 0.0        | 4.24       | 31.80                 | 12.56  | 250       | 0.26           | 0.628      | 27.56    | 86.67%    |                       |                    |     |
| CODDS ROAD            | MH3A, Blk23          | MH3A      | MH4A      | 2.16                                                                                                                                                                                                                                                                                                            |            | 42    | 130 |  |                     | 347.4      | 693.0  | 3.32            | 7.45            |                            | 0.0 |                  | 0.15            |           | 0.0 | 1.00  | 0.05 | 2.16                   | 3.18  | 1.05 |                  | 0.0        | 8.55       | 31.05                 | 87.82  | 250       | 0.25           | 0.613      | 22.50    | 72.47%    |                       |                    |     |
| CODDS ROAD            | MH4A                 | MH4A      | MH5A      | 0.05                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 693.0  | 3.32            | 7.45            |                            | 0.0 |                  | 0.15            |           | 0.0 | 1.00  | 0.05 | 0.05                   | 3.23  | 1.07 |                  | 0.0        | 8.57       | 31.17                 | 27.73  | 250       | 0.25           | 0.615      | 22.60    | 72.52%    |                       |                    |     |
|                       |                      |           |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 |                            |     |                  |                 |           |     |       |      |                        |       |      |                  |            |            |                       |        |           |                |            |          |           |                       |                    |     |
| WANAKI ROAD           | 53A, Com             | MH53A     | MH52A     | 0.16                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 0.0    | 3.80            | 0.00            |                            | 0.0 | 0.82             | 0.82            |           | 0.0 | 1.50  | 0.40 | 0.98                   | 0.98  | 0.32 |                  | 0.0        | 0.72       | 76.03                 | 67.91  | 250       | 1.50           | 1.500      | 75.31    | 99.05%    |                       |                    |     |
| WANAKI ROAD           | 52A                  | MH52A     | MH51A     | 0.02                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 0.0    | 3.80            | 0.00            |                            | 0.0 | 0.82             | 0.82            |           | 0.0 | 1.50  | 0.40 | 0.02                   | 1.00  | 0.33 |                  | 0.0        | 0.73       | 76.03                 | 8.85   | 250       | 1.50           | 1.501      | 75.30    | 99.04%    |                       |                    |     |
| WANAKI ROAD           | 51A, Blk4-19         | MH51A     | MH50A     | 1.35                                                                                                                                                                                                                                                                                                            |            | 43    |     |  |                     | 116.1      | 116.1  | 3.58            | 1.35            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.50  | 0.40 | 1.35                   | 2.35  | 0.78 |                  | 0.0        | 2.52       | 43.87                 | 103.37 | 250       | 0.50           | 0.866      | 41.35    | 94.25%    |                       |                    |     |
| WANAKI ROAD           | 50A                  | MH50A     | MH40A     | 0.19                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 116.1  | 3.58            | 1.35            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.50  | 0.40 | 0.19                   | 2.54  | 0.84 |                  | 0.0        | 2.58       | 71.01                 | 100.00 | 250       | 1.31           | 1.401      | 68.42    | 96.36%    |                       |                    |     |
| MOSES TENNISCO STREET | 41A, Blk2, Blk3      | MH41A     | MH40A     | 0.56                                                                                                                                                                                                                                                                                                            |            | 18    |     |  |                     | 48.6       | 48.6   | 3.65            | 0.58            |                            | 0.0 |                  | 0.00            |           | 0.0 | 1.00  | 0.00 | 0.56                   | 0.56  | 0.18 |                  | 0.0        | 0.76       | 97.70                 | 72.50  | 250       | 2.48           | 1.928      | 96.94    | 99.22%    |                       |                    |     |
| MOSES TENNISCO STREET | 40A                  | MH40A     | MH30A     | 0.17                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 164.7  | 3.54            | 1.89            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.50  | 0.40 | 0.17                   | 3.27  | 1.08 |                  | 0.0        | 3.37       | 53.73                 | 90.00  | 250       | 0.75           | 1.060      | 50.36    | 93.73%    |                       |                    |     |
| MICHAEL STOQUA STREET | MH31A, Blk20E, Blk1  | MH31A     | MH30A     | 0.98                                                                                                                                                                                                                                                                                                            |            | 9     | 190 |  |                     | 366.3      | 366.3  | 3.43            | 4.07            |                            | 0.0 |                  | 0.00            |           | 0.0 | 1.00  | 0.00 | 0.98                   | 0.98  | 0.32 |                  | 0.0        | 4.40       | 66.26                 | 72.51  | 250       | 1.14           | 1.308      | 61.86    | 93.36%    |                       |                    |     |
| MICHAEL STOQUA STREET | MH30A                | MH30A     | MH8A      | 0.12                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 531.0  | 3.37            | 5.80            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.00  | 0.27 | 0.12                   | 4.37  | 1.44 |                  | 0.0        | 7.50       | 39.01                 | 68.28  | 250       | 0.40           | 0.770      | 31.51    | 80.76%    |                       |                    |     |
| CODDS ROAD (FUTURE)   |                      | MH8A      | CAP (FUT) |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     | 0.0        | 531.0  | 3.37            | 5.80            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.00  | 0.27 | 0.00                   | 4.37  | 1.44 |                  | 0.0        | 7.50       | 116.06                | 18.00  | 250       | 3.50           | 2.291      | 108.56   | 93.53%    |                       |                    |     |
| CODDS ROAD            | MH8A, Blk22          | MH8A      | MH7A      | 1.77                                                                                                                                                                                                                                                                                                            |            | 34    | 128 |  |                     | 322.2      | 853.2  | 3.27            | 9.05            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.00  | 0.27 | 1.77                   | 6.14  | 2.03 |                  | 0.0        | 11.35      | 40.93                 | 32.17  | 250       | 0.44           | 0.808      | 29.58    | 72.28%    |                       |                    |     |
| CODDS ROAD            | MH7A                 | MH7A      | MH6A      | 0.08                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 853.2  | 3.27            | 9.05            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.00  | 0.27 | 0.08                   | 6.22  | 2.05 |                  | 0.0        | 11.37      | 31.10                 | 39.78  | 250       | 0.25           | 0.614      | 19.73    | 63.44%    |                       |                    |     |
| CODDS ROAD            | MH6A                 | MH6A      | MH5A      | 0.08                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 853.2  | 3.27            | 9.05            |                            | 0.0 |                  | 0.82            |           | 0.0 | 1.00  | 0.27 | 0.08                   | 6.30  | 2.08 |                  | 0.0        | 11.40      | 30.80                 | 40.58  | 250       | 0.25           | 0.608      | 19.40    | 62.98%    |                       |                    |     |
| BAREILLE-SNOW STREET  | MH5A, Blk21E, Blk20W | MH5A      | MH20A     | 1.31                                                                                                                                                                                                                                                                                                            |            |       | 387 |  |                     | 696.6      | 2242.8 | 3.04            | 22.08           |                            | 0.0 | 0.13             | 1.10            |           | 0.0 | 1.00  | 0.36 | 1.44                   | 10.97 | 3.62 |                  | 0.0        | 26.05      | 30.72                 | 73.43  | 250       | 0.25           | 0.606      | 4.67     | 15.19%    |                       |                    |     |
| BAREILLE-SNOW STREET  | MH20A                | MH20A     | BLK304AN  | 0.12                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 2242.8 | 3.04            | 22.08           |                            | 0.0 |                  | 1.10            |           | 0.0 | 1.00  | 0.36 | 0.12                   | 11.09 | 3.66 |                  | 0.0        | 26.09      | 31.02                 | 60.00  | 250       | 0.25           | 0.612      | 4.93     | 15.89%    |                       |                    |     |
| BAREILLE-SNOW STREET  | MH21A                | BLK304AN  | EXMH304A  | 0.03                                                                                                                                                                                                                                                                                                            |            |       |     |  |                     | 0.0        | 2242.8 | 3.04            | 22.08           |                            | 0.0 |                  | 1.10            |           | 0.0 | 1.00  | 0.36 | 0.03                   | 11.12 | 3.67 |                  | 0.0        | 26.10      | 31.02                 | 20.00  | 250       | 0.25           | 0.612      | 4.92     | 15.85%    |                       |                    |     |
|                       |                      |           |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 |                            |     |                  |                 |           |     |       |      |                        |       |      |                  |            |            |                       |        |           |                |            |          |           |                       |                    |     |
| Design Parameters:    |                      |           |           | Notes:<br>1. Mannings coefficient (n) = 0.013<br>2. Demand (per capita): 280 L/day<br>3. Infiltration allowance: 0.33 L/s/Ha<br>4. Residential Peaking Factor: Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8 where K = 0.8 Correction Factor<br>5. Commercial and Institutional Peak Factors based on total area, |            |       |     |  |                     |            |        |                 |                 | Designed: SEL              |     | No.              |                 | Revision  |     |       |      |                        |       |      |                  |            |            | Date                  |        |           |                |            |          |           |                       |                    |     |
| Residential           |                      | ICI Areas |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 | 1.                         |     | Submission No. 1 |                 |           |     |       |      |                        |       |      |                  | 2023-09-29 |            |                       |        |           |                |            |          |           |                       |                    |     |
| TH/SD                 |                      | INST      |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 | 2.                         |     | Submission No. 2 |                 |           |     |       |      |                        |       |      |                  | 2024-05-13 |            |                       |        |           |                |            |          |           |                       |                    |     |
| APT                   |                      | COM       |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 | 3.                         |     | Submission No. 3 |                 |           |     |       |      |                        |       |      |                  | 2024-11-11 |            |                       |        |           |                |            |          |           |                       |                    |     |
| MSS                   |                      | IND       |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 | 4.                         |     | Submission No. 4 |                 |           |     |       |      |                        |       |      |                  | 2025-05-14 |            |                       |        |           |                |            |          |           |                       |                    |     |
| Other                 |                      | MOE Chart |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 |                            |     |                  |                 |           |     |       |      |                        |       |      |                  |            |            |                       |        |           |                |            |          |           |                       |                    |     |
|                       |                      |           |           |                                                                                                                                                                                                                                                                                                                 |            |       |     |  |                     |            |        |                 |                 | Dwg. Reference: 139653-400 |     | File Reference:  |                 |           |     | Date: |      |                        |       |      |                  |            |            |                       |        | Sheet No: |                |            |          |           |                       |                    |     |





## **Appendix C Stormwater Management**

### **C.1 Storm Sewer Design Sheet**







## **C.2 Sample PCSWMM Input and Output Files**



```

[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option      Value
FLOW_UNITS    LPS
INFILTRATION  HORTON
FLOW_ROUTING  DYNWAVE
LINK_OFFSETS  ELEVATION
MIN_SLOPE     0
ALLOW_PONDING NO
SKIP_STEADY_STATE NO

START_DATE    2/23/2026
START_TIME    00:00:00
REPORT_START_DATE 2/23/2026
REPORT_START_TIME 00:00:00
END_DATE      2/24/2026
END_TIME      00:00:00
SWEEP_START   1/1
SWEEP_END     12/31
DRY_DAYS      0
REPORT_STEP   00:01:00
WET_STEP      00:05:00
DRY_STEP      00:05:00
ROUTING_STEP  5
RULE_STEP     00:00:00

INERTIAL_DAMPING PARTIAL
NORMAL_FLOW_LIMITED BOTH
FORCE_MAIN_EQUATION H-W
VARIABLE_STEP    0.75
LENGTHENING_STEP 0
MIN_SURFAREA     0
MAX_TRIALS        8
HEAD_TOLERANCE    0
SYS_FLOW_TOL      5
LAT_FLOW_TOL      5
MINIMUM_STEP      0.5

```

```

THREADS      16

```

```

[EVAPORATION]
;;Data Source Parameters
;;-----
CONSTANT      0.0
DRY_ONLY      NO

```

```

[RAINGAGES]
;;Name      Format      Interval SCF      Source
;;-----
4_mm        INTENSITY 0:10    1.0      TIMESERIES 4_mm
CHI_002     INTENSITY 0:10    1.0      TIMESERIES CHI_002
CHI_005     INTENSITY 0:10    1.0      TIMESERIES CHI_005
CHI_100     INTENSITY 0:10    1.0      TIMESERIES CHI_100
CHI_120     INTENSITY 0:10    1.0      TIMESERIES CHI_120

```

```

[SUBCATCHMENTS]
;;Name      Rain Gage      Outlet      Area      %Imperv Width      %Slope CurbLen SnowPack
;;-----
C103AA      CHI_100      CB103A1      0.136796 92.857 13.874 2      0
C105AA      CHI_100      CB105A1      0.146799 85.714 10.77 2      0
C106A       CHI_100      CB106A       0.017596 78.571 6.605 2      0
C107A       CHI_100      CB107A       0.057438 85.714 11.262 2      0
C108A       CHI_100      CB108A       0.103901 50      12.458 2      0
C110A       CHI_100      CB110A       0.19189 78.571 21.868 2      0
C110B       CHI_100      CB110B       0.14957 78.571 28.517 2      0
C110C       CHI_100      CB110C       0.160238 38.571 19.19 2      0
C114A       CHI_100      CB114A       0.243702 78.571 23.971 2      0

```

|        |         |        |          |        |        |   |   |
|--------|---------|--------|----------|--------|--------|---|---|
| C115A  | CHI_100 | CB115A | 0.134643 | 80     | 22.572 | 2 | 0 |
| C115B  | CHI_100 | CB115B | 0.174197 | 78.571 | 23.047 | 2 | 0 |
| C117A  | CHI_100 | CB117A | 0.244715 | 78.571 | 42.693 | 2 | 0 |
| C117B  | CHI_100 | CB117B | 0.192331 | 78.571 | 24.093 | 2 | 0 |
| C119A  | CHI_100 | CB119A | 0.148441 | 90     | 16.582 | 2 | 0 |
| C119CA | CHI_100 | CB119C | 0.275167 | 50     | 16.606 | 2 | 0 |
| C121A  | CHI_100 | CB121A | 0.163625 | 80     | 17.352 | 2 | 0 |
| C122A  | CHI_100 | CB122A | 0.135907 | 80     | 20.483 | 2 | 0 |
| C123A  | CHI_100 | CB123A | 0.149761 | 90     | 16.24  | 2 | 0 |
| C123B  | CHI_100 | CB123B | 0.159223 | 78.571 | 30.632 | 2 | 0 |
| C124A  | CHI_100 | CB124A | 0.138226 | 78.571 | 23.734 | 2 | 0 |
| C124B  | CHI_100 | CB124B | 0.191968 | 78.571 | 34.739 | 2 | 0 |
| TANK-1 | CHI_100 | CULTEC | 0.113051 | 42.857 | 12.547 | 2 | 0 |
| UNC-1  | CHI_100 | OF3    | 0.138083 | 57.143 | 31.069 | 2 | 0 |
| UNC-2  | CHI_100 | OF2    | 0.062468 | 57.143 | 14.055 | 2 | 0 |
| UNC-3  | CHI_100 | OF1    | 0.067173 | 42.857 | 15.114 | 2 | 0 |

| [SUBAREAS]     |          |        |          |        |         |         |           |
|----------------|----------|--------|----------|--------|---------|---------|-----------|
| ;;Subcatchment | N-Imperv | N-Perv | S-Imperv | S-Perv | PctZero | RouteTo | PctRouted |
| ;;-----        |          |        |          |        |         |         |           |
| C103AA         | 0.013    | 0.25   | 1.57     | 4.67   | 0       | OUTLET  |           |
| C105AA         | 0.013    | 0.25   | 1.57     | 4.67   | 0       | OUTLET  |           |

|        |       |      |      |      |   |        |
|--------|-------|------|------|------|---|--------|
| C106A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C107A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C108A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C110A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C110B  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C110C  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C114A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C115A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C115B  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C117A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C117B  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C119A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C119CA | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C121A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C122A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C123A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C123B  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C124A  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| C124B  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| TANK-1 | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| UNC-1  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| UNC-2  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |
| UNC-3  | 0.013 | 0.25 | 1.57 | 4.67 | 0 | OUTLET |

| [INFILTRATION] |        |        |        |        |        |
|----------------|--------|--------|--------|--------|--------|
| ;;Subcatchment | Param1 | Param2 | Param3 | Param4 | Param5 |
| ;;-----        |        |        |        |        |        |
| C103AA         | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C105AA         | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C106A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C107A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C108A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C110A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C110B          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C110C          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C114A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C115A          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C115B          | 76.2   | 13.2   | 4.14   | 7      | 0      |
| C117A          | 76.2   | 13.2   | 4.14   | 7      | 0      |

|        |      |      |      |   |   |
|--------|------|------|------|---|---|
| C117B  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C119A  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C119CA | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C121A  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C122A  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C123A  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C123B  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C124A  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| C124B  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| TANK-1 | 76.2 | 13.2 | 4.14 | 7 | 0 |
| UNC-1  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| UNC-2  | 76.2 | 13.2 | 4.14 | 7 | 0 |
| UNC-3  | 76.2 | 13.2 | 4.14 | 7 | 0 |

[OUTFALLS]

| ;;Name  | Elevation | Type  | Stage Data | Gated | Route To |
|---------|-----------|-------|------------|-------|----------|
| ;;----- |           |       |            |       |          |
| J7      | 83.54     | FIXED | 85         | NO    |          |
| OF1     | 0         | FREE  |            | NO    |          |
| OF2     | 0         | FREE  |            | NO    |          |
| OF3     | 0         | FREE  |            | NO    |          |
| OF4     | 89.32     | FREE  |            | NO    |          |
| OF5     | 89.38     | FREE  |            | NO    |          |
| OF6     | 89.2      | FREE  |            | NO    |          |
| OF7     | 88.49     | FREE  |            | NO    |          |
| OF8     | 82.05     | FREE  |            | NO    |          |

[STORAGE]

| ;;Name  | Elev.  | MaxDepth | InitDepth | Shape      | Curve Name/Params | SurDepth | Fevap |
|---------|--------|----------|-----------|------------|-------------------|----------|-------|
| Psi     | Ksat   | IMD      |           |            |                   |          |       |
| ;;----- |        |          |           |            |                   |          |       |
| 100     | 85.36  | 4.52     | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 100A    | 85.62  | 4.08     | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 100B    | 85.55  | 4.21     | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 101     | 85.44  | 4.235    | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 102     | 85.541 | 4.089    | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 103     | 85.619 | 3.953    | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |
| 103A    | 86.623 | 2.799    | 0         | FUNCTIONAL | 0 0 1.13          | 0        | 0     |

|         |        |       |   |            |          |   |   |
|---------|--------|-------|---|------------|----------|---|---|
| 104     | 85.815 | 3.825 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 105     | 85.887 | 3.636 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 105A    | 86.89  | 2.451 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 106     | 85.993 | 3.704 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 107     | 86.143 | 3.74  | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 108     | 86.469 | 3.577 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 109     | 86.232 | 3.567 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 110     | 86.426 | 3.206 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 111     | 86.773 | 2.788 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 112     | 86.858 | 3.091 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 113     | 86.251 | 3.33  | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 114     | 86.602 | 2.921 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 115     | 86.763 | 2.925 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 116     | 86.273 | 3.129 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 117     | 86.644 | 2.982 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 118     | 85.599 | 4.088 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 119     | 85.972 | 4.189 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 119A    | 86.222 | 4.265 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 119C    | 86.687 | 1.363 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 120     | 86.15  | 3.736 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 121     | 86.399 | 3.279 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 122     | 86.71  | 2.888 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 123     | 86.611 | 2.982 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| 124     | 86.751 | 2.793 | 0 | FUNCTIONAL | 0 0 1.13 | 0 | 0 |
| CB103A1 | 88.01  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB105A1 | 87.94  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB106A  | 88.1   | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB107A  | 88.37  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB108A  | 87.64  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB110A  | 88.25  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB110B  | 88.16  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB110C  | 87.78  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB114A  | 87.92  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB115A  | 88.13  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB115B  | 88.08  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB117A  | 87.88  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB117B  | 88     | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB119A  | 88.35  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |
| CB119C  | 86.67  | 1.78  | 0 | FUNCTIONAL | 0 0 0    | 0 | 0 |

|        |       |      |   |            |        |   |   |   |   |
|--------|-------|------|---|------------|--------|---|---|---|---|
| CB121A | 88.18 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CB122A | 88.11 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CB123A | 88.08 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CB123B | 88.08 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CB124A | 88.06 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CB124B | 88.03 | 1.78 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| CULTEC | 85    | 3.5  | 0 | TABULAR    | Cultec |   |   | 0 | 0 |
| SU1    | 90.26 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU10   | 89.81 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU11   | 90    | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU12   | 89.91 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU13   | 89.68 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU14   | 89.62 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU15   | 89.58 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU16   | 89.35 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU17   | 89.53 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU18   | 89.42 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU19   | 89.61 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU2    | 90.12 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU20   | 89.62 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU21   | 89.64 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU22   | 89.6  | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU23   | 89.63 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU24   | 89.69 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU25   | 89.74 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU3    | 89.83 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU4    | 89.66 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU5    | 89.6  | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU6    | 89.81 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU7    | 89.66 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU8    | 89.67 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |
| SU9    | 89.77 | 0.08 | 0 | FUNCTIONAL | 0      | 0 | 0 | 0 | 0 |

| [CONDUITS]<br>;Name<br>MaxFlow<br>;-----<br>----- | From Node | To Node | Length | Roughness | InOffset | OutOffset | InitFlow |
|---------------------------------------------------|-----------|---------|--------|-----------|----------|-----------|----------|
| 103                                               | 105       | 104     | 32.799 | 0.013     | 86.112   | 86.046    | 0 0      |

|         |        |        |        |       |        |       |   |   |
|---------|--------|--------|--------|-------|--------|-------|---|---|
| 120-123 | 123    | 120    | 77.785 | 0.013 | 86.911 | 86.6  | 0 | 0 |
| C1      | CULTEC | 100B   | 2.7    | 0.013 | 85.9   | 85.87 | 0 | 0 |
| C10     | SU6    | SU7    | 23.203 | 0.01  | 89.81  | 89.67 | 0 | 0 |
| C11     | CB115A | SU7    | 23.689 | 0.01  | 89.51  | 89.67 | 0 | 0 |
| C12     | SU8    | CB115A | 11.33  | 0.01  | 89.67  | 89.51 | 0 | 0 |
| C13     | SU9    | SU8    | 7.105  | 0.01  | 89.55  | 89.67 | 0 | 0 |
| C14     | CB110B | SU8    | 21.66  | 0.01  | 89.54  | 89.67 | 0 | 0 |
| C15     | SU10   | CB110B | 26.14  | 0.01  | 89.81  | 89.54 | 0 | 0 |
| C16     | SU10   | CB110A | 26.45  | 0.01  | 89.81  | 89.63 | 0 | 0 |
| C17     | CB110A | SU12   | 29.65  | 0.01  | 89.63  | 89.91 | 0 | 0 |
| C18     | SU11   | SU12   | 22.68  | 0.01  | 90     | 89.91 | 0 | 0 |
| C19     | SU19   | SU17   | 37.68  | 0.01  | 89.61  | 89.53 | 0 | 0 |
| C2      | 100    | CULTEC | 6.3    | 0.013 | 85.36  | 85.3  | 0 | 0 |
| C20     | SU25   | SU19   | 8.54   | 0.01  | 89.74  | 89.61 | 0 | 0 |
| C21     | SU25   | SU22   | 30.75  | 0.01  | 89.74  | 89.6  | 0 | 0 |
| C22     | SU23   | SU22   | 20.82  | 0.01  | 89.63  | 89.6  | 0 | 0 |
| C23     | SU24   | SU23   | 13.97  | 0.01  | 89.69  | 89.63 | 0 | 0 |
| C24     | SU2    | CB119A | 53.45  | 0.01  | 90.16  | 89.73 | 0 | 0 |
| C25     | CB119A | SU24   | 7.33   | 0.01  | 89.73  | 89.69 | 0 | 0 |

|     |        |        |        |      |       |       |   |   |
|-----|--------|--------|--------|------|-------|-------|---|---|
| C27 | SU13   | CB106A | 36.56  | 0.01 | 89.58 | 89.48 | 0 | 0 |
| C28 | CB106A | SU17   | 12.04  | 0.01 | 89.48 | 89.53 | 0 | 0 |
| C29 | SU12   | CB107A | 24.626 | 0.01 | 89.91 | 89.76 | 0 | 0 |
| C3  | SU1    | SU2    | 26.142 | 0.01 | 90.25 | 90.16 | 0 | 0 |
| C30 | CB107A | SU13   | 16.33  | 0.01 | 89.76 | 89.58 | 0 | 0 |
| C32 | SU3    | CB123B | 23.31  | 0.01 | 89.73 | 89.46 | 0 | 0 |
| C33 | CB123B | SU21   | 24.1   | 0.01 | 89.46 | 89.64 | 0 | 0 |
| C34 | SU21   | CB123A | 18.26  | 0.01 | 89.64 | 89.46 | 0 | 0 |
| C35 | CB123A | SU22   | 14.39  | 0.01 | 89.46 | 89.6  | 0 | 0 |
| C36 | SU4    | CB124B | 24.67  | 0.01 | 89.66 | 89.41 | 0 | 0 |
| C37 | CB124B | SU20   | 32.77  | 0.01 | 89.41 | 89.62 | 0 | 0 |
| C38 | SU20   | CB124A | 21.354 | 0.01 | 89.62 | 89.44 | 0 | 0 |
| C39 | CB124A | SU19   | 16.6   | 0.01 | 89.44 | 89.61 | 0 | 0 |
| C4  | SU2    | SU3    | 28.98  | 0.01 | 90.16 | 89.73 | 0 | 0 |
| C40 | SU5    | CB117B | 24.78  | 0.01 | 89.6  | 89.38 | 0 | 0 |
| C41 | CB117B | SU15   | 26.43  | 0.01 | 89.38 | 89.58 | 0 | 0 |
| C42 | SU15   | CB117A | 28.65  | 0.01 | 89.58 | 89.26 | 0 | 0 |
| C43 | CB117A | SU17   | 32.69  | 0.01 | 89.26 | 89.53 | 0 | 0 |
| C45 | SU7    | CB115B | 17.55  | 0.01 | 89.67 | 89.46 | 0 | 0 |
| C46 | CB115B | SU14   | 31.53  | 0.01 | 89.46 | 89.7  | 0 | 0 |

|             |         |         |        |       |        |        |   |   |
|-------------|---------|---------|--------|-------|--------|--------|---|---|
| C47         | SU14    | CB114A  | 42.243 | 0.01  | 89.7   | 89.39  | 0 | 0 |
| C48         | CB114A  | SU13    | 18.6   | 0.01  | 89.39  | 89.58  | 0 | 0 |
| C49         | 100A    | 100B    | 6.9    | 0.013 | 85.62  | 85.6   | 0 | 0 |
| C5          | SU3     | CB121A  | 23.31  | 0.01  | 89.73  | 89.56  | 0 | 0 |
| C51         | SU17    | CB105A1 | 12.89  | 0.01  | 89.53  | 89.32  | 0 | 0 |
| C52         | CB105A1 | SU18    | 7.46   | 0.01  | 89.32  | 89.42  | 0 | 0 |
| C53         | SU18    | OF6     | 8.98   | 0.01  | 89.42  | 89.2   | 0 | 0 |
| C56         | SU22    | CB103A1 | 20.67  | 0.01  | 89.6   | 89.41  | 0 | 0 |
| C57         | CB103A1 | OF4     | 7.23   | 0.01  | 89.41  | 89.32  | 0 | 0 |
| C6          | CB121A  | SU4     | 16.03  | 0.01  | 89.56  | 89.66  | 0 | 0 |
| C7          | SU4     | CB122A  | 25.36  | 0.01  | 89.66  | 89.49  | 0 | 0 |
| C8          | CB122A  | SU5     | 19.39  | 0.01  | 89.49  | 89.6   | 0 | 0 |
| C9          | SU6     | SU5     | 23.561 | 0.01  | 89.81  | 89.6   | 0 | 0 |
| Pipe_11_(1) | 103A    | 103     | 18.374 | 0.013 | 86.923 | 86.794 | 0 | 0 |
| Pipe_14     | 124     | 121     | 92.131 | 0.013 | 87.051 | 86.774 | 0 | 0 |
| Pipe_15     | 104     | 103     | 48.533 | 0.013 | 86.04  | 85.919 | 0 | 0 |
| Pipe_15_(1) | 103     | 102     | 19.155 | 0.013 | 85.919 | 85.871 | 0 | 0 |
| Pipe_18     | 102     | 101     | 8.845  | 0.013 | 85.841 | 85.815 | 0 | 0 |
| Pipe_18_(2) | 118     | 101     | 3.78   | 0.013 | 85.899 | 85.89  | 0 | 0 |

|                          |      |      |        |       |        |        |   |   |
|--------------------------|------|------|--------|-------|--------|--------|---|---|
| Pipe_19                  | 119  | 118  | 66.941 | 0.013 | 86.272 | 86.004 | 0 | 0 |
| Pipe_20                  | 120  | 119  | 29.553 | 0.013 | 86.45  | 86.332 | 0 | 0 |
| Pipe_20_(1)              | 121  | 120  | 43.524 | 0.013 | 86.699 | 86.525 | 0 | 0 |
| Pipe_20_(2)              | 119A | 119  | 25.105 | 0.013 | 86.522 | 86.422 | 0 | 0 |
| Pipe_30                  | 106  | 105  | 50.17  | 0.013 | 86.293 | 86.193 | 0 | 0 |
| Pipe_31                  | 113  | 106  | 8.17   | 0.013 | 86.551 | 86.518 | 0 | 0 |
| Pipe_32                  | 114  | 113  | 84.735 | 0.013 | 86.902 | 86.563 | 0 | 0 |
| Pipe_33                  | 115  | 114  | 21.424 | 0.013 | 87.063 | 86.977 | 0 | 0 |
| Pipe_35                  | 107  | 106  | 37.047 | 0.013 | 86.443 | 86.368 | 0 | 0 |
| Pipe_35_(1)              | 108  | 107  | 25.492 | 0.013 | 86.769 | 86.668 | 0 | 0 |
| Pipe_36                  | 109  | 107  | 7.129  | 0.013 | 86.532 | 86.518 | 0 | 0 |
| Pipe_37                  | 110  | 109  | 93.887 | 0.013 | 86.726 | 86.538 | 0 | 0 |
| Pipe_39                  | 122  | 121  | 40.367 | 0.013 | 87.01  | 86.849 | 0 | 0 |
| Pipe_40                  | 115  | 111  | 33.683 | 0.013 | 87.234 | 87.133 | 0 | 0 |
| Pipe_40_(2)              | 112  | 111  | 8.1    | 0.013 | 87.158 | 87.133 | 0 | 0 |
| Pipe_40_(3)              | 115  | 122  | 51.857 | 0.013 | 87.248 | 87.04  | 0 | 0 |
| Pipe_5_(1)_3_(6)_2_(1)_1 | 105A | 105  | 10.327 | 0.013 | 87.19  | 87.087 | 0 | 0 |
| Pipe_6                   | 100B | J7   | 7.096  | 0.013 | 85.55  | 85.51  | 0 | 0 |
| Pipe_7                   | 100  | 100A | 12.3   | 0.013 | 85.68  | 85.65  | 0 | 0 |
| Pipe_74_(1)              | 119C | 119A | 25.7   | 0.013 | 86.687 | 86.597 | 0 | 0 |

|         |     |     |        |       |        |        |   |   |
|---------|-----|-----|--------|-------|--------|--------|---|---|
| Pipe_8  | 116 | 105 | 21.423 | 0.013 | 86.423 | 86.337 | 0 | 0 |
| Pipe_9  | 117 | 116 | 89.827 | 0.013 | 86.869 | 86.51  | 0 | 0 |
| Pipe_94 | 101 | 100 | 9.039  | 0.013 | 85.74  | 85.71  | 0 | 0 |
| Pipe_95 | 111 | 110 | 7.605  | 0.013 | 87.073 | 87.051 | 0 | 0 |

| [ORIFICES] |           |         |      |        |        |       |           |
|------------|-----------|---------|------|--------|--------|-------|-----------|
| ;;Name     | From Node | To Node | Type | Offset | Qcoeff | Gated | CloseTime |
| OL1        | CB119C    | 119C    | SIDE | 86.67  | 0.572  | NO    | 0         |
| OL10       | CB122A    | 122     | SIDE | 88.11  | 0.572  | NO    | 0         |
| OL11       | CB117B    | 117     | SIDE | 88     | 0.572  | NO    | 0         |
| OL12       | CB117A    | 117     | SIDE | 87.88  | 0.572  | NO    | 0         |
| OL13       | CB105A1   | 105A    | SIDE | 87.94  | 0.572  | NO    | 0         |
| OL15       | CB106A    | 106     | SIDE | 88.1   | 0.572  | NO    | 0         |
| OL16       | CB107A    | 107     | SIDE | 88.38  | 0.572  | NO    | 0         |
| OL17       | CB108A    | 108     | SIDE | 87.64  | 0.572  | NO    | 0         |
| OL18       | CB114A    | 114     | SIDE | 87.92  | 0.572  | NO    | 0         |
| OL19       | CB110A    | 110     | SIDE | 88.25  | 0.572  | NO    | 0         |
| OL2        | CB119A    | 119     | SIDE | 88.35  | 0.572  | NO    | 0         |
| OL20       | CB115B    | 115     | SIDE | 88.08  | 0.572  | NO    | 0         |
| OL21       | CB110B    | 110     | SIDE | 88.16  | 0.572  | NO    | 0         |
| OL22       | CB115A    | 115     | SIDE | 88.13  | 0.572  | NO    | 0         |
| OL23       | CB110C    | 110     | SIDE | 87.78  | 0.572  | NO    | 0         |
| OL3        | CB123A    | 123     | SIDE | 88.08  | 0.572  | NO    | 0         |
| OL4        | CB123B    | 123     | SIDE | 88.08  | 0.572  | NO    | 0         |
| OL5        | CB103A1   | 103A    | SIDE | 88.01  | 0.572  | NO    | 0         |
| OL7        | CB124A    | 124     | SIDE | 88.06  | 0.572  | NO    | 0         |
| OL8        | CB124B    | 124     | SIDE | 88.03  | 0.572  | NO    | 0         |
| OL9        | CB121A    | 121     | SIDE | 88.18  | 0.572  | NO    | 0         |
| OR10       | CB117A    | 117     | SIDE | 87.88  | 0.572  | NO    | 0         |
| OR11       | CB115B    | 115     | SIDE | 88.08  | 0.572  | NO    | 0         |
| OR12       | CB115A    | 115     | SIDE | 88.13  | 0.572  | NO    | 0         |
| OR13       | CB114A    | 114     | SIDE | 87.92  | 0.572  | NO    | 0         |
| OR14       | CB110B    | 110     | SIDE | 88.16  | 0.572  | NO    | 0         |



|      |        |     |      |       |       |    |   |
|------|--------|-----|------|-------|-------|----|---|
| OR15 | CB110A | 110 | SIDE | 88.25 | 0.572 | NO | 0 |
| OR2  | CB124B | 124 | SIDE | 88.03 | 0.572 | NO | 0 |
| OR3  | CB124A | 124 | SIDE | 88.06 | 0.572 | NO | 0 |
| OR4  | CB123A | 123 | SIDE | 88.08 | 0.572 | NO | 0 |
| OR5  | CB123B | 123 | SIDE | 88.08 | 0.572 | NO | 0 |
| OR6  | CB119A | 119 | SIDE | 88.35 | 0.572 | NO | 0 |
| OR7  | CB121A | 121 | SIDE | 88.18 | 0.572 | NO | 0 |
| OR8  | CB122A | 122 | SIDE | 88.11 | 0.572 | NO | 0 |
| OR9  | CB117B | 117 | SIDE | 88    | 0.572 | NO | 0 |

[WEIRS]

| ;;Name   | From Node | To Node   | Type       | CrestHt | Qcoeff | Gated | EndCon |
|----------|-----------|-----------|------------|---------|--------|-------|--------|
| EndCoeff | Surcharge | RoadWidth | RoadSurf   | Coeff.  | Curve  |       |        |
| ;;       |           |           |            |         |        |       |        |
| W1       | CB110C    | OF5       | TRANSVERSE | 89.39   | 1.67   | NO    | 0      |
| YES      |           |           |            |         |        |       |        |
| W2       | CB110C    | CB108A    | TRANSVERSE | 89.52   | 1.67   | NO    | 0      |
| YES      |           |           |            |         |        |       |        |
| W3       | CB108A    | OF7       | TRANSVERSE | 88.49   | 1.67   | NO    | 0      |
| YES      |           |           |            |         |        |       |        |
| W4       | CB119C    | OF8       | TRANSVERSE | 88.2    | 1.67   | NO    | 0      |
| YES      |           |           |            |         |        |       |        |

[XSECTIONS]

| ;;Link  | Shape     | Geom1    | Geom2 | Geom3 | Geom4 | Barrels | Culvert |
|---------|-----------|----------|-------|-------|-------|---------|---------|
| ;;      |           |          |       |       |       |         |         |
| 103     | CIRCULAR  | 0.675    | 0     | 0     | 0     | 1       |         |
| 120-123 | CIRCULAR  | 0.375    | 0     | 0     | 0     | 1       |         |
| C1      | CIRCULAR  | 0.3      | 0     | 0     | 0     | 1       |         |
| C10     | IRREGULAR | Street1  |       |       |       |         |         |
| C11     | IRREGULAR | Street1  |       |       |       |         |         |
| C12     | IRREGULAR | Street1  |       |       |       |         |         |
| C13     | IRREGULAR | Street1  |       |       |       |         |         |
| C14     | IRREGULAR | NSSouth1 |       |       |       |         |         |
| C15     | IRREGULAR | NSSouth1 |       |       |       |         |         |
| C16     | IRREGULAR | NSSouth1 |       |       |       |         |         |
| C17     | IRREGULAR | NSSouth1 |       |       |       |         |         |
| C18     | IRREGULAR | Street7  |       |       |       |         |         |

|     |           |          |   |   |   |   |  |
|-----|-----------|----------|---|---|---|---|--|
| C19 | IRREGULAR | Street7  |   |   |   |   |  |
| C2  | CIRCULAR  | 0.3      | 0 | 0 | 0 | 1 |  |
| C20 | IRREGULAR | Street7  |   |   |   |   |  |
| C21 | IRREGULAR | Street7  |   |   |   |   |  |
| C22 | IRREGULAR | Street7  |   |   |   |   |  |
| C23 | IRREGULAR | Street7  |   |   |   |   |  |
| C24 | IRREGULAR | Street7  |   |   |   |   |  |
| C25 | IRREGULAR | Street7  |   |   |   |   |  |
| C27 | IRREGULAR | Street7  |   |   |   |   |  |
| C28 | IRREGULAR | Street7  |   |   |   |   |  |
| C29 | IRREGULAR | Street7  |   |   |   |   |  |
| C3  | IRREGULAR | Street1  |   |   |   |   |  |
| C30 | IRREGULAR | Street7  |   |   |   |   |  |
| C32 | IRREGULAR | Street7  |   |   |   |   |  |
| C33 | IRREGULAR | Street7  |   |   |   |   |  |
| C34 | IRREGULAR | Street7  |   |   |   |   |  |
| C35 | IRREGULAR | Street7  |   |   |   |   |  |
| C36 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C37 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C38 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C39 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C4  | IRREGULAR | Street1  |   |   |   |   |  |
| C40 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C41 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C42 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C43 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C45 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C46 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C47 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C48 | IRREGULAR | NSSouth2 |   |   |   |   |  |
| C49 | CIRCULAR  | 0.825    | 0 | 0 | 0 | 1 |  |
| C5  | IRREGULAR | Street1  |   |   |   |   |  |
| C51 | IRREGULAR | EExit    |   |   |   |   |  |
| C52 | IRREGULAR | EExit    |   |   |   |   |  |
| C53 | IRREGULAR | EExit    |   |   |   |   |  |
| C56 | IRREGULAR | WExit    |   |   |   |   |  |
| C57 | IRREGULAR | WExit    |   |   |   |   |  |
| C6  | IRREGULAR | Street1  |   |   |   |   |  |
| C7  | IRREGULAR | Street1  |   |   |   |   |  |

|                          |           |         |   |   |   |   |
|--------------------------|-----------|---------|---|---|---|---|
| C8                       | IRREGULAR | Street1 |   |   |   |   |
| C9                       | IRREGULAR | Street1 |   |   |   |   |
| Pipe_11_(1)              | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_14                  | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_15                  | CIRCULAR  | 0.675   | 0 | 0 | 0 | 1 |
| Pipe_15_(1)              | CIRCULAR  | 0.675   | 0 | 0 | 0 | 1 |
| Pipe_18                  | CIRCULAR  | 0.675   | 0 | 0 | 0 | 1 |
| Pipe_18_(2)              | CIRCULAR  | 0.6     | 0 | 0 | 0 | 1 |
| Pipe_19                  | CIRCULAR  | 0.525   | 0 | 0 | 0 | 1 |
| Pipe_20                  | CIRCULAR  | 0.525   | 0 | 0 | 0 | 1 |
| Pipe_20_(1)              | CIRCULAR  | 0.45    | 0 | 0 | 0 | 1 |
| Pipe_20_(2)              | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_30                  | CIRCULAR  | 0.6     | 0 | 0 | 0 | 1 |
| Pipe_31                  | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_32                  | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_33                  | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_35                  | CIRCULAR  | 0.525   | 0 | 0 | 0 | 1 |
| Pipe_35_(1)              | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_36                  | CIRCULAR  | 0.45    | 0 | 0 | 0 | 1 |
| Pipe_37                  | CIRCULAR  | 0.45    | 0 | 0 | 0 | 1 |
| Pipe_39                  | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_40                  | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_40_(2)              | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_40_(3)              | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_5_(1)_3_(6)_2_(1)_1 | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_6                   | CIRCULAR  | 0.825   | 0 | 0 | 0 | 1 |
| Pipe_7                   | CIRCULAR  | 0.825   | 0 | 0 | 0 | 1 |
| Pipe_74_(1)              | CIRCULAR  | 0.3     | 0 | 0 | 0 | 1 |
| Pipe_8                   | CIRCULAR  | 0.45    | 0 | 0 | 0 | 1 |
| Pipe_9                   | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| Pipe_94                  | CIRCULAR  | 0.825   | 0 | 0 | 0 | 1 |
| Pipe_95                  | CIRCULAR  | 0.375   | 0 | 0 | 0 | 1 |
| OL1                      | CIRCULAR  | 0.152   | 0 | 0 | 0 |   |
| OL10                     | CIRCULAR  | 0.083   | 0 | 0 | 0 |   |
| OL11                     | CIRCULAR  | 0.083   | 0 | 0 | 0 |   |
| OL12                     | CIRCULAR  | 0.127   | 0 | 0 | 0 |   |
| OL13                     | CIRCULAR  | 0.102   | 0 | 0 | 0 |   |
| OL15                     | CIRCULAR  | 0.083   | 0 | 0 | 0 |   |
| OL16                     | CIRCULAR  | 0.083   | 0 | 0 | 0 |   |

|      |           |       |   |   |   |  |
|------|-----------|-------|---|---|---|--|
| OL17 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL18 | CIRCULAR  | 0.095 | 0 | 0 | 0 |  |
| OL19 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL2  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL20 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL21 | CIRCULAR  | 0.095 | 0 | 0 | 0 |  |
| OL22 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL23 | CIRCULAR  | 0.095 | 0 | 0 | 0 |  |
| OL3  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL4  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL5  | CIRCULAR  | 0.108 | 0 | 0 | 0 |  |
| OL7  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL8  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OL9  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR10 | CIRCULAR  | 0.127 | 0 | 0 | 0 |  |
| OR11 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR12 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR13 | CIRCULAR  | 0.095 | 0 | 0 | 0 |  |
| OR14 | CIRCULAR  | 0.095 | 0 | 0 | 0 |  |
| OR15 | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR2  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR3  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR4  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR5  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR6  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR7  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR8  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| OR9  | CIRCULAR  | 0.083 | 0 | 0 | 0 |  |
| W1   | RECT_OPEN | 0.08  | 1 | 0 | 0 |  |
| W2   | RECT_OPEN | 0.08  | 3 | 0 | 0 |  |
| W3   | RECT_OPEN | 0.08  | 1 | 0 | 0 |  |
| W4   | RECT_OPEN | 0.08  | 1 | 0 | 0 |  |

[TRANSECTS]

;;Transect Data in HEC-2 format

;

;East entrance driveway

NC 0.002 0.002 0.013

X1 EExit 7 9.19 15.89 0.0 0.0 0.0 0.0 0.0

|                                                    |       |        |       |       |       |        |       |     |       |
|----------------------------------------------------|-------|--------|-------|-------|-------|--------|-------|-----|-------|
| GR 0.3338                                          | 0     | 0.15   | 9.19  | 0     | 9.19  | 0.067  | 12.54 | 0   | 15.89 |
| GR 0.15                                            | 15.89 | 0.3332 | 25.05 |       |       |        |       |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;Typical northsouth street, no sidewalk            |       |        |       |       |       |        |       |     |       |
| NC 0.25                                            | 0.25  | 0.013  |       |       |       |        |       |     |       |
| X1 NSSouth1                                        |       | 7      | 5.45  | 12.15 | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.298                                           | 0     | 0.08   | 5.45  | 0     | 5.45  | 0.1005 | 8.8   | 0   | 12.15 |
| GR 0.08                                            | 12.15 | 0.2248 | 15.77 |       |       |        |       |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| NC 0.25                                            | 0.25  | 0.013  |       |       |       |        |       |     |       |
| X1 NSSouth2                                        |       | 7      | 5.45  | 12.15 | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.298                                           | 0     | 0.08   | 5.45  | 0     | 5.45  | 0.1005 | 8.8   | 0   | 12.15 |
| GR 0.08                                            | 12.15 | 0.298  | 17.6  |       |       |        |       |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;For Street 1 with 1.8 m sidewalk along south side |       |        |       |       |       |        |       |     |       |
| NC 0.25                                            | 0.25  | 0.013  |       |       |       |        |       |     |       |
| X1 Street1                                         |       | 7      | 3.5   | 10.2  | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.22                                            | 0     | 0.08   | 3.5   | 0     | 3.5   | 0.1005 | 6.85  | 0   | 10.2  |
| GR 0.08                                            | 10.2  | 0.2568 | 14.62 |       |       |        |       |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;Street 7, no sidewalks                            |       |        |       |       |       |        |       |     |       |
| NC 0.25                                            | 0.25  | 0.013  |       |       |       |        |       |     |       |
| X1 Street7                                         |       | 7      | 1.25  | 7.95  | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.13                                            | 0     | 0.08   | 1.25  | 0     | 1.25  | 0.1005 | 4.6   | 0   | 7.95  |
| GR 0.08                                            | 7.95  | 0.13   | 9.2   |       |       |        |       |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;North side of Street 7, no sidewalks              |       |        |       |       |       |        |       |     |       |
| NC 0.002                                           | 0.002 | 0.013  |       |       |       |        |       |     |       |
| X1 Street7N                                        |       | 4      | 0     | 3.345 | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.0669                                          | 0     | 0      | 3.345 | 0.08  | 3.345 | 0.1336 | 6.025 |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;South side of Street 7, no sidewalks              |       |        |       |       |       |        |       |     |       |
| NC 0.002                                           | 0.002 | 0.013  |       |       |       |        |       |     |       |
| X1 Street7S                                        |       | 4      | 1.41  | 8.1   | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |
| GR 0.1082                                          | 0     | 0.08   | 1.41  | 0     | 1.41  | 0.0669 | 4.755 |     |       |
| ;                                                  |       |        |       |       |       |        |       |     |       |
| ;Street 7 west, no sidewalks                       |       |        |       |       |       |        |       |     |       |
| NC 0.002                                           | 0.002 | 0.013  |       |       |       |        |       |     |       |
| X1 Street7W                                        |       | 7      | 1.25  | 7.95  | 0.0   | 0.0    | 0.0   | 0.0 | 0.0   |

|                         |       |        |       |       |      |       |      |     |      |
|-------------------------|-------|--------|-------|-------|------|-------|------|-----|------|
| GR 0.105                | 0     | 0.08   | 1.25  | 0     | 1.25 | 0.067 | 4.6  | 0   | 7.95 |
| GR 0.08                 | 7.95  | 0.1184 | 9.87  |       |      |       |      |     |      |
| ;                       |       |        |       |       |      |       |      |     |      |
| ;West entrance driveway |       |        |       |       |      |       |      |     |      |
| NC 0.002                | 0.002 | 0.013  |       |       |      |       |      |     |      |
| X1 WExit                |       | 7      | 9.19  | 15.89 | 0.0  | 0.0   | 0.0  | 0.0 | 0.0  |
| GR 0.2034               | 0     | 0.15   | 2.67  | 0     | 2.67 | 0.067 | 6.02 | 0   | 9.37 |
| GR 0.15                 | 9.37  | 0.2522 | 14.48 |       |      |       |      |     |      |

[LOSSES]

| ;;Link      | Kentry | Kexit | Kavg | Flap Gate | Seepage |
|-------------|--------|-------|------|-----------|---------|
| ;;-----     |        |       |      |           |         |
| 103         | 0      | 0.042 | 0    | NO        | 0       |
| 120-123     | 0      | 1.344 | 0    | NO        | 0       |
| C1          | 0      | 0.259 | 0    | NO        | 0       |
| C2          | 0      | 0.053 | 0    | NO        | 0       |
| C49         | 0      | 0.91  | 0    | NO        | 0       |
| Pipe_11_(1) | 0      | 1.323 | 0    | NO        | 0       |
| Pipe_14     | 0      | 1.344 | 0    | NO        | 0       |
| Pipe_15     | 0      | 0.021 | 0    | NO        | 0       |
| Pipe_15_(1) | 0      | 0.124 | 0    | NO        | 0       |
| Pipe_18     | 0      | 0.91  | 0    | NO        | 0       |
| Pipe_18_(2) | 0      | 1.107 | 0    | NO        | 0       |
| Pipe_19     | 0      | 0.157 | 0    | NO        | 0       |
| Pipe_20     | 0      | 1.286 | 0    | NO        | 0       |
| Pipe_20_(1) | 0      | 0.022 | 0    | NO        | 0       |
| Pipe_20_(2) | 0      | 1.344 | 0    | NO        | 0       |
| Pipe_30     | 0      | 0.034 | 0    | NO        | 0       |
| Pipe_31     | 0      | 1.344 | 0    | NO        | 0       |
| Pipe_32     | 0      | 0.141 | 0    | NO        | 0       |
| Pipe_33     | 0      | 0.141 | 0    | NO        | 0       |
| Pipe_35     | 0      | 0.034 | 0    | NO        | 0       |
| Pipe_35_(1) | 0      | 0.053 | 0    | NO        | 0       |
| Pipe_36     | 0      | 1.344 | 0    | NO        | 0       |
| Pipe_37     | 0      | 0.081 | 0    | NO        | 0       |
| Pipe_39     | 0      | 0.022 | 0    | NO        | 0       |
| Pipe_40     | 0      | 1.344 | 0    | NO        | 0       |
| Pipe_40_(2) | 0      | 1.286 | 0    | NO        | 0       |
| Pipe_40_(3) | 0      | 0.229 | 0    | NO        | 0       |

|                                |   |       |   |    |   |
|--------------------------------|---|-------|---|----|---|
| Pipe_5_(1)_(3)_(6)_(2)_(1)_(1) | 0 | 1.305 | 0 | NO | 0 |
| Pipe_7                         | 0 | 0.91  | 0 | NO | 0 |
| Pipe_74_(1)                    | 0 | 0.813 | 0 | NO | 0 |
| Pipe_8                         | 0 | 1.344 | 0 | NO | 0 |
| Pipe_9                         | 0 | 0.103 | 0 | NO | 0 |
| Pipe_94                        | 0 | 0.216 | 0 | NO | 0 |
| Pipe_95                        | 0 | 0.199 | 0 | NO | 0 |

[CURVES]

| ;;Name  | Type   | X-Value | Y-Value |
|---------|--------|---------|---------|
| ;;----- |        | -----   | -----   |
| Double  | Rating | 0       | 0       |
| Double  |        | 0.01    | 1       |
| Double  |        | 0.02    | 3       |
| Double  |        | 0.03    | 5       |
| Double  |        | 0.04    | 9       |
| Double  |        | 0.05    | 16      |
| Double  |        | 0.06    | 27      |
| Double  |        | 0.07    | 36      |
| Double  |        | 0.08    | 54      |
| Double  |        | 0.09    | 71      |
| Double  |        | 0.1     | 91      |
| Double  |        | 0.11    | 109     |
| Double  |        | 0.12    | 127     |
| Double  |        | 0.13    | 140     |
| Double  |        | 0.14    | 155     |
| Double  |        | 0.15    | 169     |
| Double  |        | 0.16    | 183     |
| Double  |        | 0.17    | 196     |
| Double  |        | 0.18    | 211     |
| Double  |        | 0.19    | 228     |
| Double  |        | 0.2     | 243     |
| Double  |        | 0.21    | 259     |
| Double  |        | 0.22    | 275     |
| Double  |        | 0.23    | 291     |
| Double  |        | 0.24    | 307     |
| Double  |        | 0.25    | 322     |
| Double  |        | 0.26    | 337     |
| Double  |        | 0.27    | 354     |

|              |        |      |           |
|--------------|--------|------|-----------|
| Double       |        | 0.28 | 371       |
| Double       |        | 0.29 | 387       |
| Double       |        | 0.3  | 403       |
| Infiltration | Rating | 0    | 0.5930555 |
| Infiltration |        | 10   | 0.5930555 |
| Single       | Rating | 0    | 0         |
| Single       |        | 0.01 | 1         |
| Single       |        | 0.02 | 2         |
| Single       |        | 0.03 | 4         |
| Single       |        | 0.04 | 7         |
| Single       |        | 0.05 | 11        |
| Single       |        | 0.06 | 16        |
| Single       |        | 0.07 | 20        |
| Single       |        | 0.08 | 36        |
| Single       |        | 0.09 | 48        |
| Single       |        | 0.1  | 61        |
| Single       |        | 0.11 | 73        |
| Single       |        | 0.12 | 86        |
| Single       |        | 0.13 | 99        |
| Single       |        | 0.14 | 109       |
| Single       |        | 0.15 | 120       |
| Single       |        | 0.16 | 129       |
| Single       |        | 0.17 | 136       |
| Single       |        | 0.18 | 145       |
| Single       |        | 0.19 | 150       |
| Single       |        | 0.2  | 156       |
| Single       |        | 0.21 | 161       |
| Single       |        | 0.22 | 167       |
| Single       |        | 0.23 | 172       |
| Single       |        | 0.24 | 176       |
| Single       |        | 0.25 | 181       |
| Single       |        | 0.26 | 186       |
| Single       |        | 0.27 | 189       |
| Single       |        | 0.28 | 194       |
| Single       |        | 0.29 | 199       |
| Single       |        | 0.3  | 202       |

|        |         |        |      |
|--------|---------|--------|------|
| Cultec | Storage | 0      | 80.8 |
| Cultec |         | 1.37   | 80.8 |
| Cultec |         | 1.3701 | 0    |
| Cultec |         | 3      | 0    |

[TIMESERIES]

| ;;Name  | Date | Time  | Value       |
|---------|------|-------|-------------|
| ;;      |      |       |             |
| 4_mm    |      | 00:10 | 0.242574089 |
| 4_mm    |      | 00:20 | 0.279858456 |
| 4_mm    |      | 00:30 | 0.332594471 |
| 4_mm    |      | 00:40 | 0.413380024 |
| 4_mm    |      | 00:50 | 0.553874686 |
| 4_mm    |      | 01:00 | 0.863199515 |
| 4_mm    |      | 01:10 | 2.151698661 |
| 4_mm    |      | 01:20 | 9.07589324  |
| 4_mm    |      | 01:30 | 2.845374362 |
| 4_mm    |      | 01:40 | 1.461000792 |
| 4_mm    |      | 01:50 | 0.983633977 |
| 4_mm    |      | 02:00 | 0.744861353 |
| 4_mm    |      | 02:10 | 0.602063597 |
| 4_mm    |      | 02:20 | 0.507097884 |
| 4_mm    |      | 02:30 | 0.43933208  |
| 4_mm    |      | 02:40 | 0.38849148  |
| 4_mm    |      | 02:50 | 0.348895747 |
| 4_mm    |      | 03:00 | 0.317148732 |
| 4_mm    |      | 03:10 | 0.291104505 |
| 4_mm    |      | 03:20 | 0.269329687 |
| 4_mm    |      | 03:30 | 0.250838759 |
| 4_mm    |      | 03:40 | 0.234929801 |
| 4_mm    |      | 03:50 | 0.221087601 |
| 4_mm    |      | 04:00 | 0.208926932 |
| CHI_002 |      | 0:00  | 0           |
| CHI_002 |      | 0:10  | 2.81        |
| CHI_002 |      | 0:20  | 3.5         |
| CHI_002 |      | 0:30  | 4.69        |
| CHI_002 |      | 0:40  | 7.3         |
| CHI_002 |      | 0:50  | 18.21       |

|         |      |        |
|---------|------|--------|
| CHI_002 | 1:00 | 76.81  |
| CHI_002 | 1:10 | 24.08  |
| CHI_002 | 1:20 | 12.36  |
| CHI_002 | 1:30 | 8.32   |
| CHI_002 | 1:40 | 6.3    |
| CHI_002 | 1:50 | 5.09   |
| CHI_002 | 2:00 | 4.29   |
| CHI_002 | 2:10 | 3.72   |
| CHI_002 | 2:20 | 3.29   |
| CHI_002 | 2:30 | 2.95   |
| CHI_002 | 2:40 | 2.68   |
| CHI_002 | 2:50 | 2.46   |
| CHI_002 | 3:00 | 2.28   |
| CHI_005 | 0:00 | 0      |
| CHI_005 | 0:10 | 3.68   |
| CHI_005 | 0:20 | 4.58   |
| CHI_005 | 0:30 | 6.15   |
| CHI_005 | 0:40 | 9.61   |
| CHI_005 | 0:50 | 24.17  |
| CHI_005 | 1:00 | 104.19 |
| CHI_005 | 1:10 | 32.04  |
| CHI_005 | 1:20 | 16.34  |
| CHI_005 | 1:30 | 10.96  |
| CHI_005 | 1:40 | 8.29   |
| CHI_005 | 1:50 | 6.69   |
| CHI_005 | 2:00 | 5.63   |
| CHI_005 | 2:10 | 4.87   |
| CHI_005 | 2:20 | 4.3    |
| CHI_005 | 2:30 | 3.86   |
| CHI_005 | 2:40 | 3.51   |
| CHI_005 | 2:50 | 3.22   |
| CHI_005 | 3:00 | 2.98   |
| CHI_100 | 0:00 | 0      |
| CHI_100 | 0:10 | 6.05   |
| CHI_100 | 0:20 | 7.54   |
| CHI_100 | 0:30 | 10.16  |
| CHI_100 | 0:40 | 15.97  |

|         |      |         |
|---------|------|---------|
| CHI_100 | 0:50 | 40.65   |
| CHI_100 | 1:00 | 178.56  |
| CHI_100 | 1:10 | 54.05   |
| CHI_100 | 1:20 | 27.32   |
| CHI_100 | 1:30 | 18.24   |
| CHI_100 | 1:40 | 13.74   |
| CHI_100 | 1:50 | 11.06   |
| CHI_100 | 2:00 | 9.29    |
| CHI_100 | 2:10 | 8.02    |
| CHI_100 | 2:20 | 7.08    |
| CHI_100 | 2:30 | 6.35    |
| CHI_100 | 2:40 | 5.76    |
| CHI_100 | 2:50 | 5.28    |
| CHI_100 | 3:00 | 4.88    |
| CHI_120 | 0:00 | 0       |
| CHI_120 | 0:10 | 7.26    |
| CHI_120 | 0:20 | 9.048   |
| CHI_120 | 0:30 | 12.192  |
| CHI_120 | 0:40 | 19.164  |
| CHI_120 | 0:50 | 48.78   |
| CHI_120 | 1:00 | 214.272 |
| CHI_120 | 1:10 | 64.86   |
| CHI_120 | 1:20 | 32.784  |
| CHI_120 | 1:30 | 21.888  |
| CHI_120 | 1:40 | 16.488  |
| CHI_120 | 1:50 | 13.272  |
| CHI_120 | 2:00 | 11.148  |
| CHI_120 | 2:10 | 9.624   |
| CHI_120 | 2:20 | 8.496   |
| CHI_120 | 2:30 | 7.62    |
| CHI_120 | 2:40 | 6.912   |
| CHI_120 | 2:50 | 6.336   |
| CHI_120 | 3:00 | 5.856   |

```
[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
```

```
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL
```

```
[MAP]
DIMENSIONS      372484.75815      5035462.25445      372815.61285      5035648.54055
UNITS           Meters
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

WARNING 03: negative offset ignored for Link C13  
 WARNING 03: negative offset ignored for Link C27  
 WARNING 03: negative offset ignored for Link C3  
 WARNING 03: negative offset ignored for Link C30  
 WARNING 03: negative offset ignored for Link C32  
 WARNING 03: negative offset ignored for Link C4  
 WARNING 03: negative offset ignored for Link C48  
 WARNING 03: negative offset ignored for Link C5  
 WARNING 10: crest elevation raised to downstream invert for regulator Link OL1

\*\*\*\*\*

Element Count

\*\*\*\*\*

Number of rain gages ..... 5  
 Number of subcatchments ... 25  
 Number of nodes ..... 87  
 Number of links ..... 122  
 Number of pollutants ..... 0  
 Number of land uses ..... 0

\*\*\*\*\*

Raingage Summary

\*\*\*\*\*

| Name    | Data Source | Data Type | Recording Interval |
|---------|-------------|-----------|--------------------|
| 4_mm    | 4_mm        | INTENSITY | 10 min.            |
| CHI_002 | CHI_002     | INTENSITY | 10 min.            |
| CHI_005 | CHI_005     | INTENSITY | 10 min.            |
| CHI_100 | CHI_100     | INTENSITY | 10 min.            |
| CHI_120 | CHI_120     | INTENSITY | 10 min.            |

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Subcatchment Summary

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| Name   | Area | Width | %Imperv | %Slope | Rain Gage | Outlet  |
|--------|------|-------|---------|--------|-----------|---------|
| C103AA | 0.14 | 13.87 | 92.86   | 2.0000 | CHI_100   | CB103A1 |
| C105AA | 0.15 | 10.77 | 85.71   | 2.0000 | CHI_100   | CB105A1 |
| C106A  | 0.02 | 6.61  | 78.57   | 2.0000 | CHI_100   | CB106A  |
| C107A  | 0.06 | 11.26 | 85.71   | 2.0000 | CHI_100   | CB107A  |
| C108A  | 0.10 | 12.46 | 50.00   | 2.0000 | CHI_100   | CB108A  |
| C110A  | 0.19 | 21.87 | 78.57   | 2.0000 | CHI_100   | CB110A  |
| C110B  | 0.15 | 28.52 | 78.57   | 2.0000 | CHI_100   | CB110B  |
| C110C  | 0.16 | 19.19 | 38.57   | 2.0000 | CHI_100   | CB110C  |
| C114A  | 0.24 | 23.97 | 78.57   | 2.0000 | CHI_100   | CB114A  |
| C115A  | 0.13 | 22.57 | 80.00   | 2.0000 | CHI_100   | CB115A  |
| C115B  | 0.17 | 23.05 | 78.57   | 2.0000 | CHI_100   | CB115B  |
| C117A  | 0.24 | 42.69 | 78.57   | 2.0000 | CHI_100   | CB117A  |
| C117B  | 0.19 | 24.09 | 78.57   | 2.0000 | CHI_100   | CB117B  |
| C119A  | 0.15 | 16.58 | 90.00   | 2.0000 | CHI_100   | CB119A  |
| C119CA | 0.28 | 16.61 | 50.00   | 2.0000 | CHI_100   | CB119C  |
| C121A  | 0.16 | 17.35 | 80.00   | 2.0000 | CHI_100   | CB121A  |
| C122A  | 0.14 | 20.48 | 80.00   | 2.0000 | CHI_100   | CB122A  |
| C123A  | 0.15 | 16.24 | 90.00   | 2.0000 | CHI_100   | CB123A  |
| C123B  | 0.16 | 30.63 | 78.57   | 2.0000 | CHI_100   | CB123B  |
| C124A  | 0.14 | 23.73 | 78.57   | 2.0000 | CHI_100   | CB124A  |
| C124B  | 0.19 | 34.74 | 78.57   | 2.0000 | CHI_100   | CB124B  |
| TANK-1 | 0.11 | 12.55 | 42.86   | 2.0000 | CHI_100   | CULTEC  |
| UNC-1  | 0.14 | 31.07 | 57.14   | 2.0000 | CHI_100   | OF3     |
| UNC-2  | 0.06 | 14.05 | 57.14   | 2.0000 | CHI_100   | OF2     |
| UNC-3  | 0.07 | 15.11 | 42.86   | 2.0000 | CHI_100   | OF1     |

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Node Summary

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| Name | Type    | Invert Elev. | Max. Depth | Ponded Area | External Inflow |
|------|---------|--------------|------------|-------------|-----------------|
| J7   | OUTFALL | 83.54        | 2.80       | 0.0         |                 |

|      |         |       |      |     |
|------|---------|-------|------|-----|
| OF1  | OUTFALL | 0.00  | 0.00 | 0.0 |
| OF2  | OUTFALL | 0.00  | 0.00 | 0.0 |
| OF3  | OUTFALL | 0.00  | 0.00 | 0.0 |
| OF4  | OUTFALL | 89.32 | 0.25 | 0.0 |
| OF5  | OUTFALL | 89.38 | 0.00 | 0.0 |
| OF6  | OUTFALL | 89.20 | 0.33 | 0.0 |
| OF7  | OUTFALL | 88.49 | 0.00 | 0.0 |
| OF8  | OUTFALL | 82.05 | 0.00 | 0.0 |
| 100  | STORAGE | 85.36 | 4.52 | 0.0 |
| 100A | STORAGE | 85.62 | 4.08 | 0.0 |
| 100B | STORAGE | 85.55 | 4.21 | 0.0 |
| 101  | STORAGE | 85.44 | 4.24 | 0.0 |
| 102  | STORAGE | 85.54 | 4.09 | 0.0 |
| 103  | STORAGE | 85.62 | 3.95 | 0.0 |
| 103A | STORAGE | 86.62 | 2.80 | 0.0 |
| 104  | STORAGE | 85.81 | 3.83 | 0.0 |
| 105  | STORAGE | 85.89 | 3.64 | 0.0 |
| 105A | STORAGE | 86.89 | 2.45 | 0.0 |
| 106  | STORAGE | 85.99 | 3.70 | 0.0 |
| 107  | STORAGE | 86.14 | 3.74 | 0.0 |
| 108  | STORAGE | 86.47 | 3.58 | 0.0 |
| 109  | STORAGE | 86.23 | 3.57 | 0.0 |
| 110  | STORAGE | 86.43 | 3.21 | 0.0 |
| 111  | STORAGE | 86.77 | 2.79 | 0.0 |
| 112  | STORAGE | 86.86 | 3.09 | 0.0 |
| 113  | STORAGE | 86.25 | 3.33 | 0.0 |
| 114  | STORAGE | 86.60 | 2.92 | 0.0 |
| 115  | STORAGE | 86.76 | 2.92 | 0.0 |
| 116  | STORAGE | 86.27 | 3.13 | 0.0 |
| 117  | STORAGE | 86.64 | 2.98 | 0.0 |
| 118  | STORAGE | 85.60 | 4.09 | 0.0 |
| 119  | STORAGE | 85.97 | 4.19 | 0.0 |
| 119A | STORAGE | 86.22 | 4.26 | 0.0 |
| 119C | STORAGE | 86.69 | 1.36 | 0.0 |
| 120  | STORAGE | 86.15 | 3.74 | 0.0 |
| 121  | STORAGE | 86.40 | 3.28 | 0.0 |
| 122  | STORAGE | 86.71 | 2.89 | 0.0 |
| 123  | STORAGE | 86.61 | 2.98 | 0.0 |
| 124  | STORAGE | 86.75 | 2.79 | 0.0 |

|         |         |       |      |     |
|---------|---------|-------|------|-----|
| CB103A1 | STORAGE | 88.01 | 1.78 | 0.0 |
| CB105A1 | STORAGE | 87.94 | 1.78 | 0.0 |
| CB106A  | STORAGE | 88.10 | 1.78 | 0.0 |
| CB107A  | STORAGE | 88.37 | 1.78 | 0.0 |
| CB108A  | STORAGE | 87.64 | 1.78 | 0.0 |
| CB110A  | STORAGE | 88.25 | 1.78 | 0.0 |
| CB110B  | STORAGE | 88.16 | 1.78 | 0.0 |
| CB110C  | STORAGE | 87.78 | 1.78 | 0.0 |
| CB114A  | STORAGE | 87.92 | 1.78 | 0.0 |
| CB115A  | STORAGE | 88.13 | 1.78 | 0.0 |
| CB115B  | STORAGE | 88.08 | 1.78 | 0.0 |
| CB117A  | STORAGE | 87.88 | 1.78 | 0.0 |
| CB117B  | STORAGE | 88.00 | 1.78 | 0.0 |
| CB119A  | STORAGE | 88.35 | 1.78 | 0.0 |
| CB119C  | STORAGE | 86.67 | 1.78 | 0.0 |
| CB121A  | STORAGE | 88.18 | 1.78 | 0.0 |
| CB122A  | STORAGE | 88.11 | 1.78 | 0.0 |
| CB123A  | STORAGE | 88.08 | 1.78 | 0.0 |
| CB123B  | STORAGE | 88.08 | 1.78 | 0.0 |
| CB124A  | STORAGE | 88.06 | 1.78 | 0.0 |
| CB124B  | STORAGE | 88.03 | 1.78 | 0.0 |
| CULTEC  | STORAGE | 85.00 | 3.50 | 0.0 |
| SU1     | STORAGE | 90.26 | 0.08 | 0.0 |
| SU10    | STORAGE | 89.81 | 0.08 | 0.0 |
| SU11    | STORAGE | 90.00 | 0.08 | 0.0 |
| SU12    | STORAGE | 89.91 | 0.08 | 0.0 |
| SU13    | STORAGE | 89.68 | 0.08 | 0.0 |
| SU14    | STORAGE | 89.62 | 0.08 | 0.0 |
| SU15    | STORAGE | 89.58 | 0.08 | 0.0 |
| SU16    | STORAGE | 89.35 | 0.08 | 0.0 |
| SU17    | STORAGE | 89.53 | 0.08 | 0.0 |
| SU18    | STORAGE | 89.42 | 0.08 | 0.0 |
| SU19    | STORAGE | 89.61 | 0.08 | 0.0 |
| SU2     | STORAGE | 90.12 | 0.08 | 0.0 |
| SU20    | STORAGE | 89.62 | 0.08 | 0.0 |
| SU21    | STORAGE | 89.64 | 0.08 | 0.0 |
| SU22    | STORAGE | 89.60 | 0.08 | 0.0 |
| SU23    | STORAGE | 89.63 | 0.08 | 0.0 |
| SU24    | STORAGE | 89.69 | 0.08 | 0.0 |



|      |         |       |      |     |
|------|---------|-------|------|-----|
| SU25 | STORAGE | 89.74 | 0.08 | 0.0 |
| SU3  | STORAGE | 89.83 | 0.08 | 0.0 |
| SU4  | STORAGE | 89.66 | 0.08 | 0.0 |
| SU5  | STORAGE | 89.60 | 0.08 | 0.0 |
| SU6  | STORAGE | 89.81 | 0.08 | 0.0 |
| SU7  | STORAGE | 89.66 | 0.08 | 0.0 |
| SU8  | STORAGE | 89.67 | 0.08 | 0.0 |
| SU9  | STORAGE | 89.77 | 0.08 | 0.0 |

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Link Summary

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| Name    | From Node | To Node | Type    | Length | %Slope  | Roughness |
|---------|-----------|---------|---------|--------|---------|-----------|
| 103     | 105       | 104     | CONDUIT | 32.8   | 0.2012  | 0.0130    |
| 120-123 | 123       | 120     | CONDUIT | 77.8   | 0.3998  | 0.0130    |
| C1      | CULTEC    | 100B    | CONDUIT | 2.7    | 1.1112  | 0.0130    |
| C10     | SU6       | SU7     | CONDUIT | 23.2   | 0.6034  | 0.0130    |
| C11     | CB115A    | SU7     | CONDUIT | 23.7   | -0.6754 | 0.0130    |
| C12     | SU8       | CB115A  | CONDUIT | 11.3   | 1.4123  | 0.0130    |
| C13     | SU9       | SU8     | CONDUIT | 7.1    | 1.4076  | 0.0130    |
| C14     | CB110B    | SU8     | CONDUIT | 21.7   | -0.6002 | 0.0130    |
| C15     | SU10      | CB110B  | CONDUIT | 26.1   | 1.0330  | 0.0130    |
| C16     | SU10      | CB110A  | CONDUIT | 26.4   | 0.6805  | 0.0130    |
| C17     | CB110A    | SU12    | CONDUIT | 29.6   | -0.9444 | 0.0130    |
| C18     | SU11      | SU12    | CONDUIT | 22.7   | 0.3968  | 0.0130    |
| C19     | SU19      | SU17    | CONDUIT | 37.7   | 0.2123  | 0.0130    |
| C2      | 100       | CULTEC  | CONDUIT | 6.3    | 0.9524  | 0.0130    |
| C20     | SU25      | SU19    | CONDUIT | 8.5    | 1.5224  | 0.0130    |
| C21     | SU25      | SU22    | CONDUIT | 30.8   | 0.4553  | 0.0130    |
| C22     | SU23      | SU22    | CONDUIT | 20.8   | 0.1441  | 0.0130    |
| C23     | SU24      | SU23    | CONDUIT | 14.0   | 0.4295  | 0.0130    |
| C24     | SU2       | CB119A  | CONDUIT | 53.5   | 0.8045  | 0.0130    |
| C25     | CB119A    | SU24    | CONDUIT | 7.3    | 0.5457  | 0.0130    |
| C27     | SU13      | CB106A  | CONDUIT | 36.6   | 0.5471  | 0.0130    |
| C28     | CB106A    | SU17    | CONDUIT | 12.0   | -0.4153 | 0.0130    |
| C29     | SU12      | CB107A  | CONDUIT | 24.6   | 0.6091  | 0.0130    |
| C3      | SU1       | SU2     | CONDUIT | 26.1   | 0.3825  | 0.0130    |

|             |         |         |         |      |         |        |
|-------------|---------|---------|---------|------|---------|--------|
| C30         | CB107A  | SU13    | CONDUIT | 16.3 | 0.4899  | 0.0130 |
| C32         | SU3     | CB123B  | CONDUIT | 23.3 | 1.5875  | 0.0130 |
| C33         | CB123B  | SU21    | CONDUIT | 24.1 | -0.7469 | 0.0130 |
| C34         | SU21    | CB123A  | CONDUIT | 18.3 | 0.9858  | 0.0130 |
| C35         | CB123A  | SU22    | CONDUIT | 14.4 | -0.9729 | 0.0130 |
| C36         | SU4     | CB124B  | CONDUIT | 24.7 | 1.0134  | 0.0130 |
| C37         | CB124B  | SU20    | CONDUIT | 32.8 | -0.6408 | 0.0130 |
| C38         | SU20    | CB124A  | CONDUIT | 21.4 | 0.8430  | 0.0130 |
| C39         | CB124A  | SU19    | CONDUIT | 16.6 | -1.0242 | 0.0130 |
| C4          | SU2     | SU3     | CONDUIT | 29.0 | 1.1388  | 0.0130 |
| C40         | SU5     | CB117B  | CONDUIT | 24.8 | 0.8878  | 0.0130 |
| C41         | CB117B  | SU15    | CONDUIT | 26.4 | -0.7567 | 0.0130 |
| C42         | SU15    | CB117A  | CONDUIT | 28.6 | 1.1170  | 0.0130 |
| C43         | CB117A  | SU17    | CONDUIT | 32.7 | -0.8260 | 0.0130 |
| C45         | SU7     | CB115B  | CONDUIT | 17.6 | 1.1967  | 0.0130 |
| C46         | CB115B  | SU14    | CONDUIT | 31.5 | -0.7612 | 0.0130 |
| C47         | SU14    | CB114A  | CONDUIT | 42.2 | 0.7339  | 0.0130 |
| C48         | CB114A  | SU13    | CONDUIT | 18.6 | -1.5593 | 0.0130 |
| C49         | 100A    | 100B    | CONDUIT | 6.9  | 0.2899  | 0.0130 |
| C5          | SU3     | CB121A  | CONDUIT | 23.3 | 1.1584  | 0.0130 |
| C51         | SU17    | CB105A1 | CONDUIT | 12.9 | 1.6294  | 0.0130 |
| C52         | CB105A1 | SU18    | CONDUIT | 7.5  | -1.3406 | 0.0130 |
| C53         | SU18    | OF6     | CONDUIT | 9.0  | 2.4506  | 0.0130 |
| C56         | SU22    | CB103A1 | CONDUIT | 20.7 | 0.9192  | 0.0130 |
| C57         | CB103A1 | OF4     | CONDUIT | 7.2  | 1.2449  | 0.0130 |
| C6          | CB121A  | SU4     | CONDUIT | 16.0 | -0.6238 | 0.0130 |
| C7          | SU4     | CB122A  | CONDUIT | 25.4 | 0.6704  | 0.0130 |
| C8          | CB122A  | SU5     | CONDUIT | 19.4 | -0.5673 | 0.0130 |
| C9          | SU6     | SU5     | CONDUIT | 23.6 | 0.8913  | 0.0130 |
| Pipe_11_(1) | 103A    | 103     | CONDUIT | 18.4 | 0.7021  | 0.0130 |
| Pipe_14     | 124     | 121     | CONDUIT | 92.1 | 0.3007  | 0.0130 |
| Pipe_15     | 104     | 103     | CONDUIT | 48.5 | 0.2493  | 0.0130 |
| Pipe_15_(1) | 103     | 102     | CONDUIT | 19.2 | 0.2506  | 0.0130 |
| Pipe_18     | 102     | 101     | CONDUIT | 8.8  | 0.2940  | 0.0130 |
| Pipe_18_(2) | 118     | 101     | CONDUIT | 3.8  | 0.2381  | 0.0130 |
| Pipe_19     | 119     | 118     | CONDUIT | 66.9 | 0.4004  | 0.0130 |
| Pipe_20     | 120     | 119     | CONDUIT | 29.6 | 0.3993  | 0.0130 |
| Pipe_20_(1) | 121     | 120     | CONDUIT | 43.5 | 0.3998  | 0.0130 |
| Pipe_20_(2) | 119A    | 119     | CONDUIT | 25.1 | 0.3983  | 0.0130 |

|                                |         |      |         |      |        |        |
|--------------------------------|---------|------|---------|------|--------|--------|
| Pipe_30                        | 106     | 105  | CONDUIT | 50.2 | 0.1993 | 0.0130 |
| Pipe_31                        | 113     | 106  | CONDUIT | 8.2  | 0.4039 | 0.0130 |
| Pipe_32                        | 114     | 113  | CONDUIT | 84.7 | 0.4001 | 0.0130 |
| Pipe_33                        | 115     | 114  | CONDUIT | 21.4 | 0.4014 | 0.0130 |
| Pipe_35                        | 107     | 106  | CONDUIT | 37.0 | 0.2024 | 0.0130 |
| Pipe_35_(1)                    | 108     | 107  | CONDUIT | 25.5 | 0.3962 | 0.0130 |
| Pipe_36                        | 109     | 107  | CONDUIT | 7.1  | 0.1964 | 0.0130 |
| Pipe_37                        | 110     | 109  | CONDUIT | 93.9 | 0.2002 | 0.0130 |
| Pipe_39                        | 122     | 121  | CONDUIT | 40.4 | 0.3988 | 0.0130 |
| Pipe_40                        | 115     | 111  | CONDUIT | 33.7 | 0.2999 | 0.0130 |
| Pipe_40_(2)                    | 112     | 111  | CONDUIT | 8.1  | 0.3086 | 0.0130 |
| Pipe_40_(3)                    | 115     | 122  | CONDUIT | 51.9 | 0.4011 | 0.0130 |
| Pipe_5_(1)_(3)_(6)_(2)_(1)_(1) | 105A    | 105  | CONDUIT |      | 10.3   | 0.9974 |
| 0.0130                         |         |      |         |      |        |        |
| Pipe_6                         | 100B    | J7   | CONDUIT | 7.1  | 0.5637 | 0.0130 |
| Pipe_7                         | 100     | 100A | CONDUIT | 12.3 | 0.2439 | 0.0130 |
| Pipe_74_(1)                    | 119C    | 119A | CONDUIT | 25.7 | 0.3502 | 0.0130 |
| Pipe_8                         | 116     | 105  | CONDUIT | 21.4 | 0.4014 | 0.0130 |
| Pipe_9                         | 117     | 116  | CONDUIT | 89.8 | 0.3997 | 0.0130 |
| Pipe_94                        | 101     | 100  | CONDUIT | 9.0  | 0.3319 | 0.0130 |
| Pipe_95                        | 111     | 110  | CONDUIT | 7.6  | 0.2893 | 0.0130 |
| OL1                            | CB119C  | 119C | ORIFICE |      |        |        |
| OL10                           | CB122A  | 122  | ORIFICE |      |        |        |
| OL11                           | CB117B  | 117  | ORIFICE |      |        |        |
| OL12                           | CB117A  | 117  | ORIFICE |      |        |        |
| OL13                           | CB105A1 | 105A | ORIFICE |      |        |        |
| OL15                           | CB106A  | 106  | ORIFICE |      |        |        |
| OL16                           | CB107A  | 107  | ORIFICE |      |        |        |
| OL17                           | CB108A  | 108  | ORIFICE |      |        |        |
| OL18                           | CB114A  | 114  | ORIFICE |      |        |        |
| OL19                           | CB110A  | 110  | ORIFICE |      |        |        |
| OL2                            | CB119A  | 119  | ORIFICE |      |        |        |
| OL20                           | CB115B  | 115  | ORIFICE |      |        |        |
| OL21                           | CB110B  | 110  | ORIFICE |      |        |        |
| OL22                           | CB115A  | 115  | ORIFICE |      |        |        |
| OL23                           | CB110C  | 110  | ORIFICE |      |        |        |
| OL3                            | CB123A  | 123  | ORIFICE |      |        |        |
| OL4                            | CB123B  | 123  | ORIFICE |      |        |        |
| OL5                            | CB103A1 | 103A | ORIFICE |      |        |        |

|      |        |        |         |
|------|--------|--------|---------|
| OL7  | CB124A | 124    | ORIFICE |
| OL8  | CB124B | 124    | ORIFICE |
| OL9  | CB121A | 121    | ORIFICE |
| OR10 | CB117A | 117    | ORIFICE |
| OR11 | CB115B | 115    | ORIFICE |
| OR12 | CB115A | 115    | ORIFICE |
| OR13 | CB114A | 114    | ORIFICE |
| OR14 | CB110B | 110    | ORIFICE |
| OR15 | CB110A | 110    | ORIFICE |
| OR2  | CB124B | 124    | ORIFICE |
| OR3  | CB124A | 124    | ORIFICE |
| OR4  | CB123A | 123    | ORIFICE |
| OR5  | CB123B | 123    | ORIFICE |
| OR6  | CB119A | 119    | ORIFICE |
| OR7  | CB121A | 121    | ORIFICE |
| OR8  | CB122A | 122    | ORIFICE |
| OR9  | CB117B | 117    | ORIFICE |
| W1   | CB110C | OF5    | WEIR    |
| W2   | CB110C | CB108A | WEIR    |
| W3   | CB108A | OF7    | WEIR    |
| W4   | CB119C | OF8    | WEIR    |

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Cross Section Summary  
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| Conduit | Shape    | Full Depth | Full Area | Hyd. Rad. | Max. Width | No. of Barrels | Full Flow |
|---------|----------|------------|-----------|-----------|------------|----------------|-----------|
| -----   |          |            |           |           |            |                |           |
| 103     | CIRCULAR | 0.68       | 0.36      | 0.17      | 0.68       | 1              | 377.10    |
| 120-123 | CIRCULAR | 0.38       | 0.11      | 0.09      | 0.38       | 1              | 110.87    |
| C1      | CIRCULAR | 0.30       | 0.07      | 0.07      | 0.30       | 1              | 101.94    |
| C10     | Street1  | 0.26       | 2.15      | 0.11      | 14.62      | 1              | 2885.86   |
| C11     | Street1  | 0.26       | 2.15      | 0.11      | 14.62      | 1              | 3053.31   |
| C12     | Street1  | 0.26       | 2.15      | 0.11      | 14.62      | 1              | 4415.16   |
| C13     | Street1  | 0.26       | 2.15      | 0.11      | 14.62      | 1              | 4407.78   |
| C14     | NSSouth1 | 0.30       | 2.78      | 0.11      | 15.77      | 1              | 3916.94   |
| C15     | NSSouth1 | 0.30       | 2.78      | 0.11      | 15.77      | 1              | 5138.56   |
| C16     | NSSouth1 | 0.30       | 2.78      | 0.11      | 15.77      | 1              | 4170.89   |

|     |          |      |      |      |       |   |          |
|-----|----------|------|------|------|-------|---|----------|
| C17 | NSSouth1 | 0.30 | 2.78 | 0.11 | 15.77 | 1 | 4913.34  |
| C18 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 472.19   |
| C19 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 345.39   |
| C2  | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 94.38    |
| C20 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 924.88   |
| C21 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 505.78   |
| C22 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 284.54   |
| C23 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 491.24   |
| C24 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 672.33   |
| C25 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 553.73   |
| C27 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 554.41   |
| C28 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 483.05   |
| C29 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 585.02   |
| C3  | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 2297.80  |
| C30 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 524.65   |
| C32 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 944.44   |
| C33 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 647.82   |
| C34 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 744.24   |
| C35 | Street7  | 0.13 | 0.60 | 0.07 | 9.20  | 1 | 739.37   |
| C36 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 5085.61  |
| C37 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4044.11  |
| C38 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4638.22  |
| C39 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 5112.45  |
| C4  | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 3964.62  |
| C40 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4760.10  |
| C41 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4394.60  |
| C42 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 5339.16  |
| C43 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4591.23  |
| C45 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 5526.29  |
| C46 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4407.55  |
| C47 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 4327.69  |
| C48 | NSSouth2 | 0.30 | 2.85 | 0.11 | 17.60 | 1 | 6308.35  |
| C49 | CIRCULAR | 0.82 | 0.53 | 0.21 | 0.82  | 1 | 772.86   |
| C5  | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 3998.58  |
| C51 | EExit    | 0.33 | 3.70 | 0.77 | 25.05 | 1 | 30498.19 |
| C52 | EExit    | 0.33 | 3.70 | 0.77 | 25.05 | 1 | 27663.82 |
| C53 | EExit    | 0.33 | 3.70 | 0.77 | 25.05 | 1 | 37402.48 |
| C56 | WExit    | 0.25 | 1.93 | 0.13 | 14.48 | 1 | 3639.27  |
| C57 | WExit    | 0.25 | 1.93 | 0.13 | 14.48 | 1 | 4235.14  |

|                                |          |      |      |      |       |   |         |
|--------------------------------|----------|------|------|------|-------|---|---------|
| C6                             | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 2934.39 |
| C7                             | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 3041.83 |
| C8                             | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 2798.28 |
| C9                             | Street1  | 0.26 | 2.15 | 0.11 | 14.62 | 1 | 3507.53 |
| Pipe_11_(1)                    | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 81.03   |
| Pipe_14                        | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 96.14   |
| Pipe_15                        | CIRCULAR | 0.68 | 0.36 | 0.17 | 0.68  | 1 | 419.74  |
| Pipe_15_(1)                    | CIRCULAR | 0.68 | 0.36 | 0.17 | 0.68  | 1 | 420.81  |
| Pipe_18                        | CIRCULAR | 0.68 | 0.36 | 0.17 | 0.68  | 1 | 455.77  |
| Pipe_18_(2)                    | CIRCULAR | 0.60 | 0.28 | 0.15 | 0.60  | 1 | 299.63  |
| Pipe_19                        | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53  | 1 | 272.13  |
| Pipe_20                        | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53  | 1 | 271.77  |
| Pipe_20_(1)                    | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45  | 1 | 180.28  |
| Pipe_20_(2)                    | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 110.66  |
| Pipe_30                        | CIRCULAR | 0.60 | 0.28 | 0.15 | 0.60  | 1 | 274.15  |
| Pipe_31                        | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 111.44  |
| Pipe_32                        | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 110.91  |
| Pipe_33                        | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 61.27   |
| Pipe_35                        | CIRCULAR | 0.53 | 0.22 | 0.13 | 0.53  | 1 | 193.51  |
| Pipe_35_(1)                    | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 60.87   |
| Pipe_36                        | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45  | 1 | 126.35  |
| Pipe_37                        | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45  | 1 | 127.59  |
| Pipe_39                        | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 61.07   |
| Pipe_40                        | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 96.01   |
| Pipe_40_(2)                    | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 97.41   |
| Pipe_40_(3)                    | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 61.25   |
| Pipe_5_(1)_(3)_(6)_(2)_(1)_(1) | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 96.58   |
| Pipe_6                         | CIRCULAR | 0.82 | 0.53 | 0.21 | 0.82  | 1 | 1077.80 |
| Pipe_7                         | CIRCULAR | 0.82 | 0.53 | 0.21 | 0.82  | 1 | 708.95  |
| Pipe_74_(1)                    | CIRCULAR | 0.30 | 0.07 | 0.07 | 0.30  | 1 | 57.23   |
| Pipe_8                         | CIRCULAR | 0.45 | 0.16 | 0.11 | 0.45  | 1 | 180.65  |
| Pipe_9                         | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 110.85  |
| Pipe_94                        | CIRCULAR | 0.82 | 0.53 | 0.21 | 0.82  | 1 | 827.01  |
| Pipe_95                        | CIRCULAR | 0.38 | 0.11 | 0.09 | 0.38  | 1 | 94.31   |

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Transect Summary  
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Transect EExit

Area:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0006 | 0.0024 | 0.0054 | 0.0096 | 0.0151 |
| 0.0217 | 0.0295 | 0.0385 | 0.0488 | 0.0602 |
| 0.0723 | 0.0844 | 0.0965 | 0.1086 | 0.1206 |
| 0.1327 | 0.1448 | 0.1569 | 0.1690 | 0.1811 |
| 0.1931 | 0.2052 | 0.2175 | 0.2308 | 0.2453 |
| 0.2611 | 0.2780 | 0.2962 | 0.3155 | 0.3361 |
| 0.3578 | 0.3808 | 0.4050 | 0.4303 | 0.4569 |
| 0.4847 | 0.5137 | 0.5438 | 0.5752 | 0.6078 |
| 0.6416 | 0.6766 | 0.7128 | 0.7502 | 0.7889 |
| 0.8287 | 0.8697 | 0.9119 | 0.9554 | 1.0000 |

Hrad:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0042 | 0.0085 | 0.0127 | 0.0170 | 0.0212 |
| 0.0254 | 0.0297 | 0.0339 | 0.0382 | 0.0424 |
| 0.0506 | 0.0590 | 0.0673 | 0.0756 | 0.0838 |
| 0.0920 | 0.1002 | 0.1084 | 0.1165 | 0.1246 |
| 0.1327 | 0.1407 | 0.1487 | 0.1568 | 0.1656 |
| 0.1758 | 0.1877 | 0.2015 | 0.2175 | 0.2356 |
| 0.2560 | 0.2787 | 0.3035 | 0.3306 | 0.3597 |
| 0.3909 | 0.4242 | 0.4593 | 0.4962 | 0.5348 |
| 0.5751 | 0.6170 | 0.6603 | 0.7051 | 0.7511 |
| 0.7985 | 0.8469 | 0.8965 | 0.9472 | 1.0000 |

Width:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0267 | 0.0533 | 0.0800 | 0.1066 | 0.1333 |
| 0.1599 | 0.1866 | 0.2132 | 0.2399 | 0.2665 |
| 0.2675 | 0.2675 | 0.2675 | 0.2675 | 0.2675 |
| 0.2675 | 0.2675 | 0.2675 | 0.2675 | 0.2675 |
| 0.2675 | 0.2675 | 0.2816 | 0.3083 | 0.3349 |
| 0.3616 | 0.3882 | 0.4149 | 0.4415 | 0.4682 |
| 0.4948 | 0.5215 | 0.5481 | 0.5748 | 0.6014 |
| 0.6281 | 0.6547 | 0.6814 | 0.7080 | 0.7347 |
| 0.7613 | 0.7880 | 0.8146 | 0.8413 | 0.8679 |
| 0.8946 | 0.9212 | 0.9479 | 0.9745 | 1.0000 |

Transect NSSouth1

Area:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0004 | 0.0017 | 0.0038 | 0.0068 | 0.0106 |
|--------|--------|--------|--------|--------|

Hrad:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0153 | 0.0209 | 0.0272 | 0.0345 | 0.0426 |
| 0.0515 | 0.0613 | 0.0720 | 0.0836 | 0.0966 |
| 0.1111 | 0.1271 | 0.1441 | 0.1617 | 0.1799 |
| 0.1988 | 0.2183 | 0.2385 | 0.2593 | 0.2807 |
| 0.3028 | 0.3255 | 0.3488 | 0.3728 | 0.3974 |
| 0.4227 | 0.4486 | 0.4752 | 0.5023 | 0.5302 |
| 0.5586 | 0.5877 | 0.6174 | 0.6476 | 0.6780 |
| 0.7088 | 0.7398 | 0.7712 | 0.8030 | 0.8350 |
| 0.8674 | 0.9000 | 0.9330 | 0.9664 | 1.0000 |

Width:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0251 | 0.0501 | 0.0752 | 0.1003 | 0.1254 |
| 0.1504 | 0.1755 | 0.2006 | 0.2256 | 0.2507 |
| 0.2758 | 0.3009 | 0.3259 | 0.3508 | 0.3726 |
| 0.3917 | 0.4119 | 0.4501 | 0.4858 | 0.5191 |
| 0.5503 | 0.5796 | 0.6069 | 0.6326 | 0.6567 |
| 0.6794 | 0.7006 | 0.7207 | 0.7395 | 0.7572 |
| 0.7740 | 0.7897 | 0.8046 | 0.8187 | 0.8319 |
| 0.8445 | 0.8563 | 0.8676 | 0.8790 | 0.8903 |
| 0.9016 | 0.9129 | 0.9241 | 0.9352 | 0.9463 |
| 0.9572 | 0.9681 | 0.9788 | 0.9895 | 1.0000 |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0252 | 0.0504 | 0.0756 | 0.1008 | 0.1260 |
| 0.1512 | 0.1764 | 0.2016 | 0.2268 | 0.2520 |
| 0.2772 | 0.3023 | 0.3275 | 0.3636 | 0.4077 |
| 0.4518 | 0.4925 | 0.5114 | 0.5302 | 0.5491 |
| 0.5680 | 0.5869 | 0.6058 | 0.6247 | 0.6436 |
| 0.6625 | 0.6814 | 0.7003 | 0.7192 | 0.7381 |
| 0.7570 | 0.7759 | 0.7948 | 0.8137 | 0.8326 |
| 0.8515 | 0.8704 | 0.8866 | 0.8961 | 0.9055 |
| 0.9150 | 0.9244 | 0.9339 | 0.9433 | 0.9528 |
| 0.9622 | 0.9717 | 0.9811 | 0.9906 | 1.0000 |

Transect NSSouth2

Area:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0004 | 0.0017 | 0.0037 | 0.0067 | 0.0104 |
| 0.0150 | 0.0204 | 0.0266 | 0.0337 | 0.0416 |
| 0.0503 | 0.0599 | 0.0703 | 0.0816 | 0.0943 |
| 0.1085 | 0.1241 | 0.1407 | 0.1579 | 0.1757 |
| 0.1941 | 0.2132 | 0.2329 | 0.2532 | 0.2741 |

|                  |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|
|                  | 0.2957 | 0.3178 | 0.3406 | 0.3641 | 0.3881 |
|                  | 0.4128 | 0.4381 | 0.4640 | 0.4905 | 0.5177 |
|                  | 0.5455 | 0.5739 | 0.6029 | 0.6326 | 0.6629 |
|                  | 0.6938 | 0.7253 | 0.7575 | 0.7902 | 0.8236 |
|                  | 0.8577 | 0.8923 | 0.9276 | 0.9635 | 1.0000 |
| Hrad:            |        |        |        |        |        |
|                  | 0.0260 | 0.0520 | 0.0780 | 0.1041 | 0.1301 |
|                  | 0.1561 | 0.1821 | 0.2081 | 0.2341 | 0.2601 |
|                  | 0.2862 | 0.3122 | 0.3382 | 0.3639 | 0.3866 |
|                  | 0.4065 | 0.4274 | 0.4670 | 0.5041 | 0.5387 |
|                  | 0.5710 | 0.6013 | 0.6298 | 0.6564 | 0.6814 |
|                  | 0.7049 | 0.7270 | 0.7478 | 0.7673 | 0.7857 |
|                  | 0.8031 | 0.8194 | 0.8349 | 0.8495 | 0.8632 |
|                  | 0.8762 | 0.8885 | 0.9002 | 0.9112 | 0.9216 |
|                  | 0.9315 | 0.9408 | 0.9496 | 0.9580 | 0.9660 |
|                  | 0.9735 | 0.9807 | 0.9875 | 0.9939 | 1.0000 |
| Width:           |        |        |        |        |        |
|                  | 0.0226 | 0.0452 | 0.0677 | 0.0903 | 0.1129 |
|                  | 0.1355 | 0.1580 | 0.1806 | 0.2032 | 0.2258 |
|                  | 0.2483 | 0.2709 | 0.2935 | 0.3258 | 0.3653 |
|                  | 0.4048 | 0.4412 | 0.4582 | 0.4751 | 0.4920 |
|                  | 0.5090 | 0.5259 | 0.5428 | 0.5598 | 0.5767 |
|                  | 0.5936 | 0.6106 | 0.6275 | 0.6444 | 0.6614 |
|                  | 0.6783 | 0.6952 | 0.7122 | 0.7291 | 0.7460 |
|                  | 0.7630 | 0.7799 | 0.7968 | 0.8138 | 0.8307 |
|                  | 0.8476 | 0.8645 | 0.8815 | 0.8984 | 0.9153 |
|                  | 0.9323 | 0.9492 | 0.9661 | 0.9831 | 1.0000 |
| Transect Street1 |        |        |        |        |        |
| Area:            |        |        |        |        |        |
|                  | 0.0004 | 0.0016 | 0.0037 | 0.0065 | 0.0102 |
|                  | 0.0147 | 0.0201 | 0.0262 | 0.0332 | 0.0409 |
|                  | 0.0495 | 0.0589 | 0.0692 | 0.0802 | 0.0921 |
|                  | 0.1048 | 0.1189 | 0.1344 | 0.1513 | 0.1696 |
|                  | 0.1887 | 0.2083 | 0.2286 | 0.2495 | 0.2710 |
|                  | 0.2931 | 0.3158 | 0.3391 | 0.3631 | 0.3877 |
|                  | 0.4128 | 0.4386 | 0.4650 | 0.4921 | 0.5197 |
|                  | 0.5479 | 0.5768 | 0.6063 | 0.6364 | 0.6671 |
|                  | 0.6984 | 0.7303 | 0.7629 | 0.7958 | 0.8291 |

|                  |        |        |        |        |        |
|------------------|--------|--------|--------|--------|--------|
|                  | 0.8627 | 0.8965 | 0.9307 | 0.9652 | 1.0000 |
| Hrad:            |        |        |        |        |        |
|                  | 0.0233 | 0.0466 | 0.0699 | 0.0932 | 0.1164 |
|                  | 0.1397 | 0.1630 | 0.1863 | 0.2096 | 0.2329 |
|                  | 0.2562 | 0.2795 | 0.3028 | 0.3260 | 0.3493 |
|                  | 0.3726 | 0.3938 | 0.4125 | 0.4293 | 0.4540 |
|                  | 0.4890 | 0.5221 | 0.5533 | 0.5828 | 0.6106 |
|                  | 0.6369 | 0.6618 | 0.6854 | 0.7077 | 0.7288 |
|                  | 0.7488 | 0.7678 | 0.7859 | 0.8030 | 0.8192 |
|                  | 0.8347 | 0.8494 | 0.8634 | 0.8766 | 0.8893 |
|                  | 0.9013 | 0.9128 | 0.9238 | 0.9348 | 0.9457 |
|                  | 0.9567 | 0.9676 | 0.9785 | 0.9893 | 1.0000 |
| Width:           |        |        |        |        |        |
|                  | 0.0234 | 0.0468 | 0.0703 | 0.0937 | 0.1171 |
|                  | 0.1405 | 0.1639 | 0.1874 | 0.2108 | 0.2342 |
|                  | 0.2576 | 0.2810 | 0.3045 | 0.3279 | 0.3513 |
|                  | 0.3822 | 0.4231 | 0.4641 | 0.5051 | 0.5360 |
|                  | 0.5535 | 0.5711 | 0.5887 | 0.6062 | 0.6238 |
|                  | 0.6414 | 0.6589 | 0.6765 | 0.6941 | 0.7116 |
|                  | 0.7292 | 0.7468 | 0.7643 | 0.7819 | 0.7995 |
|                  | 0.8170 | 0.8346 | 0.8521 | 0.8697 | 0.8873 |
|                  | 0.9048 | 0.9224 | 0.9385 | 0.9473 | 0.9561 |
|                  | 0.9649 | 0.9737 | 0.9824 | 0.9912 | 1.0000 |
| Transect Street7 |        |        |        |        |        |
| Area:            |        |        |        |        |        |
|                  | 0.0004 | 0.0015 | 0.0034 | 0.0060 | 0.0094 |
|                  | 0.0136 | 0.0185 | 0.0242 | 0.0306 | 0.0378 |
|                  | 0.0457 | 0.0544 | 0.0638 | 0.0740 | 0.0849 |
|                  | 0.0967 | 0.1091 | 0.1223 | 0.1363 | 0.1510 |
|                  | 0.1665 | 0.1827 | 0.1997 | 0.2175 | 0.2360 |
|                  | 0.2552 | 0.2752 | 0.2960 | 0.3175 | 0.3398 |
|                  | 0.3628 | 0.3870 | 0.4126 | 0.4394 | 0.4676 |
|                  | 0.4971 | 0.5279 | 0.5600 | 0.5934 | 0.6275 |
|                  | 0.6622 | 0.6975 | 0.7333 | 0.7697 | 0.8067 |
|                  | 0.8442 | 0.8823 | 0.9210 | 0.9602 | 1.0000 |
| Hrad:            |        |        |        |        |        |
|                  | 0.0190 | 0.0381 | 0.0571 | 0.0762 | 0.0952 |
|                  | 0.1143 | 0.1333 | 0.1524 | 0.1714 | 0.1905 |

|                   |        |        |        |        |        |
|-------------------|--------|--------|--------|--------|--------|
| Width:            | 0.2095 | 0.2286 | 0.2476 | 0.2667 | 0.2857 |
|                   | 0.3048 | 0.3238 | 0.3429 | 0.3619 | 0.3809 |
|                   | 0.4000 | 0.4190 | 0.4381 | 0.4571 | 0.4762 |
|                   | 0.4952 | 0.5143 | 0.5333 | 0.5524 | 0.5714 |
|                   | 0.5906 | 0.6092 | 0.6266 | 0.6429 | 0.6583 |
|                   | 0.6728 | 0.6866 | 0.6997 | 0.7183 | 0.7479 |
|                   | 0.7765 | 0.8044 | 0.8314 | 0.8576 | 0.8831 |
|                   | 0.9078 | 0.9319 | 0.9552 | 0.9779 | 1.0000 |
|                   | 0.0188 | 0.0377 | 0.0565 | 0.0754 | 0.0942 |
|                   | 0.1130 | 0.1319 | 0.1507 | 0.1696 | 0.1884 |
|                   | 0.2072 | 0.2261 | 0.2449 | 0.2638 | 0.2826 |
|                   | 0.3014 | 0.3203 | 0.3391 | 0.3580 | 0.3768 |
|                   | 0.3957 | 0.4145 | 0.4333 | 0.4522 | 0.4710 |
|                   | 0.4899 | 0.5087 | 0.5275 | 0.5464 | 0.5652 |
|                   | 0.5873 | 0.6203 | 0.6533 | 0.6862 | 0.7192 |
|                   | 0.7522 | 0.7851 | 0.8181 | 0.8446 | 0.8587 |
|                   | 0.8728 | 0.8870 | 0.9011 | 0.9152 | 0.9293 |
|                   | 0.9435 | 0.9576 | 0.9717 | 0.9859 | 1.0000 |
| Transect Street7N |        |        |        |        |        |
| Area:             | 0.0004 | 0.0018 | 0.0039 | 0.0070 | 0.0110 |
|                   | 0.0158 | 0.0215 | 0.0281 | 0.0355 | 0.0439 |
|                   | 0.0531 | 0.0632 | 0.0741 | 0.0860 | 0.0987 |
|                   | 0.1123 | 0.1268 | 0.1422 | 0.1584 | 0.1755 |
|                   | 0.1935 | 0.2123 | 0.2321 | 0.2527 | 0.2742 |
|                   | 0.2962 | 0.3181 | 0.3401 | 0.3621 | 0.3841 |
|                   | 0.4065 | 0.4299 | 0.4541 | 0.4792 | 0.5051 |
|                   | 0.5320 | 0.5597 | 0.5883 | 0.6178 | 0.6482 |
|                   | 0.6794 | 0.7115 | 0.7445 | 0.7784 | 0.8131 |
|                   | 0.8487 | 0.8852 | 0.9226 | 0.9609 | 1.0000 |
| Hrad:             | 0.0091 | 0.0181 | 0.0272 | 0.0363 | 0.0453 |
|                   | 0.0544 | 0.0635 | 0.0725 | 0.0816 | 0.0907 |
|                   | 0.0997 | 0.1088 | 0.1179 | 0.1269 | 0.1360 |
|                   | 0.1450 | 0.1541 | 0.1632 | 0.1722 | 0.1813 |
|                   | 0.1904 | 0.1994 | 0.2085 | 0.2176 | 0.2266 |
|                   | 0.2441 | 0.2618 | 0.2794 | 0.2970 | 0.3145 |

|                   |        |        |        |        |        |
|-------------------|--------|--------|--------|--------|--------|
| Width:            | 0.3320 | 0.3498 | 0.3685 | 0.3886 | 0.4103 |
|                   | 0.4339 | 0.4595 | 0.4872 | 0.5172 | 0.5495 |
|                   | 0.5841 | 0.6210 | 0.6603 | 0.7019 | 0.7459 |
|                   | 0.7921 | 0.8407 | 0.8916 | 0.9447 | 1.0000 |
|                   | 0.0222 | 0.0443 | 0.0665 | 0.0887 | 0.1109 |
|                   | 0.1330 | 0.1552 | 0.1774 | 0.1996 | 0.2217 |
|                   | 0.2439 | 0.2661 | 0.2883 | 0.3104 | 0.3326 |
|                   | 0.3548 | 0.3770 | 0.3991 | 0.4213 | 0.4435 |
|                   | 0.4657 | 0.4878 | 0.5100 | 0.5322 | 0.5544 |
|                   | 0.5552 | 0.5552 | 0.5552 | 0.5552 | 0.5565 |
|                   | 0.5787 | 0.6009 | 0.6230 | 0.6452 | 0.6674 |
|                   | 0.6896 | 0.7117 | 0.7339 | 0.7561 | 0.7783 |
|                   | 0.8004 | 0.8226 | 0.8448 | 0.8670 | 0.8891 |
|                   | 0.9113 | 0.9335 | 0.9557 | 0.9778 | 1.0000 |
| Transect Street7S |        |        |        |        |        |
| Area:             | 0.0004 | 0.0017 | 0.0039 | 0.0069 | 0.0108 |
|                   | 0.0156 | 0.0213 | 0.0278 | 0.0351 | 0.0434 |
|                   | 0.0525 | 0.0625 | 0.0733 | 0.0850 | 0.0976 |
|                   | 0.1110 | 0.1253 | 0.1405 | 0.1566 | 0.1735 |
|                   | 0.1913 | 0.2099 | 0.2294 | 0.2498 | 0.2711 |
|                   | 0.2932 | 0.3162 | 0.3400 | 0.3648 | 0.3904 |
|                   | 0.4168 | 0.4436 | 0.4704 | 0.4973 | 0.5241 |
|                   | 0.5509 | 0.5777 | 0.6050 | 0.6331 | 0.6622 |
|                   | 0.6920 | 0.7228 | 0.7544 | 0.7869 | 0.8202 |
|                   | 0.8545 | 0.8895 | 0.9255 | 0.9623 | 1.0000 |
| Hrad:             | 0.0128 | 0.0257 | 0.0385 | 0.0513 | 0.0642 |
|                   | 0.0770 | 0.0898 | 0.1027 | 0.1155 | 0.1283 |
|                   | 0.1412 | 0.1540 | 0.1668 | 0.1797 | 0.1925 |
|                   | 0.2053 | 0.2182 | 0.2310 | 0.2438 | 0.2567 |
|                   | 0.2695 | 0.2823 | 0.2952 | 0.3080 | 0.3208 |
|                   | 0.3337 | 0.3465 | 0.3593 | 0.3722 | 0.3850 |
|                   | 0.3989 | 0.4243 | 0.4497 | 0.4750 | 0.5003 |
|                   | 0.5256 | 0.5508 | 0.5761 | 0.6015 | 0.6277 |
|                   | 0.6552 | 0.6844 | 0.7156 | 0.7488 | 0.7844 |
|                   | 0.8223 | 0.8628 | 0.9059 | 0.9516 | 1.0000 |

|        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|
| Width: | 0.0228 | 0.0455 | 0.0683 | 0.0910 | 0.1138 |
|        | 0.1365 | 0.1593 | 0.1820 | 0.2048 | 0.2275 |
|        | 0.2503 | 0.2731 | 0.2958 | 0.3186 | 0.3413 |
|        | 0.3641 | 0.3868 | 0.4096 | 0.4323 | 0.4551 |
|        | 0.4779 | 0.5006 | 0.5234 | 0.5461 | 0.5689 |
|        | 0.5916 | 0.6144 | 0.6371 | 0.6599 | 0.6826 |
|        | 0.7035 | 0.7035 | 0.7035 | 0.7035 | 0.7035 |
|        | 0.7035 | 0.7042 | 0.7269 | 0.7497 | 0.7725 |
|        | 0.7952 | 0.8180 | 0.8407 | 0.8635 | 0.8862 |
|        | 0.9090 | 0.9317 | 0.9545 | 0.9772 | 1.0000 |

Transect Street7W  
Area:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0004 | 0.0018 | 0.0040 | 0.0070 | 0.0110 |
| 0.0158 | 0.0215 | 0.0281 | 0.0356 | 0.0439 |
| 0.0532 | 0.0633 | 0.0743 | 0.0861 | 0.0989 |
| 0.1125 | 0.1270 | 0.1424 | 0.1586 | 0.1758 |
| 0.1938 | 0.2127 | 0.2324 | 0.2531 | 0.2746 |
| 0.2970 | 0.3203 | 0.3445 | 0.3693 | 0.3942 |
| 0.4191 | 0.4439 | 0.4688 | 0.4937 | 0.5192 |
| 0.5455 | 0.5728 | 0.6009 | 0.6299 | 0.6598 |
| 0.6906 | 0.7222 | 0.7548 | 0.7882 | 0.8223 |
| 0.8570 | 0.8921 | 0.9276 | 0.9636 | 1.0000 |

Hrad:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0109 | 0.0217 | 0.0326 | 0.0435 | 0.0543 |
| 0.0652 | 0.0761 | 0.0869 | 0.0978 | 0.1087 |
| 0.1195 | 0.1304 | 0.1413 | 0.1522 | 0.1630 |
| 0.1739 | 0.1848 | 0.1956 | 0.2065 | 0.2174 |
| 0.2282 | 0.2391 | 0.2500 | 0.2608 | 0.2717 |
| 0.2826 | 0.2934 | 0.3043 | 0.3227 | 0.3442 |
| 0.3656 | 0.3871 | 0.4085 | 0.4299 | 0.4512 |
| 0.4729 | 0.4956 | 0.5196 | 0.5454 | 0.5730 |
| 0.6028 | 0.6347 | 0.6690 | 0.7057 | 0.7475 |
| 0.7933 | 0.8416 | 0.8922 | 0.9451 | 1.0000 |

Width:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0240 | 0.0480 | 0.0720 | 0.0960 | 0.1200 |
| 0.1440 | 0.1679 | 0.1919 | 0.2159 | 0.2399 |
| 0.2639 | 0.2879 | 0.3119 | 0.3359 | 0.3599 |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.3839 | 0.4079 | 0.4319 | 0.4558 | 0.4798 |
| 0.5038 | 0.5278 | 0.5518 | 0.5758 | 0.5998 |
| 0.6238 | 0.6478 | 0.6718 | 0.6788 | 0.6788 |
| 0.6788 | 0.6788 | 0.6788 | 0.6840 | 0.7080 |
| 0.7320 | 0.7560 | 0.7800 | 0.8040 | 0.8280 |
| 0.8520 | 0.8759 | 0.8999 | 0.9239 | 0.9400 |
| 0.9520 | 0.9640 | 0.9760 | 0.9880 | 1.0000 |

Transect WExit  
Area:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0007 | 0.0026 | 0.0059 | 0.0106 | 0.0165 |
| 0.0238 | 0.0323 | 0.0422 | 0.0534 | 0.0660 |
| 0.0798 | 0.0950 | 0.1115 | 0.1290 | 0.1465 |
| 0.1640 | 0.1816 | 0.1991 | 0.2166 | 0.2342 |
| 0.2517 | 0.2692 | 0.2867 | 0.3043 | 0.3218 |
| 0.3393 | 0.3569 | 0.3744 | 0.3919 | 0.4095 |
| 0.4280 | 0.4479 | 0.4690 | 0.4915 | 0.5153 |
| 0.5405 | 0.5669 | 0.5947 | 0.6238 | 0.6542 |
| 0.6858 | 0.7181 | 0.7510 | 0.7846 | 0.8188 |
| 0.8537 | 0.8893 | 0.9256 | 0.9624 | 1.0000 |

Hrad:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.1381 | 0.2762 | 0.4143 | 0.5524 | 0.6905 |
| 0.8286 | 0.9667 | 1.1048 | 1.2429 | 1.3810 |
| 1.5191 | 1.6572 | 1.7953 | 0.2796 | 0.3171 |
| 0.3545 | 0.3918 | 0.4290 | 0.4661 | 0.5031 |
| 0.5400 | 0.5767 | 0.6134 | 0.6499 | 0.6864 |
| 0.7227 | 0.7590 | 0.7951 | 0.8311 | 0.8514 |
| 0.8311 | 0.8158 | 0.8045 | 0.7966 | 0.7916 |
| 0.7890 | 0.7884 | 0.7897 | 0.7925 | 0.7967 |
| 0.8127 | 0.8338 | 0.8548 | 0.8757 | 0.8966 |
| 0.9174 | 0.9381 | 0.9588 | 0.9794 | 1.0000 |

Width:

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.0348 | 0.0697 | 0.1045 | 0.1393 | 0.1742 |
| 0.2090 | 0.2438 | 0.2787 | 0.3135 | 0.3483 |
| 0.3832 | 0.4180 | 0.4528 | 0.4627 | 0.4627 |
| 0.4627 | 0.4627 | 0.4627 | 0.4627 | 0.4627 |
| 0.4627 | 0.4627 | 0.4627 | 0.4627 | 0.4627 |
| 0.4627 | 0.4627 | 0.4627 | 0.4627 | 0.4718 |
| 0.5067 | 0.5415 | 0.5763 | 0.6112 | 0.6460 |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.6808 | 0.7157 | 0.7505 | 0.7853 | 0.8202 |
| 0.8432 | 0.8607 | 0.8781 | 0.8955 | 0.9129 |
| 0.9303 | 0.9477 | 0.9652 | 0.9826 | 1.0000 |

\*\*\*\*\*

#### Analysis Options

\*\*\*\*\*

Flow Units ..... LPS

#### Process Models:

Rainfall/Runoff ..... YES

RDII ..... NO

Snowmelt ..... NO

Groundwater ..... NO

Flow Routing ..... YES

Ponding Allowed ..... NO

Water Quality ..... NO

Infiltration Method ..... HORTON

Flow Routing Method ..... DYNWAVE

Surcharge Method ..... EXTRAN

Starting Date ..... 02/23/2026 00:00:00

Ending Date ..... 02/24/2026 00:00:00

Antecedent Dry Days ..... 0.0

Report Time Step ..... 00:01:00

Wet Time Step ..... 00:05:00

Dry Time Step ..... 00:05:00

Routing Time Step ..... 5.00 sec

Variable Time Step ..... YES

Maximum Trials ..... 8

Number of Threads ..... 16

Head Tolerance ..... 0.001524 m

| *****                      | Volume    | Depth  |
|----------------------------|-----------|--------|
| Runoff Quantity Continuity | hectare-m | mm     |
| *****                      | -----     | -----  |
| Total Precipitation .....  | 0.265     | 71.667 |
| Evaporation Loss .....     | 0.000     | 0.000  |
| Infiltration Loss .....    | 0.046     | 12.522 |

|                            |        |        |
|----------------------------|--------|--------|
| Surface Runoff .....       | 0.217  | 58.616 |
| Final Storage .....        | 0.004  | 1.147  |
| Continuity Error (%) ..... | -0.863 |        |

| *****                      | Volume    | Volume   |
|----------------------------|-----------|----------|
| Flow Routing Continuity    | hectare-m | 10^6 ltr |
| *****                      | -----     | -----    |
| Dry Weather Inflow .....   | 0.000     | 0.000    |
| Wet Weather Inflow .....   | 0.217     | 2.166    |
| Groundwater Inflow .....   | 0.000     | 0.000    |
| RDII Inflow .....          | 0.000     | 0.000    |
| External Inflow .....      | 0.000     | 0.000    |
| External Outflow .....     | 0.210     | 2.102    |
| Flooding Loss .....        | 0.000     | 0.000    |
| Evaporation Loss .....     | 0.000     | 0.000    |
| Exfiltration Loss .....    | 0.000     | 0.000    |
| Initial Stored Volume .... | 0.000     | 0.000    |
| Final Stored Volume .....  | 0.006     | 0.064    |
| Continuity Error (%) ..... | 0.023     |          |

\*\*\*\*\*

#### Highest Continuity Errors

\*\*\*\*\*

Node SU8 (63.89%)

Node SU7 (4.85%)

Node SU13 (-4.50%)

Node SU5 (2.62%)

\*\*\*\*\*

#### Time-Step Critical Elements

\*\*\*\*\*

Link C1 (21.46%)

Link Pipe\_18\_(2) (16.26%)

Link C2 (1.08%)



\*\*\*\*\*  
Highest Flow Instability Indexes  
\*\*\*\*\*  
Link OL1 (3)

\*\*\*\*\*  
Most Frequent Nonconverging Nodes  
\*\*\*\*\*  
Convergence obtained at all time steps.

\*\*\*\*\*  
Routing Time Step Summary  
\*\*\*\*\*  
Minimum Time Step : 0.50 sec  
Average Time Step : 3.59 sec  
Maximum Time Step : 5.00 sec  
% of Time in Steady State : 0.00  
Average Iterations per Step : 2.01  
% of Steps Not Converging : 0.02  
Time Step Frequencies :  
5.000 - 3.155 sec : 63.52 %  
3.155 - 1.991 sec : 5.57 %  
1.991 - 1.256 sec : 10.01 %  
1.256 - 0.792 sec : 4.51 %  
0.792 - 0.500 sec : 16.40 %

\*\*\*\*\*  
Subcatchment Runoff Summary  
\*\*\*\*\*

-----  
-----  
Total Peak Runoff Total Total Total Total Imperv Perv Total  
Precip Runon Evap Infil Runoff Runoff Runoff

Runoff Runoff Coeff  
Subcatchment  
ltr LPS mm mm mm mm mm mm mm 10^6

-----  
C103AA 71.67 0.00 0.00 3.17 65.66 2.09 67.75  
0.09 66.29 0.945  
C105AA 71.67 0.00 0.00 6.51 60.63 3.87 64.50  
0.09 66.96 0.900  
C106A 71.67 0.00 0.00 9.49 55.25 6.36 61.61  
0.01 8.34 0.860  
C107A 71.67 0.00 0.00 6.35 60.47 4.17 64.64  
0.04 27.48 0.902  
C108A 71.67 0.00 0.00 23.65 35.27 12.44 47.71  
0.05 33.87 0.666  
C110A 71.67 0.00 0.00 9.75 55.53 5.82 61.35  
0.12 85.35 0.856  
C110B 71.67 0.00 0.00 9.60 55.41 6.07 61.48  
0.09 68.83 0.858  
C110C 71.67 0.00 0.00 29.46 27.17 14.83 42.00  
0.07 43.77 0.586  
C114A 71.67 0.00 0.00 9.80 55.55 5.74 61.29  
0.15 107.16 0.855  
C115A 71.67 0.00 0.00 8.97 56.46 5.64 62.09  
0.08 62.07 0.866  
C115B 71.67 0.00 0.00 9.70 55.50 5.90 61.39  
0.11 78.32 0.857  
C117A 71.67 0.00 0.00 9.62 55.44 6.03 61.46  
0.15 112.03 0.858  
C117B 71.67 0.00 0.00 9.71 55.51 5.87 61.38  
0.12 86.14 0.856  
C119A 71.67 0.00 0.00 4.46 63.63 2.88 66.51  
0.10 71.26 0.928  
C119CA 71.67 0.00 0.00 24.91 35.35 11.06 46.42  
0.13 80.27 0.648  
C121A 71.67 0.00 0.00 9.10 56.55 5.43 61.98  
0.10 73.25 0.865  
C122A 71.67 0.00 0.00 9.00 56.48 5.59 62.07

|        |       |       |       |      |      |       |       |       |       |
|--------|-------|-------|-------|------|------|-------|-------|-------|-------|
| 0.08   | 62.27 | 0.866 |       |      |      |       |       |       |       |
| C123A  |       |       | 71.67 | 0.00 | 0.00 | 4.46  | 63.63 | 2.87  | 66.50 |
| 0.10   | 71.81 | 0.928 |       |      |      |       |       |       |       |
| C123B  |       |       | 71.67 | 0.00 | 0.00 | 9.60  | 55.41 | 6.07  | 61.48 |
| 0.10   | 73.31 | 0.858 |       |      |      |       |       |       |       |
| C124A  |       |       | 71.67 | 0.00 | 0.00 | 9.62  | 55.44 | 6.02  | 61.46 |
| 0.08   | 63.22 | 0.858 |       |      |      |       |       |       |       |
| C124B  |       |       | 71.67 | 0.00 | 0.00 | 9.61  | 55.43 | 6.04  | 61.47 |
| 0.12   | 88.07 | 0.858 |       |      |      |       |       |       |       |
| TANK-1 |       |       | 71.67 | 0.00 | 0.00 | 27.41 | 30.22 | 13.79 | 44.00 |
| 0.05   | 32.61 | 0.614 |       |      |      |       |       |       |       |
| UNC-1  |       |       | 71.67 | 0.00 | 0.00 | 19.50 | 40.21 | 11.63 | 51.84 |
| 0.07   | 54.49 | 0.723 |       |      |      |       |       |       |       |
| UNC-2  |       |       | 71.67 | 0.00 | 0.00 | 19.50 | 40.21 | 11.63 | 51.84 |
| 0.03   | 24.65 | 0.723 |       |      |      |       |       |       |       |
| UNC-3  |       |       | 71.67 | 0.00 | 0.00 | 26.31 | 30.13 | 15.08 | 45.21 |
| 0.03   | 22.70 | 0.631 |       |      |      |       |       |       |       |

\*\*\*\*\*  
Node Depth Summary  
\*\*\*\*\*

| Node | Type    | Average<br>Depth<br>Meters | Maximum<br>Depth<br>Meters | Maximum<br>HGL<br>Meters | Time of Max<br>Occurrence<br>days hr:min | Reported<br>Max Depth<br>Meters |
|------|---------|----------------------------|----------------------------|--------------------------|------------------------------------------|---------------------------------|
| J7   | OUTFALL | 1.46                       | 1.46                       | 85.00                    | 0 00:00                                  | 1.46                            |
| OF1  | OUTFALL | 0.00                       | 0.00                       | 0.00                     | 0 00:00                                  | 0.00                            |
| OF2  | OUTFALL | 0.00                       | 0.00                       | 0.00                     | 0 00:00                                  | 0.00                            |
| OF3  | OUTFALL | 0.00                       | 0.00                       | 0.00                     | 0 00:00                                  | 0.00                            |
| OF4  | OUTFALL | 0.00                       | 0.03                       | 89.35                    | 0 01:10                                  | 0.03                            |
| OF5  | OUTFALL | 0.00                       | 0.00                       | 89.38                    | 0 00:00                                  | 0.00                            |
| OF6  | OUTFALL | 0.00                       | 0.03                       | 89.23                    | 0 01:10                                  | 0.03                            |
| OF7  | OUTFALL | 0.00                       | 0.00                       | 88.49                    | 0 00:00                                  | 0.00                            |
| OF8  | OUTFALL | 0.00                       | 0.00                       | 82.05                    | 0 00:00                                  | 0.00                            |
| 100  | STORAGE | 0.46                       | 1.01                       | 86.37                    | 0 01:14                                  | 1.01                            |
| 100A | STORAGE | 0.13                       | 0.62                       | 86.24                    | 0 01:14                                  | 0.62                            |

|         |         |      |      |       |         |      |
|---------|---------|------|------|-------|---------|------|
| 100B    | STORAGE | 0.10 | 0.49 | 86.04 | 0 01:14 | 0.49 |
| 101     | STORAGE | 0.43 | 0.98 | 86.42 | 0 01:14 | 0.98 |
| 102     | STORAGE | 0.43 | 0.97 | 86.51 | 0 01:15 | 0.97 |
| 103     | STORAGE | 0.42 | 0.94 | 86.56 | 0 01:15 | 0.94 |
| 103A    | STORAGE | 0.32 | 0.44 | 87.06 | 0 01:10 | 0.44 |
| 104     | STORAGE | 0.34 | 0.83 | 86.64 | 0 01:15 | 0.83 |
| 105     | STORAGE | 0.34 | 0.82 | 86.70 | 0 01:15 | 0.82 |
| 105A    | STORAGE | 0.32 | 0.43 | 87.32 | 0 01:10 | 0.43 |
| 106     | STORAGE | 0.39 | 0.78 | 86.78 | 0 01:14 | 0.78 |
| 107     | STORAGE | 0.37 | 0.67 | 86.82 | 0 01:14 | 0.67 |
| 108     | STORAGE | 0.32 | 0.39 | 86.86 | 0 01:05 | 0.39 |
| 109     | STORAGE | 0.37 | 0.66 | 86.90 | 0 01:15 | 0.66 |
| 110     | STORAGE | 0.36 | 0.62 | 87.04 | 0 01:14 | 0.62 |
| 111     | STORAGE | 0.29 | 0.36 | 87.13 | 0 01:15 | 0.36 |
| 112     | STORAGE | 0.00 | 0.00 | 86.86 | 0 00:00 | 0.00 |
| 113     | STORAGE | 0.38 | 0.67 | 86.92 | 0 01:15 | 0.67 |
| 114     | STORAGE | 0.36 | 0.59 | 87.19 | 0 01:15 | 0.59 |
| 115     | STORAGE | 0.35 | 0.54 | 87.30 | 0 01:14 | 0.54 |
| 116     | STORAGE | 0.21 | 0.51 | 86.78 | 0 01:15 | 0.51 |
| 117     | STORAGE | 0.28 | 0.54 | 87.19 | 0 01:12 | 0.54 |
| 118     | STORAGE | 0.41 | 0.90 | 86.50 | 0 01:14 | 0.90 |
| 119     | STORAGE | 0.39 | 0.80 | 86.77 | 0 01:14 | 0.80 |
| 119A    | STORAGE | 0.34 | 0.58 | 86.80 | 0 01:13 | 0.58 |
| 119C    | STORAGE | 0.05 | 0.25 | 86.94 | 0 01:10 | 0.25 |
| 120     | STORAGE | 0.39 | 0.76 | 86.91 | 0 01:15 | 0.76 |
| 121     | STORAGE | 0.36 | 0.61 | 87.01 | 0 01:15 | 0.61 |
| 122     | STORAGE | 0.33 | 0.47 | 87.18 | 0 01:14 | 0.47 |
| 123     | STORAGE | 0.34 | 0.53 | 87.14 | 0 01:04 | 0.52 |
| 124     | STORAGE | 0.35 | 0.55 | 87.31 | 0 01:21 | 0.55 |
| CB103A1 | STORAGE | 0.17 | 1.43 | 89.44 | 0 01:10 | 1.43 |
| CB105A1 | STORAGE | 0.23 | 1.52 | 89.46 | 0 01:10 | 1.52 |
| CB106A  | STORAGE | 0.04 | 0.66 | 88.76 | 0 01:11 | 0.66 |
| CB107A  | STORAGE | 0.13 | 1.42 | 89.79 | 0 01:10 | 1.42 |
| CB108A  | STORAGE | 0.13 | 0.90 | 88.54 | 0 01:10 | 0.90 |
| CB110A  | STORAGE | 0.29 | 1.57 | 89.82 | 0 01:15 | 1.57 |
| CB110B  | STORAGE | 0.16 | 1.51 | 89.67 | 0 01:12 | 1.51 |
| CB110C  | STORAGE | 0.20 | 1.66 | 89.44 | 0 01:10 | 1.66 |
| CB114A  | STORAGE | 0.30 | 1.67 | 89.59 | 0 01:15 | 1.67 |
| CB115A  | STORAGE | 0.20 | 1.54 | 89.67 | 0 01:13 | 1.54 |

|        |         |      |      |       |   |       |      |
|--------|---------|------|------|-------|---|-------|------|
| CB115B | STORAGE | 0.26 | 1.56 | 89.64 | 0 | 01:14 | 1.56 |
| CB117A | STORAGE | 0.15 | 1.51 | 89.39 | 0 | 01:12 | 1.50 |
| CB117B | STORAGE | 0.30 | 1.59 | 89.59 | 0 | 01:18 | 1.59 |
| CB119A | STORAGE | 0.15 | 1.43 | 89.78 | 0 | 01:10 | 1.43 |
| CB119C | STORAGE | 0.18 | 1.59 | 88.26 | 0 | 01:10 | 1.59 |
| CB121A | STORAGE | 0.21 | 1.52 | 89.70 | 0 | 01:11 | 1.52 |
| CB122A | STORAGE | 0.20 | 1.52 | 89.63 | 0 | 01:13 | 1.52 |
| CB123A | STORAGE | 0.21 | 1.56 | 89.64 | 0 | 01:10 | 1.56 |
| CB123B | STORAGE | 0.24 | 1.56 | 89.64 | 0 | 01:14 | 1.56 |
| CB124A | STORAGE | 0.20 | 1.54 | 89.60 | 0 | 01:13 | 1.54 |
| CB124B | STORAGE | 0.30 | 1.59 | 89.62 | 0 | 01:16 | 1.59 |
| CULTEC | STORAGE | 0.79 | 1.26 | 86.26 | 0 | 01:12 | 1.26 |
| SU1    | STORAGE | 0.00 | 0.00 | 90.26 | 0 | 00:00 | 0.00 |
| SU10   | STORAGE | 0.00 | 0.01 | 89.82 | 0 | 01:14 | 0.01 |
| SU11   | STORAGE | 0.00 | 0.00 | 90.00 | 0 | 00:00 | 0.00 |
| SU12   | STORAGE | 0.00 | 0.00 | 89.91 | 0 | 00:00 | 0.00 |
| SU13   | STORAGE | 0.00 | 0.02 | 89.70 | 0 | 01:10 | 0.02 |
| SU14   | STORAGE | 0.00 | 0.00 | 89.62 | 0 | 00:00 | 0.00 |
| SU15   | STORAGE | 0.00 | 0.01 | 89.59 | 0 | 01:17 | 0.01 |
| SU16   | STORAGE | 0.00 | 0.00 | 89.35 | 0 | 00:00 | 0.00 |
| SU17   | STORAGE | 0.00 | 0.00 | 89.53 | 0 | 00:00 | 0.00 |
| SU18   | STORAGE | 0.00 | 0.03 | 89.45 | 0 | 01:10 | 0.03 |
| SU19   | STORAGE | 0.00 | 0.00 | 89.61 | 0 | 00:00 | 0.00 |
| SU2    | STORAGE | 0.00 | 0.00 | 90.12 | 0 | 00:00 | 0.00 |
| SU20   | STORAGE | 0.00 | 0.00 | 89.62 | 0 | 00:00 | 0.00 |
| SU21   | STORAGE | 0.00 | 0.00 | 89.64 | 0 | 01:14 | 0.00 |
| SU22   | STORAGE | 0.00 | 0.03 | 89.63 | 0 | 01:11 | 0.03 |
| SU23   | STORAGE | 0.01 | 0.06 | 89.69 | 0 | 01:10 | 0.06 |
| SU24   | STORAGE | 0.00 | 0.05 | 89.74 | 0 | 01:10 | 0.05 |
| SU25   | STORAGE | 0.00 | 0.00 | 89.74 | 0 | 00:00 | 0.00 |
| SU3    | STORAGE | 0.00 | 0.00 | 89.83 | 0 | 00:00 | 0.00 |
| SU4    | STORAGE | 0.00 | 0.03 | 89.69 | 0 | 01:11 | 0.03 |
| SU5    | STORAGE | 0.00 | 0.03 | 89.63 | 0 | 01:13 | 0.03 |
| SU6    | STORAGE | 0.00 | 0.00 | 89.81 | 0 | 00:00 | 0.00 |
| SU7    | STORAGE | 0.00 | 0.00 | 89.66 | 0 | 01:14 | 0.00 |
| SU8    | STORAGE | 0.00 | 0.00 | 89.67 | 0 | 01:13 | 0.00 |
| SU9    | STORAGE | 0.00 | 0.00 | 89.77 | 0 | 00:00 | 0.00 |

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Node Inflow Summary  
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| Node | Type    | Maximum<br>Lateral<br>Inflow<br>LPS | Maximum<br>Total<br>Inflow<br>LPS | Time of Max<br>Occurrence<br>days hr:min | Lateral<br>Inflow<br>Volume<br>10^6 ltr | Total<br>Inflow<br>Volume<br>10^6 ltr | Flow<br>Balance<br>Error<br>Percent |
|------|---------|-------------------------------------|-----------------------------------|------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------------|
| J7   | OUTFALL | 0.00                                | 711.83                            | 0 01:14                                  | 0                                       | 1.88                                  | 0.000                               |
| OF1  | OUTFALL | 22.70                               | 22.70                             | 0 01:10                                  | 0.0304                                  | 0.0304                                | 0.000                               |
| OF2  | OUTFALL | 24.65                               | 24.65                             | 0 01:10                                  | 0.0324                                  | 0.0324                                | 0.000                               |
| OF3  | OUTFALL | 54.49                               | 54.49                             | 0 01:10                                  | 0.0716                                  | 0.0716                                | 0.000                               |
| OF4  | OUTFALL | 0.00                                | 101.81                            | 0 01:10                                  | 0                                       | 0.0439                                | 0.000                               |
| OF5  | OUTFALL | 0.00                                | 20.88                             | 0 01:10                                  | 0                                       | 0.00789                               | 0.000                               |
| OF6  | OUTFALL | 0.00                                | 40.89                             | 0 01:10                                  | 0                                       | 0.0172                                | 0.000                               |
| OF7  | OUTFALL | 0.00                                | 21.10                             | 0 01:10                                  | 0                                       | 0.011                                 | 0.000                               |
| OF8  | OUTFALL | 0.00                                | 27.26                             | 0 01:10                                  | 0                                       | 0.00917                               | 0.000                               |
| 100  | STORAGE | 0.00                                | 692.41                            | 0 01:15                                  | 0                                       | 1.91                                  | -0.001                              |
| 100A | STORAGE | 0.00                                | 570.49                            | 0 01:14                                  | 0                                       | 1.59                                  | -0.006                              |
| 100B | STORAGE | 0.00                                | 711.82                            | 0 01:14                                  | 0                                       | 1.88                                  | -0.000                              |
| 101  | STORAGE | 0.00                                | 692.37                            | 0 01:14                                  | 0                                       | 1.88                                  | 0.021                               |
| 102  | STORAGE | 0.00                                | 406.33                            | 0 01:15                                  | 0                                       | 1.11                                  | -0.005                              |
| 103  | STORAGE | 0.00                                | 406.11                            | 0 01:15                                  | 0                                       | 1.11                                  | -0.042                              |
| 103A | STORAGE | 0.00                                | 27.25                             | 0 01:10                                  | 0                                       | 0.0743                                | 0.014                               |
| 104  | STORAGE | 0.00                                | 379.00                            | 0 01:14                                  | 0                                       | 1.03                                  | -0.031                              |
| 105  | STORAGE | 0.00                                | 379.59                            | 0 01:14                                  | 0                                       | 1.03                                  | -0.037                              |
| 105A | STORAGE | 0.00                                | 25.07                             | 0 01:10                                  | 0                                       | 0.0774                                | 0.013                               |
| 106  | STORAGE | 0.00                                | 245.61                            | 0 01:12                                  | 0                                       | 0.688                                 | 0.044                               |
| 107  | STORAGE | 0.00                                | 132.83                            | 0 01:14                                  | 0                                       | 0.347                                 | -0.035                              |
| 108  | STORAGE | 0.00                                | 12.74                             | 0 01:10                                  | 0                                       | 0.0386                                | 0.069                               |
| 109  | STORAGE | 0.00                                | 104.72                            | 0 01:14                                  | 0                                       | 0.275                                 | -0.314                              |
| 110  | STORAGE | 0.00                                | 104.89                            | 0 01:12                                  | 0                                       | 0.276                                 | 0.185                               |
| 111  | STORAGE | 0.00                                | 5.05                              | 0 01:15                                  | 0                                       | 0.00733                               | 0.132                               |
| 112  | STORAGE | 0.00                                | 0.00                              | 0 00:00                                  | 0                                       | 0                                     | 0.000 ltr                           |
| 113  | STORAGE | 0.00                                | 104.44                            | 0 01:15                                  | 0                                       | 0.329                                 | -0.061                              |
| 114  | STORAGE | 0.00                                | 104.45                            | 0 01:14                                  | 0                                       | 0.329                                 | 0.044                               |
| 115  | STORAGE | 0.00                                | 67.44                             | 0 01:14                                  | 0                                       | 0.19                                  | 0.179                               |

|         |         |        |        |   |       |        |          |           |
|---------|---------|--------|--------|---|-------|--------|----------|-----------|
| 116     | STORAGE | 0.00   | 111.13 | 0 | 01:13 | 0      | 0.271    | -0.019    |
| 117     | STORAGE | 0.00   | 111.08 | 0 | 01:13 | 0      | 0.273    | 0.570     |
| 118     | STORAGE | 0.00   | 286.88 | 0 | 01:14 | 0      | 0.774    | -0.258    |
| 119     | STORAGE | 0.00   | 287.68 | 0 | 01:13 | 0      | 0.776    | 0.253     |
| 119A    | STORAGE | 0.00   | 52.89  | 0 | 01:10 | 0      | 0.118    | 0.054     |
| 119C    | STORAGE | 0.00   | 52.95  | 0 | 01:10 | 0      | 0.119    | 0.196     |
| 120     | STORAGE | 0.00   | 205.40 | 0 | 01:17 | 0      | 0.578    | -0.093    |
| 121     | STORAGE | 0.00   | 137.94 | 0 | 01:14 | 0      | 0.389    | 0.110     |
| 122     | STORAGE | 0.00   | 37.05  | 0 | 01:13 | 0      | 0.0902   | 0.014     |
| 123     | STORAGE | 0.00   | 67.48  | 0 | 01:12 | 0      | 0.19     | 0.180     |
| 124     | STORAGE | 0.00   | 67.66  | 0 | 01:14 | 0      | 0.208    | -0.187    |
| CB103A1 | STORAGE | 66.29  | 128.30 | 0 | 01:10 | 0.0927 | 0.118    | 0.098     |
| CB105A1 | STORAGE | 66.96  | 66.96  | 0 | 01:10 | 0.0947 | 0.0947   | -0.015    |
| CB106A  | STORAGE | 8.34   | 11.90  | 0 | 01:10 | 0.0108 | 0.0124   | -0.003    |
| CB107A  | STORAGE | 27.48  | 27.48  | 0 | 01:10 | 0.0371 | 0.0371   | -0.155    |
| CB108A  | STORAGE | 33.87  | 33.87  | 0 | 01:10 | 0.0496 | 0.0496   | -0.003    |
| CB110A  | STORAGE | 85.35  | 85.35  | 0 | 01:10 | 0.118  | 0.118    | -0.108    |
| CB110B  | STORAGE | 68.83  | 68.83  | 0 | 01:10 | 0.0919 | 0.0922   | -0.195    |
| CB110C  | STORAGE | 43.77  | 43.77  | 0 | 01:10 | 0.0673 | 0.0673   | -0.002    |
| CB114A  | STORAGE | 107.16 | 113.73 | 0 | 01:10 | 0.149  | 0.152    | 0.180     |
| CB115A  | STORAGE | 62.07  | 62.07  | 0 | 01:10 | 0.0836 | 0.0836   | -0.044    |
| CB115B  | STORAGE | 78.32  | 78.32  | 0 | 01:10 | 0.107  | 0.107    | -0.001    |
| CB117A  | STORAGE | 112.03 | 112.03 | 0 | 01:10 | 0.15   | 0.151    | -0.108    |
| CB117B  | STORAGE | 86.14  | 86.65  | 0 | 01:10 | 0.118  | 0.122    | -0.129    |
| CB119A  | STORAGE | 71.26  | 71.26  | 0 | 01:10 | 0.0987 | 0.0987   | -0.034    |
| CB119C  | STORAGE | 80.27  | 80.27  | 0 | 01:10 | 0.128  | 0.128    | 0.016     |
| CB121A  | STORAGE | 73.25  | 73.25  | 0 | 01:10 | 0.101  | 0.102    | -0.098    |
| CB122A  | STORAGE | 62.27  | 70.74  | 0 | 01:10 | 0.0843 | 0.0898   | -0.160    |
| CB123A  | STORAGE | 71.81  | 74.88  | 0 | 01:08 | 0.0996 | 0.1      | 0.038     |
| CB123B  | STORAGE | 73.31  | 73.31  | 0 | 01:10 | 0.0979 | 0.0979   | -0.038    |
| CB124A  | STORAGE | 63.22  | 63.22  | 0 | 01:10 | 0.0849 | 0.0849   | 0.009     |
| CB124B  | STORAGE | 88.07  | 98.55  | 0 | 01:10 | 0.118  | 0.124    | 0.314     |
| CULTEC  | STORAGE | 32.61  | 150.11 | 0 | 01:07 | 0.0497 | 0.37     | 0.016     |
| SU1     | STORAGE | 0.00   | 0.00   | 0 | 00:00 | 0      | 0        | 0.000 ltr |
| SU10    | STORAGE | 0.00   | 9.75   | 0 | 01:13 | 0      | 0.000653 | 73.193    |
| SU11    | STORAGE | 0.00   | 0.00   | 0 | 00:00 | 0      | 0        | 0.000 ltr |
| SU12    | STORAGE | 0.00   | 0.00   | 0 | 00:00 | 0      | 0        | 0.000 ltr |
| SU13    | STORAGE | 0.00   | 11.24  | 0 | 01:10 | 0      | 0.00425  | -4.311    |
| SU14    | STORAGE | 0.00   | 0.00   | 0 | 00:00 | 0      | 0        | 0.000 ltr |

|      |         |      |       |   |       |   |          |            |
|------|---------|------|-------|---|-------|---|----------|------------|
| SU15 | STORAGE | 0.00 | 11.04 | 0 | 01:14 | 0 | 0.000842 | 70.519     |
| SU16 | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU17 | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU18 | STORAGE | 0.00 | 41.02 | 0 | 01:10 | 0 | 0.0173   | 0.131      |
| SU19 | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU2  | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU20 | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU21 | STORAGE | 0.00 | 1.55  | 0 | 01:14 | 0 | 7.74e-05 | 62.685 ltr |
| SU22 | STORAGE | 0.00 | 68.49 | 0 | 01:10 | 0 | 0.0264   | -0.449     |
| SU23 | STORAGE | 0.00 | 37.81 | 0 | 01:10 | 0 | 0.0182   | 0.248      |
| SU24 | STORAGE | 0.00 | 38.07 | 0 | 01:10 | 0 | 0.0181   | -0.508     |
| SU25 | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU3  | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU4  | STORAGE | 0.00 | 30.40 | 0 | 01:10 | 0 | 0.011    | -2.269     |
| SU5  | STORAGE | 0.00 | 16.38 | 0 | 01:11 | 0 | 0.00493  | 2.689      |
| SU6  | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |
| SU7  | STORAGE | 0.00 | 0.07  | 0 | 01:13 | 0 | 4.04e-06 | 0.196 ltr  |
| SU8  | STORAGE | 0.00 | 3.15  | 0 | 01:12 | 0 | 0.00012  | 176.912    |
| SU9  | STORAGE | 0.00 | 0.00  | 0 | 00:00 | 0 | 0        | 0.000 ltr  |

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Node Surcharge Summary  
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No nodes were surcharged.

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Node Flooding Summary  
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No nodes were flooded.

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Storage Volume Summary  
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| Storage Unit | Average<br>Volume<br>1000 m | Avg<br>Pcnt<br>Full | Evap<br>Pcnt<br>Loss | Exfil<br>Pcnt<br>Loss | Maximum<br>Volume<br>1000 m | Max<br>Pcnt<br>Full | Time of Max<br>Occurrence<br>days hr:min | Maximum<br>Outflow<br>LPS |
|--------------|-----------------------------|---------------------|----------------------|-----------------------|-----------------------------|---------------------|------------------------------------------|---------------------------|
| 100          | 0.001                       | 10.1                | 0.0                  | 0.0                   | 0.001                       | 22.4                | 0 01:14                                  | 692.50                    |
| 100A         | 0.000                       | 3.3                 | 0.0                  | 0.0                   | 0.001                       | 15.2                | 0 01:14                                  | 570.48                    |
| 100B         | 0.000                       | 2.5                 | 0.0                  | 0.0                   | 0.001                       | 11.6                | 0 01:14                                  | 711.83                    |
| 101          | 0.000                       | 10.3                | 0.0                  | 0.0                   | 0.001                       | 23.2                | 0 01:14                                  | 692.41                    |
| 102          | 0.000                       | 10.4                | 0.0                  | 0.0                   | 0.001                       | 23.7                | 0 01:15                                  | 406.47                    |
| 103          | 0.000                       | 10.6                | 0.0                  | 0.0                   | 0.001                       | 23.8                | 0 01:15                                  | 406.33                    |
| 103A         | 0.000                       | 11.6                | 0.0                  | 0.0                   | 0.000                       | 15.7                | 0 01:10                                  | 27.25                     |
| 104          | 0.000                       | 8.8                 | 0.0                  | 0.0                   | 0.001                       | 21.6                | 0 01:15                                  | 378.99                    |
| 105          | 0.000                       | 9.3                 | 0.0                  | 0.0                   | 0.001                       | 22.4                | 0 01:15                                  | 379.00                    |
| 105A         | 0.000                       | 13.2                | 0.0                  | 0.0                   | 0.000                       | 17.4                | 0 01:10                                  | 25.07                     |
| 106          | 0.000                       | 10.6                | 0.0                  | 0.0                   | 0.001                       | 21.2                | 0 01:14                                  | 244.24                    |
| 107          | 0.000                       | 9.8                 | 0.0                  | 0.0                   | 0.001                       | 18.0                | 0 01:14                                  | 132.52                    |
| 108          | 0.000                       | 8.9                 | 0.0                  | 0.0                   | 0.000                       | 11.0                | 0 01:05                                  | 12.76                     |
| 109          | 0.000                       | 10.3                | 0.0                  | 0.0                   | 0.001                       | 18.6                | 0 01:15                                  | 104.79                    |
| 110          | 0.000                       | 11.2                | 0.0                  | 0.0                   | 0.001                       | 19.2                | 0 01:14                                  | 104.72                    |
| 111          | 0.000                       | 10.3                | 0.0                  | 0.0                   | 0.000                       | 12.9                | 0 01:15                                  | 5.05                      |
| 112          | 0.000                       | 0.0                 | 0.0                  | 0.0                   | 0.000                       | 0.0                 | 0 00:00                                  | 0.00                      |
| 113          | 0.000                       | 11.3                | 0.0                  | 0.0                   | 0.001                       | 20.2                | 0 01:15                                  | 104.50                    |
| 114          | 0.000                       | 12.4                | 0.0                  | 0.0                   | 0.001                       | 20.2                | 0 01:15                                  | 104.44                    |
| 115          | 0.000                       | 11.9                | 0.0                  | 0.0                   | 0.001                       | 18.3                | 0 01:14                                  | 67.43                     |
| 116          | 0.000                       | 6.8                 | 0.0                  | 0.0                   | 0.001                       | 16.2                | 0 01:15                                  | 110.99                    |
| 117          | 0.000                       | 9.4                 | 0.0                  | 0.0                   | 0.001                       | 18.2                | 0 01:12                                  | 111.13                    |
| 118          | 0.000                       | 10.1                | 0.0                  | 0.0                   | 0.001                       | 22.0                | 0 01:14                                  | 286.85                    |
| 119          | 0.000                       | 9.3                 | 0.0                  | 0.0                   | 0.001                       | 19.1                | 0 01:14                                  | 286.88                    |
| 119A         | 0.000                       | 8.0                 | 0.0                  | 0.0                   | 0.001                       | 13.7                | 0 01:13                                  | 52.07                     |
| 119C         | 0.000                       | 3.3                 | 0.0                  | 0.0                   | 0.000                       | 18.5                | 0 01:10                                  | 52.89                     |
| 120          | 0.000                       | 10.4                | 0.0                  | 0.0                   | 0.001                       | 20.4                | 0 01:15                                  | 207.20                    |
| 121          | 0.000                       | 11.0                | 0.0                  | 0.0                   | 0.001                       | 18.6                | 0 01:15                                  | 138.20                    |
| 122          | 0.000                       | 11.4                | 0.0                  | 0.0                   | 0.001                       | 16.3                | 0 01:14                                  | 37.05                     |
| 123          | 0.000                       | 11.5                | 0.0                  | 0.0                   | 0.001                       | 17.6                | 0 01:04                                  | 67.73                     |
| 124          | 0.000                       | 12.7                | 0.0                  | 0.0                   | 0.001                       | 19.9                | 0 01:21                                  | 67.71                     |
| CB103A1      | 0.000                       | 0.0                 | 0.0                  | 0.0                   | 0.000                       | 0.0                 | 0 00:00                                  | 129.06                    |
| CB105A1      | 0.000                       | 0.0                 | 0.0                  | 0.0                   | 0.000                       | 0.0                 | 0 00:00                                  | 66.09                     |
| CB106A       | 0.000                       | 0.0                 | 0.0                  | 0.0                   | 0.000                       | 0.0                 | 0 00:00                                  | 10.77                     |

|        |       |      |     |     |       |      |         |        |
|--------|-------|------|-----|-----|-------|------|---------|--------|
| CB107A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 27.30  |
| CB108A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 33.84  |
| CB110A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 43.60  |
| CB110B | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 43.38  |
| CB110C | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 43.72  |
| CB114A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 45.80  |
| CB115A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 36.74  |
| CB115B | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 33.85  |
| CB117A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 77.10  |
| CB117B | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 45.10  |
| CB119A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 70.38  |
| CB119C | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 80.21  |
| CB121A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 63.71  |
| CB122A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 49.66  |
| CB123A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 64.76  |
| CB123B | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 35.36  |
| CB124A | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 33.59  |
| CB124B | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 34.11  |
| CULTEC | 0.064 | 57.7 | 0.0 | 0.0 | 0.102 | 92.3 | 0 01:12 | 142.33 |
| SU1    | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU10   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.75   |
| SU11   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU12   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU13   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 10.51  |
| SU14   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU15   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.96   |
| SU16   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU17   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU18   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 40.89  |
| SU19   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU2    | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU20   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU21   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.01   |
| SU22   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 68.02  |
| SU23   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 37.56  |
| SU24   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 37.81  |
| SU25   | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU3    | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 0.00   |
| SU4    | 0.000 | 0.0  | 0.0 | 0.0 | 0.000 | 0.0  | 0 00:00 | 27.54  |

|     |       |     |     |     |       |     |         |       |
|-----|-------|-----|-----|-----|-------|-----|---------|-------|
| SU5 | 0.000 | 0.0 | 0.0 | 0.0 | 0.000 | 0.0 | 0 00:00 | 11.53 |
| SU6 | 0.000 | 0.0 | 0.0 | 0.0 | 0.000 | 0.0 | 0 00:00 | 0.00  |
| SU7 | 0.000 | 0.0 | 0.0 | 0.0 | 0.000 | 0.0 | 0 00:00 | 2.70  |
| SU8 | 0.000 | 0.0 | 0.0 | 0.0 | 0.000 | 0.0 | 0 00:00 | 0.05  |
| SU9 | 0.000 | 0.0 | 0.0 | 0.0 | 0.000 | 0.0 | 0 00:00 | 0.00  |

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Outfall Loading Summary  
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| Outfall Node | Flow<br>Freq<br>Pcnt | Avg<br>Flow<br>LPS | Max<br>Flow<br>LPS | Total<br>Volume<br>10^6 ltr |
|--------------|----------------------|--------------------|--------------------|-----------------------------|
| J7           | 61.72                | 186.75             | 711.83             | 1.878                       |
| OF1          | 36.58                | 5.24               | 22.70              | 0.030                       |
| OF2          | 37.00                | 5.40               | 24.65              | 0.032                       |
| OF3          | 37.84                | 11.68              | 54.49              | 0.072                       |
| OF4          | 6.76                 | 51.35              | 101.81             | 0.044                       |
| OF5          | 4.79                 | 13.00              | 20.88              | 0.008                       |
| OF6          | 9.71                 | 14.48              | 40.89              | 0.017                       |
| OF7          | 8.79                 | 9.58               | 21.10              | 0.011                       |
| OF8          | 4.17                 | 17.21              | 27.26              | 0.009                       |
| System       | 23.04                | 314.69             | 998.31             | 2.102                       |

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Link Flow Summary  
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| Link | Type    | Maximum<br> Flow <br>LPS | Time of Max<br>Occurrence<br>days hr:min | Maximum<br> Veloc <br>m/sec | Max/<br>Full<br>Flow | Max/<br>Full<br>Depth |
|------|---------|--------------------------|------------------------------------------|-----------------------------|----------------------|-----------------------|
| 103  | CONDUIT | 379.00                   | 0 01:14                                  | 1.25                        | 1.01                 | 0.88                  |

|         |         |        |         |      |      |      |
|---------|---------|--------|---------|------|------|------|
| 120-123 | CONDUIT | 67.73  | 0 01:05 | 0.98 | 0.61 | 0.70 |
| C1      | CONDUIT | 142.33 | 0 01:12 | 2.04 | 1.40 | 0.96 |
| C10     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C11     | CHANNEL | 2.70   | 0 01:14 | 0.01 | 0.00 | 0.35 |
| C12     | CHANNEL | 3.15   | 0 01:12 | 0.02 | 0.00 | 0.32 |
| C13     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.01 |
| C14     | CHANNEL | 0.02   | 0 01:13 | 0.03 | 0.00 | 0.22 |
| C15     | CHANNEL | 0.41   | 0 01:14 | 0.15 | 0.00 | 0.22 |
| C16     | CHANNEL | 9.75   | 0 01:13 | 0.04 | 0.00 | 0.33 |
| C17     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.31 |
| C18     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C19     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C2      | CONDUIT | 122.51 | 0 01:15 | 1.73 | 1.30 | 1.00 |
| C20     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C21     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.11 |
| C22     | CHANNEL | 37.56  | 0 01:10 | 0.62 | 0.13 | 0.35 |
| C23     | CHANNEL | 37.81  | 0 01:10 | 0.43 | 0.08 | 0.43 |
| C24     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.19 |
| C25     | CHANNEL | 38.07  | 0 01:10 | 0.45 | 0.07 | 0.39 |
| C27     | CHANNEL | 3.71   | 0 01:10 | 0.28 | 0.01 | 0.15 |
| C28     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C29     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.13 |
| C3      | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C30     | CHANNEL | 11.24  | 0 01:10 | 0.57 | 0.02 | 0.21 |
| C32     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.50 |
| C33     | CHANNEL | 1.55   | 0 01:14 | 0.01 | 0.00 | 0.51 |
| C34     | CHANNEL | 0.01   | 0 01:14 | 0.01 | 0.00 | 0.51 |
| C35     | CHANNEL | 30.98  | 0 01:10 | 0.15 | 0.04 | 0.61 |
| C36     | CHANNEL | 15.22  | 0 01:11 | 0.04 | 0.00 | 0.39 |
| C37     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.35 |
| C38     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.27 |
| C39     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.27 |
| C4      | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.00 |
| C40     | CHANNEL | 11.53  | 0 01:13 | 0.05 | 0.00 | 0.39 |
| C41     | CHANNEL | 11.04  | 0 01:14 | 0.04 | 0.00 | 0.36 |
| C42     | CHANNEL | 0.54   | 0 01:17 | 0.20 | 0.00 | 0.21 |
| C43     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.21 |
| C45     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.31 |
| C46     | CHANNEL | 0.00   | 0 00:00 | 0.00 | 0.00 | 0.31 |

|                                |         |        |   |       |      |      |      |
|--------------------------------|---------|--------|---|-------|------|------|------|
| C47                            | CHANNEL | 0.00   | 0 | 00:00 | 0.00 | 0.00 | 0.34 |
| C48                            | CHANNEL | 6.80   | 0 | 01:10 | 0.07 | 0.00 | 0.36 |
| C49                            | CONDUIT | 570.48 | 0 | 01:14 | 1.55 | 0.74 | 0.65 |
| C5                             | CHANNEL | 0.00   | 0 | 00:00 | 0.00 | 0.00 | 0.27 |
| C51                            | CHANNEL | 0.00   | 0 | 00:00 | 0.00 | 0.00 | 0.20 |
| C52                            | CHANNEL | 41.02  | 0 | 01:10 | 0.12 | 0.00 | 0.25 |
| C53                            | CHANNEL | 40.89  | 0 | 01:10 | 0.76 | 0.00 | 0.10 |
| C56                            | CHANNEL | 68.02  | 0 | 01:11 | 1.50 | 0.02 | 0.12 |
| C57                            | CHANNEL | 101.81 | 0 | 01:10 | 2.00 | 0.02 | 0.13 |
| C6                             | CHANNEL | 30.40  | 0 | 01:10 | 0.13 | 0.01 | 0.33 |
| C7                             | CHANNEL | 12.32  | 0 | 01:11 | 0.12 | 0.00 | 0.33 |
| C8                             | CHANNEL | 16.38  | 0 | 01:11 | 0.13 | 0.01 | 0.33 |
| C9                             | CHANNEL | 0.00   | 0 | 00:00 | 0.00 | 0.00 | 0.06 |
| Pipe_11_(1)                    | CONDUIT | 27.25  | 0 | 01:10 | 0.94 | 0.34 | 0.43 |
| Pipe_14                        | CONDUIT | 67.71  | 0 | 01:15 | 0.92 | 0.70 | 0.65 |
| Pipe_15                        | CONDUIT | 378.99 | 0 | 01:15 | 1.15 | 0.90 | 0.92 |
| Pipe_15_(1)                    | CONDUIT | 406.33 | 0 | 01:15 | 1.16 | 0.97 | 0.95 |
| Pipe_18                        | CONDUIT | 406.47 | 0 | 01:15 | 1.16 | 0.89 | 0.95 |
| Pipe_18_(2)                    | CONDUIT | 286.85 | 0 | 01:14 | 1.08 | 0.96 | 0.94 |
| Pipe_19                        | CONDUIT | 286.88 | 0 | 01:14 | 1.42 | 1.05 | 0.95 |
| Pipe_20                        | CONDUIT | 207.20 | 0 | 01:17 | 1.20 | 0.76 | 0.86 |
| Pipe_20_(1)                    | CONDUIT | 138.20 | 0 | 01:17 | 1.13 | 0.77 | 0.77 |
| Pipe_20_(2)                    | CONDUIT | 52.07  | 0 | 01:10 | 0.76 | 0.47 | 0.85 |
| Pipe_30                        | CONDUIT | 244.24 | 0 | 01:13 | 1.10 | 0.89 | 0.83 |
| Pipe_31                        | CONDUIT | 104.50 | 0 | 01:16 | 1.09 | 0.94 | 0.84 |
| Pipe_32                        | CONDUIT | 104.44 | 0 | 01:15 | 1.05 | 0.94 | 0.87 |
| Pipe_33                        | CONDUIT | 58.65  | 0 | 01:14 | 1.07 | 0.96 | 0.75 |
| Pipe_35                        | CONDUIT | 132.52 | 0 | 01:14 | 0.86 | 0.68 | 0.74 |
| Pipe_35_(1)                    | CONDUIT | 12.76  | 0 | 01:06 | 0.72 | 0.21 | 0.40 |
| Pipe_36                        | CONDUIT | 104.79 | 0 | 01:15 | 0.89 | 0.83 | 0.73 |
| Pipe_37                        | CONDUIT | 104.72 | 0 | 01:14 | 0.85 | 0.82 | 0.75 |
| Pipe_39                        | CONDUIT | 37.05  | 0 | 01:14 | 0.97 | 0.61 | 0.55 |
| Pipe_40                        | CONDUIT | 5.05   | 0 | 01:15 | 0.48 | 0.05 | 0.15 |
| Pipe_40_(2)                    | CONDUIT | 0.00   | 0 | 00:00 | 0.00 | 0.00 | 0.00 |
| Pipe_40_(3)                    | CONDUIT | 3.72   | 0 | 01:14 | 0.19 | 0.06 | 0.32 |
| Pipe_5_(1)_(3)_(6)_(2)_(1)_(1) | CONDUIT | 25.07  | 0 | 01:10 | 1.00 | 0.26 | 0.38 |
| Pipe_6                         | CONDUIT | 711.83 | 0 | 01:14 | 2.15 | 0.66 | 0.59 |
| Pipe_7                         | CONDUIT | 570.49 | 0 | 01:14 | 1.28 | 0.80 | 0.78 |
| Pipe_74_(1)                    | CONDUIT | 52.89  | 0 | 01:10 | 0.98 | 0.92 | 0.76 |

|         |         |        |   |       |      |      |      |
|---------|---------|--------|---|-------|------|------|------|
| Pipe_8  | CONDUIT | 110.99 | 0 | 01:16 | 1.02 | 0.61 | 0.80 |
| Pipe_9  | CONDUIT | 111.13 | 0 | 01:13 | 1.24 | 1.00 | 0.78 |
| Pipe_94 | CONDUIT | 692.41 | 0 | 01:15 | 1.49 | 0.84 | 0.81 |
| Pipe_95 | CONDUIT | 5.05   | 0 | 01:15 | 0.51 | 0.05 | 0.14 |
| OL1     | ORIFICE | 52.95  | 0 | 01:10 |      |      | 1.00 |
| OL10    | ORIFICE | 16.67  | 0 | 01:13 |      |      | 1.00 |
| OL11    | ORIFICE | 17.05  | 0 | 01:18 |      |      | 1.00 |
| OL12    | ORIFICE | 38.55  | 0 | 01:12 |      |      | 1.00 |
| OL13    | ORIFICE | 25.07  | 0 | 01:10 |      |      | 1.00 |
| OL15    | ORIFICE | 10.77  | 0 | 01:11 |      |      | 1.00 |
| OL16    | ORIFICE | 16.06  | 0 | 01:10 |      |      | 1.00 |
| OL17    | ORIFICE | 12.74  | 0 | 01:10 |      |      | 1.00 |
| OL18    | ORIFICE | 22.90  | 0 | 01:15 |      |      | 1.00 |
| OL19    | ORIFICE | 16.94  | 0 | 01:15 |      |      | 1.00 |
| OL2     | ORIFICE | 16.15  | 0 | 01:10 |      |      | 1.00 |
| OL20    | ORIFICE | 16.92  | 0 | 01:14 |      |      | 1.00 |
| OL21    | ORIFICE | 21.69  | 0 | 01:12 |      |      | 1.00 |
| OL22    | ORIFICE | 16.80  | 0 | 01:13 |      |      | 1.00 |
| OL23    | ORIFICE | 22.84  | 0 | 01:10 |      |      | 1.00 |
| OL3     | ORIFICE | 16.89  | 0 | 01:10 |      |      | 1.00 |
| OL4     | ORIFICE | 16.90  | 0 | 01:14 |      |      | 1.00 |
| OL5     | ORIFICE | 27.25  | 0 | 01:10 |      |      | 1.00 |
| OL7     | ORIFICE | 16.80  | 0 | 01:13 |      |      | 1.00 |
| OL8     | ORIFICE | 17.05  | 0 | 01:16 |      |      | 1.00 |
| OL9     | ORIFICE | 16.66  | 0 | 01:11 |      |      | 1.00 |
| OR10    | ORIFICE | 38.55  | 0 | 01:12 |      |      | 1.00 |
| OR11    | ORIFICE | 16.92  | 0 | 01:14 |      |      | 1.00 |
| OR12    | ORIFICE | 16.80  | 0 | 01:13 |      |      | 1.00 |
| OR13    | ORIFICE | 22.90  | 0 | 01:15 |      |      | 1.00 |
| OR14    | ORIFICE | 21.69  | 0 | 01:12 |      |      | 1.00 |
| OR15    | ORIFICE | 16.94  | 0 | 01:15 |      |      | 1.00 |
| OR2     | ORIFICE | 17.05  | 0 | 01:16 |      |      | 1.00 |
| OR3     | ORIFICE | 16.80  | 0 | 01:13 |      |      | 1.00 |
| OR4     | ORIFICE | 16.89  | 0 | 01:10 |      |      | 1.00 |
| OR5     | ORIFICE | 16.90  | 0 | 01:14 |      |      | 1.00 |
| OR6     | ORIFICE | 16.15  | 0 | 01:10 |      |      | 1.00 |
| OR7     | ORIFICE | 16.66  | 0 | 01:11 |      |      | 1.00 |
| OR8     | ORIFICE | 16.67  | 0 | 01:13 |      |      | 1.00 |
| OR9     | ORIFICE | 17.05  | 0 | 01:18 |      |      | 1.00 |

|    |      |       |   |       |  |      |
|----|------|-------|---|-------|--|------|
| W1 | WEIR | 20.88 | 0 | 01:10 |  | 0.67 |
| W2 | WEIR | 0.00  | 0 | 00:00 |  | 0.00 |
| W3 | WEIR | 21.10 | 0 | 01:10 |  | 0.68 |
| W4 | WEIR | 27.26 | 0 | 01:10 |  | 0.80 |

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Flow Classification Summary  
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|         | Adjusted          | ----- |           | Fraction of Time |             | in Flow Class |            | -----        |             |               |
|---------|-------------------|-------|-----------|------------------|-------------|---------------|------------|--------------|-------------|---------------|
| Conduit | /Actual<br>Length | Dry   | Up<br>Dry | Down<br>Dry      | Sub<br>Crit | Sup<br>Crit   | Up<br>Crit | Down<br>Crit | Norm<br>Ltd | Inlet<br>Ctrl |
| 103     | 1.00              | 0.02  | 0.00      | 0.00             | 0.21        | 0.00          | 0.00       | 0.76         | 0.00        | 0.00          |
| 120-123 | 1.00              | 0.02  | 0.00      | 0.00             | 0.02        | 0.00          | 0.00       | 0.96         | 0.02        | 0.00          |
| C1      | 1.00              | 0.95  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.05         | 0.00        | 0.00          |
| C10     | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C11     | 1.00              | 0.98  | 0.01      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C12     | 1.00              | 0.04  | 0.01      | 0.00             | 0.01        | 0.00          | 0.00       | 0.94         | 0.01        | 0.00          |
| C13     | 1.00              | 0.05  | 0.95      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C14     | 1.00              | 0.04  | 0.01      | 0.00             | 0.01        | 0.00          | 0.00       | 0.94         | 0.01        | 0.00          |
| C15     | 1.00              | 0.04  | 0.01      | 0.00             | 0.01        | 0.00          | 0.00       | 0.94         | 0.01        | 0.00          |
| C16     | 1.00              | 0.04  | 0.01      | 0.00             | 0.02        | 0.00          | 0.00       | 0.93         | 0.02        | 0.00          |
| C17     | 1.00              | 0.97  | 0.03      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C18     | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C19     | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C2      | 1.00              | 0.03  | 0.00      | 0.00             | 0.96        | 0.00          | 0.00       | 0.01         | 0.00        | 0.00          |
| C20     | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C21     | 1.00              | 0.04  | 0.96      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C22     | 1.00              | 0.04  | 0.00      | 0.00             | 0.95        | 0.01          | 0.00       | 0.00         | 0.00        | 0.00          |
| C23     | 1.00              | 0.04  | 0.00      | 0.00             | 0.96        | 0.00          | 0.00       | 0.00         | 0.95        | 0.00          |
| C24     | 1.00              | 0.99  | 0.01      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C25     | 1.00              | 0.04  | 0.95      | 0.00             | 0.01        | 0.00          | 0.00       | 0.00         | 0.95        | 0.00          |
| C27     | 1.00              | 0.05  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.95         | 0.00        | 0.00          |
| C28     | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C29     | 1.00              | 0.99  | 0.01      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |
| C3      | 1.00              | 1.00  | 0.00      | 0.00             | 0.00        | 0.00          | 0.00       | 0.00         | 0.00        | 0.00          |

|             |      |      |      |      |      |      |      |      |      |      |
|-------------|------|------|------|------|------|------|------|------|------|------|
| C30         | 1.00 | 0.04 | 0.95 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.95 | 0.00 |
| C32         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C33         | 1.00 | 0.04 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C34         | 1.00 | 0.04 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C35         | 1.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C36         | 1.00 | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.93 | 0.03 | 0.00 |
| C37         | 1.00 | 0.97 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C38         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C39         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C4          | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C40         | 1.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.93 | 0.02 | 0.00 |
| C41         | 1.00 | 0.04 | 0.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.93 | 0.02 | 0.00 |
| C42         | 1.00 | 0.04 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 |
| C43         | 1.00 | 0.99 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C45         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C46         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C47         | 1.00 | 0.97 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C48         | 1.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.93 | 0.02 | 0.00 |
| C49         | 1.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| C5          | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C51         | 1.00 | 0.98 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| C52         | 1.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C53         | 1.00 | 0.05 | 0.00 | 0.00 | 0.90 | 0.05 | 0.00 | 0.00 | 0.94 | 0.00 |
| C56         | 1.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.95 | 0.01 | 0.00 |
| C57         | 1.00 | 0.99 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.95 | 0.00 |
| C6          | 1.00 | 0.04 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C7          | 1.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C8          | 1.00 | 0.04 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.94 | 0.01 | 0.00 |
| C9          | 1.00 | 0.05 | 0.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pipe_11_(1) | 1.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | 0.00 | 0.00 |
| Pipe_14     | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_15     | 1.00 | 0.03 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 |
| Pipe_15_(1) | 1.00 | 0.03 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.91 | 0.00 | 0.00 |
| Pipe_18     | 1.00 | 0.03 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 |
| Pipe_18_(2) | 1.00 | 0.03 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 |
| Pipe_19     | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |
| Pipe_20     | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_20_(1) | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |
| Pipe_20_(2) | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |



|                                     |      |      |      |      |      |      |      |      |      |      |
|-------------------------------------|------|------|------|------|------|------|------|------|------|------|
| Pipe_30                             | 1.00 | 0.03 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 |
| Pipe_31                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 |
| Pipe_32                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.86 | 0.07 | 0.00 |
| Pipe_33                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.95 | 0.00 | 0.00 |
| Pipe_35                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.94 | 0.00 | 0.00 |
| Pipe_35_(1)                         | 1.00 | 0.03 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.96 | 0.01 | 0.00 |
| Pipe_36                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_37                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.77 | 0.10 | 0.00 |
| Pipe_39                             | 1.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_40                             | 1.00 | 0.97 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 |
| Pipe_40_(2)                         | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pipe_40_(3)                         | 1.00 | 0.89 | 0.09 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 |
| Pipe_5_(1)_ (3)_ (6)_ (2)_ (1)_ (1) | 1.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.98 | 0.00 |
| Pipe_6                              | 1.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_7                              | 1.00 | 0.04 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.87 | 0.00 | 0.00 |
| Pipe_74_(1)                         | 1.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 |
| Pipe_8                              | 1.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |
| Pipe_9                              | 1.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.97 | 0.00 | 0.00 |
| Pipe_94                             | 1.00 | 0.03 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.86 | 0.00 | 0.00 |
| Pipe_95                             | 1.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | 0.00 | 0.00 |

\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

| Conduit     | Hours Full |          |          | Hours                  | Hours            |
|-------------|------------|----------|----------|------------------------|------------------|
|             | Both Ends  | Upstream | Dnstream | Above Full Normal Flow | Capacity Limited |
| 103         | 0.01       | 0.01     | 0.01     | 0.06                   | 0.01             |
| C1          | 0.01       | 0.37     | 0.01     | 0.41                   | 0.01             |
| C2          | 23.14      | 23.14    | 23.14    | 0.41                   | 0.42             |
| C33         | 0.01       | 0.01     | 0.20     | 0.01                   | 0.01             |
| C34         | 0.01       | 0.01     | 0.12     | 0.01                   | 0.01             |
| C35         | 0.01       | 0.01     | 0.23     | 0.01                   | 0.01             |
| Pipe_18_(2) | 0.01       | 0.03     | 0.01     | 0.01                   | 0.01             |
| Pipe_19     | 0.01       | 0.01     | 0.01     | 0.20                   | 0.01             |

|        |      |      |      |      |      |
|--------|------|------|------|------|------|
| Pipe_9 | 0.01 | 0.01 | 0.01 | 0.06 | 0.01 |
|--------|------|------|------|------|------|

Analysis begun on: Tue Sep 1 08:11:30 2026  
Analysis ended on: Tue Sep 1 08:11:35 2026  
Total elapsed time: 00:00:05

## **C.3 Background Report Excerpts**



Canada Lands Company

# Design Brief

## Wateridge Village at Rockcliffe Phases 6 and 7

August 2025

# Design Brief

## Wateridge Village at Rockcliffe Phase 6 and 7

| Drainage Area ID          | Continuous/Sag <sup>(1),(2)</sup> | Road Type             | Minor System Design Target | Generated Flow on Individual Segment for Minor System Design Target (DDSWMM Simulation) (l/s) | ICD (l/s) | Note |
|---------------------------|-----------------------------------|-----------------------|----------------------------|-----------------------------------------------------------------------------------------------|-----------|------|
| S50                       | Continuous                        | 20m Row, 8.5m asphalt | 100                        | 84                                                                                            | 25        |      |
| S51                       | Sag                               | 20m Row, 8.5m asphalt | 100                        | 95                                                                                            | 416       |      |
| S53                       | Continuous                        | 20m Row, 8.5m asphalt | 100                        | 55                                                                                            | 76        |      |
| S5A                       | Sag                               | 20m Row, 8.5m asphalt | 100                        | 5                                                                                             | 6         |      |
| S6                        | Sag                               | 20m Row, 8.5m asphalt | 100                        | 59                                                                                            | 228       |      |
| S6A                       | Sag                               | 20m Row, 8.5m asphalt | 100                        | 31                                                                                            | 86        |      |
| S8                        | Sag                               | 20m Row, 8.5m asphalt | 100                        | 10                                                                                            | 19        |      |
| S8B                       | Continuous                        | 20m Row, 8.5m asphalt | 100                        | 21                                                                                            | 57        |      |
| Park & Development Blocks |                                   |                       |                            |                                                                                               |           |      |
| Park                      | Rear Yard                         | Rear Yard             | 5                          | 200                                                                                           | 200       |      |
| B1A                       | Rear Yard                         | Rear Yard             | 5                          | 142                                                                                           | 142       |      |
| B21                       | Rear Yard                         | Rear Yard             | 5                          | 144                                                                                           | 144       |      |
| B21B                      | Rear Yard                         | Rear Yard             | 5                          | 120                                                                                           | 120       |      |
| B31A                      | Rear Yard                         | Rear Yard             | 5                          | 31                                                                                            | 31        |      |
| B31B                      | Rear Yard                         | Rear Yard             | 5                          | 120                                                                                           | 120       |      |
| B41A                      | Rear Yard                         | Rear Yard             | 5                          | 31                                                                                            | 31        |      |
| B5                        | Rear Yard                         | Rear Yard             | 5                          | 338                                                                                           | 338       |      |
| B51A                      | Rear Yard                         | Rear Yard             | 5                          | 215                                                                                           | 215       |      |

| Drainage Area ID | Continuous/Sag <sup>(1),(2)</sup> | Road Type | Minor System Design Target | Generated Flow on Individual Segment for Minor System Design Target (DDSWMM Simulation) (l/s) | ICD (l/s) | Note |
|------------------|-----------------------------------|-----------|----------------------------|-----------------------------------------------------------------------------------------------|-----------|------|
| B53A             | Rear Yard                         | Rear Yard | 5                          | 118                                                                                           | 118       |      |
| B60              | Rear Yard                         | Rear Yard | 5                          | 48                                                                                            | 48        |      |
| B8A              | Rear Yard                         | Rear Yard | 5                          | 299                                                                                           | 299       |      |

(1) Capture on continuous grade is limited to capacity of grate

(2) The minor flow restriction has been increased in sags to allow full capture of overflow from upstream segments on continuous grade during the design storm event without ponding.

## 5.4.2 Results of Hydrological Modeling

### 5.4.2.1 Street Segment Storage

The storage available on-site storage and the results of the DDSWMM major system evaluation for the design storm are presented in Table 5-4. The minor system design identified in the below table corresponds to the target storm event per OSDG, and the storm event for which it is demonstrated that no ponding is utilized. However, as noted above, the minor system capture across the Phase 6, 7 street segments has generally been increased to the 100 year to minimize major flow leaving the site. The ponding plan for the subject site is presented in **Appendix F on Drawing 139653-600**.

Table 5-4 On-site Storage during Target Minor System Design Storm per OSDG

| Street Segment ID | Minor System Design Storm per OSDG | Available Static Storage (m <sup>3</sup> ) | Total Storage Used During 2 Year Storm (DDSWMM Simulation) (m <sup>3</sup> ) | Overflow (DDSWMM Simulation) (l/s) |
|-------------------|------------------------------------|--------------------------------------------|------------------------------------------------------------------------------|------------------------------------|
| S1B               | 2                                  | 43.46                                      | 0                                                                            | 0                                  |
| S20               | 2                                  | 0.50                                       | 0                                                                            | 0                                  |
| S30               | 2                                  | 28.34                                      | 0                                                                            | 0                                  |
| S31A              | 2                                  | 0.28                                       | 0                                                                            | 0                                  |
| S31B              | 2                                  | 0.20                                       | 0                                                                            | 0                                  |
| S4                | 2                                  | 52.09                                      | 0                                                                            | 0                                  |

## 5.6 Eastern SWM Facility and Outlet Pipe

### 5.6.1 Water Quality Control

The Eastern SWM Facility is designed to provide an Enhanced Level of Protection. According to the MOE Stormwater Management Planning and Design Manual, March 2003, the treatment volume is a function of the drainage area, the urban imperviousness ratio and the level of protection.

The water quality calculations have been updated as the detailed design of various phases has been completed. Corresponding water quality volume requirements are summarized in the below table.

Table 5-9 Water Quality Volume Calculations

| Level of Protection | Urban Drainage Area, Type of Facility, %IMP | Permanent Storage (ha-m) |                      | Extended Storage (ha-m) |                      | Total Storage (ha-m) |                      |
|---------------------|---------------------------------------------|--------------------------|----------------------|-------------------------|----------------------|----------------------|----------------------|
|                     |                                             | Req.                     | Prov. <sup>(1)</sup> | Req.                    | Prov. <sup>(1)</sup> | Req.                 | Prov. <sup>(1)</sup> |
| Enhanced            | 163.83 ha<br>Wet Pond<br>71 %               | 2.81                     | 2.95                 | 0.91                    | 1.92                 | 3.72                 | 4.87                 |

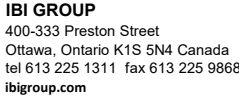
(1) From 2016 Pond Design Brief

As development within the Eastern SWM Facility drainage area has progressed, there have been minor changes to the overall contributing drainage area and corresponding imperviousness. The above table indicates that the Eastern SWM Facility is adequately sized to provide water quality treatment for the contributing drainage area.

### 5.6.2 Hydraulic Evaluation of the SWM Facility and Outlet Pipe

The hydraulic evaluation of the Eastern SWM Facility and receiving outlet pipe has been updated to reflect the most up-to-date hydrograph from the contributing development. The pond and outlet pipe are evaluated in a standalone XPSWMM model, a schematic of which is included in **Appendix F**. In accordance with the MSS, the model includes an allocation for the overflow from the future Western SWM Facility system.

The performance of the Eastern SWM Facility is summarized in the below table, compared to the evaluation completed to support its detailed design in February 2016.



Wateridge Village Phase 6, 7  
CITY OF OTTAWA  
Canada Lands Company

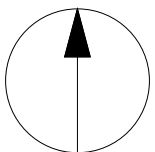
2025-06-27 9:34 AM





LEGEND :

- MH8  
0.10|0.70  
AREA NUMBER  
RUNOFF COEFFICIENT  
AREA IN HECTARES



CLIENT

**CANADA LANDS COMPANY**

 **CANADA LANDS COMPANY**  
SOCIÉTÉ IMMOBILIÈRE DU CANADA

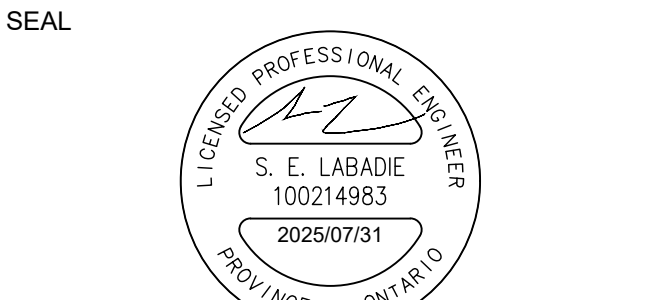
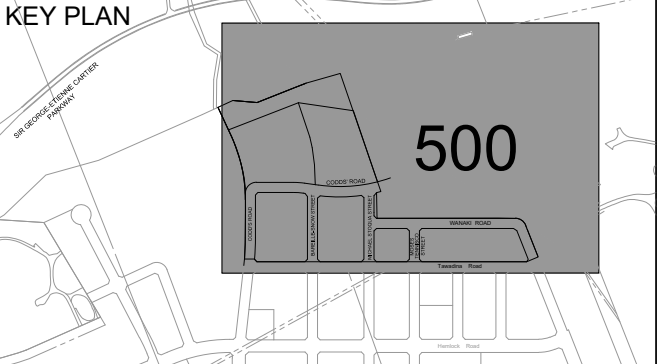
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| 3      | SUBMISSION NO.2 FOR CITY REVIEW | 2024-06-21 |
| 4      | ISSUED FOR GEOTECHNICAL REVIEW  | 2024-11-26 |
| 5      | SUBMISSION NO.3 FOR CITY REVIEW | 2024-12-20 |
| 6      | SUBMISSION NO.4 FOR CITY REVIEW | 2025-06-27 |
| 7      | SUBMISSION NO.5 FOR CITY REVIEW | 2025-07-31 |
| 8      |                                 |            |

SEE 010, 011 FOR NOTES, LEGEND, CB TABLE, STREET SECTIONS AND DETAILS



 **ARCADIS**

333 Preston Street - Suite 500  
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tel 613 225 1311  
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**PROJECT**

**WATERIDGE VILLAGE  
AT ROCKCLIFFE**

PHASES 6 AND 7

**PROJECT NO:**  
139653

**DRAWN BY:**  
M.M.

**PROJECT MGR:**  
S.L.

**CHECKED BY:**  
J.I.M.

**APPROVED BY:**  
S.L.

**SHEET TITLE**

**STORM DRAINAGE AREA  
PLAN**

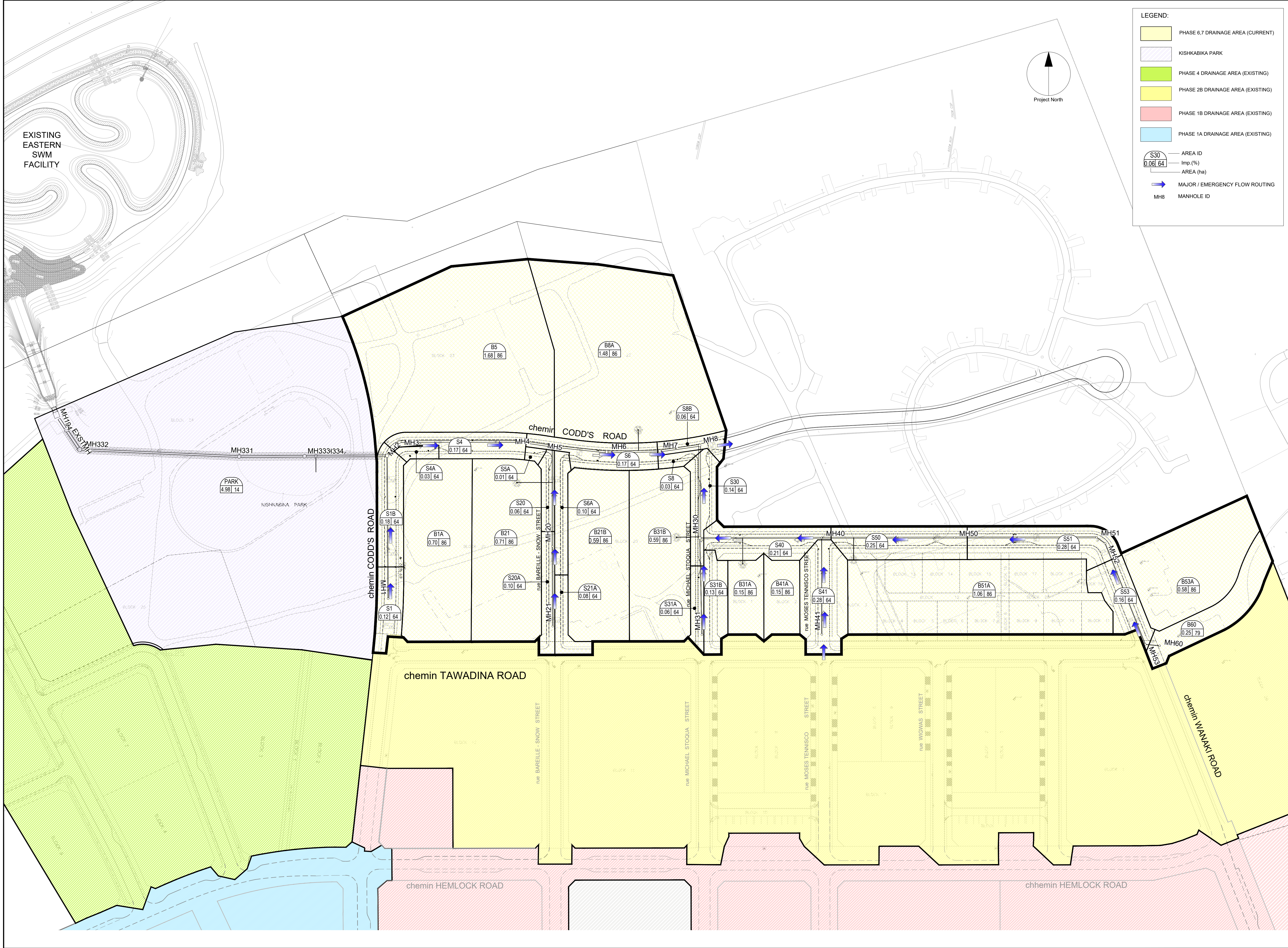
**SHEET NUMBER**

**500**

**ISSUE**

**7**





**LEGEND:**

- PHASE 6,7 DRAINAGE AREA (CURRENT)
- KISHKABIKI PARK
- PHASE 4 DRAINAGE AREA (EXISTING)
- PHASE 2B DRAINAGE AREA (EXISTING)
- PHASE 1B DRAINAGE AREA (EXISTING)
- PHASE 1A DRAINAGE AREA (EXISTING)

AREA ID  
Imp. (%)  
AREA (ha)

MAJOR / EMERGENCY FLOW ROUTING  
MANHOLE ID

CLIENT

**WATERIDGE VILLAGE  
PHASE 6 & 7**

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| 2      | SUBMISSION NO.2 FOR CITY REVIEW | 2024-06-14 |
| 3      | SUBMISSION NO.4 FOR CITY REVIEW | 2025-06-27 |
| 4      |                                 |            |
| 5      |                                 |            |
| 6      |                                 |            |
| 7      |                                 |            |
| 8      |                                 |            |

**KEY PLAN**

**NOT FOR CONSTRUCTION**

**SEAL**

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**PROJECT**

**WATERIDGE VILLAGE  
AT ROCKCLIFFE**

**PROJECT NO:**  
139653

**DRAWN BY:**  
S.V.

**CHECKED BY:**  
M.B.

**PROJECT MGR:**  
M.B.

**APPROVED BY:**  
P.S.

**SHEET TITLE**

**DDSWMM MODEL  
SCHEMATIC**

|                     |            |              |          |
|---------------------|------------|--------------|----------|
| <b>SHEET NUMBER</b> | <b>750</b> | <b>ISSUE</b> | <b>3</b> |
|---------------------|------------|--------------|----------|



Storm Hydraulic Grade Line Summary of Results

| XPSWMM<br>NODE ID | PROPOSED GROUND<br>ELEVATION (M) | USF (M) | 100 YEAR 3 HOUR CHICAGO |               | 100 YEAR 3 HOUR CHICAGO INCREASED BY 20% |               | 100 YEAR 24 HOUR SCS TYPE II |               | JULY 1 1979 |               | AUGUST 1988 |               | AUGUST 1996 |               |
|-------------------|----------------------------------|---------|-------------------------|---------------|------------------------------------------|---------------|------------------------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
|                   |                                  |         | HGL (M)                 | USF - HGL (M) | HGL (M)                                  | USF - HGL (M) | HGL (M)                      | USF - HGL (M) | HGL (M)     | USF - HGL (M) | HGL (M)     | USF - HGL (M) | HGL (M)     | USF - HGL (M) |
| S113              |                                  | 84.51   | 83.48                   | 1.03          | 83.80                                    | 0.71          | 83.06                        | 1.45          | 83.43       | 1.08          | 83.12       | 1.39          | 83.05       | 1.46          |
| S114              |                                  | 83.91   | 83.11                   | 0.80          | 83.38                                    | 0.53          | 82.67                        | 1.24          | 83.07       | 0.84          | 82.90       | 1.01          | 82.49       | 1.42          |
| S115              |                                  | 83.56   | 83.11                   | 0.45          | 83.38                                    | 0.18          | 82.65                        | 0.91          | 83.04       | 0.52          | 82.89       | 0.67          | 82.45       | 1.11          |
| S116              |                                  | 83.71   | 82.93                   | 0.78          | 83.22                                    | 0.49          | 82.52                        | 1.19          | 82.88       | 0.83          | 82.75       | 0.96          | 82.10       | 1.61          |
| S120              |                                  | 83.96   | 82.90                   | 1.07          | 83.15                                    | 0.81          | 82.50                        | 1.46          | 82.85       | 1.11          | 82.72       | 1.24          | 82.06       | 1.90          |
| Phase 2B, 4       |                                  |         |                         |               |                                          |               |                              |               |             |               |             |               |             |               |
| MH317             | 94.08                            | 91.68   | 91.17                   | 0.51          | 91.18                                    | 0.50          | 91.14                        | 0.54          | 91.15       | 0.53          | 91.14       | 0.54          | 91.11       | 0.57          |
| MH316             | 94.09                            | 91.69   | 90.96                   | 0.73          | 90.96                                    | 0.73          | 90.95                        | 0.74          | 90.95       | 0.74          | 90.95       | 0.74          | 90.92       | 0.77          |
| MH315             | 93.39                            | 91.36   | 90.28                   | 1.08          | 90.29                                    | 1.07          | 90.25                        | 1.11          | 90.27       | 1.09          | 90.27       | 1.09          | 90.26       | 1.10          |
| MH314             | 93.00                            | 91.16   | 89.91                   | 1.25          | 89.91                                    | 1.25          | 89.91                        | 1.25          | 89.91       | 1.25          | 89.91       | 1.25          | 89.89       | 1.27          |
| MH313             | 92.62                            | 90.71   | 89.35                   | 1.36          | 89.34                                    | 1.37          | 89.35                        | 1.36          | 89.35       | 1.36          | 89.35       | 1.36          | 89.34       | 1.37          |
| MH312             | 91.36                            | 89.68   | 88.42                   | 1.26          | 88.42                                    | 1.26          | 88.41                        | 1.27          | 88.42       | 1.26          | 88.42       | 1.26          | 88.38       | 1.30          |
| MH311             | 90.69                            | 88.29   | 87.44                   | 0.85          | 87.44                                    | 0.73          | 87.40                        | 0.89          | 87.45       | 0.84          | 87.47       | 0.82          | 87.38       | 0.91          |
| MH310             | 90.04                            | 87.64   | 87.28                   | 0.36          | 87.42                                    | 0.22          | 87.25                        | 0.39          | 87.30       | 0.34          | 87.33       | 0.31          | 87.06       | 0.58          |
| MH309             | 90.15                            | 87.75   | 87.44                   | 0.31          | 87.08                                    | 0.67          | 87.33                        | 0.42          | 87.41       | 0.34          | 87.43       | 0.32          | 87.22       | 0.53          |
| MH308             | 89.68                            | 87.28   | 86.88                   | 0.40          | 86.69                                    | 0.59          | 86.81                        | 0.47          | 86.87       | 0.41          | 86.88       | 0.40          | 86.76       | 0.52          |
| MH326             | 94.76                            | 92.36   | 91.33                   | 1.03          | 91.33                                    | 1.03          | 91.32                        | 1.04          | 91.32       | 1.04          | 91.32       | 1.04          | 91.33       | 1.03          |
| MH318             | 94.40                            | 92.00   | 91.03                   | 0.97          | 91.03                                    | 0.97          | 91.00                        | 1.00          | 91.00       | 1.00          | 91.00       | 1.00          | 91.00       | 1.00          |
| MH300             | 94.00                            | 91.60   | 90.71                   | 0.89          | 90.70                                    | 0.90          | 90.67                        | 0.93          | 90.68       | 0.92          | 90.68       | 0.92          | 90.68       | 0.92          |
| MH301             | 93.73                            | 91.33   | 90.21                   | 1.12          | 90.21                                    | 1.12          | 90.20                        | 1.13          | 90.21       | 1.12          | 90.20       | 1.13          | 90.20       | 1.13          |
| MH302             | 92.80                            | 90.40   | 88.64                   | 1.76          | 88.64                                    | 1.76          | 88.63                        | 1.77          | 88.64       | 1.76          | 88.63       | 1.77          | 88.63       | 1.77          |
| MH303             | 90.67                            | 88.27   | 87.80                   | 0.47          | 87.81                                    | 0.46          | 87.63                        | 0.64          | 87.79       | 0.48          | 87.72       | 0.55          | 87.64       | 0.63          |
| MH304             | 90.30                            | 87.90   | 87.39                   | 0.51          | 87.38                                    | 0.52          | 87.30                        | 0.60          | 87.38       | 0.52          | 87.34       | 0.56          | 87.30       | 0.60          |
| MH305             | 91.00                            | 88.60   | 86.54                   | 2.06          | 86.56                                    | 2.04          | 86.61                        | 1.99          | 86.69       | 1.91          | 86.65       | 1.95          | 86.60       | 2.00          |
| MH319             | 88.81                            | 86.61   | 86.13                   | 0.48          | 86.12                                    | 0.49          | 86.12                        | 0.49          | 86.12       | 0.49          | 86.12       | 0.49          | 86.12       | 0.49          |
| MH320             | 89.12                            | 86.92   | 85.49                   | 1.43          | 85.49                                    | 1.43          | 85.49                        | 1.43          | 85.49       | 1.43          | 85.49       | 1.43          | 85.49       | 1.43          |
| MH321             | 87.67                            | 85.47   | 84.18                   | 1.29          | 84.39                                    | 1.08          | 84.10                        | 1.37          | 84.11       | 1.36          | 84.13       | 1.34          | 84.09       | 1.38          |
| MH322             | 87.50                            | 85.30   | 84.18                   | 1.12          | 84.39                                    | 0.91          | 84.10                        | 1.20          | 84.10       | 1.20          | 84.12       | 1.18          | 84.09       | 1.21          |
| MH323             | 86.57                            | 84.37   | 83.40                   | 0.97          | 83.48                                    | 0.89          | 83.31                        | 1.06          | 83.32       | 1.05          | 83.34       | 1.03          | 83.30       | 1.07          |
| Phase 6 &7        |                                  |         |                         |               |                                          |               |                              |               |             |               |             |               |             |               |
| MH1               | 90.50                            | 88.10   | 86.68                   | 1.42          | 86.67                                    | 1.43          | 86.56                        | 1.54          | 86.65       | 1.45          | 86.67       | 1.43          | 86.43       | 1.67          |
| MH2               | 90.60                            | 88.20   | 84.81                   | 3.39          | 84.88                                    | 3.32          | 84.61                        | 3.59          | 84.65       | 3.55          | 84.68       | 3.52          | 84.49       | 3.71          |
| MH3               | 89.55                            | 87.15   | 85.13                   | 2.02          | 85.22                                    | 1.93          | 84.85                        | 2.30          | 84.90       | 2.25          | 84.94       | 2.21          | 84.67       | 2.48          |
| MH4               | 89.47                            | 87.07   | 85.74                   | 1.33          | 85.88                                    | 1.19          | 85.32                        | 1.75          | 85.39       | 1.68          | 85.45       | 1.62          | 85.04       | 2.03          |
| MH5               | 89.38                            | 86.98   | 85.90                   | 1.08          | 86.05                                    | 0.93          | 85.44                        | 1.54          | 85.52       | 1.46          | 85.58       | 1.40          | 85.13       | 1.85          |
| MH6               | 89.19                            | 86.79   | 86.07                   | 0.72          | 86.24                                    | 0.55          | 85.57                        | 1.22          | 85.65       | 1.14          | 85.72       | 1.07          | 85.23       | 1.56          |
| MH7               | 89.40                            | 87.00   | 86.14                   | 0.86          | 86.31                                    | 0.69          | 85.63                        | 1.37          | 85.71       | 1.29          | 85.77       | 1.23          | 85.27       | 1.73          |
| MH8               | 89.20                            | 86.80   | 86.23                   | 0.57          | 86.42                                    | 0.38          | 85.70                        | 1.10          | 85.78       | 1.02          | 85.85       | 0.95          | 85.32       | 1.48          |
| MH20              | 89.70                            | 87.30   | 86.46                   | 0.84          | 86.56                                    | 0.74          | 86.33                        | 0.97          | 86.34       | 0.96          | 86.36       | 0.94          | 86.32       | 0.98          |
| MH21              | 90.08                            | 87.68   | 86.98                   | 0.70          | 86.98                                    | 0.70          | 86.98                        | 0.70          | 86.98       | 0.70          | 86.98       | 0.70          | 86.98       | 0.70          |
| MH30              | 89.72                            | 87.32   | 86.43                   | 0.89          | 86.64                                    | 0.68          | 85.84                        | 1.48          | 85.92       | 1.40          | 86.01       | 1.31          | 85.46       | 1.86          |
| MH31              | 90.44                            | 88.04   | 87.29                   | 0.75          | 87.59                                    | 0.45          | 86.89                        | 1.15          | 86.89       | 1.14          | 86.92       | 1.11          | 86.88       | 1.16          |
| MH40              | 90.46                            | 88.06   | 87.57                   | 0.49          | 87.82                                    | 0.24          | 86.68                        | 1.38          | 86.81       | 1.25          | 86.96       | 1.10          | 86.53       | 1.53          |
| MH41              | 92.37                            | 89.97   | 88.32                   | 1.65          | 88.37                                    | 1.60          | 88.32                        | 1.65          | 88.32       | 1.66          | 88.32       | 1.65          | 88.31       | 1.66          |
| MH50              | 92.12                            | 89.72   | 88.20                   | 1.52          | 88.48                                    | 1.24          | 87.81                        | 1.91          | 87.81       | 1.91          | 87.82       | 1.90          | 87.79       | 1.93          |
| MH51              | 92.72                            | 90.32   | 88.85                   | 1.47          | 89.17                                    | 1.15          | 88.59                        | 1.73          | 88.60       | 1.72          | 88.64       | 1.68          | 88.54       | 1.78          |
| MH52              | 92.82                            | 90.42   | 89.08                   | 1.34          | 89.41                                    | 1.01          | 88.87                        | 1.55          | 88.88       | 1.54          | 88.89       | 1.53          | 88.86       | 1.56          |
| MH53              | 93.86                            | 91.46   | 90.78                   | 0.67          | 91.03                                    | 0.42          | 90.50                        | 0.95          | 90.56       | 0.89          | 90.57       | 0.89          | 90.48       | 0.97          |
| MH60              | 93.77                            | 91.37   | 90.90                   | 0.47          | 91.07                                    | 0.30          | 90.90                        | 0.47          | 90.90       | 0.47          | 90.90       | 0.47          | 90.90       | 0.47          |
| MH334             | n/a                              | N/A     | 84.16                   | N/A           | 84.18                                    | N/A           | 84.09                        | N/A           | 84.10       | N/A           | 84.11       | N/A           | 84.03       | N/A           |
| MH333             | n/a                              | N/A     | 82.99                   | N/A           | 83.02                                    | N/A           | 82.87                        | N/A           | 82.91       | N/A           | 82.93       | N/A           | 82.77       | N/A           |
| MH331             | n/a                              | N/A     | 81.62                   | N/A           | 81.83                                    | N/A           | 81.22                        | N/A           | 81.32       | N/A           | 81.36       | N/A           | 81.07       | N/A           |
| MH332             | n/a                              | N/A     | 80.66                   | N/A           | 80.77                                    | N/A           | 80.46                        | N/A           | 80.60       | N/A           | 80.56       | N/A           | 80.27       | N/A           |

## **C.4 Cultec Infiltration Gallery**



# MATTAMY HOMES WATERIDGE VILLAGE BLOCK 23

OTTAWA, ON, CANADA

| DRAWING INDEX        |           |
|----------------------|-----------|
| TITLE                | SHEET NO. |
| COVER SHEET          | 1 OF 4    |
| SYSTEM LAYOUT SHEET  | 2 OF 4    |
| SYSTEM OVERLAY SHEET | 3 OF 4    |
| R-360HD DETAIL SHEET | 4 OF 4    |

| PROJECT INFORMATION       |           |      |    |          |                     |      |
|---------------------------|-----------|------|----|----------|---------------------|------|
| PROJECT NO.               |           |      |    |          |                     |      |
| CULTEC SALES REP          |           |      |    |          |                     |      |
| CULTEC PROJECT SUPERVISOR |           |      |    |          |                     |      |
| ENGINEER OF RECORD        |           |      |    |          |                     |      |
| REVISIONS                 | ITERATION | DATE | BY | COMMENTS | EOR SHEET REFERENCE | DATE |
|                           | 00        |      |    |          |                     |      |
|                           |           |      |    |          |                     |      |



CULTEC

Subsurface Stormwater Management Systems

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878 Federal Road  
Brookfield, CT 06804  
www.cultec.com

PH: 1(203) 775-4416  
PH: 1(800) 4-CULTEC  
stormgenie cultec.com

NOTE: THESE SHOP DRAWINGS MAY CONTAIN COMPONENTS INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, STORM PIPES AND FITTINGS, MANIFOLDS, CASTINGS AND OTHER NECESSARY APPURTENANCES THAT MAY NOT BE SUPPLIED BY CULTEC, INC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SUPPLIER TO CONFIRM WITH CULTEC THE MATERIALS PROVIDED.

BEFORE YOU BEGIN - REQUIRED MATERIALS AND EQUIPMENT

1. PROPER GEOTECHNICAL SOIL EVALUATION BY A QUALIFIED ENGINEER OR SOIL SCIENTIST TO DETERMINE SUITABILITY OF STRUCTURAL INSTALLATION
2. OSHA COMPLIANCE
3. CULTEC WARNING TAPE, OR EQUIVALENT
4. ASSURANCES FROM LOCAL UTILITIES THAT NO UNDERGROUND GAS, ELECTRICAL OR OTHER POTENTIALLY DANGEROUS PIPELINES OR CONDUITS ARE ALREADY BURIED AT THE SITE
5. ACCEPTABLE 1- 2 INCH (25 - 51 mm) WASHED, CRUSHED STONE AS DETAILED IN CULTEC'S INSTALLATION INSTRUCTIONS. CLEANLINESS OF STONE TO BE VERIFIED BY ENGINEER.
6. ACCEPTABLE FILL MATERIAL AS SHOWN IN CULTEC'S INSTALLATION INSTRUCTIONS.
7. ALL CULTEC CHAMBERS AND ACCESSORIES AS SPECIFIED IN THE ENGINEER'S PLANS INCLUDING NON-WOVEN GEOTEXTILE, CULTEC STORMFILTER AND CULTEC AFAB-HPF WOVEN GEOTEXTILE, WHERE APPLICABLE.
8. RECIPROCATING SAW OR ROUTER
9. STONE BUCKET
10. STONE CONVEYOR AND/OR TRACKED EXCAVATOR
11. TRANSIT OR LASER LEVEL MEASURING DEVICE
12. COMPACTION EQUIPMENT WITH MAXIMUM GROSS VEHICLE WEIGHT OF 12,000 LBS (5,440 KGS). VIBRATORY ROLLERS MAY ONLY BE USED ON THE STONE BASE PRIOR TO THE INSTALLATION OF CHAMBERS.
13. CHECK CULTEC CHAMBERS FOR DAMAGE PRIOR TO INSTALLATION. DO NOT USE DAMAGED CULTEC CHAMBERS, CONTACT YOUR SUPPLIER IMMEDIATELY TO REPORT DAMAGE OR PACKING-LIST DISCREPANCIES.

REQUIREMENTS FOR CULTEC CHAMBER SYSTEM INSTALLATIONS

1. INSTALLING CONTRACTORS ARE EXPECTED TO COMPREHEND AND USE THE MOST CURRENT INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING A SYSTEM INSTALLATION. IF THERE IS ANY QUESTION AS TO WHETHER YOU POSSESS THE MOST CURRENT INSTRUCTIONS, CONTACT CULTEC AT (203) 775-4416 OR VISIT WWW.CULTEC.COM.
2. CONTACT CULTEC AT LEAST THIRTY DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.
3. ALL CULTEC SYSTEM DESIGNS MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
4. USE CULTEC INSTALLATION INSTRUCTIONS AS A GUIDELINE ONLY FOR MINIMUM/MAXIMUM REQUIREMENTS. ACTUAL DESIGN MAY VARY. REFER TO APPROVED CONSTRUCTION DRAWINGS FOR JOB-SPECIFIC DETAILS. BE SURE TO FOLLOW THE ENGINEER'S DRAWINGS AS YOUR PRIMARY GUIDE.
5. THE FOUNDATION STONE SHALL BE LEVEL AND COMPACTED PRIOR TO CHAMBER INSTALLATION.
6. OVERLAPPING RIB CONNECTIONS OF CHAMBERS SHALL BE FULLY SHOULDERED PRIOR TO STONE PLACEMENT.
7. CENTER-TO-CENTER SPACING SHALL BE CHECKED AND MAINTAINED THROUGHOUT INSTALLATION PROCESS.
8. ANY DISCREPANCIES WITH THE SYSTEM SUB-GRADE SOIL'S BEARING CAPACITY MUST BE REPORTED TO THE DESIGN ENGINEER.
9. NON-WOVEN GEOTEXTILE MUST BE USED AS SPECIFIED IN THE ENGINEER'S DRAWINGS.
10. CULTEC REQUIRES THE CONTRACTOR TO REFER TO CULTEC'S INSTALLATION INSTRUCTIONS CONCERNING VEHICULAR TRAFFIC. RESPONSIBILITY FOR PREVENTING VEHICLES THAT EXCEED CULTEC'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE CHAMBER SYSTEM LIES SOLELY WITH THE CONTRACTOR THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS. THE PLACEMENT OF WARNING TAPE, TEMPORARY FENCING, AND/OR APPROPRIATELY LOCATED SIGNS IS HIGHLY RECOMMENDED. IMPRINTED WARNING TAPE IS AVAILABLE FROM CULTEC. FOR ACCEPTABLE VEHICLE LOAD INFORMATION, REFER TO CULTEC INSTALLATION INSTRUCTIONS.
11. TRAFFIC OF INSTALLATION EQUIPMENT OR OTHER VEHICULAR TRAFFIC OVER TOP OF THE CULTEC STORMWATER SYSTEM IS STRICTLY RESTRICTED AND PROHIBITED UNTIL SATISFACTORY COVER AND COMPACTION IS ACHIEVED ACCORDING TO CULTEC'S MANUFACTURER INSTALLATION INSTRUCTIONS.
12. EROSION AND SEDIMENT-CONTROL MEASURES MUST MEET LOCAL CODES AND THE DESIGN ENGINEER'S SPECIFICATIONS THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS.
13. CULTEC SYSTEMS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. FAILURE TO DO SO WILL VOID THE LIMITED WARRANTY.
14. CONTACT CULTEC, INC. AT 203-775-4416 WITH ANY QUESTIONS OR FURTHER CLARIFICATION OF REQUIREMENTS.
15. PLACEMENT OF EMBEDMENT STONE MUST BE IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS. STONE COLUMN HEIGHT DEFERENTIAL MUST NEVER EXCEED 12" (305 mm) BETWEEN CHAMBER ROWS, ADJACENT CHAMBERS OR STONE PERIMETER. STONE MUST BE PLACED OVER THE CROWN OF THE CHAMBERS TO ANCHOR THE CHAMBERS IN PLACE AND MAINTAIN ROW SPACING.
16. EMBEDMENT STONE MUST ONLY BE PLACED BY EXCAVATOR OR TELESCOPING CONVEYOR BOOM. PLACEMENT OF EMBEDMENT STONE WITH BULLDOZER IS NOT AN ACCEPTABLE METHOD OF INSTALLATION AND MAY CAUSE DAMAGE TO THE CHAMBERS. ANY CHAMBERS DAMAGED USING AN UNACCEPTABLE METHOD OF BACKFILL ARE NOT COVERED UNDER THE CULTEC LIMITED WARRANTY.

THIS DRAWING HAS BEEN PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO CULTEC UNDER THE DIRECTION OF THE PROJECT ENGINEER OF RECORD OR OTHER PROJECT REPRESENTATIVE. IT IS ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS, REGULATIONS AND MANUFACTURER REQUIREMENTS.

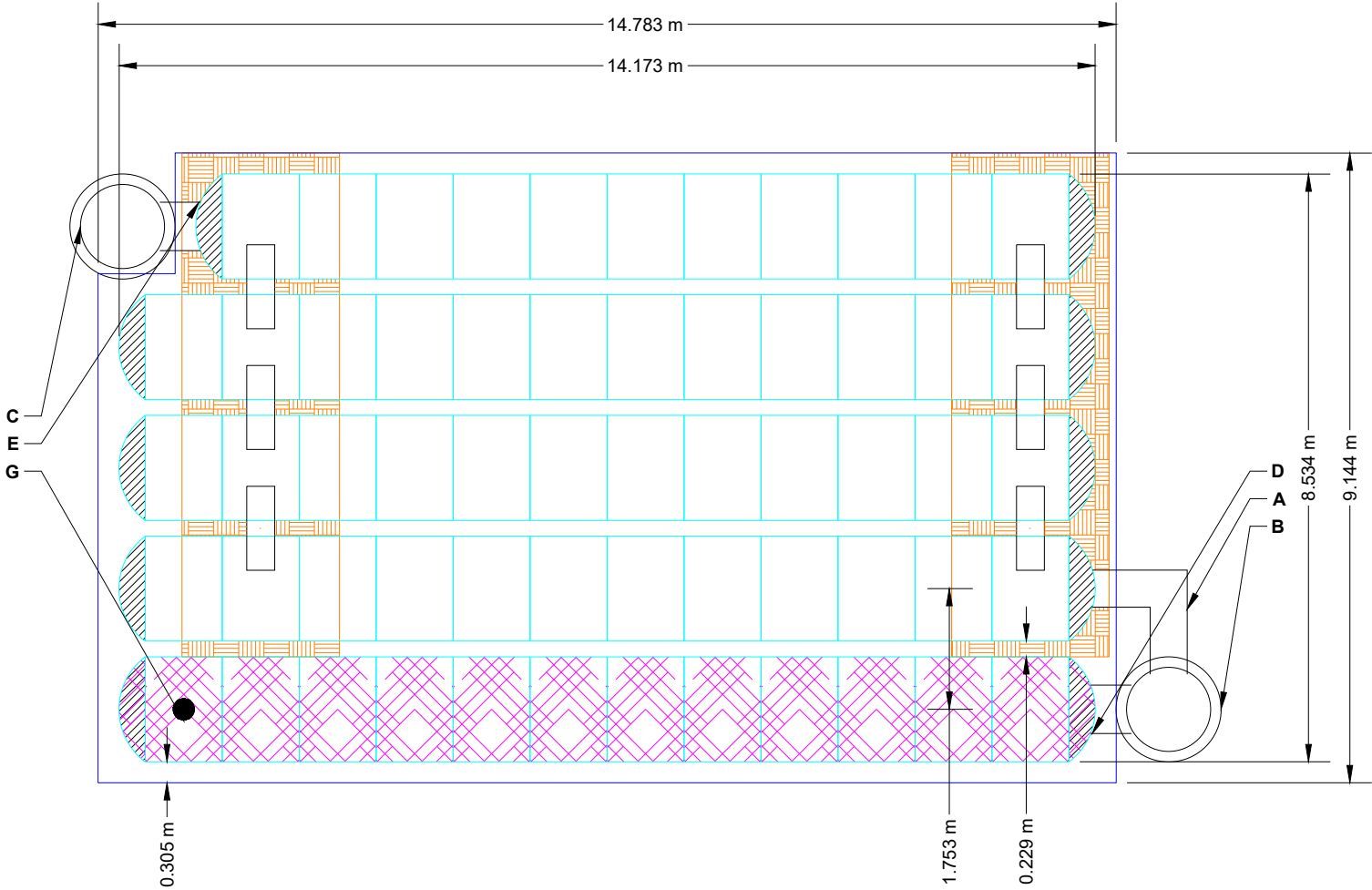
| PROPOSED STORMWATER MANAGEMENT SYSTEM ELEVATIONS (M) |        |
|------------------------------------------------------|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT OR UNPAVED) | 89.872 |
| MINIMUM ALLOWABLE GRADE (UNPAVED TRAFFIC)            | 86.824 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)      | 86.671 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)  | 86.671 |
| TOP OF STONE ELEVATION                               | 86.367 |
| TOP OF CHAMBER ELEVATION                             | 86.214 |
| 450 mm x 450 mm TOP MANIFOLD INVERT                  | 85.630 |
| 600 mm BOTTOM CONNECTION INVERT                      | 85.351 |
| 600 mm BOTTOM CONNECTION INVERT                      | 85.351 |
| BOTTOM OF CHAMBER ELEVATION                          | 85.300 |
| BOTTOM OF STONE ELEVATION                            | 85.000 |

| CULTEC STORMWATER MANAGEMENT SYSTEM SUMMARY |       |
|---------------------------------------------|-------|
| TOTAL STORAGE REQUIRED (CU. METERS)         | 110.0 |
| TOTAL STORAGE PROVIDED (CU. METERS)         | 110.7 |
| % STONE POROSITY                            | 40    |
| SYSTEM AREA (SQ. METERS)                    | 133.2 |
| DEPTH OF EMBEDMENT STONE (MM)               | 152   |
| DEPTH OF BEDDING STONE (MM)                 | 300   |
| SYSTEM PERIMETER (M)                        | 47.9  |
| SPACING BETWEEN CHAMBER ROWS (MM)           | 228.6 |

NOTES: ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY THE ENGINEER OF RECORD. ALL PROPOSED SYSTEM ELEVATIONS PROVIDED MUST BE VERIFIED BY THE ENGINEER OF RECORD ENGINEER AND THE ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

| MATERIALS LIST SUPPLIED BY CULTEC                |     |            |
|--------------------------------------------------|-----|------------|
| CULTEC RECHARGER 360HD CHAMBER                   | 59  | PIECES     |
| CULTEC RECHARGER 360HD END CAP                   | 10  | PIECES     |
| CULTEC HVLV FC-48 FEED CONNECTOR                 | 6   | PIECES     |
| CULTEC No.410 NON-WOVEN GEOTEXTILE (40% OVERAGE) | 495 | SQ. METERS |
| CULTEC AFAB-HPF WOVEN GEOTEXTILE (10% OVERAGE)   | 37  | METERS     |
| CULTEC INSPECTION PORT KIT                       | 1   | PIECES     |
| MATERIALS LIST NOT SUPPLIED BY CULTEC            |     |            |
| 1-2 INCH WASHED, CRUSHED STONE                   | 119 | CU. METERS |

| CULTEC RECHARGER 360HD LEGEND                                                       |                                              |
|-------------------------------------------------------------------------------------|----------------------------------------------|
|  | CULTEC RECHARGER 360HD CHAMBER               |
|  | CULTEC RECHARGER 360HD END CAP               |
|  | CULTEC HVLV FC-48 FEED CONNECTORS            |
|  | CULTEC SEPARATOR ROW / ADS ISOLATOR ROW PLUS |
|  | CULTEC WOVEN GEOTEXTILE                      |
|  | STONE BORDER                                 |



1 SYSTEM LAYOUT SHEET 1 / 100

\*INVERT ABOVE BASE OF CHAMBER

| PART TYPE            | ITEM ON LAYOUT | DESCRIPTION                                                                                | INVERT* |
|----------------------|----------------|--------------------------------------------------------------------------------------------|---------|
| ELEVATED BYPASS PIPE | A              | 450 mm HIGH-FLOW BYPASS PIPE (PROVIDED BY OTHERS)                                          | 330 mm  |
| CONCRETE STRUCTURE   | B              | INLET STRUCTURE (DESIGN BY ENGINEER / PROVIDED BY OTHERS)                                  |         |
| CONCRETE STRUCTURE   | C              | OUTLET STRUCTURE (DESIGN BY ENGINEER / PROVIDED BY OTHERS)                                 |         |
| INLET PIPE           | D              | 600 mm INLET/CULTEC SEPARATOR ROW / ADS ISOLATOR ROW PLUS ACCESS PIPE (PROVIDED BY OTHERS) | 51 mm   |
| OUTLET PIPE          | E              | 600 mm OUTLET PIPE (PROVIDED BY OTHERS)                                                    | 51 mm   |
| INSPECTION PORT      | G              | 6"-10" UNIVERSAL (SEE DETAIL)                                                              |         |

| CULTEC STORMWATER CHAMBER |            |            |        |
|---------------------------|------------|------------|--------|
| PROJECT :                 | DATE:      | 08/14/2026 |        |
|                           | CHECKED:   | N/A        |        |
| DESIGNED BY:              | StormGenie | SHEET      | 2 OF 4 |
| SCALE:                    | 1 / 100    |            |        |

MATTAMY HOMES WATERIDGE VILLAGE BLOCK 23

OTTAWA, ON, CANADA

SYSTEM LAYOUT SHEET



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Date: 08/14/2026

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**PROJECT INFORMATION**

**Project Name:** Mattamy Homes Wateridge Village Block 23  
**City:** Ottawa  
**State / Province:** ON  
**Country:** Canada

Chamber Model:

Number of Rows:

Total Number of Chambers :

Stone Void :

Stone Base :

Stone Above Units :

Area :

Base of Stone Elevation:

| Recharger 360HD |                |
|-----------------|----------------|
| 5               | units          |
| 59              | units          |
| 40              | %              |
| 300             | mm             |
| 152             | mm             |
| 133.22          | m <sup>2</sup> |
| 85.00           | m              |

**133.12 Min. Area Required**

*Note: Min. Area required is based on 305 mm around the system and typ. spacing*

**Mattamy Homes Wateridge Village Block 23  
Recharger 360HD Incremental Storage Volumes**

| Height of System | Chamber Volume | Stone Volume   | Cumulative Storage Volume | Total Cumulative Storage Volume | Elevation |
|------------------|----------------|----------------|---------------------------|---------------------------------|-----------|
| mm               | m <sup>3</sup> | m <sup>3</sup> | m <sup>3</sup>            | m <sup>3</sup>                  | m         |
| 1372             | 0.000          | 1.35           | 1.35                      | 110.88                          | 86.37     |
| 1346             | 0.000          | 1.35           | 1.35                      | 109.53                          | 86.35     |
| 1321             | 0.000          | 1.35           | 1.35                      | 108.18                          | 86.32     |
| 1295             | 0.000          | 1.35           | 1.35                      | 106.83                          | 86.30     |
| 1270             | 0.000          | 1.35           | 1.35                      | 105.47                          | 86.27     |
| 1245             | 0.000          | 1.35           | 1.35                      | 104.12                          | 86.24     |
| 1219             | 0.137          | 1.30           | 1.43                      | 102.77                          | 86.22     |
| 1194             | 0.290          | 1.24           | 1.53                      | 101.33                          | 86.19     |
| 1168             | 0.431          | 1.18           | 1.61                      | 99.81                           | 86.17     |
| 1143             | 0.727          | 1.06           | 1.79                      | 98.20                           | 86.14     |
| 1118             | 0.918          | 0.99           | 1.90                      | 96.41                           | 86.12     |
| 1092             | 1.062          | 0.93           | 1.99                      | 94.50                           | 86.09     |
| 1067             | 1.182          | 0.88           | 2.06                      | 92.51                           | 86.07     |
| 1041             | 1.286          | 0.84           | 2.12                      | 90.45                           | 86.04     |
| 1016             | 1.378          | 0.80           | 2.18                      | 88.33                           | 86.02     |
| 991              | 1.461          | 0.77           | 2.23                      | 86.15                           | 85.99     |
| 965              | 1.537          | 0.74           | 2.27                      | 83.92                           | 85.97     |
| 940              | 1.607          | 0.71           | 2.32                      | 81.64                           | 85.94     |
| 914              | 1.673          | 0.68           | 2.36                      | 79.33                           | 85.91     |
| 889              | 1.733          | 0.66           | 2.39                      | 76.97                           | 85.89     |
| 864              | 1.788          | 0.64           | 2.43                      | 74.58                           | 85.86     |
| 838              | 1.839          | 0.62           | 2.46                      | 72.15                           | 85.84     |
| 813              | 1.887          | 0.60           | 2.49                      | 69.70                           | 85.81     |
| 787              | 1.933          | 0.58           | 2.51                      | 67.21                           | 85.79     |
| 762              | 1.976          | 0.56           | 2.54                      | 64.70                           | 85.76     |
| 737              | 2.013          | 0.55           | 2.56                      | 62.16                           | 85.74     |
| 711              | 2.052          | 0.53           | 2.58                      | 59.60                           | 85.71     |
| 686              | 2.088          | 0.52           | 2.61                      | 57.02                           | 85.69     |
| 660              | 2.122          | 0.50           | 2.63                      | 54.41                           | 85.66     |
| 635              | 2.155          | 0.49           | 2.65                      | 51.79                           | 85.63     |
| 610              | 2.183          | 0.48           | 2.66                      | 49.14                           | 85.61     |
| 584              | 2.212          | 0.47           | 2.68                      | 46.48                           | 85.58     |
| 559              | 2.240          | 0.46           | 2.70                      | 43.80                           | 85.56     |
| 533              | 2.264          | 0.45           | 2.71                      | 41.10                           | 85.53     |
| 508              | 2.289          | 0.44           | 2.73                      | 38.39                           | 85.51     |
| 483              | 2.313          | 0.43           | 2.74                      | 35.66                           | 85.48     |
| 457              | 2.336          | 0.42           | 2.75                      | 32.92                           | 85.46     |
| 432              | 2.354          | 0.41           | 2.77                      | 30.17                           | 85.43     |
| 406              | 2.374          | 0.40           | 2.78                      | 27.41                           | 85.41     |
| 381              | 2.391          | 0.40           | 2.79                      | 24.63                           | 85.38     |
| 356              | 2.409          | 0.39           | 2.80                      | 21.84                           | 85.36     |
| 330              | 2.432          | 0.38           | 2.81                      | 19.04                           | 85.33     |
| 305              | 0.000          | 1.35           | 1.35                      | 16.23                           | 85.30     |
| 279              | 0.000          | 1.35           | 1.35                      | 14.88                           | 85.28     |
| 254              | 0.000          | 1.35           | 1.35                      | 13.53                           | 85.25     |
| 229              | 0.000          | 1.35           | 1.35                      | 12.17                           | 85.23     |
| 203              | 0.000          | 1.35           | 1.35                      | 10.82                           | 85.20     |
| 178              | 0.000          | 1.35           | 1.35                      | 9.47                            | 85.18     |
| 152              | 0.000          | 1.35           | 1.35                      | 8.12                            | 85.15     |
| 127              | 0.000          | 1.35           | 1.35                      | 6.76                            | 85.13     |
| 102              | 0.000          | 1.35           | 1.35                      | 5.41                            | 85.10     |
| 76               | 0.000          | 1.35           | 1.35                      | 4.06                            | 85.08     |
| 51               | 0.000          | 1.35           | 1.35                      | 2.71                            | 85.05     |

| Mattamy Homes Wateridge Village Block 23    |                |                |                           |                                 |           |
|---------------------------------------------|----------------|----------------|---------------------------|---------------------------------|-----------|
| Recharger 360HD Incremental Storage Volumes |                |                |                           |                                 |           |
| Height of System                            | Chamber Volume | Stone Volume   | Cumulative Storage Volume | Total Cumulative Storage Volume | Elevation |
| mm                                          | m <sup>3</sup> | m <sup>3</sup> | m <sup>3</sup>            | m <sup>3</sup>                  | m         |
| 25                                          | 0.000          | 1.35           | 1.35                      | 1.35                            | 85.03     |
| 0                                           | 0.000          |                |                           |                                 | 85.00     |



## **C.5 Stormceptor EFO8 Specifications**



## Imbrium® Systems

## ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

08/14/2026

|                           |                |                   |                            |
|---------------------------|----------------|-------------------|----------------------------|
| Province:                 | Ontario        | Project Name:     | Wateridge Block 23         |
| City:                     | Ottawa         | Project Number:   | 160402276                  |
| Nearest Rainfall Station: | OTTAWA CDA RCS | Designer Name:    | Alyssa Gladish             |
| Climate Station Id:       | 6105978        | Designer Company: | Stantec Consulting Ltd.    |
| Years of Rainfall Data:   | 20             | Designer Email:   | alyssa.gladish@stantec.com |
|                           |                | Designer Phone:   | 587-721-1241               |
| Site Name:                | OGS1           | EOR Name:         |                            |
|                           |                | EOR Company:      |                            |
| Drainage Area (ha):       | 2.09           | EOR Email:        |                            |
| Runoff Coefficient 'c':   | 0.74           | EOR Phone:        | ###-###-####               |

|                                                   |        |
|---------------------------------------------------|--------|
| Particle Size Distribution:                       | Fine   |
| Target TSS Removal (%):                           | 80.0   |
| Required Water Quality Runoff Volume Capture (%): | 90.00  |
| Estimated Water Quality Flow Rate (L/s):          | 49.92  |
| Oil / Fuel Spill Risk Site?                       | Yes    |
| Upstream Flow Control?                            | No     |
| Peak Conveyance (maximum) Flow Rate (L/s):        | 342.00 |
| Influent TSS Concentration (mg/L):                | 200    |
| Estimated Average Annual Sediment Load (kg/yr):   | 1794   |
| Estimated Average Annual Sediment Volume (L/yr):  | 1458   |

**Net Annual Sediment  
(TSS) Load Reduction  
Sizing Summary**

| Stormceptor Model | TSS Removal Provided (%) |
|-------------------|--------------------------|
| EFO4              | 63                       |
| EFO5              | 72                       |
| EFO6              | 78                       |
| <b>EFO8</b>       | <b>86</b>                |
| EFO10             | 91                       |
| EFO12             | 94                       |

**Recommended Stormceptor EFO Model:** **EFO8**  
**Estimated Net Annual Sediment (TSS) Load Reduction (%):** **86**  
**Water Quality Runoff Volume Capture (%):** **> 90**

### THIRD-PARTY TESTING AND VERIFICATION

► **Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

### PERFORMANCE

► **Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterways.

### PARTICLE SIZE DISTRIBUTION (PSD)

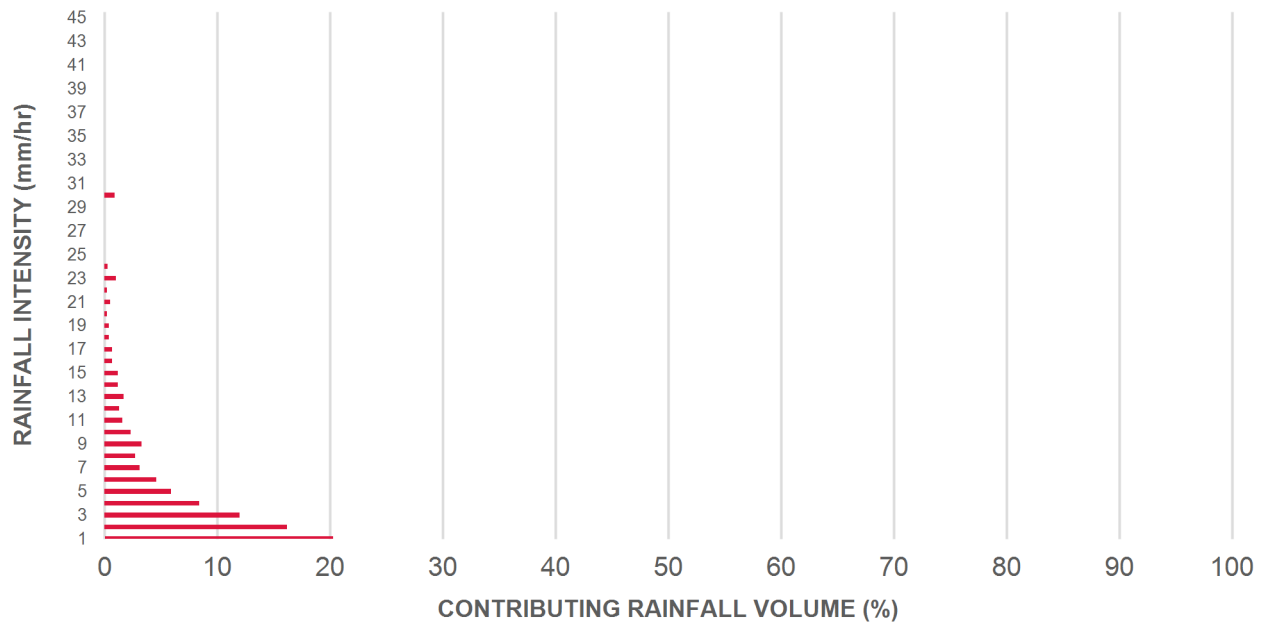
► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

| Particle Size (µm) | Percent Less Than | Particle Size Fraction (µm) | Percent |
|--------------------|-------------------|-----------------------------|---------|
| 1000               | 100               | 500-1000                    | 5       |
| 500                | 95                | 250-500                     | 5       |
| 250                | 90                | 150-250                     | 15      |
| 150                | 75                | 100-150                     | 15      |
| 100                | 60                | 75-100                      | 10      |
| 75                 | 50                | 50-75                       | 5       |
| 50                 | 45                | 20-50                       | 10      |
| 20                 | 35                | 8-20                        | 15      |
| 8                  | 20                | 5-8                         | 10      |
| 5                  | 10                | 2-5                         | 5       |
| 2                  | 5                 | <2                          | 5       |

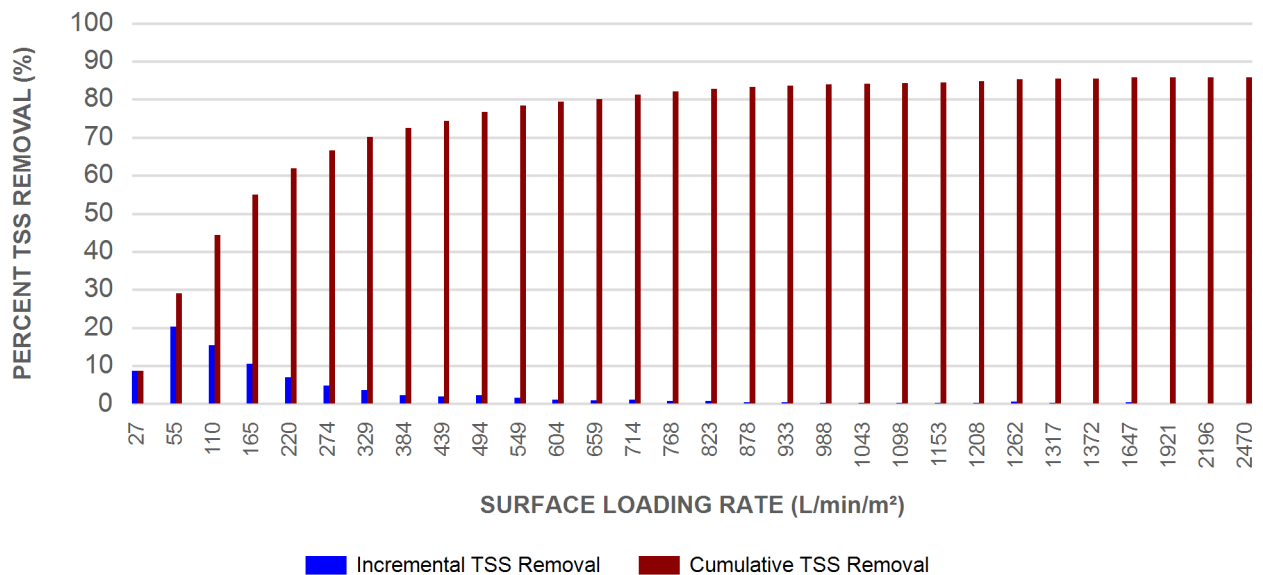
| Rainfall Intensity (mm / hr)                         | Percent Rainfall Volume (%) | Cumulative Rainfall Volume (%) | Flow Rate (L/s) | Flow Rate (L/min) | Surface Loading Rate (L/min/m²) | Removal Efficiency (%) | Incremental Removal (%) | Cumulative Removal (%) |
|------------------------------------------------------|-----------------------------|--------------------------------|-----------------|-------------------|---------------------------------|------------------------|-------------------------|------------------------|
| 0.50                                                 | 8.6                         | 8.6                            | 2.15            | 129.0             | 27.0                            | 100                    | 8.6                     | 8.6                    |
| 1.00                                                 | 20.3                        | 29.0                           | 4.30            | 258.0             | 55.0                            | 100                    | 20.3                    | 29.0                   |
| 2.00                                                 | 16.2                        | 45.2                           | 8.60            | 516.0             | 110.0                           | 95                     | 15.3                    | 44.3                   |
| 3.00                                                 | 12.0                        | 57.2                           | 12.90           | 774.0             | 165.0                           | 88                     | 10.6                    | 54.9                   |
| 4.00                                                 | 8.4                         | 65.6                           | 17.20           | 1032.0            | 220.0                           | 82                     | 6.9                     | 61.8                   |
| 5.00                                                 | 5.9                         | 71.6                           | 21.50           | 1290.0            | 274.0                           | 80                     | 4.7                     | 66.6                   |
| 6.00                                                 | 4.6                         | 76.2                           | 25.80           | 1548.0            | 329.0                           | 77                     | 3.6                     | 70.1                   |
| 7.00                                                 | 3.1                         | 79.3                           | 30.10           | 1806.0            | 384.0                           | 75                     | 2.3                     | 72.4                   |
| 8.00                                                 | 2.7                         | 82.0                           | 34.40           | 2064.0            | 439.0                           | 72                     | 2.0                     | 74.4                   |
| 9.00                                                 | 3.3                         | 85.3                           | 38.70           | 2322.0            | 494.0                           | 70                     | 2.3                     | 76.7                   |
| 10.00                                                | 2.3                         | 87.6                           | 43.00           | 2580.0            | 549.0                           | 67                     | 1.5                     | 78.3                   |
| 11.00                                                | 1.6                         | 89.2                           | 47.30           | 2838.0            | 604.0                           | 65                     | 1.0                     | 79.3                   |
| 12.00                                                | 1.3                         | 90.5                           | 51.59           | 3096.0            | 659.0                           | 64                     | 0.8                     | 80.1                   |
| 13.00                                                | 1.7                         | 92.2                           | 55.89           | 3354.0            | 714.0                           | 64                     | 1.1                     | 81.2                   |
| 14.00                                                | 1.2                         | 93.5                           | 60.19           | 3612.0            | 768.0                           | 63                     | 0.8                     | 82.0                   |
| 15.00                                                | 1.2                         | 94.6                           | 64.49           | 3870.0            | 823.0                           | 63                     | 0.7                     | 82.7                   |
| 16.00                                                | 0.7                         | 95.3                           | 68.79           | 4128.0            | 878.0                           | 63                     | 0.4                     | 83.2                   |
| 17.00                                                | 0.7                         | 96.1                           | 73.09           | 4386.0            | 933.0                           | 62                     | 0.5                     | 83.6                   |
| 18.00                                                | 0.4                         | 96.5                           | 77.39           | 4644.0            | 988.0                           | 62                     | 0.2                     | 83.9                   |
| 19.00                                                | 0.4                         | 96.9                           | 81.69           | 4901.0            | 1043.0                          | 61                     | 0.2                     | 84.1                   |
| 20.00                                                | 0.2                         | 97.1                           | 85.99           | 5159.0            | 1098.0                          | 59                     | 0.1                     | 84.3                   |
| 21.00                                                | 0.5                         | 97.5                           | 90.29           | 5417.0            | 1153.0                          | 58                     | 0.3                     | 84.5                   |
| 22.00                                                | 0.2                         | 97.8                           | 94.59           | 5675.0            | 1208.0                          | 57                     | 0.1                     | 84.7                   |
| 23.00                                                | 1.0                         | 98.8                           | 98.89           | 5933.0            | 1262.0                          | 56                     | 0.6                     | 85.2                   |
| 24.00                                                | 0.3                         | 99.1                           | 103.19          | 6191.0            | 1317.0                          | 54                     | 0.1                     | 85.4                   |
| 25.00                                                | 0.0                         | 99.1                           | 107.49          | 6449.0            | 1372.0                          | 53                     | 0.0                     | 85.4                   |
| 30.00                                                | 0.9                         | 100.0                          | 128.99          | 7739.0            | 1647.0                          | 45                     | 0.4                     | 85.8                   |
| 35.00                                                | 0.0                         | 100.0                          | 150.48          | 9029.0            | 1921.0                          | 38                     | 0.0                     | 85.8                   |
| 40.00                                                | 0.0                         | 100.0                          | 171.98          | 10319.0           | 2196.0                          | 33                     | 0.0                     | 85.8                   |
| 45.00                                                | 0.0                         | 100.0                          | 193.48          | 11609.0           | 2470.0                          | 30                     | 0.0                     | 85.8                   |
| Estimated Net Annual Sediment (TSS) Load Reduction = |                             |                                |                 |                   |                                 |                        |                         | 86 %                   |

Climate Station ID: 6105978 Years of Rainfall Data: 20

### RAINFALL DATA FROM OTTAWA CDA RCS RAINFALL STATION



### INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



## Maximum Pipe Diameter / Peak Conveyance

| Stormceptor<br>EF / EFO | Model Diameter |      | Min Angle Inlet /<br>Outlet Pipes | Max Inlet Pipe<br>Diameter |      | Max Outlet Pipe<br>Diameter |      | Peak Conveyance<br>Flow Rate |       |
|-------------------------|----------------|------|-----------------------------------|----------------------------|------|-----------------------------|------|------------------------------|-------|
|                         | (m)            | (ft) |                                   | (mm)                       | (in) | (mm)                        | (in) | (L/s)                        | (cfs) |
| EF4 / EFO4              | 1.2            | 4    | 90                                | 609                        | 24   | 609                         | 24   | 425                          | 15    |
| EF5 / EFO5              | 1.5            | 5    | 90                                | 762                        | 30   | 762                         | 30   | 710                          | 25    |
| EF6 / EFO6              | 1.8            | 6    | 90                                | 914                        | 36   | 914                         | 36   | 990                          | 35    |
| EF8 / EFO8              | 2.4            | 8    | 90                                | 1219                       | 48   | 1219                        | 48   | 1700                         | 60    |
| EF10 / EFO10            | 3.0            | 10   | 90                                | 1828                       | 72   | 1828                        | 72   | 2830                         | 100   |
| EF12 / EFO12            | 3.6            | 12   | 90                                | 1828                       | 72   | 1828                        | 72   | 2830                         | 100   |

## SCOUR PREVENTION AND ONLINE CONFIGURATION

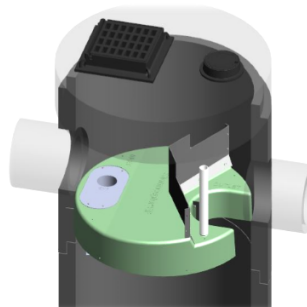
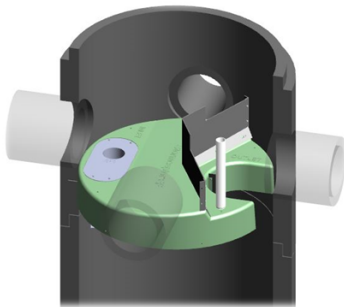
► Stormceptor® EF and EFO feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

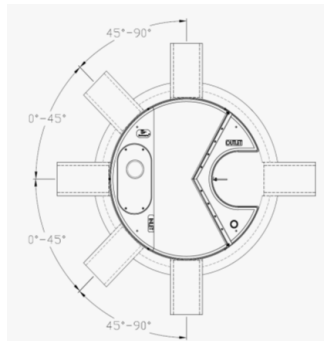
## DESIGN FLEXIBILITY

► Stormceptor® EF and EFO offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

## OIL CAPTURE AND RETENTION

► While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, Stormceptor® EFO has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.



**INLET-TO-OUTLET DROP**

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

**HEAD LOSS**

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1.

For submerged conditions the applicable K value is 3.0.

**Pollutant Capacity**

| Stormceptor EF / EFO | Model Diameter |      | Depth (Outlet Pipe Invert to Sump Floor) |      | Oil Volume |       | Recommended Sediment Maintenance Depth * |      | Maximum Sediment Volume * |       | Maximum Sediment Mass ** |        |
|----------------------|----------------|------|------------------------------------------|------|------------|-------|------------------------------------------|------|---------------------------|-------|--------------------------|--------|
|                      | (m)            | (ft) | (m)                                      | (ft) | (L)        | (Gal) | (mm)                                     | (in) | (L)                       | (ft³) | (kg)                     | (lb)   |
| EF4 / EFO4           | 1.2            | 4    | 1.52                                     | 5.0  | 265        | 70    | 203                                      | 8    | 1190                      | 42    | 1904                     | 5250   |
| EF5 / EFO5           | 1.5            | 5    | 1.62                                     | 5.3  | 420        | 111   | 305                                      | 10   | 2124                      | 75    | 2612                     | 5758   |
| EF6 / EFO6           | 1.8            | 6    | 1.93                                     | 6.3  | 610        | 160   | 305                                      | 12   | 3470                      | 123   | 5552                     | 15375  |
| EF8 / EFO8           | 2.4            | 8    | 2.59                                     | 8.5  | 1070       | 280   | 610                                      | 24   | 8780                      | 310   | 14048                    | 38750  |
| EF10 / EFO10         | 3.0            | 10   | 3.25                                     | 10.7 | 1670       | 440   | 610                                      | 24   | 17790                     | 628   | 28464                    | 78500  |
| EF12 / EFO12         | 3.6            | 12   | 3.89                                     | 12.8 | 2475       | 655   | 610                                      | 24   | 31220                     | 1103  | 49952                    | 137875 |

\*Increased sump depth may be added to increase sediment storage capacity

\*\* Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft³)

| Feature                                                                 | Benefit                                           | Feature Appeals To                                  |
|-------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------|
| Patent-pending enhanced flow treatment and scour prevention technology  | Superior, verified third-party performance        | Regulator, Specifying & Design Engineer             |
| Third-party verified light liquid capture and retention for EFO version | Proven performance for fuel/oil hotspot locations | Regulator, Specifying & Design Engineer, Site Owner |
| Functions as bend, junction or inlet structure                          | Design flexibility                                | Specifying & Design Engineer                        |
| Minimal drop between inlet and outlet                                   | Site installation ease                            | Contractor                                          |
| Large diameter outlet riser for inspection and maintenance              | Easy maintenance access from grade                | Maintenance Contractor & Site Owner                 |

**STANDARD STORMCEPTOR EF/EFO DRAWINGS**

For standard details, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>

**STANDARD STORMCEPTOR EF/EFO SPECIFICATION**

For specifications, please visit <http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef>



## STANDARD PERFORMANCE SPECIFICATION FOR “OIL GRIT SEPARATOR” (OGS) STORMWATER QUALITY TREATMENT DEVICE

### PART 1 – GENERAL

#### 1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

#### 1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators**

#### 1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

### PART 2 – PRODUCTS

#### 2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

|       |                                     |                                             |
|-------|-------------------------------------|---------------------------------------------|
| 2.1.1 | 4 ft (1219 mm) Diameter OGS Units:  | 1.19 m <sup>3</sup> sediment / 265 L oil    |
|       | 5 ft (1524 mm) Diameter OGS Units:  | 1.95 m <sup>3</sup> sediment / 420 L oil    |
|       | 6 ft (1829 mm) Diameter OGS Units:  | 3.48 m <sup>3</sup> sediment / 609 L oil    |
|       | 8 ft (2438 mm) Diameter OGS Units:  | 8.78 m <sup>3</sup> sediment / 1,071 L oil  |
|       | 10 ft (3048 mm) Diameter OGS Units: | 17.78 m <sup>3</sup> sediment / 1,673 L oil |
|       | 12 ft (3657 mm) Diameter OGS Units: | 31.23 m <sup>3</sup> sediment / 2,476 L oil |

### PART 3 – PERFORMANCE & DESIGN

### 3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

### 3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m<sup>2</sup> to 1400 L/min/m<sup>2</sup>, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m<sup>2</sup> and 1400 L/min/m<sup>2</sup> shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m<sup>2</sup> shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m<sup>2</sup>. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m<sup>2</sup>.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m<sup>2</sup> shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m<sup>2</sup>, and shall be calculated using a simple proportioning formula, with 1400 L/min/m<sup>2</sup> in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m<sup>2</sup>.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

### 3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**.

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m<sup>2</sup>.

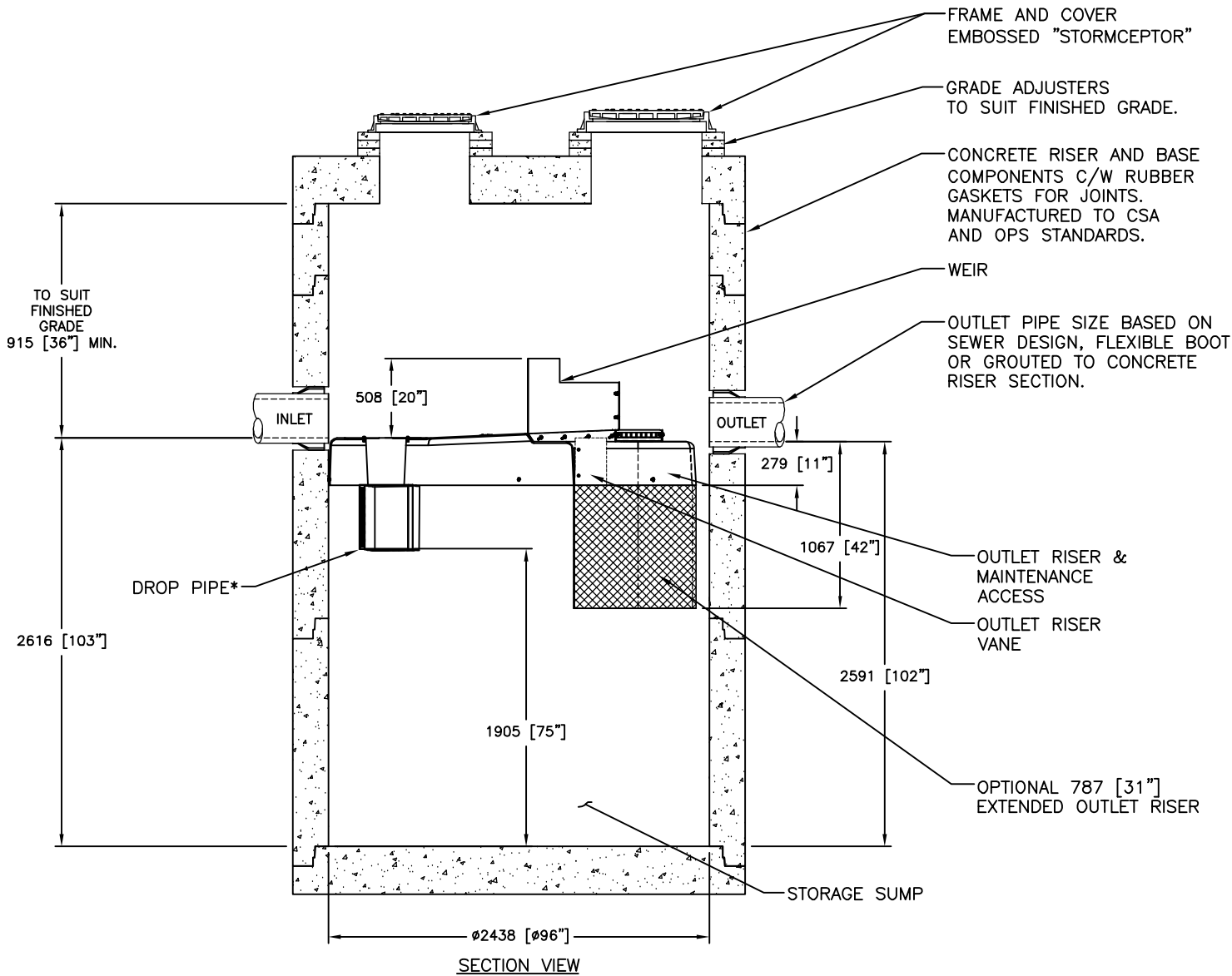
### 3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid

Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators**, with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m<sup>2</sup> to 2600 L/min/m<sup>2</sup>) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators**. However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

DRAWING NOT TO BE USED FOR CONSTRUCTION

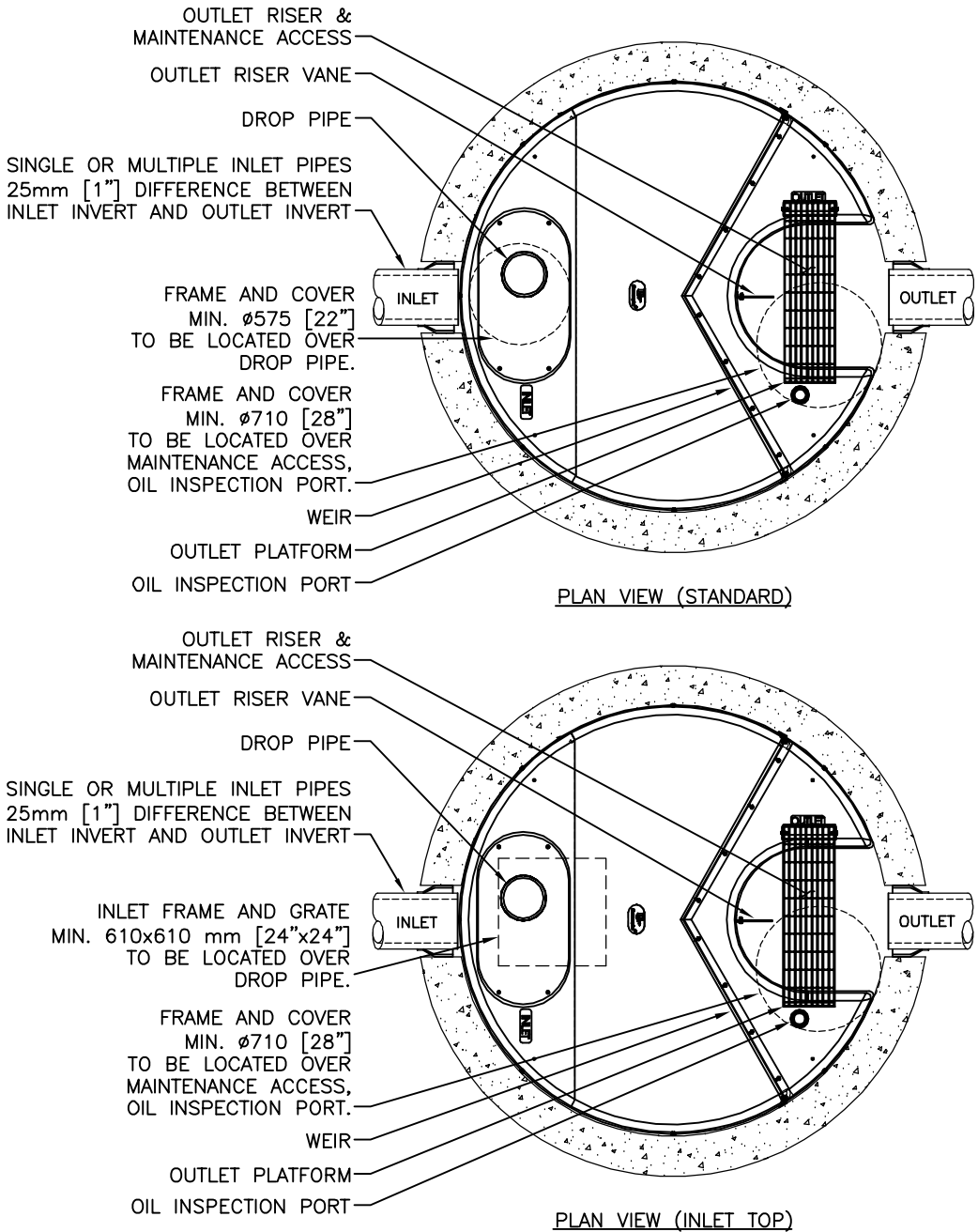


- GENERAL NOTES:**
- \* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m<sup>2</sup> (27.9 gpm/ft<sup>2</sup>) FOR STORMCEPTOR EF8 AND 535 L/min/m<sup>2</sup> (13.1 gpm/ft<sup>2</sup>) FOR STORMCEPTOR EFO8 (OIL CAPTURE CONFIGURATION).
  - ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
  - STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
  - UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
  - DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
  - NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

- INSTALLATION NOTES**
- A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
  - B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
  - C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
  - D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
  - E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

STANDARD DETAIL  
NOT FOR CONSTRUCTION



| SITE SPECIFIC DATA REQUIREMENTS  |      |       |     |         |     |
|----------------------------------|------|-------|-----|---------|-----|
| STORMCEPTOR MODEL                |      | EFO8  |     |         |     |
| STRUCTURE ID                     |      | *     |     |         |     |
| HYDROCARBON STORAGE REQ'D (L)    |      | *     |     |         |     |
| WATER QUALITY FLOW RATE (L/s)    |      | *     |     |         |     |
| PEAK FLOW RATE (L/s)             |      | *     |     |         |     |
| RETURN PERIOD OF PEAK FLOW (yrs) |      | *     |     |         |     |
| DRAINAGE AREA (HA)               |      | *     |     |         |     |
| DRAINAGE AREA IMPERVIOUSNESS (%) |      | *     |     |         |     |
| PIPE DATA:                       | I.E. | MAT'L | DIA | SLOPE % | HGL |
| INLET #1                         | *    | *     | *   | *       | *   |
| INLET #2                         | *    | *     | *   | *       | *   |
| OUTLET                           | *    | *     | *   | *       | *   |
| * PER ENGINEER OF RECORD         |      |       |     |         |     |

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|      |      |      |      |                 |                 |                      |
|------|------|------|------|-----------------|-----------------|----------------------|
| #### | #### | #### | #### | JSK             | JSK             | BY                   |
| #### | #### | #### | #### | OUTLET PLATFORM | INITIAL RELEASE | REVISION DESCRIPTION |
| #### | #### | #### | #### | 6/8/18          | 5/26/17         | DATE                 |
| #### | #### | #### | #### | 1               | 0               | MARK                 |

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TEL: 800-385-4801 CA: 416-860-9600 INTL: +1-416-860-9600  
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DATE: 10/13/2017

|                   |                 |
|-------------------|-----------------|
| DESIGNED: JSK     | DRAWN: JSK      |
| CHECKED: BSF      | APPROVED: *     |
| PROJECT No.: EFO8 | SEQUENCE No.: * |
| SHEET: 1          | OF 1            |

## **Appendix D Geotechnical Report Excerpts**



# **Geotechnical Investigation**

## **Proposed Residential Development**

Wateridge Village Phases 6, 7 & 8  
Ottawa, Ontario

Prepared for Canada Lands Company c/o Arcadis IBI Group

Report PG6331-1 Revision 5 dated December 10, 2024



## **4.0 Observations**

### **4.1 Surface Conditions**

The subject site was part of the lots acquired by the Department of National Defense in the 1890's and used as a military base known as CFB Rockcliffe until the early 2010's.

The subject site was occupied by single family dwellings, residential buildings, car parking areas, in addition to some landscaped areas with scattered mature trees and grass covered surface. However, during the construction of various stages of the Wateridge development, several areas of the subject site had been utilized by the local contractors by placing construction trailers, generators and stockpiling fill and blast rock material and equipment for the installation of the municipal services and construction of the proposed roadways surrounding the subject site.

Historical aerial photographs of the subject site and its surroundings are provided in Figures 2, 3, and 4 - Aerial Photographs, in Appendix 2.

A steep escarpment covered by tall mature trees was observed along the north boundary of the site. The ground surface across this slope generally slopes down towards the north direction from approximate geodetic elevations of 86.8 to 54.9 m.

The site is generally bordered by the above noted slope and further by Sir-George-Etienne-Cartier Road and Rockcliffe Waterfall and Pond to the north, undeveloped land and commercial developments to the east, and by future residential development to the south and west.

The ground surface across the subject site generally slopes down toward the north and east directions, from approximate geodetic elevations 93.2 to 81.9 m.

### **4.2 Subsurface Profile**

#### **Overburden**

Generally, the subsurface soil profile encountered at the test hole locations consists of fill extending to a maximum depth of 3.3 m below existing grade, underlain by silty sand, silty clay, glacial till and/or bedrock surface.

The silty clay deposit was encountered within the central-east and western portions of the site, and it was observed to consist of a hard to stiff brown silty clay crust underlain by a stiff to firm grey silty clay and/or a deposit of very dense to compact glacial till.



Loose to compact brown silty sand was encountered below the fill in some boreholes. The glacial till deposit was generally observed to consist of compact to very dense silty sand to silty clay with gravel, cobbles, and boulders.

Practical refusal to augering, DCPT testing, and excavation was encountered at depths ranging from 0.3 to 13.64 m below the existing ground surface at various boreholes locations across the subject site.

Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for the details of the soil profile encountered at each test hole location.

## **Bedrock**

Based on available geological mapping, the bedrock across the majority of the site consists of shale of the Rockcliffe formation and interbedded limestone and dolomite of the Gull River formation in the south portion of the site with an approximate overburden thickness across the majority of the subject site ranging between 1 to 4 m.

## **Atterberg Limit Tests**

Atterberg limits testing, as well as associated moisture content testing, was completed on the recovered silty clay samples. The results of the Atterberg limits test are presented in Table 1 and on the Atterberg Limits Results sheet in Appendix 1. The tested silty clay samples classify as inorganic silts of high plasticity (MH), inorganic clays of low plasticity (CL), and inorganic clays of high plasticity (CH) in accordance with the Unified Soil Classification System.

## **Shrinkage Testing**

Linear shrinkage testing was completed on samples recovered from 1.07 m depth from boreholes BH 21-22 and BH 40-22 and from 1.83 m depth from borehole BH 65-22. The shrinkage limit and shrinkage ratio of the tested silty clay sample (BH 21-22) were found to be 21.22% and 1.72, respectively. The shrinkage limit and shrinkage ratio of the tested silty clay sample (BH 40-22) were found to be 20.59% and 1.75, respectively.

## **4.3 Low Impact Development Feasibility (LID)**

It is understood that Low Impact Development Measures (LID) are being considered to be implemented for the proposed development. In order to assess the feasibility of LID measures, permeameter testing and long-term groundwater monitoring have been completed at the subject site. Testing was completed between September 6 and September 7, 2022 and in dry conditions (greater than 48 hours removed from any significant rainfall events of 15 mm depth or more).

### **Permeameter Testing Results**

Preparation and testing of this investigation was done in accordance with the Canadian Standards Association (CSA) B65-12-Annex E. Field saturated hydraulic conductivity ( $K_{fs}$ ) values and estimated infiltration values are presented in Table 3 below.

Field saturated hydraulic conductivity values were determined using the Engineering Technologies Canada (ETC) Ltd. Reference tables provided in the most recent ETC Past Permeameter User Guide dated July 2018. Infiltration rates have been determined based on the relationship described in Appendix C of the Credit Valley Conservation Authority and Toronto and Region Conservation Authority Low Impact Development Stormwater Management Planning and Design Guide (2011). The testing locations are presented on Drawing PG6331-5 – In-Situ Infiltration Testing Location Plan included in Appendix 2.

The measured  $K_{fs}$  values are consistent with similar material Paterson has encountered on other sites which generally range from  $1.4 \times 10^{-8}$  to  $2.4 \times 10^{-5}$  m/sec for silty sand to sandy silt and glacial till, and from  $1.4 \times 10^{-8}$  to  $5.3 \times 10^{-7}$  m/sec for silty clay. The range in  $K_{fs}$  values is generally due to the variability in composition and consistency of the material encountered.

It is important to note that the infiltration rates derived from the  $K_{fs}$  values in the table below are unfactored. Prior to use for design purposes, a safety correction factor will need to be applied to the above infiltration rates to account for a number of factors including variations in soil composition and anticipated accumulation of fine-grained material over time. For use in the design of Low Impact Development measures (LID's), the safety correction factor to be incorporated will be dependent on the size and invert depth of the system relative to the infiltration rates observed up to 1.5 m below the base of the system. It should also be noted that for most infiltration-based LID measures, the bottom of the facility should be separated at least 1 m from the bedrock surface and from the seasonally high groundwater table.

**Table 3 – Summary of Field Saturated Hydraulic Conductivity Values and Infiltration Rates.**

| Test Location ID | Ground Surface Elevation (m) | Depth of Permeameter Testing (m) | Elevation of Permeameter Testing (m asl) | $K_{fs}$ (m/sec)       | Infiltration Rate (mm/hr) | Soil Type              |
|------------------|------------------------------|----------------------------------|------------------------------------------|------------------------|---------------------------|------------------------|
| PT 1             | 89.50                        | 0.20                             | 89.30                                    | $7.50 \times 10^{-06}$ | 79.24                     | Silty sand with rocks  |
|                  |                              | 0.50                             | 89.00                                    | $5.30 \times 10^{-06}$ | 72.21                     | Silty Sand with Gravel |
| PT 2             | 87.74                        | 0.30                             | 87.44                                    | $1.10 \times 10^{-06}$ | 47.41                     | Clayey Silt            |
|                  |                              | 0.80                             | 86.94                                    | $1.40 \times 10^{-08}$ | 14.74                     | Silty Clay             |
| PT 3             | 89.81                        | 0.25                             | 89.56                                    | $2.70 \times 10^{-06}$ | 60.28                     | Silty Sand with Clay   |
|                  |                              | 0.75                             | 89.06                                    | $1.90 \times 10^{-05}$ | 101.62                    | Silty Sand             |
| PT 4             | 91.29                        | 0.25                             | 91.04                                    | $8.20 \times 10^{-07}$ | 43.82                     | Clayey Silt            |
|                  |                              | 0.75                             | 90.54                                    | $1.10 \times 10^{-05}$ | 87.80                     | Silty Sand             |
| PT 5             | 87.46                        | 0.20                             | 87.26                                    | $4.30 \times 10^{-06}$ | 68.28                     | Silty Sand             |
|                  |                              | 0.60                             | 86.86                                    | $5.30 \times 10^{-08}$ | 21.05                     | Silty Clay             |
| PT 6             | 84.97                        | 0.30                             | 84.67                                    | $5.30 \times 10^{-07}$ | 38.99                     | Silty Clay             |
|                  |                              | 0.80                             | 84.17                                    | $8.00 \times 10^{-07}$ | 43.53                     | Clayey Silt            |
| PT 7             | 85.63                        | 0.20                             | 85.43                                    | $1.60 \times 10^{-06}$ | 52.41                     | Clayey Silt            |
|                  |                              | 0.60                             | 85.03                                    | $5.30 \times 10^{-07}$ | 38.99                     | Silty Clay             |
| PT 8             | 85.36                        | 0.30                             | 85.06                                    | $2.70 \times 10^{-06}$ | 60.28                     | Silty Sand with Clay   |
|                  |                              | 0.75                             | 84.66                                    | $2.70 \times 10^{-08}$ | 17.58                     | Silty Clay             |
| PT 9             | 89.28                        | 0.25                             | 89.03                                    | $5.90 \times 10^{-06}$ | 74.31                     | Silty Sand             |
|                  |                              | 0.50                             | 88.78                                    | $1.10 \times 10^{-05}$ | 87.80                     | Silty Sand             |
| PT 10            | 88.78                        | 0.30                             | 88.48                                    | $2.20 \times 10^{-05}$ | 105.69                    | Silty Sand             |
|                  |                              | 0.80                             | 87.98                                    | $8.50 \times 10^{-06}$ | 81.94                     | Silty Sand             |
| PT 11            | 89.22                        | 0.30                             | 88.92                                    | $2.40 \times 10^{-05}$ | 108.18                    | Silty Sand             |
|                  |                              | 0.80                             | 88.42                                    | $1.60 \times 10^{-05}$ | 97.06                     | Silty Sand             |
| PT 12            | 88.57                        | 0.20                             | 88.37                                    | $7.50 \times 10^{-06}$ | 79.24                     | Silty Sand             |
|                  |                              | 0.60                             | 87.97                                    | $1.10 \times 10^{-06}$ | 47.41                     | Silty Sand             |
| PT 13            | 91.39                        | 0.30                             | 91.09                                    | $2.70 \times 10^{-06}$ | 60.28                     | Sand with Gravel       |
|                  |                              | 0.75                             | 90.64                                    | $6.40 \times 10^{-06}$ | 75.95                     | Silty Sand             |

**Table 3 – Summary of Field Saturated Hydraulic Conductivity Values and Infiltration Rates.**

| Test Location ID | Ground Surface Elevation (m) | Depth of Permeameter Testing (m) | Elevation of Permeameter Testing (m asl) | K <sub>fs</sub> (m/sec) | Infiltration Rate (mm/hr) | Soil Type    |
|------------------|------------------------------|----------------------------------|------------------------------------------|-------------------------|---------------------------|--------------|
| PT14             | 82.55                        | 0.30                             | 82.25                                    | 1.40×10 <sup>-07</sup>  | 27.30                     | Silty Clay   |
|                  |                              | 0.80                             | 81.75                                    | 1.40×10 <sup>-08</sup>  | 14.74                     | Glacial Till |
| PT15             | 83.49                        | 0.20                             | 83.29                                    | 8.50×10 <sup>-06</sup>  | 81.94                     | Silty Sand   |
|                  |                              | 0.60                             | 82.89                                    | 1.75×10 <sup>-07</sup>  | 28.94                     | Silty Clay   |

## Groundwater

Groundwater levels were manually measured in the installed piezometers and monitoring wells on November 18, 2022, March 24, 2023, April 20, 2023, May 30, 2023, and September 20, 2023.

In addition, data loggers were installed in the monitoring wells to record seasonal fluctuations and precipitation collected within the upper portion of the subsurface profile across the site.

The manual groundwater level (GWL) readings are presented in Table 4 below and are shown on the Soil Profile and Test Data sheets in Appendix 1.

| Table 4 – Summary of Groundwater Levels |                              |                            |               |                    |
|-----------------------------------------|------------------------------|----------------------------|---------------|--------------------|
| Borehole Number                         | Ground Surface Elevation (m) | Measured Groundwater Level |               | Date Recorded      |
|                                         |                              | Depth (m)                  | Elevation (m) |                    |
| BH1-23                                  | 89.02                        | dry                        | NA            | September 20, 2023 |
| BH 2-23                                 | 84.89                        | 1.94                       | 82.95         |                    |
| BH4-23                                  | 88.23                        | 2.23                       | 86.01         |                    |
| BH5-23                                  | 87.65                        | dry                        | NA            |                    |
| BH6-23                                  | 90.99                        | dry                        | NA            |                    |
| BH7-23                                  | 83.5                         | 2.32                       | 81.18         |                    |
| BH8-23                                  | 82.3                         | 2.13                       | 80.17         |                    |
| BH9-23                                  | 83.46                        | 2.92                       | 80.54         |                    |
| BH11-23                                 | 85.81                        | 2.99                       | 82.82         |                    |
| BH12-23                                 | 88.72                        | 3.94                       | 84.78         |                    |
| BH13A-23                                | 92.11                        | dry                        | NA            |                    |
| BH1-23                                  | 89.02                        | dry                        | NA            | May 30, 2023       |
| BH4-23                                  | 88.23                        | 2.53                       | 85.70         |                    |

| <b>Table 4 – Summary of Groundwater Levels</b> |                                     |                                   |                      |                      |
|------------------------------------------------|-------------------------------------|-----------------------------------|----------------------|----------------------|
| <b>Borehole Number</b>                         | <b>Ground Surface Elevation (m)</b> | <b>Measured Groundwater Level</b> |                      | <b>Date Recorded</b> |
|                                                |                                     | <b>Depth (m)</b>                  | <b>Elevation (m)</b> |                      |
| Bh5-23                                         | 87.65                               | 1.84                              | 85.81                | May 30, 2023         |
| BH6-23                                         | 90.99                               | dry                               | NA                   |                      |
| BH7-23                                         | 83.5                                | 3.02                              | 80.48                |                      |
| BH8-23                                         | 82.3                                | 2.82                              | 79.48                |                      |
| BH11-23                                        | 85.81                               | 3.45                              | 82.36                |                      |
| BH13A-23                                       | 92.11                               | dry                               | NA                   |                      |
| BH1-23                                         | 89.02                               | 1.57                              | 87.45                | April 20, 2023       |
| BH2-23                                         | 84.89                               | 1.82                              | 83.07                |                      |
| BH4-23                                         | 88.23                               | 1.3                               | 86.93                |                      |
| BH5-23                                         | 87.65                               | dry                               | NA                   |                      |
| BH6-23                                         | 90.99                               | dry                               | NA                   |                      |
| BH7-23                                         | 83.5                                | 1.71                              | 81.79                |                      |
| BH8-23                                         | 82.3                                | 1.68                              | 80.62                |                      |
| BH9-23                                         | 83.46                               | 2.25                              | 81.21                |                      |
| BH11-23                                        | 85.81                               | 2.4                               | 83.41                |                      |
| BH12-23                                        | 88.72                               | 3.71                              | 85.01                |                      |
| BH13A-23                                       | 92.11                               | dry                               | NA                   |                      |
| BH8-22                                         | 88.82                               | 0.54                              | 88.28                | March 24, 2023       |
| BH10-22                                        | 89.53                               | dry                               | NA                   |                      |
| BH11-22                                        | 84.89                               | 1.24                              | 83.65                |                      |
| BH21-22                                        | 86.35                               | 2.76                              | 83.59                |                      |
| BH47-22                                        | 90.33                               | dry                               | NA                   |                      |
| BH48-22                                        | 91.08                               | dry                               | NA                   |                      |
| BH50-22                                        | 92.04                               | dry                               | NA                   |                      |
| BH53-22                                        | 87.50                               | 2.97                              | 84.53                |                      |
| BH54-22                                        | 88.10                               | dry                               | NA                   |                      |
| BH55-22                                        | 88.53                               | dry                               | NA                   |                      |
| BH56-22                                        | 88.84                               | dry                               | NA                   |                      |
| BH57-22                                        | 89.64                               | dry                               | NA                   |                      |
| BH58-22                                        | 89.35                               | 1.68                              | 87.67                |                      |
| BH69-22                                        | 92.46                               | 2.14                              | 90.32                |                      |
| BH 1-22                                        | 87.85                               | 1.54                              | 86.31                | November 18, 2022    |
| BH 2-22                                        | 89.20                               | Dry                               | NA                   |                      |
| BH 3-22                                        | 88.44                               | 0.56                              | 87.88                |                      |

| <b>Table 4 – Summary of Groundwater Levels</b> |                                     |                                   |                      |                      |
|------------------------------------------------|-------------------------------------|-----------------------------------|----------------------|----------------------|
| <b>Borehole Number</b>                         | <b>Ground Surface Elevation (m)</b> | <b>Measured Groundwater Level</b> |                      | <b>Date Recorded</b> |
|                                                |                                     | <b>Measured Groundwater Level</b> | <b>Elevation (m)</b> |                      |
| BH 4-22                                        | 89.20                               | Dry                               | NA                   | November 18, 2022    |
| BH 5-22                                        | 89.30                               | Dry                               | NA                   |                      |
| BH 8-22                                        | 88.82                               | Dry                               | NA                   |                      |
| BH 9-22                                        | 90.68                               | Dry                               | NA                   |                      |
| BH 10-22                                       | 89.53                               | Dry                               | NA                   |                      |
| BH 11-22                                       | 84.89                               | 2.12                              | 82.77                |                      |
| BH 12-22                                       | 85.38                               | 2.62                              | 82.76                |                      |
| BH 13-22                                       | 84.92                               | Dry                               | NA                   |                      |
| BH 14-22                                       | 84.40                               | Dry                               | NA                   |                      |
| BH 16-22                                       | 87.86                               | Dry                               | NA                   |                      |
| BH 17-22                                       | 88.75                               | Dry                               | NA                   |                      |
| BH 18-22                                       | 91.05                               | Dry                               | NA                   |                      |
| BH 19-22                                       | 91.06                               | Dry                               | NA                   |                      |
| BH 20-22                                       | 86.55                               | 0.71                              | 85.84                |                      |
| BH 21-22                                       | 86.35                               | 3.05                              | 83.3                 |                      |
| BH 22-22                                       | 87.59                               | Dry                               | NA                   |                      |
| BH 23-22                                       | 87.88                               | Dry                               | NA                   |                      |
| BH 24-22                                       | 88.34                               | Dry                               | NA                   |                      |
| BH 25-22                                       | 89.17                               | Dry                               | NA                   |                      |
| BH 26-22                                       | 87.96                               | Dry                               | NA                   |                      |
| BH 28-22                                       | 88.17                               | Dry                               | NA                   |                      |
| BH 29-22                                       | 83.17                               | 1.9                               | 81.27                |                      |
| BH 30-22                                       | 82.54                               | Dry                               | NA                   |                      |
| BH 31-22                                       | 82.67                               | 2.86                              | 79.81                |                      |
| BH 32-22                                       | 82.22                               | 3.06                              | 79.16                |                      |
| BH 33-22                                       | 81.99                               | 3.38                              | 78.61                |                      |
| BH 34-22                                       | 82.20                               | 1.93                              | 80.27                |                      |
| BH 35-22                                       | 83.74                               | Dry                               | NA                   |                      |
| BH 36-22                                       | 83.51                               | 2.35                              | 81.16                |                      |
| BH 37-22                                       | 84.52                               | 3.37                              | 81.15                |                      |
| BH 38-22                                       | 83.51                               | 3.01                              | 80.5                 |                      |
| BH 39-22                                       | 83.92                               | 4.88                              | 79.04                |                      |
| BH 40-22                                       | 83.72                               | 4.69                              | 79.03                |                      |
| BH 43-22                                       | 84.73                               | 3.41                              | 81.32                |                      |
| BH 44-22                                       | 85.94                               | 3.21                              | 82.73                |                      |
| BH 45-22                                       | 90.37                               | Dry                               | NA                   |                      |
| BH 47-22                                       | 90.33                               | Dry                               | NA                   |                      |
| BH 48-22                                       | 91.08                               | Dry                               | NA                   |                      |
| BH 49-22                                       | 91.34                               | Dry                               | NA                   |                      |

| Table 4 – Summary of Groundwater Levels                                                                                       |                              |                            |               |                   |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------|---------------|-------------------|
| Borehole Number                                                                                                               | Ground Surface Elevation (m) | Measured Groundwater Level |               | Date Recorded     |
|                                                                                                                               |                              | Measured Groundwater Level | Elevation (m) |                   |
| BH 50-22                                                                                                                      | 92.04                        | Dry                        | NA            | November 18, 2022 |
| BH 51-22                                                                                                                      | 90.53                        | Dry                        | NA            |                   |
| BH 52-22                                                                                                                      | 89.98                        | Dry                        | NA            |                   |
| BH 53-22                                                                                                                      | 87.50                        | 3.45                       | 84.05         |                   |
| BH 54-22                                                                                                                      | 88.10                        | Dry                        | NA            |                   |
| BH 55-22                                                                                                                      | 88.53                        | Dry                        | NA            |                   |
| BH 56-22                                                                                                                      | 88.84                        | Dry                        | NA            |                   |
| BH 57-22                                                                                                                      | 89.64                        | Dry                        | NA            |                   |
| BH 58-22                                                                                                                      | 89.35                        | Dry                        | NA            |                   |
| BH 61-22                                                                                                                      | 89.78                        | Dry                        | NA            |                   |
| BH 62-22                                                                                                                      | 85.57                        | 2.9                        | 82.67         |                   |
| BH 63-22                                                                                                                      | 82.75                        | 1.83                       | 80.92         |                   |
| BH 64-22                                                                                                                      | 82.24                        | 2.12                       | 80.12         |                   |
| BH 65-22                                                                                                                      | 83.21                        | 2.76                       | 80.45         |                   |
| BH 66-22                                                                                                                      | 92.85                        | 1.14                       | 91.71         |                   |
| BH 67-22                                                                                                                      | 93.15                        | Dry                        | NA            |                   |
| BH 68-22                                                                                                                      | 91.47                        | Dry                        | NA            |                   |
| BH 69-22                                                                                                                      | 92.46                        | Dry                        | NA            |                   |
| <b>Note:</b> The ground surface elevation at each borehole location was surveyed using a handheld GPS using a geodetic datum. |                              |                            |               |                   |

In addition to manual water level measurements, a groundwater monitoring program was carried out at the subject site. The groundwater monitoring program provides an overview of the variations of the monitoring well water levels based on seasonal fluctuations. The monitoring wells were equipped with submersible dataloggers (TD-Diver, VanEssen Instruments) to accurately monitor fluctuations in the water levels. Dataloggers were programmed to continuously measure and record water levels at a fixed rate of one (1) reading every 24 hours for approximately 13 months.

The monitoring program was undertaken from April 2023 to May 2024. The monitoring data was compared with Environment and Natural Resources Canada precipitation data from the Ottawa International Airport over the same timeframe as part of the monitoring program. The groundwater monitoring results are presented in Appendix 1.



## **5.0 Discussion**

### **5.1 Geotechnical Assessment**

The details of the future development were not known at the time of writing this report. It is assumed that the development will generally consist of conventional two to three-storey single and townhouse style residential dwellings in addition to low and medium rise residential buildings of slab-on-grade construction and/or with one basement level and local roadways. From a geotechnical perspective, the subject site is considered suitable for the proposed development.

It is anticipated that the future buildings will be founded over conventional shallow footings placed on an undisturbed very stiff to stiff brown silty clay, compact to dense silty sand, compact to very dense glacial till, or clean, surface-sounded bedrock bearing surface.

Due to the presence of the sensitive silty clay deposit, the proposed development will be subjected to a permissible grade raise restrictions. Permissible grade raise recommendations have been provided for the subject site. If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements.

The above and other considerations are discussed in the following sections.

### **5.2 Site Grading and Preparation**

#### **Stripping Depth**

Topsoil and deleterious fill, such as those containing significant amounts of organic materials, or construction debris/remnants should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures. Care should be taken not to disturb subgrade soils during site preparation activities.

Existing foundation walls and other construction debris should be entirely removed from within the building perimeters. Under paved areas, existing construction remnants such as foundation walls should be excavated to a minimum of 1 m below final grade.

## **Permissible Grade Raise Restrictions**

Based on the undrained shear strength values of the silty clay deposit encountered throughout the subject site, the recommended permissible grade raise areas for buildings are defined in Drawing PG6331-2 - Permissible Grade Raise Plan in Appendix 2.

In addition, it should be noted that an additional 500 mm can be implemented for the permissible grade raise for the proposed roads at the subject site, for a total PGR of 2.5 m.

If higher than permissible grade raises are required, preloading with or without a surcharge, lightweight fill, and/or other measures should be investigated to reduce the risks of unacceptable long-term post construction total and differential settlements. Provided sufficient time is available to induce the required settlements, consideration could be given to surcharging the subject site.

A silty clay deposit was encountered at the location of TP 6-23, TP 7-23, and TP 8-23 within the Kishkabika Park Block on the western portion of the subject site. Based on the undrained shear strength values, gravel and cobble content, color and consistency of the silty clay deposit encountered within this portion of the site, the permissible grade raise for this location is greater than 5 meters. Therefore, consolidation of the silty clay deposit as a result of raising the grade is not expected to be an issue within the subject park block. For settlement sensitive structures proposed within the park, it is recommended that Paterson review the final grading and backfill operations recommended for these structures from a geotechnical perspective prior to construction.

## **5.4 Design for Earthquakes**

The site class for seismic site response can be taken as **Class C** for foundations constructed at the subject site. If a higher seismic site class such as Class A or B is required, a site specific shear wave velocity testing will be required. The soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the 2012 Ontario Building Code for a full discussion of the earthquake design requirements.

## **5.5 Floor Slab Construction**

With the removal of all topsoil and deleterious fill from within the footprints of the proposed buildings, the native soil surface or approved engineered fill surface will be considered to be an acceptable subgrade on which to commence backfilling for floor slab construction.

Where the subgrade consists of existing fill, a vibratory drum roller should complete several passes over the subgrade surface as a proof-rolling program. Any poor performing areas should be removed and reinstated with an engineered fill, such as Granular B Type II.

Where existing fill, free of deleterious material and significant organic content, is encountered below the floor slab, provisions should be made to removing the existing fill from within the building footprint and replacing the fill with OPSS Granular A or Granular B Type II compacted to a minimum 98% of the material's SPMDD.

It is also acceptable to use workable, site excavated brown silty clay material, free of deleterious materials and organics, below the floor slab and outside the lateral support zone of the proposed footings provided the material is placed under dry conditions and above freezing temperatures, reviewed and approved by Paterson prior to placement. The silty clay backfill should be compacted using a sheepfoot roller making several passes under the full supervision of Paterson field personnel. A minimum 500 mm thick cap layer of OPSS Granular A or Granular B Type II should be placed over the silty clay and compacted to a minimum 98% of the material's SPMDD. It is recommended that the upper 200 mm of sub- floor fill consists of 19 mm clear crushed stone.

All backfill material within the footprint of the proposed buildings should be placed in maximum 300 mm thick loose layers and compacted to a minimum of 98% of the SPMDD.

## 5.6 Pavement Structure

For design purposes, the following pavement structures, presented below, are recommended for the design of car parking areas, local and collector roadways.

| <b>Table 6 - Recommended Pavement Structure - Car Only Parking Areas and Driveways</b>                                 |                                                                |
|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Thickness (mm)</b>                                                                                                  | <b>Material Description</b>                                    |
| 50                                                                                                                     | <b>Wear Course</b> - HL 3 or Superpave 12.5 Asphaltic Concrete |
| 150                                                                                                                    | <b>BASE</b> - OPSS Granular A Crushed Stone                    |
| 300                                                                                                                    | <b>SUBBASE</b> - OPSS Granular B Type II                       |
| <b>SUBGRADE</b> - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill. |                                                                |
| <b>Note:</b> Minimum Performance Graded (PG) 58-34 asphalt cement should be used for driveways.                        |                                                                |

| <b>Table 7 - Recommended Pavement Structure - Access Lanes, Heavy Vehicle Loading, and Local Residential Roadways</b>                                                                                                          |                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| <b>Thickness (mm)</b>                                                                                                                                                                                                          | <b>Material Description</b>                                     |
| 40                                                                                                                                                                                                                             | <b>Wear Course</b> - HL3 or Superpave 12.5 Asphaltic Concrete   |
| 50                                                                                                                                                                                                                             | <b>Binder Course</b> - HL8 or Superpave 19.0 Asphaltic Concrete |
| 150                                                                                                                                                                                                                            | <b>BASE</b> - OPSS Granular A Crushed Stone                     |
| 450                                                                                                                                                                                                                            | <b>SUBBASE</b> - OPSS Granular B Type II                        |
| <b>SUBGRADE</b> - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill.<br><b>Note:</b> Minimum Performance Graded (PG) 58-34 asphalt cement should be used for local roadways. |                                                                 |

| <b>Table 8 - Recommended Pavement Structure - Roadways with Bus Traffic and Fire Routes</b>                                                                                                                                              |                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Thickness (mm)</b>                                                                                                                                                                                                                    | <b>Material Description</b>                                           |
| 40                                                                                                                                                                                                                                       | <b>Wear Course</b> - HL3 or Superpave 12.5 Asphaltic Concrete         |
| 50                                                                                                                                                                                                                                       | <b>Upper Binder Course</b> - HL8 or Superpave 19.0 Asphaltic Concrete |
| 50                                                                                                                                                                                                                                       | <b>Lower Binder Course</b> - HL8 or Superpave 19.0 Asphaltic Concrete |
| 150                                                                                                                                                                                                                                      | <b>BASE</b> - OPSS Granular A Crushed Stone                           |
| 600                                                                                                                                                                                                                                      | <b>SUBBASE</b> - OPSS Granular B Type II                              |
| <b>SUBGRADE</b> - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill<br><b>Note:</b> Minimum Performance Graded (PG) 64-34 asphalt cement should be used for roadways with bus traffic. |                                                                       |

If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. Weak subgrade conditions may be experienced over service trench fill materials. This may require the use of a geotextile, thicker subbase or other measures that can be recommended at the time of construction as part of the field observation program.

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for driveways and local roadways and PG 64-34 asphalt cement should be used for roadways with bus traffic. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.

## 7.0 Recommendations

The following is recommended to be completed once the preliminary site plan and site development are determined:

- ☐ Review detailed grading plan(s) from a geotechnical perspective, once available.
- ☐ Observation of all bearing surfaces prior to the placement of concrete.
- ☐ Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
- ☐ Observation of all subgrades prior to backfilling.
- ☐ Field density tests to ensure that the specified level of compaction has been achieved.
- ☐ Sampling and testing of the bituminous concrete including mix design reviews.

All excess soils must be handled as per ***Ontario Regulation 406/19: On-Site and Excess Soil Management***.

A report confirming that these works have been conducted in general accordance with our recommendations could be issued upon the completion of a satisfactory inspection program by the geotechnical consultant.

## 8.0 Statement of Limitations

The recommendations provided are in accordance with the present understanding of the project. Paterson requests permission to review the recommendations when the drawings and specifications are completed.

A soils investigation is a limited sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, Paterson requests immediate notification to permit reassessment of our recommendations.

The recommendations provided herein should only be used by the design professionals associated with this project. They are not intended for contractors bidding on or undertaking the work. The latter should evaluate the factual information provided in this report and determine the suitability and completeness for their intended construction schedule and methods. Additional testing may be required for their purposes.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Canada Lands Company, C/O Arcadis IBI Group or their agents is not authorized without review by Paterson for the applicability of our recommendations to the alternative use of the report.

**Paterson Group Inc.**



Nicole Patey, P.Eng.

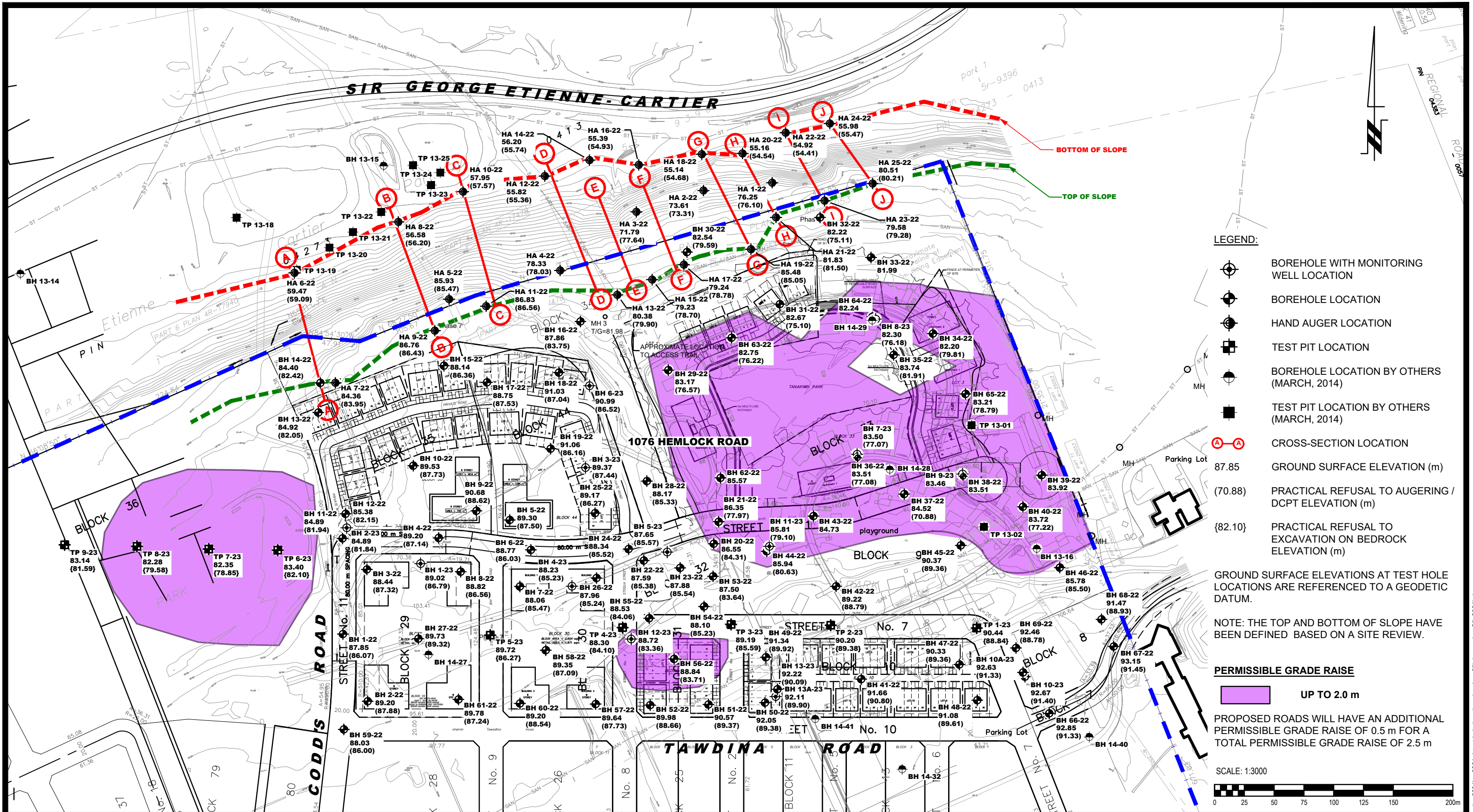


Faisal I. Abou-Seido, P.Eng.

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|-----|----------------------------------------------------------------------------------------------|------------|---------|
| 5.  | ADDED UPDATED CONCEPTUAL PLAN                                                                | 25/11/2024 | NP      |
| 4.  | REVISED AS PER CITY COMMENTS                                                                 | 19/06/2024 | YZ      |
| 3.  | ADDED 2023 TEST PITS LOCATION TP1-23 TO TP9-23<br>AND UPDATED PERMISSIBLE GRADE RAISE AREA   | 05/01/2024 | YZ      |
| 2.  | ADDED BOREHOLES AND TEST PITS LOCATION BY OTHERS<br>AND UPDATED PERMISSIBLE GRADE RAISE AREA | 05/12/2023 | YZ      |
| 1.  | ADDED 2023 MONITORING WELL BOREHOLE LOCATION TO PLAN                                         | 24/04/2023 | YZ      |
| NO. | REVISIONS                                                                                    | DATE       | INITIAL |

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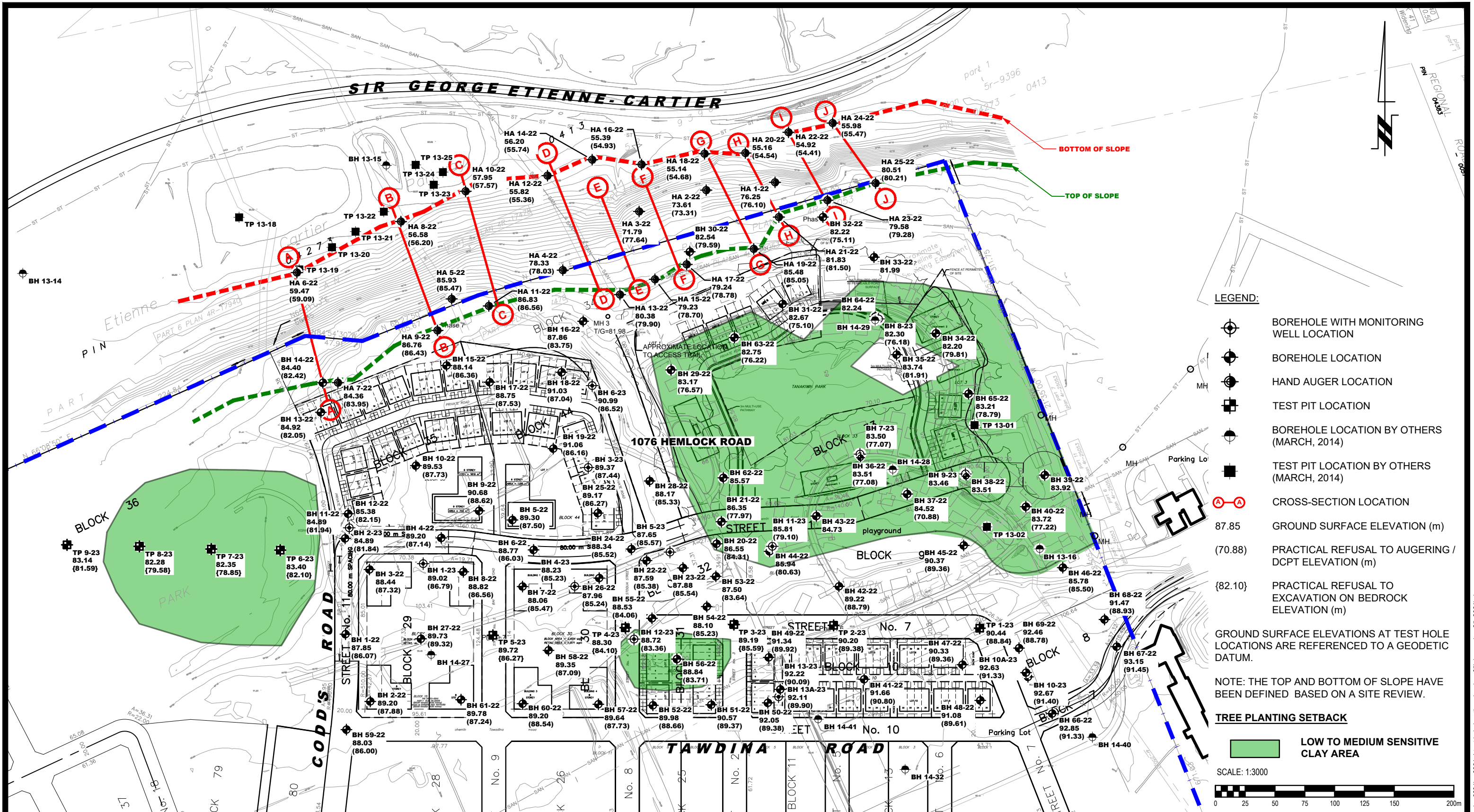
CANADA LANDS COMPANY, C/O IBI GROUP  
GEOTECHNICAL INVESTIGATION  
PROPOSED DEVELOPMENT  
WATERIDGE VILLAGE - PHASE 6, 7 AND 8  
PERMISSIBLE GRADE RAISE PLAN

ONTARIO

Scale: 1:3000  
Drawn by: GK  
Checked by: YZ  
Approved by: FA

Date: 02/2023  
Report No.: PG6331-1  
Dwg. No.: PG6331-2  
Revision No.: 5





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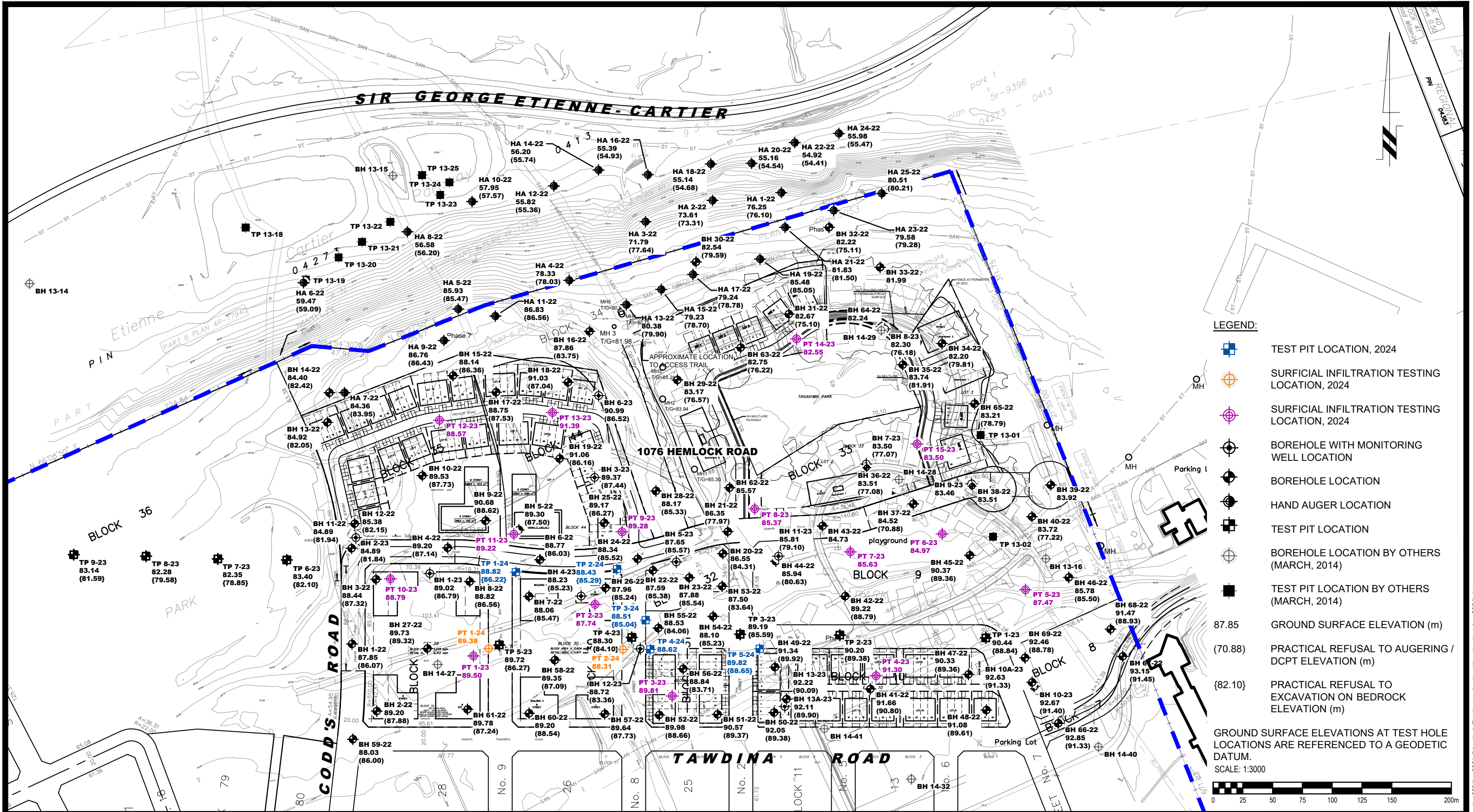
|     |                                                                                            |            |         |
|-----|--------------------------------------------------------------------------------------------|------------|---------|
| 5.  | ADDED UPDATED CONCEPTUAL PLAN                                                              | 25/11/2024 | NP      |
| 4.  | REVISED AS PER CITY COMMENTS                                                               | 28/05/2024 | FA      |
| 3.  | ADDED 2023 TEST PITS LOCATION TP1-23 TO TP9-23<br>AND UPDATED TREE PLANTING SETBACK AREA   | 05/01/2024 | YZ      |
| 2.  | ADDED BOREHOLES AND TEST PITS LOCATION BY OTHERS<br>AND UPDATED TREE PLANTING SETBACK AREA | 05/12/2023 | YZ      |
| 1.  | ADDED 2023 MONITORING WELL BOREHOLE LOCATION TO PLAN                                       | 24/04/2023 | YZ      |
| NO. | REVISIONS                                                                                  | DATE       | INITIAL |

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PROPOSED DEVELOPMENT  
WATERIDGE VILLAGE - PHASE 6, 7 AND 8  
ONTARIO  
TREE PLANTING SETBACK PLAN

|              |        |               |          |
|--------------|--------|---------------|----------|
| Scale:       | 1:3000 | Date:         | 02/2023  |
| Drawn by:    | GK     | Report No.:   | PG6331-1 |
| Checked by:  | YZ     | Dwg. No.:     | PG6331-3 |
| Approved by: | FA     | Revision No.: | 5        |







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GEOTECHNICAL INVESTIGATION  
PROPOSED DEVELOPMENT  
WATERIDGE VILLAGE - PHASE 6, 7 AND 8

OTTAWA, ONTARIO

Title:

IN-SITU INFILTRATION TESTING LOCATION PLAN

|              |        |               |               |
|--------------|--------|---------------|---------------|
| Scale:       | 1:3000 | Date:         | 12/2024       |
| Drawn by:    | GK     | Report No.:   | PG6331-LET.02 |
| Checked by:  | ZB     | Dwg. No.:     | PG6331-5      |
| Approved by: | ML     | Revision No.: |               |

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