

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

Site Servicing and Stormwater Management Report



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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 watermains 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
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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 (m)	Maximum Capacity (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 m². 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 m² 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 watermains were 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**.



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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 m² 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:

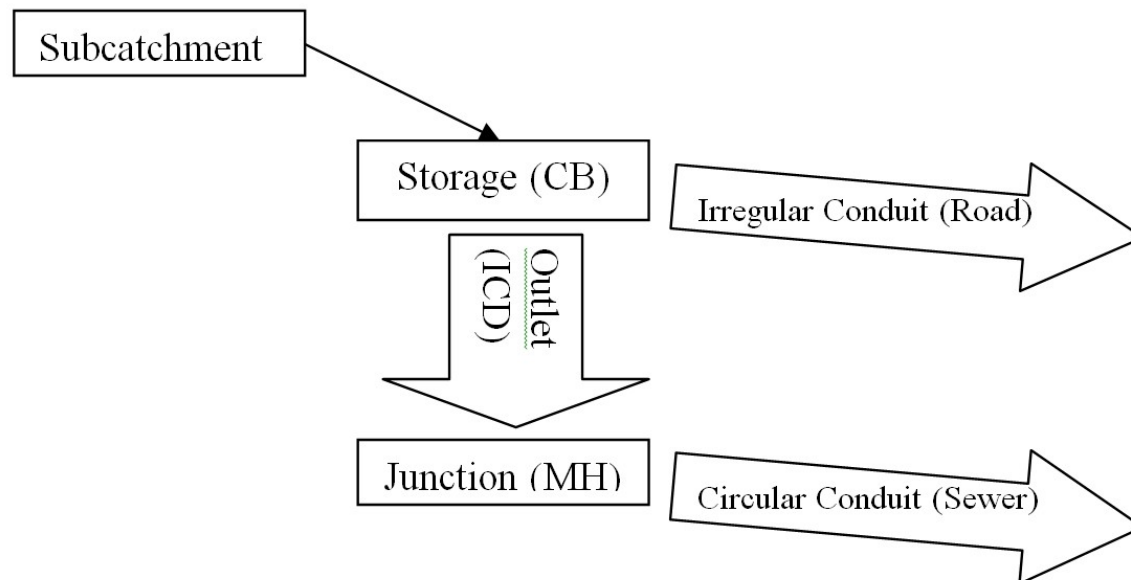
- Hydrologic parameters as per Ottawa Sewer Design Guidelines, including Horton infiltration, Manning's 'n', and depression storage values.
- 3-hour Chicago Storm distribution for the 2-year, 5-year and 100-year analysis.
- To 'stress test' the system a 'climate change' scenario was created by adding 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 66m³. 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 4m³ 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 ≥ 60 mm/hr)
- Bedrock: situated ≥ 1.0 m below the bottom of the infiltration bed
- Groundwater: situated ≥ 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 115m².

$$A = 1000V \div Pn\Delta t \quad [Equation 4.3 MECP SMPDM 2023]$$

Where:

A = bottom area of the infiltration bed (m²)

V = runoff volume to be infiltrated (m³)

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

n = porosity of the storage media

Δt = retention time (24 to 48 hours)

Consequently, 66m³ of infiltration storage and a minimum bed area of 115m² 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 ³
Total Storage Provided	110.7 m ³
Clearstone Porosity (n)	0.4
System Area	133.2 m ²
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 (66m³) to ensure the bed area exceeded 115m². 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

Material	Driveways and Car-only Parking Areas	Local Residential Roadways
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

Thickness (mm)	Material Description
-	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 ¹		Peak Hour Demand ¹	
			(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
Total Site:	185	500	97.1	1.6	242.8	4.0	534.2	8.9

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

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 & Instituti	28000	L/ha/day

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

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 m², per site plan provided by Korsiki Urban Planning, dated Feb 11, 2026. Firewall to split block into 6-unit and 8-unit clusters and reduce footprint to 463 m².

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 ^{1/2}). 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 m², 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 m².

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 ^{1/2}). 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 m², 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 m².

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 ^{1/2}). 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 m², 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 m².

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 ^{1/2}). 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 m², 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 m².

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 ^{1/2}). 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**.

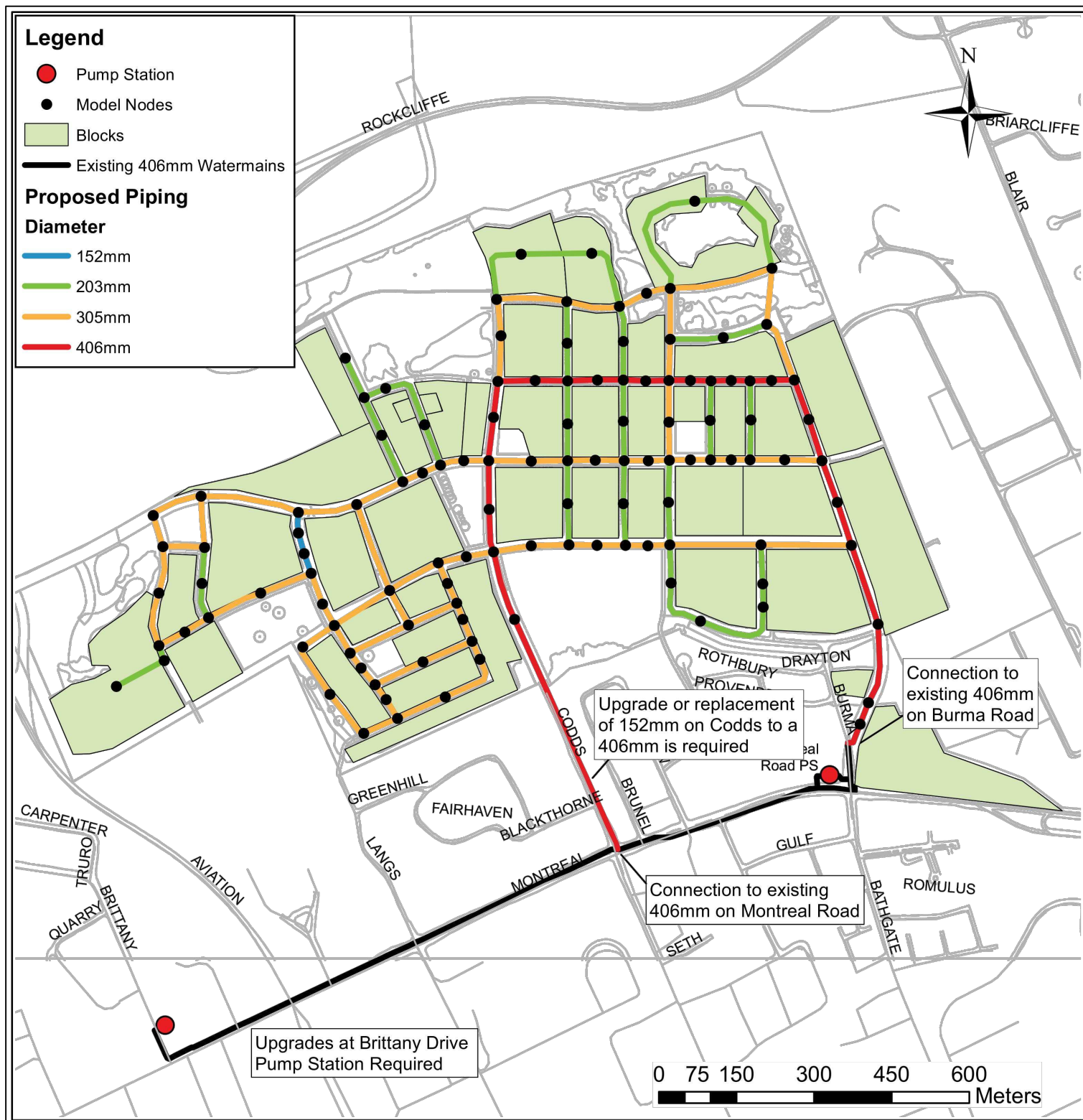
2.3.4 Boundary Conditions

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
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 L/s)	141.7	139.2	139.2	141.7	141.7
Max Day + FF (183.3 L/s)	141.2	137.6	137.6	141.2	141.2
Max Day + FF (216.7 L/s)	140.7	135.7	135.7	140.6	140.6
Max Day + FF (250 L/s)	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 305mm on Codd's Rd	Connection 2 203mm on Bareille-Snow	Connection 3 203mm on Codd's Rd	Connection 4 305mm on Moses Tennisco	Connection 5 305mm 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 L/s)	141.7	139.2	139.2	141.7	141.7
Max Day + FF (183.3 L/s)	141.2	137.6	137.6	141.2	141.2
Max Day + FF (216.7 L/s)	140.7	135.7	135.7	140.6	140.6
Max Day + FF (250 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

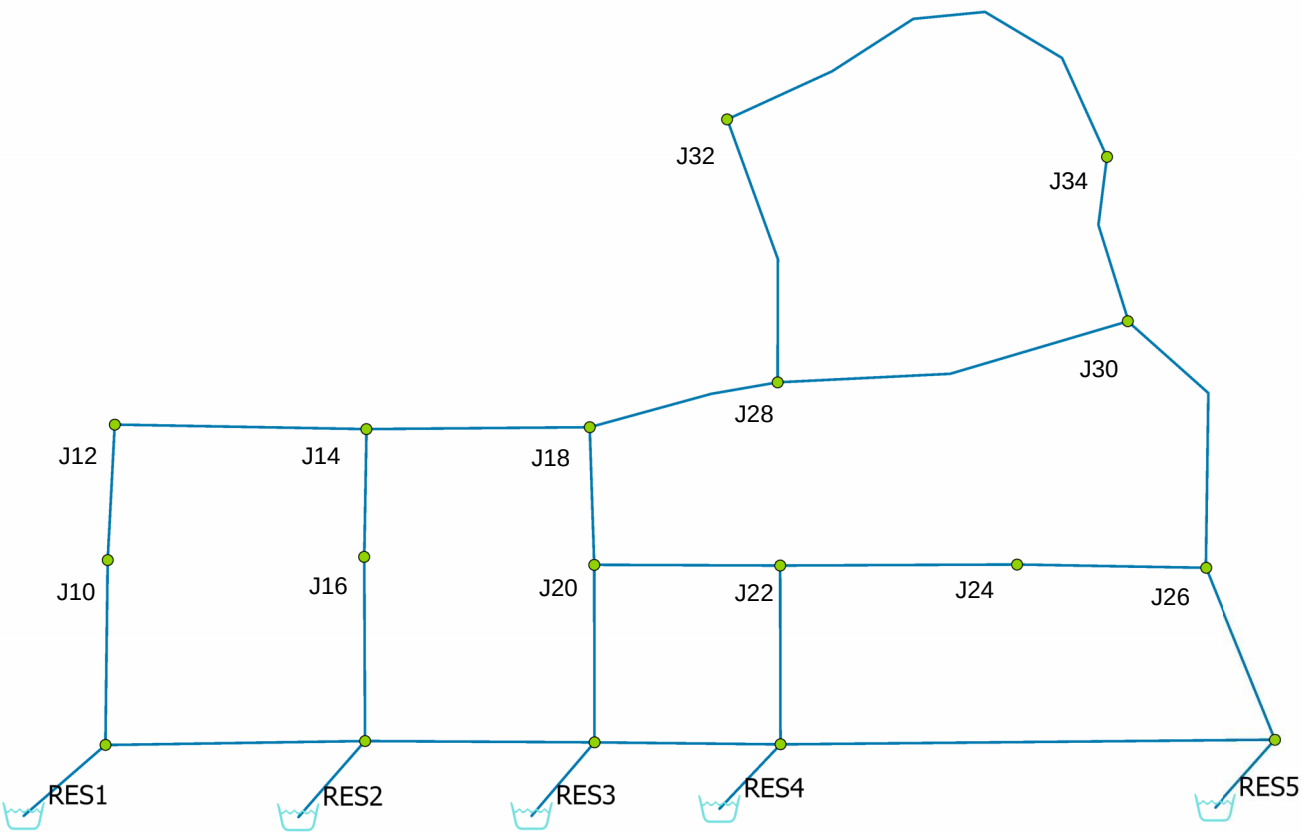
Legend

Public

Private

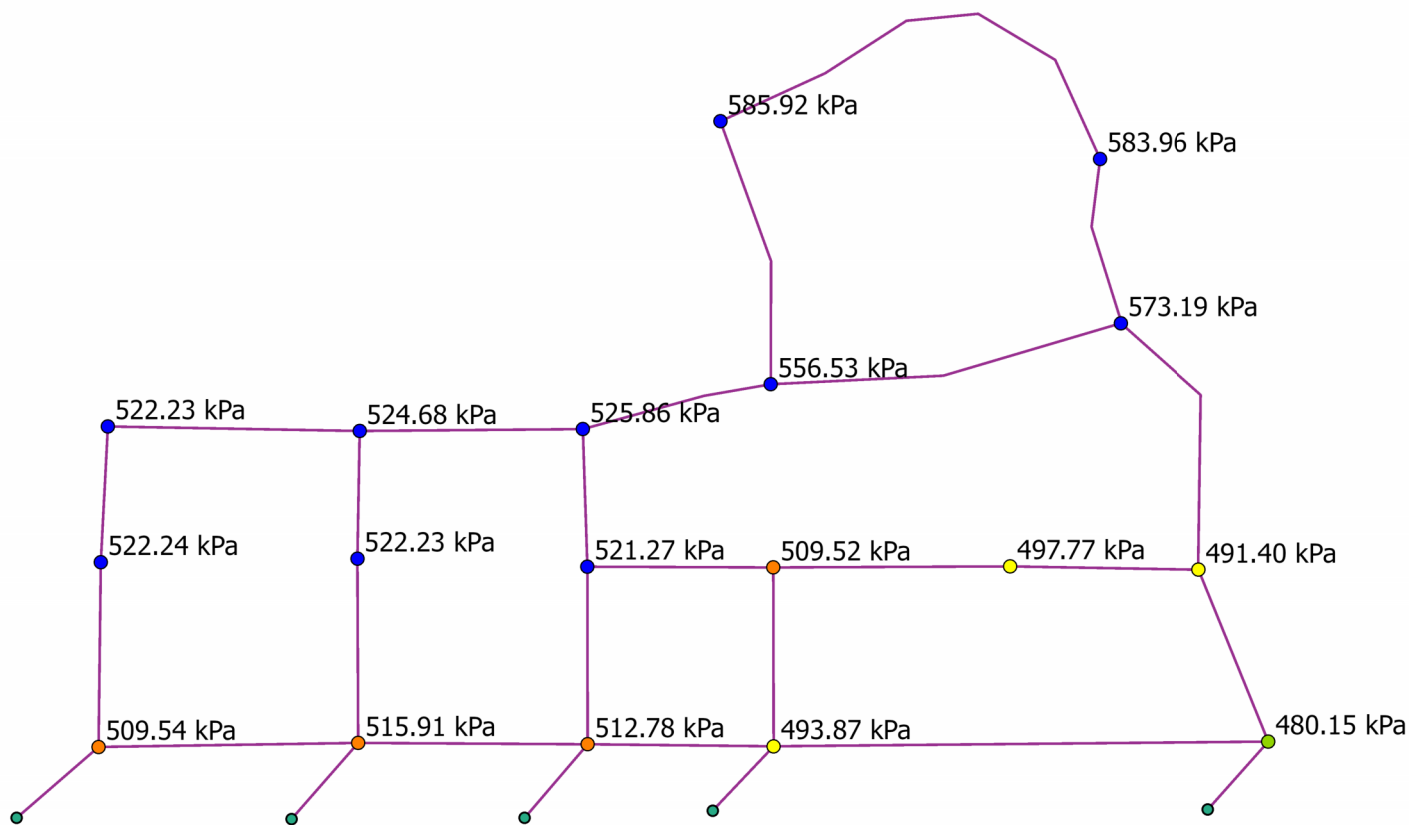
City of Ottawa

Node IDs



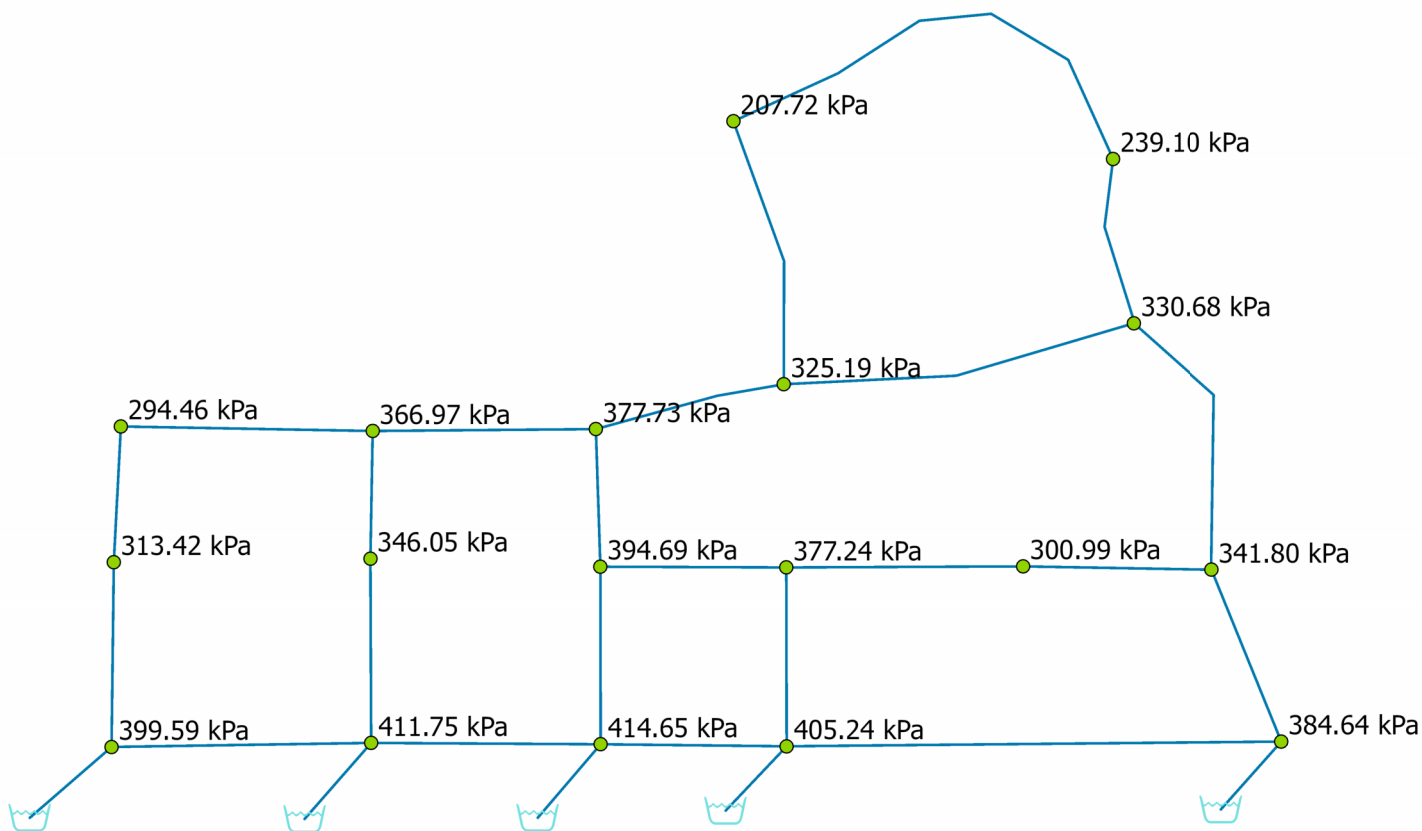
Average Day

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



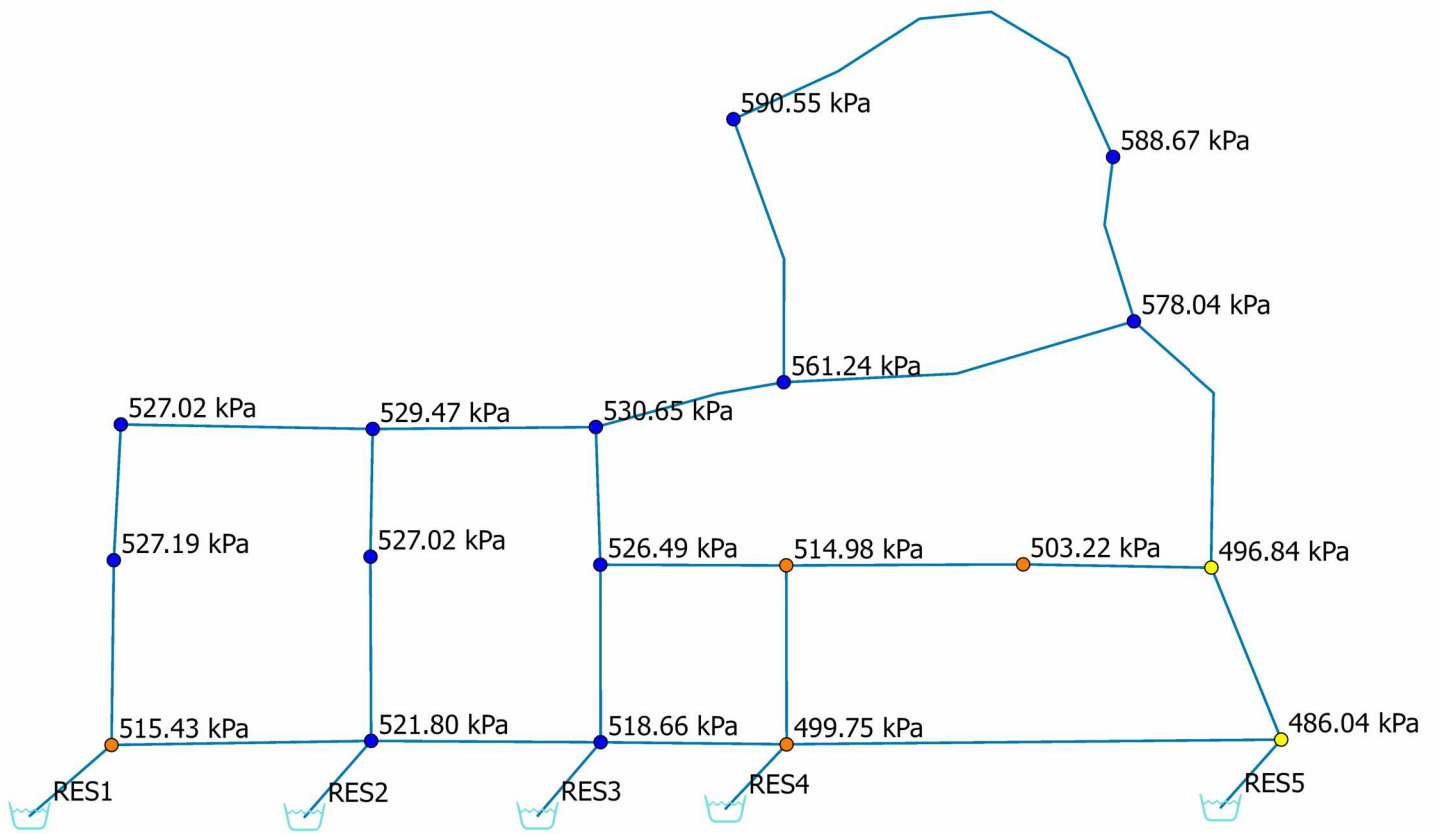
Fireflow - 15000 L/min

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



Peak Hour

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



V:\01-604\active\160402276 design\drawing\160402276-FA.dwg
2026/08/28 11:09 AM By: Wu, Michael



 Stantec	Project:	Wateridge Block 23	160402276
	TABLE 1: FIRE HYDRANT COVERAGE TABLE		
	Revision: 01	Prepared By: MW	
	Revision Date: 2026-08-28	Checked By:	

Description	Hydrants ¹			Total Available Fire Flow (L/min)	Total Required Fire Flow ² (L/min)
	HYD-01	HYD-02	HYD-03		
Block 17					
Distance from building (m)	5.4	4.1	4.4	-	-
Maximum fire flow capacity ³ (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



	SUBDIVISION:		SANITARY SEWER DESIGN SHEET (City of Ottawa)										DESIGN PARAMETERS																							
	Wateridge Block 23												MAX PEAK FACTOR (RES.):= 4.0		AVG. DAILY FLOW / PERSON 280 l/p/day		MINIMUM VELOCITY 0.60 m/s																			
	DATE: 2026-08-28												MIN PEAK FACTOR (RES.):= 2.0		COMMERCIAL 28,000 l/ha/day		MAXIMUM VELOCITY 3.00 m/s																			
REVISION: 1		PEAKING FACTOR (INDUSTRIAL): 2.4		INDUSTRIAL (HEAVY) 55,000 l/ha/day		MANNINGS n 0.013		DESIGNED BY: JP		PEAKING FACTOR (ICI >20%): 1.5		INDUSTRIAL (LIGHT) 35,000 l/ha/day		BEDDING CLASS B		CHECKED BY: MW		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+I+I		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).



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

https://arcadiso365.sharepoint.com/sites/139653/Internal Documents/6.0_Technical/6.04_Civil/04_Design-Analysis/4th Sub/CCS_sanitary_Wateridge_2025-05-14



LEGEND :

MH10A

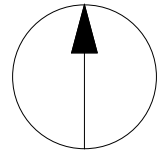
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0.0

AREA NUMBER

POPULATION

AREA IN HECTARES



CLIENT

CANADA LANDS COMPANY



CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

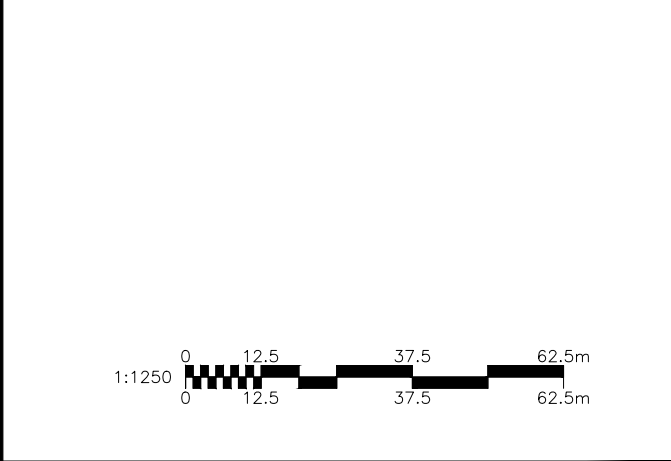
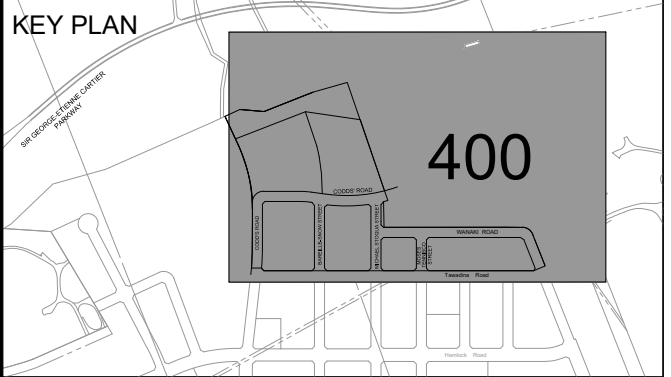
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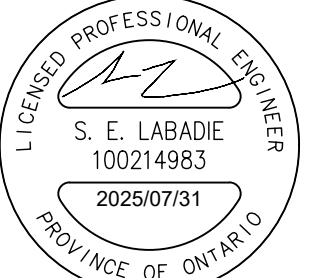
Arcadis Professional Services (Canada) Inc.
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ISSUES		
No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2023-10-05
2	ISSUED FOR CLIENT REVIEW	2024-06-12
3	SUBMISSION NO.2 FOR CITY REVIEW	2024-06-21
4	ISSUED FOR GEOTECHNICAL REVIEW	2024-11-26
5	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



SEAL



ARCADIS

333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

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

SANITARY DRAINAGE AREA
PLAN

SHEET NUMBER

400

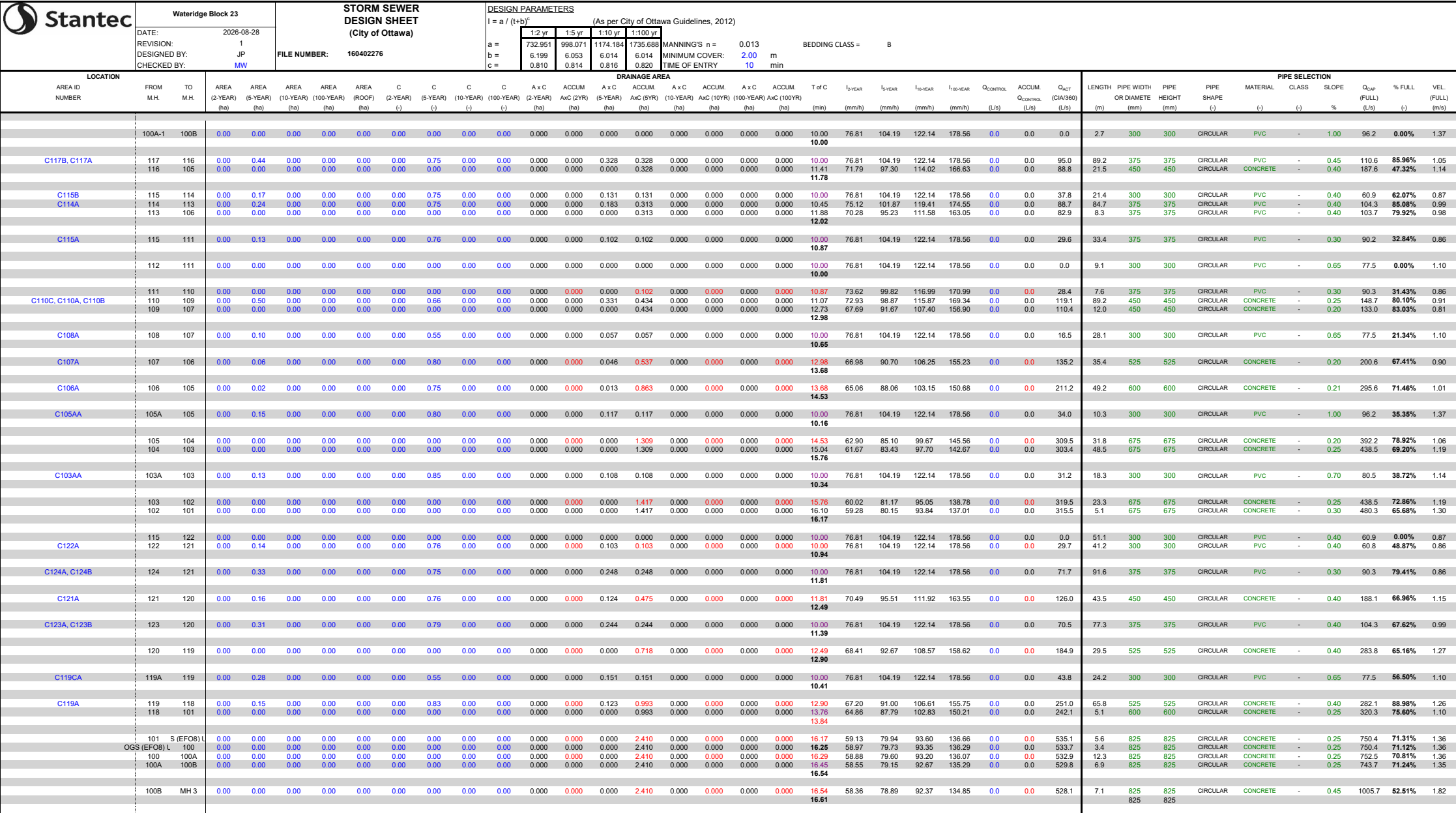
ISSUE

7

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] ;Name MaxFlow ;----- -----	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.

Subcatchment Summary

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

Node Summary

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

Link Summary

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

Cross Section Summary

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

Transect Summary

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
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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

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 0L1 (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 Precip	Total Runon	Total Evap	Total Infil	Imperv Runoff	Perv Runoff	Total Runoff
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Runoff Subcatchment ltr	Runoff LPS	Coeff	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 Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth 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

Node Inflow Summary

Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow Volume 10^6 ltr	Flow Balance Error 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

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 m	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow 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

 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 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

 Link Flow Summary

Link	Type	Maximum Flow LPS	Time of Max Occurrence days hr:min	Maximum Veloc m/sec	Max/ Full Flow	Max/ Full 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

Flow Classification Summary

Conduit	Adjusted /Actual Length	-----		-----		-----		-----		-----		Norm Ltd	Inlet Ctrl
		Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet 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	----- Both Ends	Hours Full Upstream	----- Dnstream	Hours Above Full Normal Flow	Hours 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 ^{(1),(2)}	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 ^{(1),(2)}	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 ³)	Total Storage Used During 2 Year Storm (DDSWMM Simulation) (m ³)	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. ⁽¹⁾	Req.	Prov. ⁽¹⁾	Req.	Prov. ⁽¹⁾
Enhanced	163.83 ha Wet Pond 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.

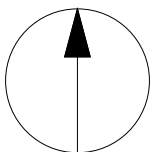
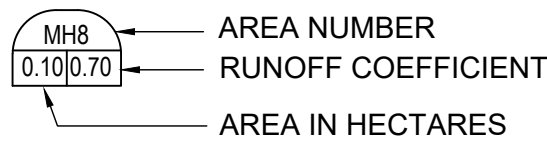


Wateridge Village Phase 6, 7
CITY OF OTTAWA
Canada Lands Company

2025-06-27 9:34 AM



LEGEND :



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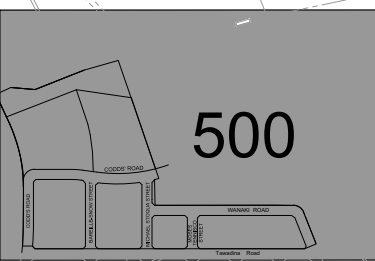
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ISSUES

No.	DESCRIPTION	DATE
1	SUBMISSION NO.1 FOR CITY REVIEW	2023-10-05
2	ISSUED FOR CLIENT REVIEW	2024-06-12
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

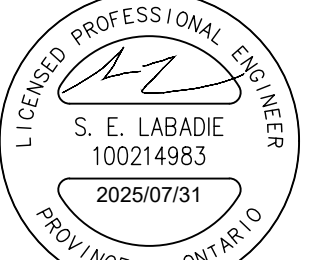
KEY PLAN



1:1250



SEAL





333 Preston Street - Suite 500
Ottawa ON K1S 5N4 Canada
tel 613 225 1311
www.arcadis.com

PROJECT

WATERIDGE VILLAGE AT ROCKCLIFFE

PHASES 6 AND 7

PROJECT NO:

139653

DRAWN BY:

M.M.

CHECKED BY:

J.I.M.

PROJECT MGR:

S.L.

APPROVED BY:

S.L.

SHEET TITLE

STORM DRAINAGE AREA PLAN

SHEET NUMBER

500

ISSUE

7

FILE LOCATION: \\139653_000399-49_W\7_0_Production\7_03_Design\04_Civil\Sheets\500 STORM DRAINAGE AREA PLAN.dwg

Version: 1

Plotted: July 31, 2025 2:42:14 PM by Milne, Maran

CITY PLAN No. 19055 CITY FILE No. D07-16-15-0003

Storm Hydraulic Grade Line Summary of Results

XPSWMM NODE ID	PROPOSED GROUND 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	87.56	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

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.

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					

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.



CULTEC

Subsurface Stormwater Management Systems

P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com

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

GENERAL
CULTEC RECHARGER 360HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF ON-SITE STORMWATER RUNOFF.

1. THE CHAMBERS SHALL BE MANUFACTURED IN THE U.S.A. OR CANADA BY CULTEC, INC. OF BROOKFIELD, CT. (203-775-4416 OR 1-800-428-5832)

15. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES.

4. THE END CAP SHALL BE STRUCTURAL FOAM INJECTION MOLDED OF BLUE VIRGIN HIGH MOLECULAR WEIGHT IMPACT-MODIFIED POLYPROPYLENE.

6. THE END CAP SHALL BE OPEN-BOTTOMED.

9. THE NOMINAL DIMENSIONS OF THE END CAP SHALL BE 36.5 INCHES (927 mm) TALL, 60 INCHES (1525 mm) WIDE AND 18 INCHES (458 mm) LONG. WHEN JOINED WITH A RECHARGER 360HD CHAMBER, THE INSTALLED LENGTH OF THE END CAP SHALL BE 15 INCHES (381 mm).

10. THE NOMINAL STORAGE VOLUME OF THE END CAP SHALL BE 5.17 FT³ / FT (0.48 m³ / m) - WITHOUT STONE. THE NOMINAL STORAGE VOLUME OF AN INTERLOCKED END CAP SHALL BE 6.46 FT³ / UNIT (0.183 m³ / UNIT) - WITHOUT STONE.

12. THE CHAMBER SHALL BE MANUFACTURED IN A FACILITY EMPLOYING CULTEC'S QUALITY CONTROL AND ASSURANCE PROCEDURES

1. THE FEED CONNECTOR SHALL BE MANUFACTURED BY COLTEC, INC. OF BROOKFIELD, CT.
(203-775-4416 OR 1-800-428-5832)

3. THE FEED CONNECTOR SHALL BE ARCHED IN SHAPE.

- CULTEC NO. 410™ NON-WOVEN GEOTEXTILE**
CULTEC NO. 410™ NON-WOVEN GEOTEXTILE MAY BE USED WITH CULTEC CONTACTOR AND RECHARGER® STORMWATER INSTALLATIONS TO PROVIDE A BARRIER THAT PREVENTS SOIL INTRUSION INTO THE STONE.

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT.
(203-775-4416 OR 1-800-478-5832)

- CULTEC AFAB-HPF™ WOVEN GEOTEXTILE**
CULTEC AFAB-HPF WOVEN GEOTEXTILE IS DESIGNED AS A UNDERLAYMENT TO PREVENT SCOURING CAUSED BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEEL CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE. IT MAY ALSO BE USED AS A COMPONENT OF THE CULTEC SEPARATOR ROW / ADS ISOLATOR ROW PLUS TO ACT AS A BARRIER TO PREVENT SOIL/CONTAMINANT INTRUSION INTO THE STONE WHILE ALLOWING FOR MAINTENANCE.

1. THE GEOTEXTILE SHALL BE PROVIDED BY CULTEC OF BROOKFIELD, CT.
(203-775-4416 OR 1-800-428-5832)

3. THE GEOTEKSTILE SHALL HAVE A TENSILE STRENGTH OF 320 X 320 LBS (1,420 X 1,420 N) PER ASTM D4632 TESTING METHOD.
4. THE GEOTEKSTILE SHALL HAVE A ELONGATION @ BREAK RESISTANCE OF 15 X 15 PER ASTM D4632 TESTING METHOD.
5. THE GEOTEKSTILE SHALL HAVE A WIDE WIDTH TENSILE RESISTANCE OF 3,563 X 3,563 LBS/FT (52 X 52 KN/M) PER ASTM D4595 TESTING METHOD.
6. THE GEOTEKSTILE SHALL HAVE A CRB (PUNCTURE) RESISTANCE OF 1,500 LBS (6,600 N) PER ASTM D6241 TESTING METHOD.
7. THE GEOTEKSTILE SHALL HAVE A TRAPEZOIDAL TEAR RESISTANCE OF 120 X 120 (540 X 540 N) PER ASTM D4533 TESTING METHOD.
8. THE GEOTEKSTILE SHALL HAVE AN APPARENT OPENING SIZE OF 30 US STD. SIEV (0.60 MM) PER ASTM D4751 TESTING METHOD.
9. THE GEOTEKSTILE SHALL HAVE A PERMITTIVITY RATING OF 0.2 SEC-1 PER ASTM D4491 TESTING METHOD.
10. THE GEOTEKSTILE SHALL HAVE A WATER FLOW RATING OF 22 GPM/FT² (900 LPM PER ASTM D4491 TESTING METHOD.
11. THE GEOTEKSTILE SHALL HAVE A UV RESISTANCE OF 70% @ 500 HRS. PER ASTM D4355 TESTING METHOD.

The diagram illustrates a cross-section of a stormwater collection system. Two corrugated metal chambers are shown side-by-side, separated by a wall. Above the chambers is a layer of stone, followed by a layer of washed, crushed stone. A 12-inch thick layer of stone surrounds the chambers. The top surface is finished grade. Below the chambers is a layer of stone, followed by a layer of washed, crushed stone. A 12-inch thick layer of stone surrounds the chambers. The bottom of the chambers is lined with a material labeled "NON-WOVEN GEOTEXTILE TO BE PLACED BENEATH INTERMANIFOLD FEATURE AND BENEATH ALL INLET/CUTOUTS (SCOUR PROTECTION)". The diagram also shows a "CULVERT RECHARGER 360HD IN CULVERT SEPARATOR ROW (IF APPLICABLE)" and "ADS ISOLATOR ROW PLUS CONFIGURATION (IF APPLICABLE)". Dimensions include: 12" 25-50mm WASHED, CRUSHED STONE SURROUNDING CHAMBERS; 12" 36mm MAX. COVER DEPTH; 18.0" 457mm MIN. FOR UNPAVED (REDUCE TO 12.0" 305mm FOR NON-TRAFFIC APPLICATION); 12.0" 305mm MIN.; 69.0" 1752mm MIN. CENTER TO CENTER; 60.0" 1524mm; 12.0" 305mm MIN. FOR RIGID PAVEMENT; 12.0" 305mm MIN. FOR FLEXIBLE PAVEMENT; 8.0" 102mm MIN.; 36.0" 915mm; 8.0" 102mm MIN.

NOTES:

- THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". THE LOAD CASE CONFIGURATION SHALL INCLUDE:
 - INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
 - MAXIMUM PERMANENT (50-YEAR) COVER LOAD
 - 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
- THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTECT'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
 - THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
 - THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
 - THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

THE DESIGN ENGINEER IS RESPONSIBLE FOR ENSURING THAT THE REQUIRED BEARING CAPACITY OF SUB-GRADE SOILS HAVE BEEN MET

FIELD PLACED CLASS "C" CONCRETE COLLAR.
CONCRETE COLLAR CAN RECEIVE ASPHALT
OVERLAY IF DESIRED

AASHTO HS-20 RATED DUCTILE IRON
FRAME AND COVER

CONCRETE COLLAR/ASPHALT OVERLAY NOT
REQUIRED FOR NON-TRAFFIC APPLICATIONS

COMPACTED GRANULAR BACKFILL. THE BACKFILL
MATERIAL SHALL MEET THE REQUIREMENTS OF CLASS
I, II, OR III MATERIALS AS DEFINED BY ASTM D2321

CULTEC 12" PVC UNIVERSAL INLINE DRAIN BODY

12" PVC UNIVERSAL INLINE DRAIN BODY CAN BE TRIMMED TO
ACCOMMODATE 6" 150mm, 8" 200mm AND
10" 250mm SDR-35 PVC PIPE

6" 150mm, 8" 200mm, OR 10" 250mm SDR-35 RISER
(LENGTH VARIES BASED ON SYSTEM DEPTH)

HOLE TO BE CUT W/ HOLE SAW CENTERED
ON CORRUGATION CREST. 6.25" 160mm ,
8.50" 220mm, OR 10.75" 275mm

SDR-35 PIPE. BELL END CUT AND
INSERTED 6.0" 150mm INTO CHAMBER

PIPE TO BE INSERTED 12.0" MIN. INTO CHAMBER
MAXIMUM PIPE SIZE:
24" 600mm HDPE
30" 762mm PVC

MIN. 95% COMPACTED FILL OR GRANULAR SUB-BASE

TRAFFIC RATED CULVERT INSPECTION PORT (SEE ZOOM DETAIL)

INLET STRUCTURE

24.0" 305mm MIN SUMP

TYPICAL CULVERT SEPARATOR ROW / 1/2" 25-50mm WASHED, CRUSHED STONE SURROUNDING CHAMBER

PAVEMENT OR FINISHED GRADE

NON-WOVEN GEOTEXTILE AROUND SIDES MANDATORY, BOTTOM IF DESIGN PREFERENCE.

1 LAYER OF WOVEN GEOTEXTILE TO BE PLACED BENEATH ENTIRE CULVERT SEPARATOR ROW / 1/2" 150mm PLUS

THE DESIGN ENGINEER IS RESPONSIBLE FOR ENSURING THAT THE REQUIRED BEARING CAPACITY OF SUB-GRADE SOILS HAS BEEN MET

FIGURE 1

MAX. PIPE:
10" 250mm HDPE
12" 300mm PVC

ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.

PIPE	A	B
6" 150 mm	26.50" 673 mm	1.00" 25 mm
8" 200 mm	24.50" 622 mm	1.00" 25 mm
10" 250 mm	22.25" 565 mm	1.25" 32 mm
12" 300 mm	19.75" 502 mm	1.75" 45 mm
15" 375 mm	16.50" 419 mm	2.00" 50 mm
18" 450 mm	13.00" 330 mm	2.50" 64 mm
21" 525 mm	10.00" 254 mm	2.50" 64 mm
24" 600 mm	7.00" 178 mm	2.50" 64 mm
30" 750 mm	N/A	3.50" 89 mm

THE TYPICAL INVERT TABLE ABOVE IS BASED ON THE INSIDE DIAMETER OF STANDARD CORRUGATED PLASTIC PIPE. THE HEAVY DUTY END CAP HAS PRE-MARKED TRIM LINES FOR PIPE DIAMETERS 12" (300mm), 15" (375mm), 18" (450mm) AND 24" (600mm). PIPES OF ANY SIZE AND MATERIAL UP TO 24" (600mm) MAY BE PLACED AT CUSTOM LOCATIONS AND CUSTOM INVERTS. 30" (750mm) SMOOTH-WALL SDR-35 PVC PIPE MAY BE USED AT THE BOTTOM OF THE END CAP. THE CROWN OF THE PIPE MUST REMAIN A MINIMUM OF 3" (75mm) FROM THE EDGE OF THE HEAVY DUTY END CAP.

CULTEC RECHARGER 360HD TYPICAL PIPE INVERTS

CULTEC HVLV FC-48
FEED CONNECTOR THREE VIEW

OPTIONAL CULTEC INSPECTION PORT - ZOOM DETAIL

NOTES:

1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL, STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:

a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT F3430-20

b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD

2. THE 7-WEEK PAVED AASHTO DESIGN TRUCK LOAD

3. THE CHAMBERS SHALL BE DESIGNED TO ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL, STORMWATER COLLECTION CHAMBERS."

4. THE CHAMBERS SHALL BE DESIGNED TO PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTECS RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:

a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430

b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75

c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

FIGURE 1

MAX. PIPE:
10" 250mm HDPE
12" 300mm PVC

ZOOM OF SIDE PORTAL SHOWING MAX. PIPE O.D.



Date: 08/14/2026

[Click for Imperial](#)

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 ²
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 ³	m ³	m ³	m ³	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 ³	m ³	m ³	m ³	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
EFO8	86
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)

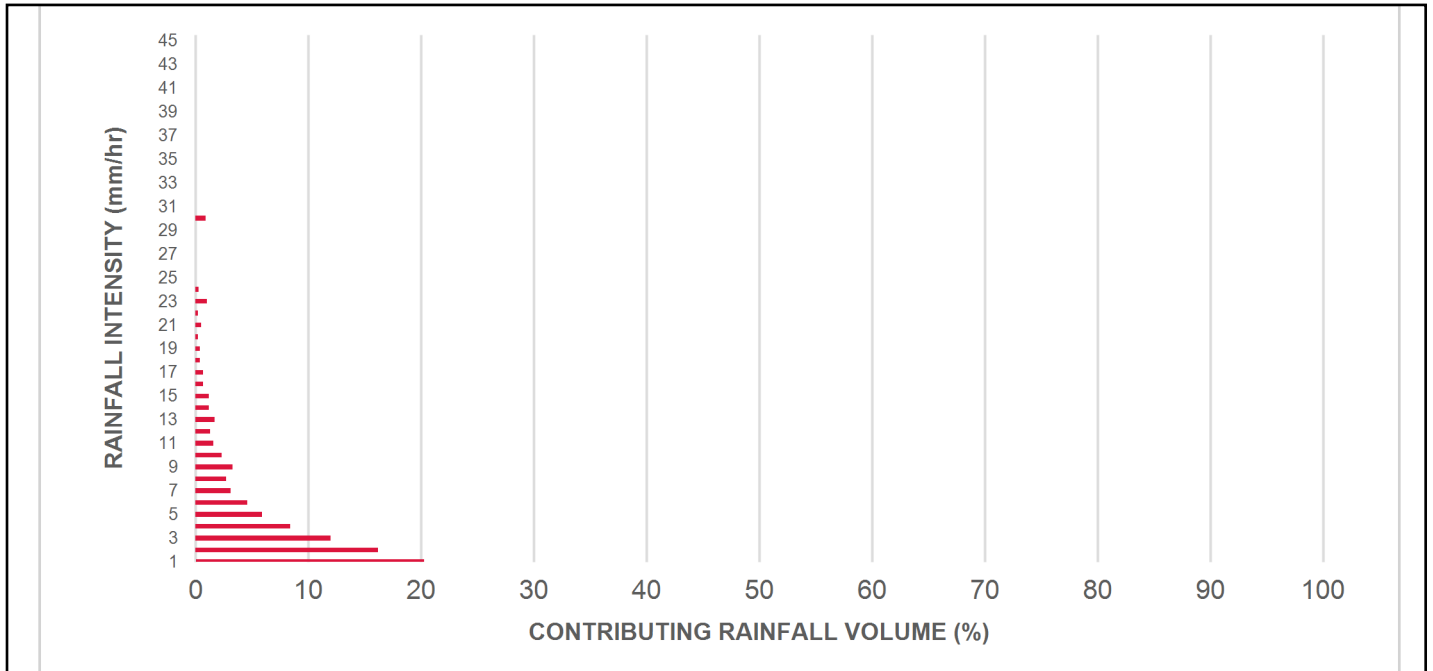
► The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a 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

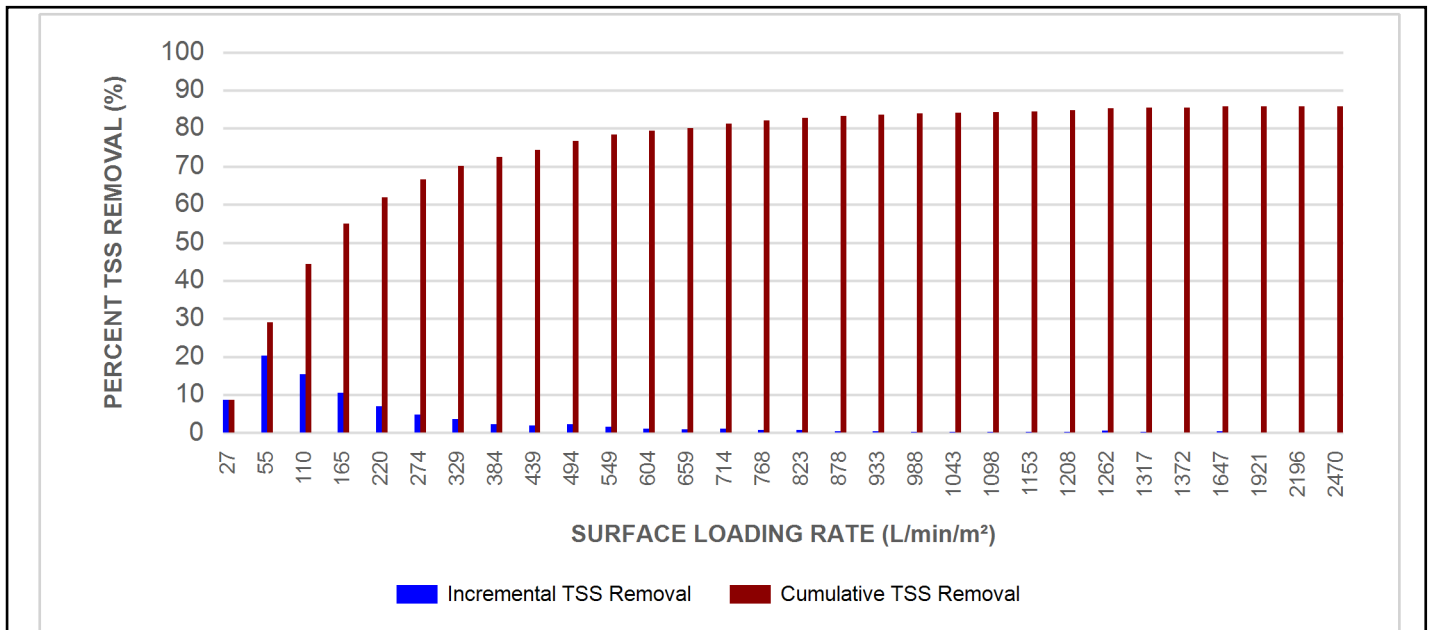
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.6	8.6	2.15	129.0	27.0	100	8.6	8.6
1.00	20.3	29.0	4.30	258.0	55.0	100	20.3	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 EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance 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

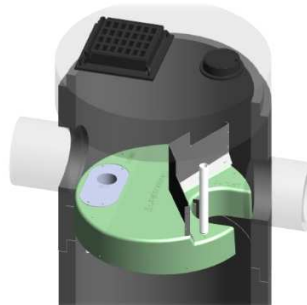
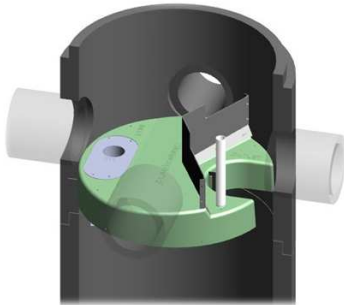
► **Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test 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.

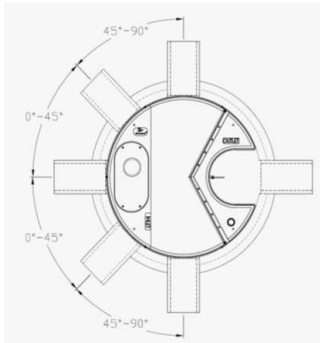
DESIGN FLEXIBILITY

► **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 ³ sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m ³ sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m ³ sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m ³ sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m ³ sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m ³ 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/m² to 1400 L/min/m², 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/m² and 1400 L/min/m² 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/m² shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m². No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m².

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m² shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m², and shall be calculated using a simple proportioning formula, with 1400 L/min/m² 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/m².

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/m².

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/m² to 2600 L/min/m²) 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.

\\IMBRIUM\PRODUCTS\STORMCEPTOR EF40 DRAWINGS & DETAILS\STANDARD DETAILS\EF08-DETAIL.DWG 4/12/2019 11:07 AM



- ## INSTALLATION NOTES

- 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).

OUTLET RISER & MAINTENANCE ACCESS

OUTLET RISER VANE

DROP PIPE

SINGLE OR MULTIPLE INLET PIPES
25mm [1"] DIFFERENCE BETWEEN
INLET INVERT AND OUTLET INVERT

FRAME AND COVER
MIN. $\phi 575$ [22"]
TO BE LOCATED OVER
DROP PIPE.

FRAME AND COVER
MIN. $\phi 710$ [28"]
TO BE LOCATED OVER
MAINTENANCE ACCESS,
OIL INSPECTION PORT.

WEIR

OUTLET PLATFORM

OIL INSPECTION PORT

PLAN VIEW (STANDARD)

OUTLET RISER & MAINTENANCE ACCESS

OUTLET RISER VANE

DROP PIPE

SINGLE OR MULTIPLE INLET PIPES
25mm [1"] DIFFERENCE BETWEEN
INLET INVERT AND OUTLET INVERT

INLET FRAME AND GRATE
MIN. 610x610 mm [24"x24"]
TO BE LOCATED OVER
DROP PIPE.

FRAME AND COVER
MIN. $\phi 710$ [28"]
TO BE LOCATED OVER
MAINTENANCE ACCESS,
OIL INSPECTION PORT.

WEIR

OUTLET PLATFORM

OIL INSPECTION PORT

PLAN VIEW (INLET TOP)

<u>SITE SPECIFIC DATA REQUIREMENTS</u>					
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					



Stormceptor® EF

SCALE = NTS

DATE: 10/13/2017

DESIGNED: JSK	DRAWN: JSK
CHECKED: BSF	APPROVED: *
PROJECT No.: EFO8	SEQUENCE No.: *

SHEET: 1 OF 1

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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 1.4×10^{-8} to 2.4×10^{-5} m/sec for silty sand to sandy silt and glacial till, and from 1.4×10^{-8} to 5.3×10^{-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	7.50×10^{-06}	79.24	Silty sand with rocks
		0.50	89.00	5.30×10^{-06}	72.21	Silty Sand with Gravel
PT 2	87.74	0.30	87.44	1.10×10^{-06}	47.41	Clayey Silt
		0.80	86.94	1.40×10^{-08}	14.74	Silty Clay
PT 3	89.81	0.25	89.56	2.70×10^{-06}	60.28	Silty Sand with Clay
		0.75	89.06	1.90×10^{-05}	101.62	Silty Sand
PT 4	91.29	0.25	91.04	8.20×10^{-07}	43.82	Clayey Silt
		0.75	90.54	1.10×10^{-05}	87.80	Silty Sand
PT 5	87.46	0.20	87.26	4.30×10^{-06}	68.28	Silty Sand
		0.60	86.86	5.30×10^{-08}	21.05	Silty Clay
PT 6	84.97	0.30	84.67	5.30×10^{-07}	38.99	Silty Clay
		0.80	84.17	8.00×10^{-07}	43.53	Clayey Silt
PT 7	85.63	0.20	85.43	1.60×10^{-06}	52.41	Clayey Silt
		0.60	85.03	5.30×10^{-07}	38.99	Silty Clay
PT 8	85.36	0.30	85.06	2.70×10^{-06}	60.28	Silty Sand with Clay
		0.75	84.66	2.70×10^{-08}	17.58	Silty Clay
PT 9	89.28	0.25	89.03	5.90×10^{-06}	74.31	Silty Sand
		0.50	88.78	1.10×10^{-05}	87.80	Silty Sand
PT 10	88.78	0.30	88.48	2.20×10^{-05}	105.69	Silty Sand
		0.80	87.98	8.50×10^{-06}	81.94	Silty Sand
PT 11	89.22	0.30	88.92	2.40×10^{-05}	108.18	Silty Sand
		0.80	88.42	1.60×10^{-05}	97.06	Silty Sand
PT 12	88.57	0.20	88.37	7.50×10^{-06}	79.24	Silty Sand
		0.60	87.97	1.10×10^{-06}	47.41	Silty Sand
PT 13	91.39	0.30	91.09	2.70×10^{-06}	60.28	Sand with Gravel
		0.75	90.64	6.40×10^{-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_{fs} (m/sec)	Infiltration Rate (mm/hr)	Soil Type
PT14	82.55	0.30	82.25	1.40×10^{-07}	27.30	Silty Clay
		0.80	81.75	1.40×10^{-08}	14.74	Glacial Till
PT15	83.49	0.20	83.29	8.50×10^{-06}	81.94	Silty Sand
		0.60	82.89	1.75×10^{-07}	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	

Table 4 – Summary of Groundwater Levels				
Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
		Depth (m)	Elevation (m)	
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	

Table 4 – Summary of Groundwater Levels				
Borehole Number	Ground Surface Elevation (m)	Measured Groundwater Level		Date Recorded
		Measured Groundwater Level	Elevation (m)	
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	
Note: 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.

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

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

Table 8 - Recommended Pavement Structure - Roadways with Bus Traffic and Fire Routes	
Thickness (mm)	Material Description
40	Wear Course - HL3 or Superpave 12.5 Asphaltic Concrete
50	Upper Binder Course - HL8 or Superpave 19.0 Asphaltic Concrete
50	Lower Binder Course - HL8 or Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
600	SUBBASE - OPSS Granular B Type II
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill Note: 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.



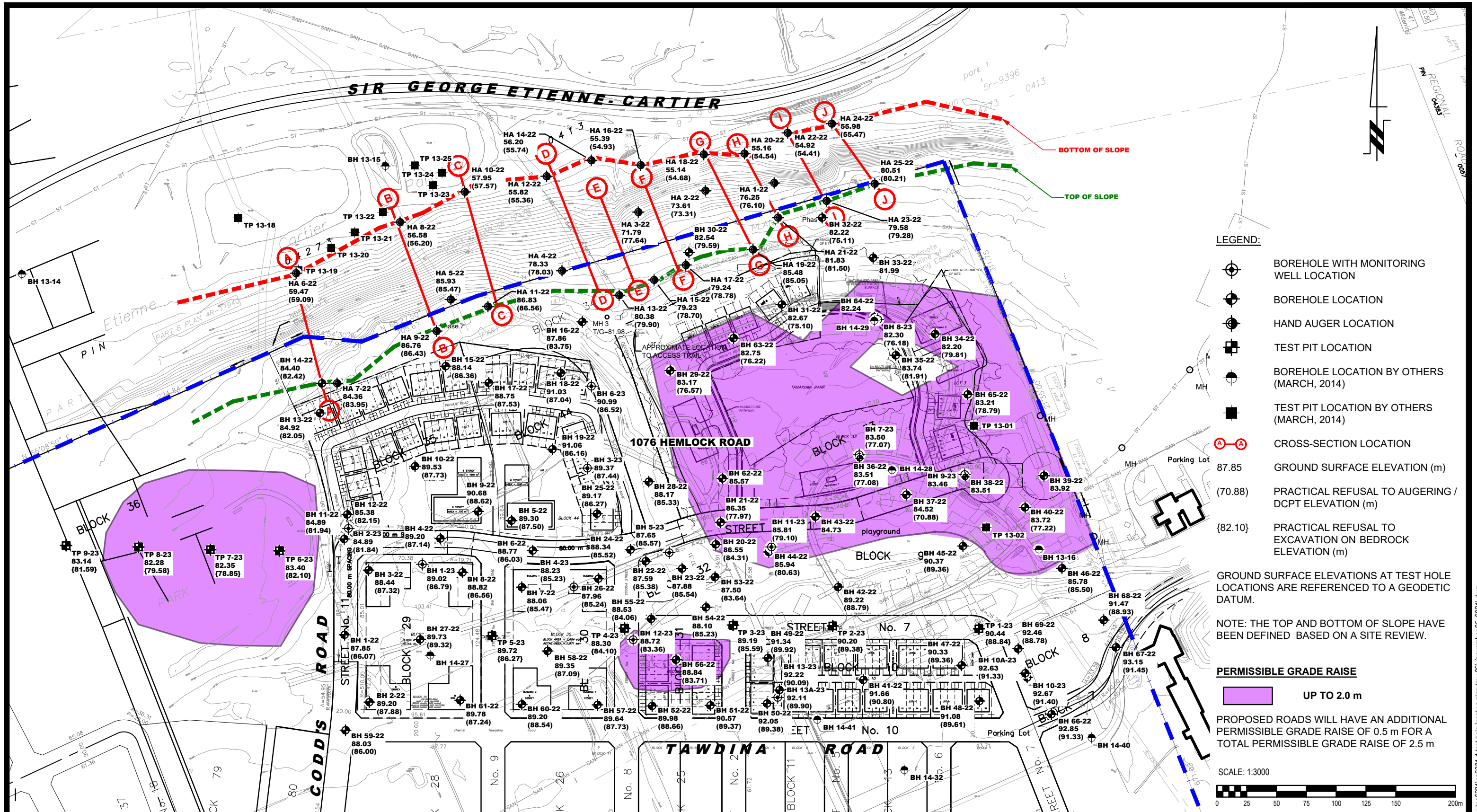
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Faisal I. Abou-Seido, P.Eng.

Report Distribution:

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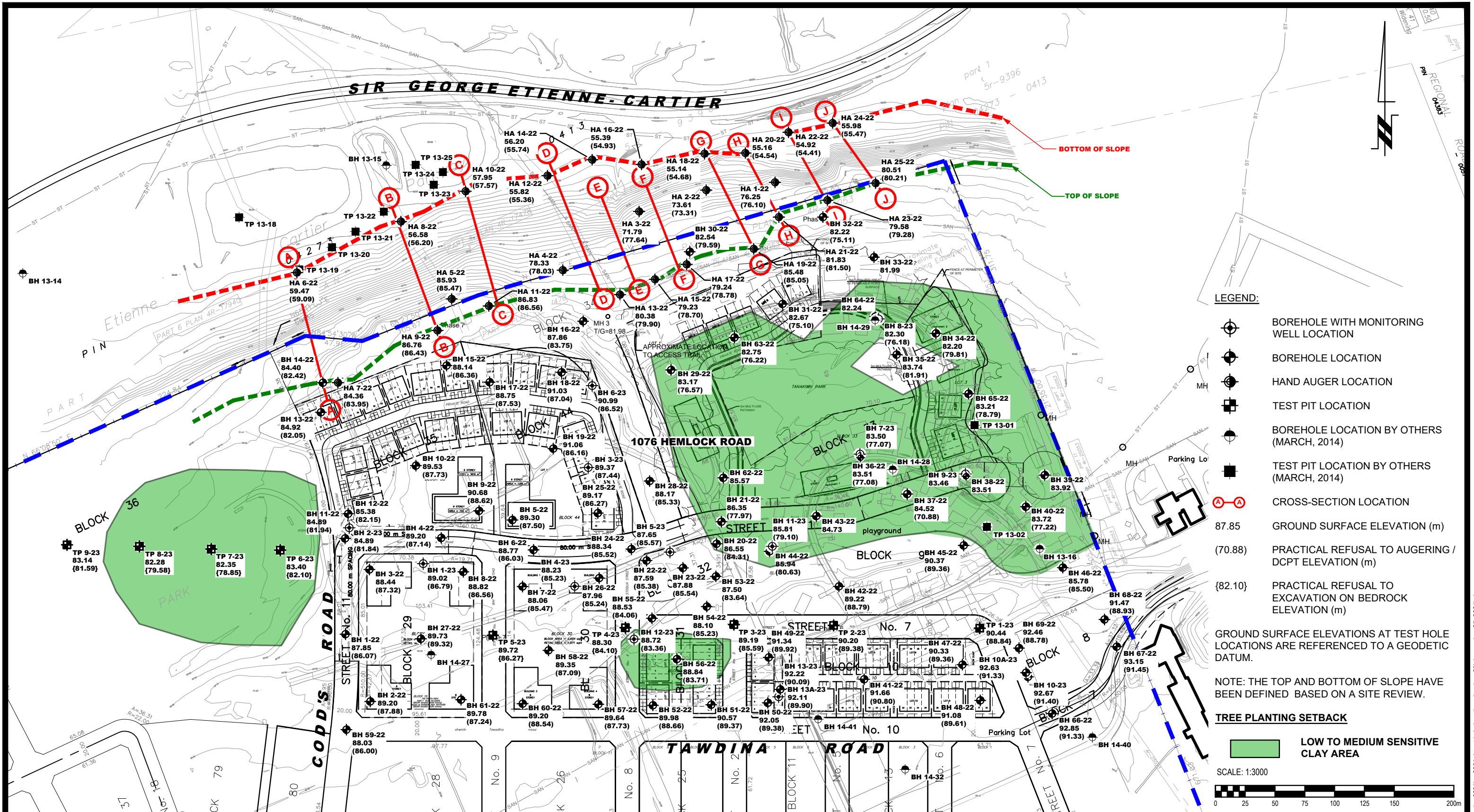
5.	ADDED UPDATED CONCEPTUAL PLAN	25/11/2024	NP
4.	REVISED AS PER CITY COMMENTS	19/06/2024	YZ
3.	ADDED 2023 TEST PITS LOCATION TP1-23 TO TP9-23 AND UPDATED PERMISSIBLE GRADE RAISE AREA	05/01/2024	YZ
2.	ADDED BOREHOLES AND TEST PITS LOCATION BY OTHERS AND UPDATED PERMISSIBLE GRADE RAISE AREA	05/12/2023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

OTTAWA,
Title:

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	Date:	02/2023
Drawn by:	GK	Report No.:	PG6331-1
Checked by:	YZ	Dwg. No.:	PG6331-2
Approved by:	FA	Revision No.:	5



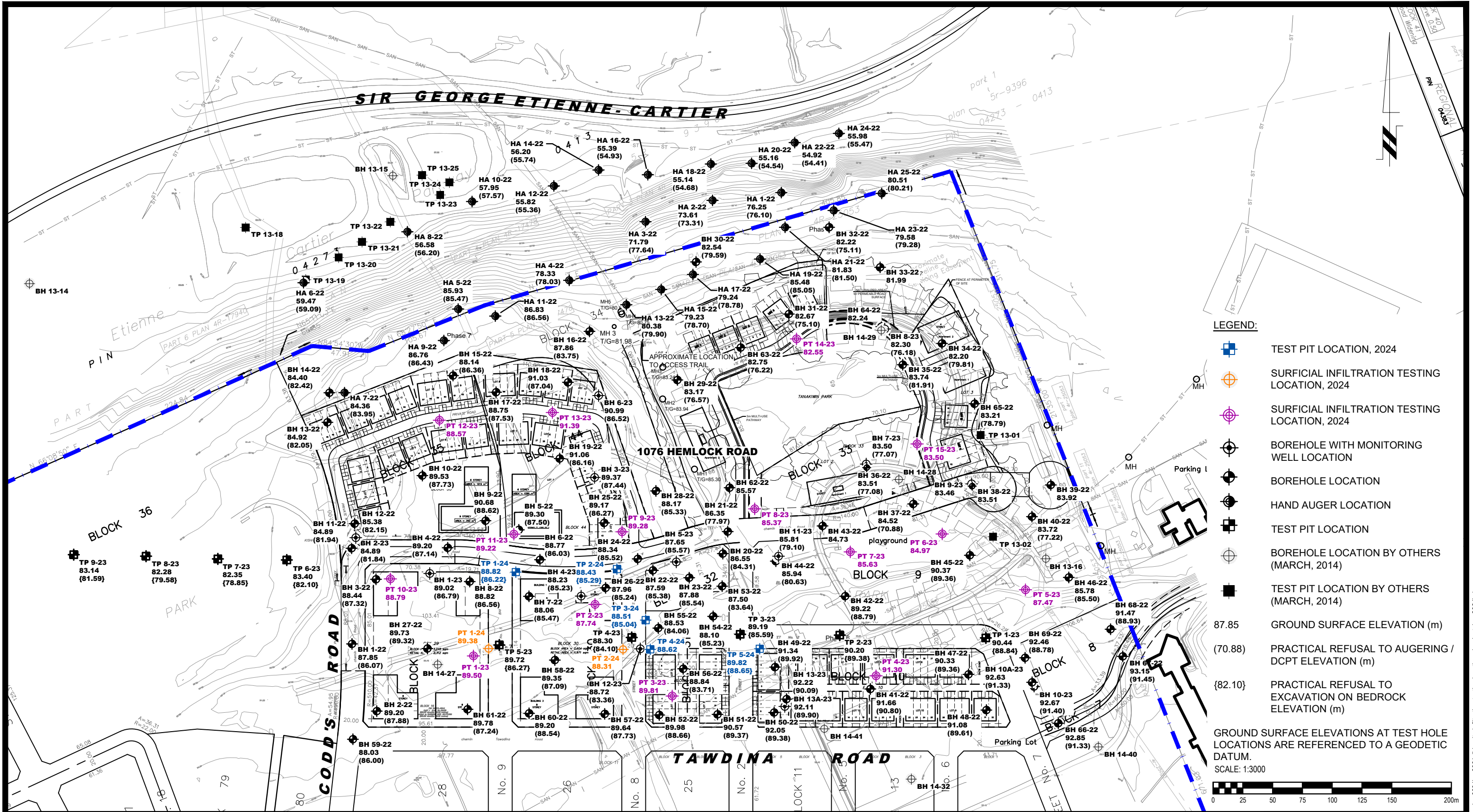
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5.	ADDED UPDATED CONCEPTUAL PLAN	25/11/2024	NP
4.	REVISED AS PER CITY COMMENTS	28/05/2024	FA
3.	ADDED 2023 TEST PITS LOCATION TP1-23 TO TP9-23 AND UPDATED TREE PLANTING SETBACK AREA	05/01/2024	YZ
2.	ADDED BOREHOLES AND TEST PITS LOCATION BY OTHERS 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

OTTAWA,
Title:

CANADA LANDS COMPANY, C/O IBI GROUP
GEOTECHNICAL INVESTIGATION
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



NO.	REVISIONS	DATE	INITIAL

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Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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