MAMTA HOMES

FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

PROPOSED TOWNHOUSE DEVELOPMENT
645 MARTINS STREET
TOWN OF MOUNT FOREST
TOWNSHIP OF WELLINGTON NORTH

FEBRUARY 2023

COBIDE Engineering Inc
517 10th Street
Hanover, ON N4N 1R4
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COBIDE
ENGINEERING INC

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1. INTRODUCTION

Cobide Engineering Inc. was retained by Mamta Developments Inc. to prepare a Functional Servicing and Stormwater Management Report to support the Draft Plan Approval for a proposed Condominium townhouse development located in Mount Forest.

1.1 LOCATION

The proposed development is located at 645 Martin Street in Mount Forest, within the Township of Wellington North, County of Wellington (described herein as the “site”). The proposed site will have access from Cork Street. A Regional Location Map is included as Figure 1.

1.2 DEVELOPMENT PROPOSAL

The overall property area is 1.98 hectares (4.89 acres) in size. The portion fronting onto Martin Street is intended to be developed under a separate application. The remainder of the property, 1.62 hectares (4.0 acres), is planned to be developed into a private townhouse site consisting of nine (9) townhouse blocks, including internal roadways, parking, sidewalks, and landscaped green space.

There will be private road throughout the development with provisions for fire truck access. Two entrances will be provided off Cork Street, one at the north end and one at the south end.

The Site Plan showing the overall configuration of the development has been included in Appendix A and noted as Drawing 03909-C1.

The proposed development is located within the “Residential” designation of both the current County and Local Official Plans. The property is currently zoned R2(H) Medium Density Residential with a Holding and is in the process of being re-zoned to remove the holding to permit construction of homes.

MAP SOURCE - MTO ROAD MAP

COBIDE ENGINEERING INC
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ORIGINAL SHEET – 8 x 11

Client/Project
PROPOSED TOWNHOUSE DEVELOPMENT
645 MARTIN STREET, MOUNT FOREST
TOWNSHIP OF WELLINGTON NORTH
COUNTY OF WELLINGTON
FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

Figure No.
1

Title
REGIONAL LOCATION MAP

Figure 1 – Regional Location Map

2. WATER DISTRIBUTION SYSTEM

The water distribution system will be sized based on the existing conditions at the connection to the municipal system and the subdivisions demands which are determined by the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems (2008).

2.1 DESIGN CRITERIA

The water distribution system will be design in accordance MECP guidelines which state the system *"should be designed to satisfy the greater of the following demands:*

- *Maximum day demand plus fire flow; or,*
- *Peak hour demand*

The maximum day demand and peak hour demand are based on the projected water consumption from the development and the fire flow is based on the type of the development.

Based on MECP guidelines, the minimum pressure at ground level at all points in the distribution system under maximum day demand plus fire flow conditions are to be 140 kPa (20 psi). The normal operation pressure should be between 350 kPa (50 psi) to 480 kPa (70 psi). There shall be no point in the distribution system that has a normal operating pressure of less than 275 kPa (40 psi). The maximum pressure in the pipe cannot exceed 700 kPa (100 psi).

2.2 WATER CONSUMPTION

The system will be designed based on a domestic water demand of 450 L/cap/day. The peaking factors will be derived from Table 3-1 of the MECP Design Guidelines. Based on the projected population of 48 people the peaking factor for the maximum day demand will be 2.75 and the peaking factor for the peak hour demand will be 4.13.

Table 1 below summarizes the projected maximum day and peak hour demands for all the units within the proposed development:

Table 1 - Proposed Water Demands

Demand	Population	Consumption (L/cap/day)	Peaking Factor	Peak Rate (L/day)	Peak Rate (L/s)
Maximum Day	85	450	2.75	105,188	1.22
Peak Hour	85	450	4.13	157,973	1.83

The system should be capable of supplying a minimum of 1.83 L/s of water to meet the peak hour demand of the entire proposed development.

2.3 FIRE FLOW

The AWWA *Manual of Water Supply Practices M31 – Distribution System Requirements for Fire Protection* and the Fire Underwriters Survey document *Water Supply for Public Fire Protection* will determine the required fire flows.

The fire flows are dependent upon many factors including the type of construction materials, building height and density of the development.

The Township's "Mount Forest Sanitary and Water Servicing Technical Update" completed in 2021 identifies the minimum target fire flow capabilities of 50 L/s for low density residential and 75 L/s for medium density residential development.

2.4 WATERMAIN CONFIGURATION

The proposed watermain will be connected to the municipal system at the proposed entrance from Cork Street and will loop around and through the site. The new watermain for the development will be 150mm diameter and will run east into the site complete with a valve at the property line to allow for isolation from the municipal water system. A 150mm diameter watermain is required to provide adequate fire coverage.

Fire hydrants will be placed throughout the site at a spacing no greater than 90m to provide fire department connections. A blow-off will be provided at each end of the turn-around where the watermain terminates.

A 25mm diameter water service will be provided to each unit for domestic water distribution.

A drawing showing the proposed watermain distribution system has been included in Appendix A as Drawing 03909-C2.

3. SANITARY SERVICING

The sanitary sewer system will be sized based on the existing conditions at the connection to the municipal system and the demands of the proposed development which are determined by the MECP Design Guidelines for Sewage Works (2008).

3.1 DESIGN CRITERIA

The sanitary sewer system will be design in accordance MECP guidelines.

The sanitary sewer will be designed to convey the projected peak flow based upon the projected population of the development as well as extraneous flows.

3.2 DESIGN FLOW RATES

The sanitary sewer will be designed based on a peak flow of 450 L/cap/day and a peaking factor of 4.0 for the size and type of the development. Based on a population of 85, the projected residential flow is 1.77 L/s. The development will contribute 1.98 ha of extraneous flows to the sanitary sewer. This will contribute 0.55 L/s to the flow. Therefore, the peak flow plus infiltration from the development is 2.32 L/s.

3.3 SANITARY SEWER CONFIGURATION

There is an existing 200mm diameter PVC sanitary sewer on Cork Street that flows north. The site will connect into the existing sanitary manhole located at the north entrance and a new sanitary manhole will be installed on the sewer for the south entrance. Each unit will be serviced with a 125mm sanitary service.

All sanitary sewers within the development are proposed to be 200mm diameter PVC pipe. Where possible the minimum slope considered will be 1.0% to maintain a minimum velocity at full flow to prevent sediment deposition and blockages however due to the depth of the existing sanitary sewer on Cork Street, there are some sections that are required to be less than 1.0%.

A drawing showing the proposed sanitary collection network has been included in Appendix A as Drawing 03909-SSP.

4. STORMWATER MANAGEMENT AND SITE DRAINAGE

The stormwater management and site drainage for the proposed townhouse development must comply with the current standards of the Municipality, Conservation Authority and MECP Design Guidelines. The following provides a summary of the stormwater management and site drainage plan for the development.

The recommended stormwater strategy for the development requires the post development peak flows from the property to be less than or equal to the pre-development peak flow conditions with the stormwater discharging to the existing storm sewer on Cork Street.

4.1 EXISTING DRAINAGE CONDITIONS

The current site topography provides overland drainage from northeast to southwest draining into an existing catch basin in the ditch on the east side of Cork Street. There is existing runoff from the neighbouring lots that discharges onto this site.

4.2 PROPOSED DRAINAGE CONDITIONS

The intent of the stormwater drainage plan for the townhouse development is proposed to collect the runoff from the site and convey the runoff away from neighbouring residential lots.

Since the development will increase the overall impervious area of the subject property, stormwater runoff will need to be over-controlled in order to reduce the peak flows to pre-development conditions. This will be achieved through the construction of a stormwater management pond and underground storage chambers. The outlet from the underground storage chambers will connect to the existing storm sewer on Cork Street at the proposed entrance to the Sunvale Homes Subdivision.

The existing rear yard swale on the lots at the corner of Cork Street and Martin Street will be connected to the existing storm sewer stub at the intersection. The drainage design has been completed based on Cork Street being urbanized.

4.3 STORMWATER MODELING

The stormwater modeling for the pre and post development scenarios was completed using PCSWMM and the 6 hour SCS rainfall distribution. Rainfall data was obtained from the Mount Forest weather station.

According to the Soils Survey of Wellington County, the local native soils are reported to be a mix of Listowel Silt Loam and Harriston Silt Loam which are classified at Hydrologic Soil Group BC.

The existing storm sewer on Cork Street that outlets to the unnamed watercourse is considered to be Discharge Point #1 for the purposes of this report. The storm sewer at the intersection of Cork Street and Martin Street will be considered Discharge Point #2.

4.3.1 PRE-DEVELOPMENT CONDITIONS

A total catchment area of 2.57 ha was used to determine the pre-development peak flows for the design storm events at the property boundary.

Catchment 101 consists of the development lands as well as some upstream lands that discharge across the site. The total area is 2.07 ha. Catchment 101 is considered to outlet to Discharge Point #1.

Catchment 102 consists of a portion of the lands to the south that outlet to the existing catchbasin in the ditch on Cork Street. The total area is 0.50 ha. Catchment 102 is considered to outlet to Discharge Point #1.

The pre-development catchment areas are included in Appendix A as drawing 03909-SWM1.

4.3.2 POST DEVELOPMENT CONDITIONS

The proposed development of the site will include the construction of townhouses as well as paving the associated interior roadway, driveways, and parking areas. Grading of the site and internal storm sewers will direct the majority of the post-development run-off from the site into proposed underground storage chambers and a stormwater management pond. A small portion of the street townhouses will outlet directly to Cork Street as the grading does not allow for the units to outlet to the pond and chambers. The stormwater pond and storage tanks will work in conjunction to provide storage for all post-development flows and control the discharge rate of the site's stormwater into the existing Municipal infrastructure.

Catchment 201 is the development area that can be conveyed to the stormwater system. The total area of Catchment 201 is 1.74 ha. Catchment 201 is considered to outlet to Discharge Point #1.

Catchment 202 is a portion of the 4 unit street townhouses that cannot be conveyed to the pond. The total area of Catchment 202 is 0.06 ha. Catchment 202 is considered to outlet to Discharge Point #1.

Catchment 203 is a portion of the 3 unit street townhouses that cannot be conveyed to the pond. The total area of Catchment 203 is 0.06 ha. Catchment 203 is considered to outlet to Discharge Point #1.

Catchment 204 is a portion of the deep lots fronting Martin Street This area will be conveyed through the development site. The total area of Catchment 204 is 0.37 ha. Catchment 204 is considered to outlet to Discharge Point #1.

Catchment 205 is a portion of the lots fronting Martin Street. This area will be conveyed to Cork Street but not through the development site. The total area of Catchment 205 is 0.39 ha. Catchment 205 is considered to outlet to Discharge Point #2.

Based on the post development stormwater flows for this catchment area, there will be a requirement to reduce the peak stormwater flow from the catchment areas in order to meet the pre-development peak flow conditions.

The stormwater management facility and outlet structure have been designed to control peak runoff rates as well as conform to MECP best practices.

In order to provide the above required volumes and discharges, the following SWM Facility geometry is being proposed:

Table 6.1 – SWM Facility Geometry

SWM FACILITY	DETAILED DESIGN
Side Slope	3:1
SWM Facility Bottom	410.66
Top Elevation	411.42
High Water Elevation	411.23

Also included as part of the stormwater management system is the ADS Stormtech SC-740 Chambers. There will be 11 rows of chambers with varying numbers per row. The bottom of the chambers will be at an elevation of 409.45 with 150mm of stone below the chambers.

The outlet configuration for the SWM Facility will be as follows:

- A 300mm diameter storm sewer with an outlet elevation of 409.41m c/w a 200mm orifice;

4.3.3 SWM FACILITY PERFORMANCE

Below is a summary of the hydraulic performance of the stormwater SWM Facility during the various storm events.

Table 6.2 – SWM Facility Performance

RETURN PERIOD	ELEVATION (m)	STORAGE (m^3)	DISCHARGE (l/s)
2 Year	409.81	230	49
5 Year	409.99	308	63
25 Year	410.82	421	104
50 Year	410.96	475	109
100 Year	411.08	539	114
MTO 100 Year	411.23	634	119

4.4 MODELLING RESULTS

Based upon the above outlet structure, the following summarizes the pre-development and post development peak flows to the two (2) discharge points.

Table 6.3 - Peak Flow Summary

RETURN PERIOD	DISCHARGE POINT #1 (l/s)		DISCHARGE POINT #2 (l/s)	
	PRE	POST	PRE	POST
2 Year	51	59	0	40
5 Year	81	75	0	55
25 Year	140	114	0	81
50 Year	169	131	0	93
100 Year	199	140	0	105
MTO 100 Year	248	149	0	123

As seen in the table above, all storm events with the exception of the 2 year design storm event at Discharge Point #1 have a lower peak flow than the pre development design storm event. The exceedance in the 2 year design storm is not expected to cause any issues downstream as the storm sewers were designed for the 5 year storm event and post development modelling for the neighbouring subdivisions show the channel can convey the design storm events modelled with causing flooding concerns.

While the peak flows for Discharge Point #2 exceed the pre development flows in all instances, this is not expected to be a concern as the storm sewer stub on Cork Street that this area will outlet to was originally designed for a much larger catchment that can no longer be conveyed through this storm sewer as the SVCA is requiring it continue to outlet to the existing ditch as it is providing inflow to the watercourse. Therefore the downstream storm sewer that was proposed to convey that runoff now has significant extra capacity for the Catchment 205 runoff.

The post-development catchment area is included as Appendix A as drawing 03909-SWM2.

5. GRADING, EROSION & SEDIMENT CONTROL

Erosion and sediment controls shall meet the requirements of the most recent version of the MECP *Stormwater Management Planning and Design Manual* at the time of construction.

5.1 CONSTRUCTION STAGE

Prior to the start of construction, appropriate sediment control facilities are to be in place. Following are details regarding erosion and sediment control that are to be implemented:

- Light duty siltation fencing will be installed at any development grading limits where runoff may discharge from the site.
- It is proposed that the pond be constructed first to act as a sedimentation basin.
- Placement of temporary straw check dams within swales and any other locations where a concentrated flow of runoff may occur. All proposed drainage swales are to be seeded during construction;
- Installation of filter cloth under all new and existing catchbasin grates until paving of the subdivision streets is completed;
- Mud mats will be placed at construction accesses to keep public roadways free from debris during the construction period.
- Re-vegetate all disturbed areas after underground and surface works have been constructed.

Prior to removal of sediment control facilities, ensure that sediment that may have accumulated has been removed.

Once the area has been stabilized, the silt fencing can be removed.

6. TRAFFIC AND ROADS

Vehicular access to the development will be from Cork Street.

- 6.1m road width;
- 6.0m wide Fire Route with 12.0m radius;
- Pavement design:
    - 450mm Granular B
    - 150mm Granular A
    - 50mm HL4
    - 40mm HL3

7. UTILITIES

7.1 STREETLIGHTS

The configuration of the streetlights will be designed in accordance with municipal standards. Photometric design and calculations will be provided.

7.2 ELECTRICITY

Wellington North Hydro will be responsible for reviewing the design of the electrical distribution system. Underground distribution lines will be utilized for this development and each unit will be metered separately.

7.3 NATURAL GAS

Enbridge Gas will be responsible for completing the design of the natural gas distribution system. Underground distribution lines will be utilized for this development and each unit will be metered separately.

7.4 TELEPHONE/ CABLE TV/ INTERNET

Wightman, Eastlink and other utilities will be given the opportunity to provide telephone, cable TV and internet services to the development. They will complete their own design, based upon the proposed design configuration along with trench locations dictated by the Township's standard cross section.

If you have any questions regarding the above, please contact either of the undersigned at 519-506-5959 ext. 101.

Sincerely,

Cobide Engineering Inc.

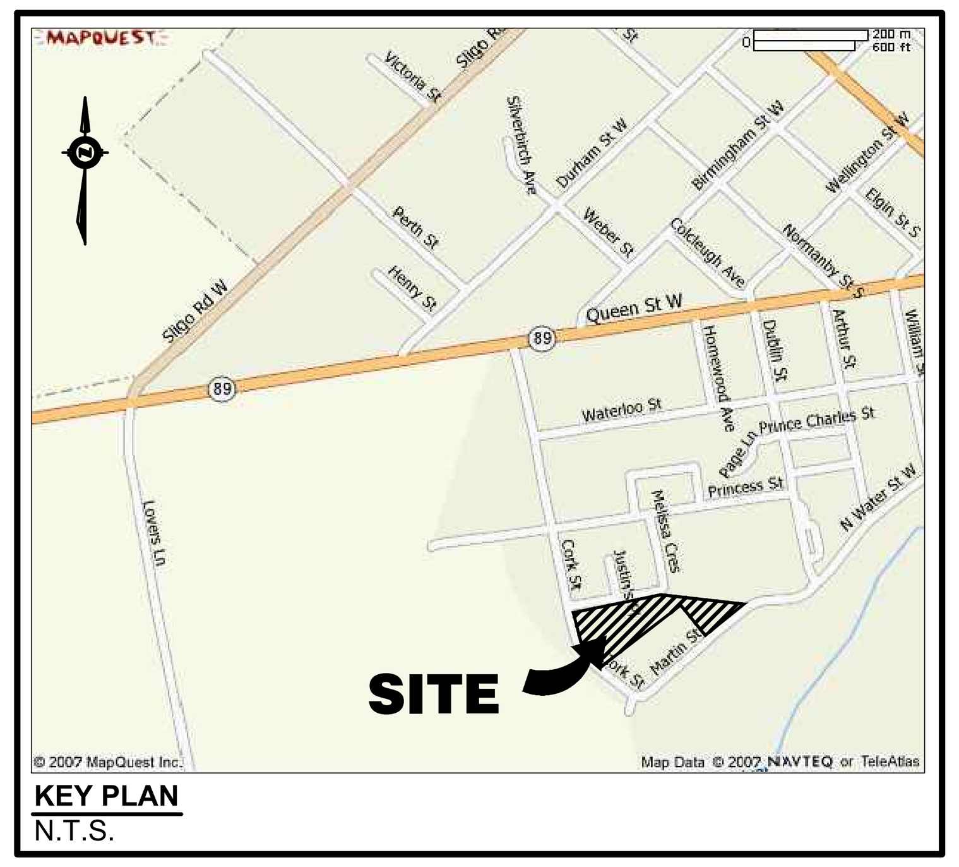
Travis Burnside, P. Eng.

H:\Kang\03909 645 Martins Street Mount Forest\Reports\FSR\2022-12-05 Kang Martin Street Townhouses - Functional Servicing Report & SWM.docx

Appendix A

DRAWINGS

645 MARTINS STREET DEVELOPMENT



LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- EDGE OF PROPOSED PAVEMENT
- EDGE OF EXISTING PAVEMENT
- EDGE OF EXISTING GRAVEL
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED SUBDRAIN
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- CATV — EXISTING UNDERGROUND TV CABLE
- GAS — EXISTING UNDERGROUND GAS LINE
- H — EXISTING UNDERGROUND HYDRO CABLE
- T — EXISTING UNDERGROUND TELEPHONE CABLE
- PROPOSED 1.80m HIGH SOLID BOARD FENCE
- PROPOSED 1.22m HIGH CHAINLINK FENCE
- SANMH — PROPOSED SANITARY MANHOLE
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- TICBMH — PROPOSED TWIN INLET CATCHBASIN MANHOLE
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- CO — PROPOSED SANITARY SERVICE CLEANOUT
- CSV — PROPOSED CURB STOP VALVE
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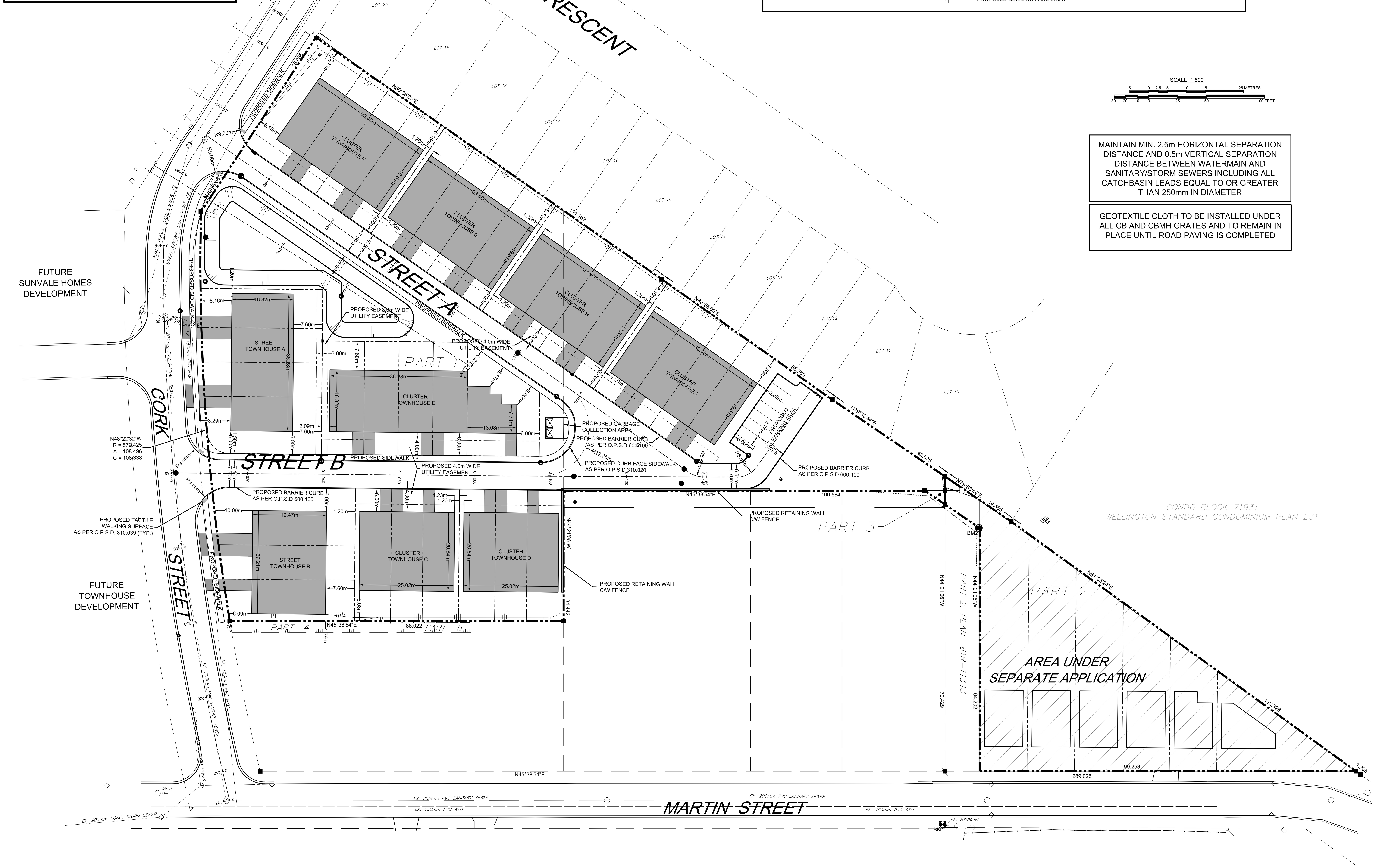
- EXISTING WELL
- BM — BENCHMARK
- BH — BOREHOLE
- 486.21 — PROPOSED ELEVATION
- 486.21 — EXISTING ELEVATION
- ASPHALT REMOVAL
- PROPOSED GATE VALVE
- EXISTING GATE VALVE
- PROPOSED SIGNAGE



MAINTAIN MIN. 2.5m HORIZONTAL SEPARATION DISTANCE AND 0.5m VERTICAL SEPARATION DISTANCE BETWEEN WATERMAIN AND SANITARY/STORM SEWERS INCLUDING ALL CATCHBASIN LEADS EQUAL TO OR GREATER THAN 250mm IN DIAMETER

GEOTEXTILE CLOTH TO BE INSTALLED UNDER ALL CB AND CBMH GRATES AND TO REMAIN IN PLACE UNTIL ROAD PAVING IS COMPLETED

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

Notes

1. TOPOGRAPHIC INFORMATION DERIVED FROM TOPOGRAPHICAL SURVEY BY COBIDE ENGINEERING INC. DATED OCTOBER 27, 2022.
2. PROPERTY BOUNDARY DERIVED FROM LEGAL PLAN OF SURVEY BY WILSON-FORD DATED APRIL 29, 2022.
3. SEE SHEET 03909-DET1 FOR TYPICAL CROSS SECTIONS AND PAVEMENT DESIGN.
4. ALL ORGANIC MATERIAL WITHIN 1.2m OF FINISHED PROFILE GRADE TO BE REMOVED FROM ALL AREAS UNDER THE TRAVELED PORTION OF THE ROAD.
5. COVER OVER WATERMAIN & SERVICES 2.0m MINIMUM AT ALL POINTS.
6. SANITARY SEWER TO BE PVC SDR35.
7. ALL WATERMAINS TO BE PVC DR18 WITH MUNICIPEX WATER SERVICES.
8. MAINTAIN 2.5m CLEARANCE BETWEEN STORM SEWER AND WATERMAIN.
9. ALL HYDRANT SETS REQUIRE TEST POINT AND HYDRANT MARKER.
10. ALL JOINTS OF SANITARY MANHOLES TO BE CAULKED WITH MIN. 15mm BEAD, INSTALLED ON THE TOP OF JOINT OF EACH SECTION PRIOR TO SECTION ABOVE BEING INSTALLED. CAULKING TO BE SIKAFLEX 1A OR APPROVED EQUIVALENT. ALL JOINTS TO BE WRAPPED WITH 150mm DENSO TAPE.
11. ALL STORM CATCHBASINS TO HAVE A MINIMUM SUMP OF 600mm AND ALL STORM MANHOLES AND CATCHBASIN MANHOLES TO HAVE A SUMP OF 300mm.
12. CONTRACTOR TO OBTAIN A COPY OF THE MOST CURRENT VERSION OF THE MUNICIPAL SERVICING STANDARDS PRIOR TO CONSTRUCTION.
13. 48 HOURS NOTICE MUST BE GIVEN TO THE TOWNSHIP PUBLIC WORKS DEPARTMENT BEFORE ANY CONSTRUCTION WITHIN THE TOWNSHIP ROAD ALLOWANCE.
14. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNTIL STAMPED 'ISSUED FOR CONSTRUCTION'
15. ALL CONSTRUCTION TO BE COMPLETED TO MUNICIPAL SERVICING STANDARDS FOR THE TOWNSHIP OF WELLINGTON NORTH.
16. WATERMAIN TO BE RESTRAINED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. RESTRAINTS TO CONFORM TO TOWNSHIP OF WELLINGTON NORTH STANDARDS.
17. SANITARY SERVICES SHALL BE PVC DR 28, 125mmØ IN SIZE AND CONNECTED USING A FACTORY TEE.
18. STORM SERVICES SHALL BE PVC DR 28, 100mmØ IN SIZE AND CONNECTED USING A FACTORY TEE.
19. WATER SERVICES (19mmØ MUNICIPEX) ARE TO BE COMPLETELY EMBEDDED USING SAND. SAND SHALL BE FINE AGGREGATE PASSING SPECS AS PER OPSS. 1001.

Benchmark Information

BM1
TOP NUT OF EXISTING HYDRANT AT 650 MARTIN STREET (HYDRANT NO. 148).
ELEVATION 415.65m

BM2
TOP OF EXISTING IB LOCATED AT THE NORTHEAST PROPERTY BOUNDARY, APPROX. 73m NORTH OF THE SANITARY MANHOLE LOCATED BETWEEN 645 AND 655 MARTIN STREET.
ELEVATION 415.01m

No.	DATE	DESCRIPTION	BY	APPD
0	FEB 13/23	PRELIMINARY SUBMISSION	ARMH	TLB

REVISION / ISSUE

Seal not valid unless signed and dated

LICENSED PROFESSIONAL ENGINEER
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PROVINCE OF ONTARIO

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Title:
PROPOSED TOWNHOUSE DEVELOPMENT
645 MARTIN STREET, MOUNT FOREST
TOWNSHIP OF WELLINGTON NORTH
SITE PLAN

Client:
MAMTA HOMES

Design:	TLB	Scale:	1:500
Drawn:	ARMH	Approved:	
Checked:	TLB		
Date:	NOVEMBER 2022		Design Engineer
DRAWING No.		03909-C1	

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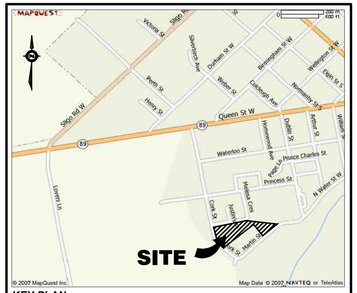

KEY PLAN
N.T.S.

LEGEND

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- EXISTING WELL
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- BH — BOREHOLE
- 1500A 486.27 — PROPOSED ELEVATION / EXISTING ELEVATION
- ASPHALT REMOVAL
- WV — PROPOSED GATE VALVE
- EXISTING GATE VALVE
- PROPOSED SIGNAGE

SCALE 1:500
5 0 2.5 5 10 15 25 METRES
30 20 10 0 25 50 100 FEET

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Benchmark Information

BM1
TOP NUT OF EXISTING HYDRANT AT 650 MARTIN STREET (HYDRANT NO. 148).
ELEVATION 415.65m

BM2
TOP OF EXISTING IB LOCATED AT THE NORTHEAST PROPERTY BOUNDARY, APPROX. 73m NORTH OF THE SANITARY MANHOLE LOCATED BETWEEN 645 AND 655 MARTIN STREET.
ELEVATION 415.01m

No.	DATE	DESCRIPTION	BY	APPD
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REVISION / ISSUE

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LICENSED PROFESSIONAL ENGINEER
2/10/2023
T. L. BURNSIDE
100199868
PROVINCE OF ONTARIO

COBIDE ENGINEERING INC
517 10th Street, Hanover, Ontario N4N 1R4
Telephone: (519) 506-5959
www.cobideeng.com

Title:
PROPOSED TOWNHOUSE DEVELOPMENT 645 MARTIN STREET, MOUNT FOREST TOWNSHIP OF WELLINGTON NORTH SITE SERVICING PLAN

Client: MAMTA HOMES

Design:	TLB	Scale:	1:500
Drawn:	ARMH	Approved:	
Checked:	TLB		
Date:	NOVEMBER 2022		Design Engineer

DRAWING No. 03909-C2

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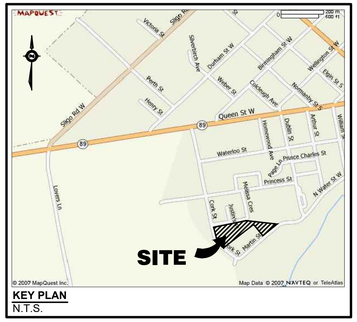

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N.T.S.

LEGEND

- PROPERTY BOUNDARY
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- EDGE OF PROPOSED PAVEMENT
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- PROPOSED PARKING LOT LIGHT STANDARD
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- EXISTING GAS MARKER
- W — EXISTING WELL
- BM — BENCHMARK
- BH — BOREHOLE
- 1500A 486.27 — PROPOSED ELEVATION / EXISTING ELEVATION
- ASPHALT REMOVAL
- WV — PROPOSED GATE VALVE
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- PROPOSED SIGNAGE

SCALE 1:500
5 0 2.5 5 10 15 25 METRES
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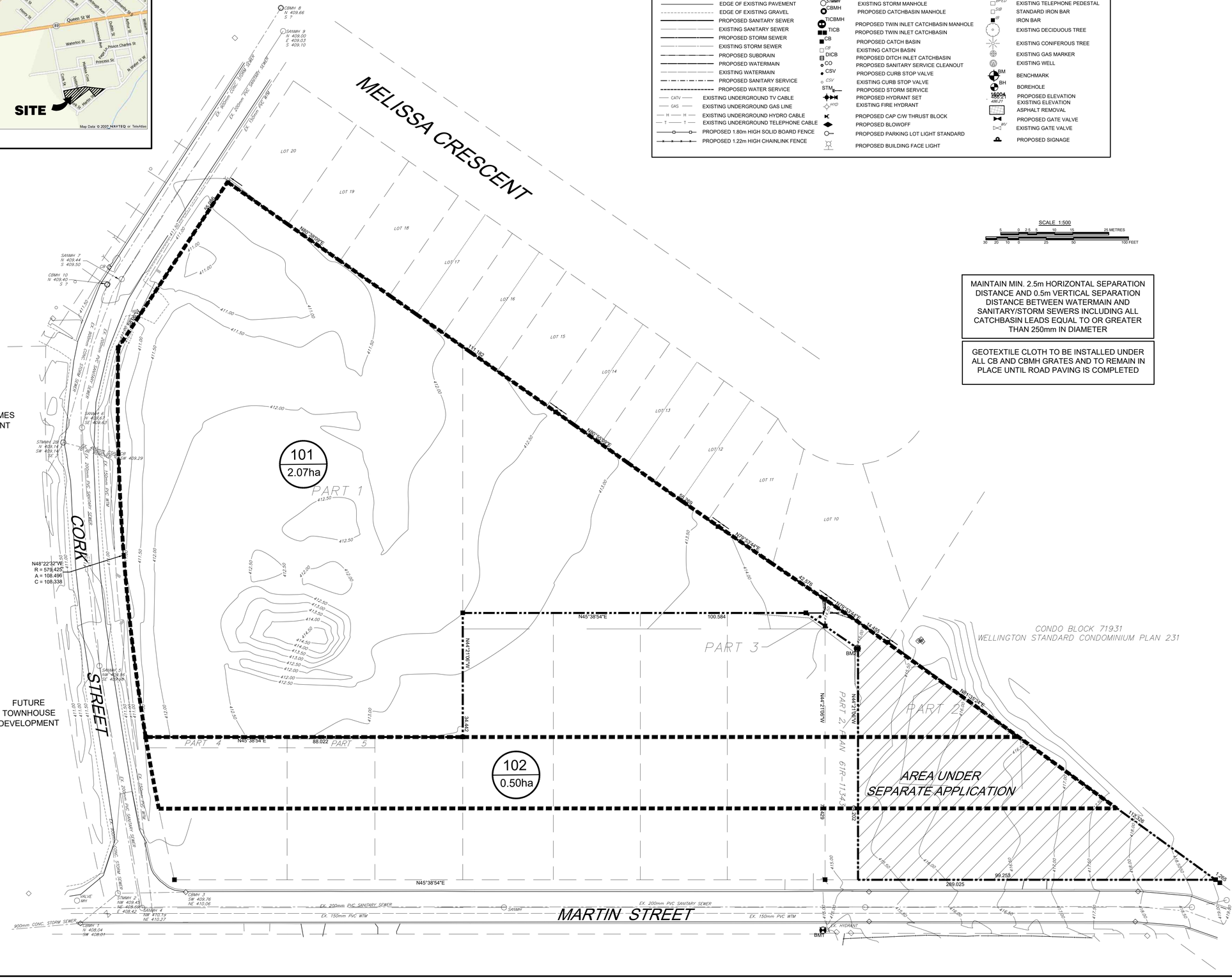

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Drawn:	ARMH	Approved:	
Checked:	TLB		
Date:	NOVEMBER 2022		Design Engineer

DRAWING No. 03909-SWM1

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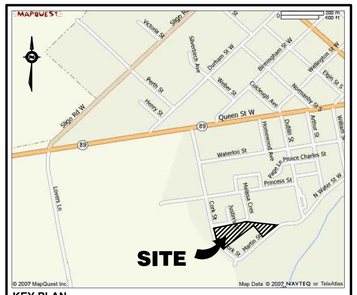

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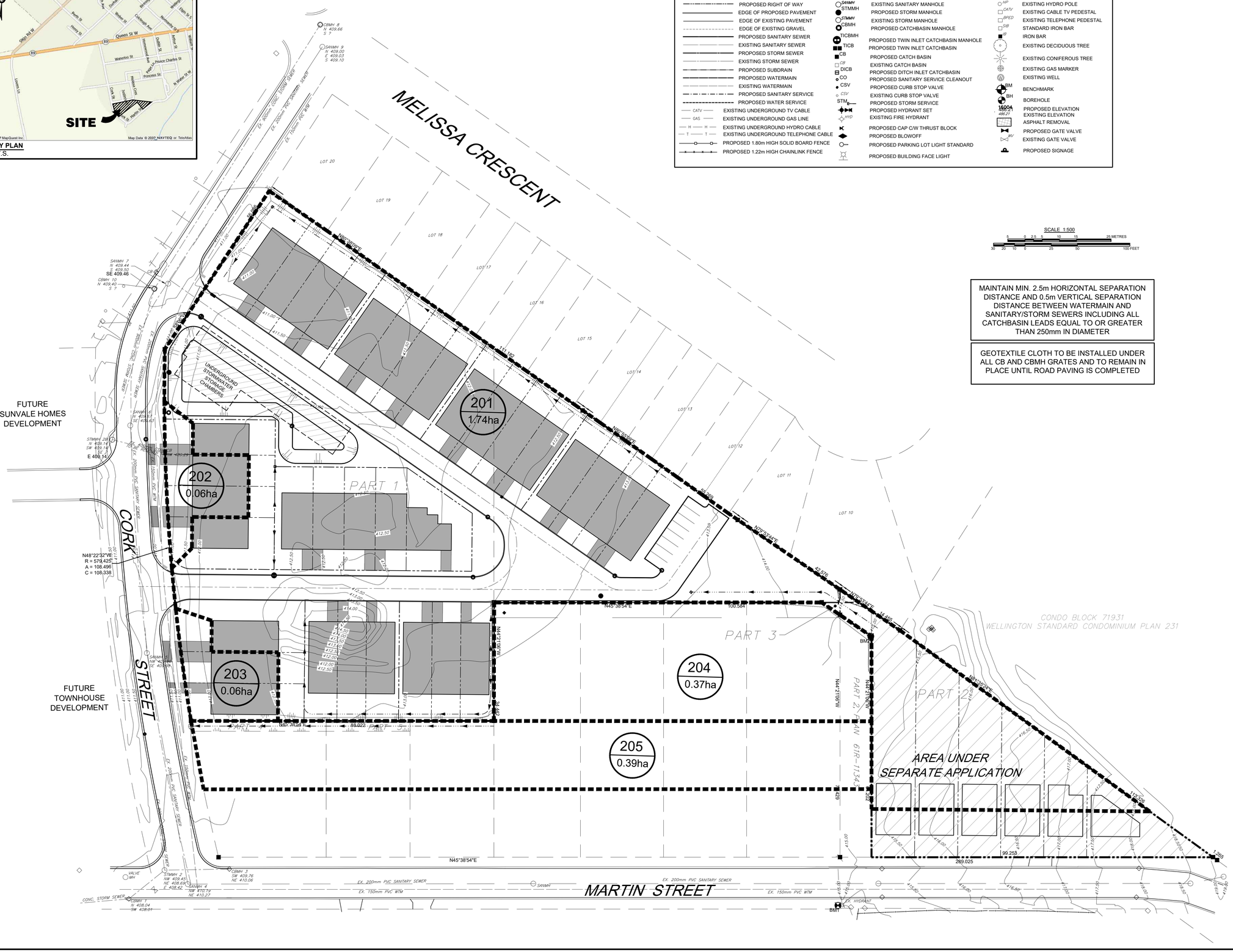

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Drawn:	ARMH	Approved:	
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Appendix B

PRE DEVELOPMENT MODEL AND OUTPUT

645 MARTINS STREET DEVELOPMENT

Table A.1 Parameter Summary Table

Existing Conditions									
Outlet Location	**Model Catchment ID**	**Description**	**Area (ha)**	**Drainage Channel (m)**	**Flow Length (m)**	**Gradient (%)**	**Total Imperv. Connected (%)**	**Manning's 'n' (Perv.)**	**CN (Perv.)**
Cork Street North	101	Entire Site boundary	2.07	150	138	2.0	0.0	0.30	72.0
Cork Street South	102	Rear half of lots fronting Martin Street	0.50	198	25	2.3	27.9	0.25	77.0

Table A.2 Site Soils: (as per Ontario Soil Survey Report No. 35 for Wellington County)

Soil Type
Listowel Silt Loam

Hydologic Soil Group
BC

TABLE OF CURVE NUMBERS (CN's)									
Land Use	Hydrologic Soil Type								
	A	AB	B	BC	C	CD	D	Manning's 'n'	
Meadow	50	54	58	64.5	71	74.5	78	0.4	continuous grass
Woodlot	50	55.3	60.5	67	73.5	76.8	80	0.4	forests
Long Grass	55	60	65	72	79	81.5	84	0.3	natural, not maintained
Lawns	60	65.5	71	77	83	86	89	0.25	maintained
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	farm pasture
Crop	66	70	74	78	82	84	86	0.13	farm land
Fallow (bare)	77	82	86	89	91	93	94	0.05	idle farm land (bare)
Built-up	60	65.5	71	77	83	89	89	0.25	Lawns Existing
Streets, paved	98	98	98	98	98	98	98	0.01	

HYDROLOGIC SOIL TYPE (%) - Existing Conditions								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
101	0	0	0	100	0	0	0	100
102	0	0	0	100	0	0	0	100
103	0	0	0	100	0	0	0	100
104	0	0	0	100	0	0	0	100
105	0	0	0	100	0	0	0	100
106	0	0	0	100	0	0	0	100
107	0	0	0	100	0	0	0	100
108	0	0	0	100	0	0	0	100
109	0	0	0	100	0	0	0	100
110	0	0	0	100	0	0	0	100
111	0	0	0	100	0	0	0	100

LAND USE (%) - Existing Conditions										
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Imperv. Not Connected (Rooftops)	Imperv. Connected	Total
101	0	0	100	0	0.0	0.0	0	0.0	0.0	100
102	0	0	0	72	0	0	0	27.5	0.4	100
103	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
104	0	0	0	0	0.0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
105	0	0	0	0	0.0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
106	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
107	0	0	0	0	0	0.0	0	#DIV/0!	#DIV/0!	#DIV/0!
108	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
109	0	0	0.0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
110	0	0	0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!
111	0	0	0.0	0	0	0	0	#DIV/0!	#DIV/0!	#DIV/0!

CURVE NUMBER (CN) - Existing Conditions											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Built-up	Imperv. Not Connected (Rooftops)	Weighted CN - Pervious	Manning's 'n'
101	65	67	72	77	70.5	78	89	77	90	72.0	0.30
102	65	67.0	72	77	71	78	89	77	90	77.0	0.25
103	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
104	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
105	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
106	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
107	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
108	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
109	65	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
110	64.5	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!
111	64.5	67	72	77	70.5	78	89	77	90	#DIV/0!	#DIV/0!

Table A.3: Impervious Area Determination for Subcatchment 101-102

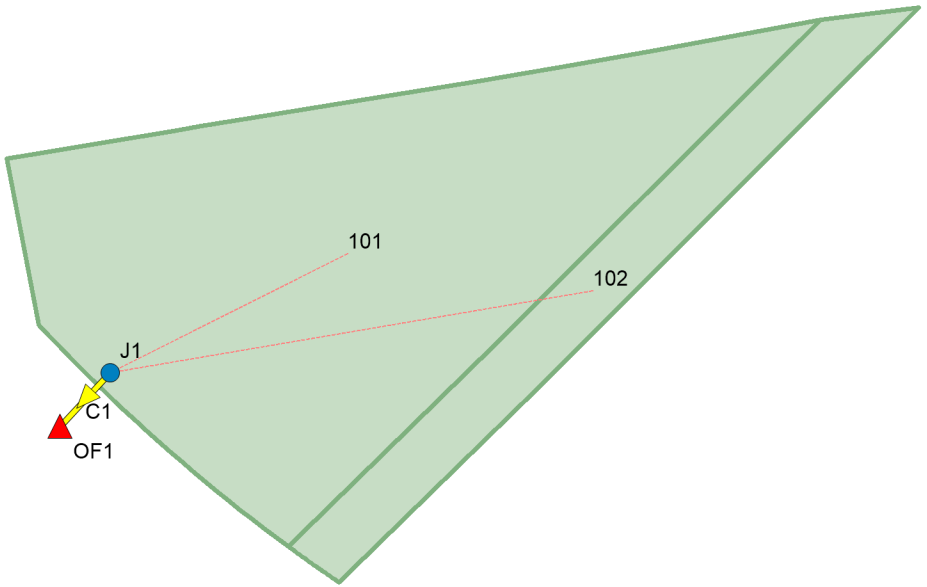
Existing Conditions

Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
101	2.07	0.00	0.0	0.00	0.0	0.0
102	0.50	0.00	0.4	0.14	27.5	27.9

Table A.3 - Impervious Area Determination for Existing Catchments 101-102

Catchment					Imperv. Area	Imperv %
101	1	m of	1	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	1	Impervious Area	1	m^2 @ 100% imperv. Concrete	0.00 ha	0.0 %
	1	Roof Area	1	m^2 @ 100% imperv.	0.00 ha	0.0 %
					0.00 ha	
102	0	m of	10	m wide ROW @ 50% imperv.	0.00 ha	0.0 %
	1	Driveway	18.74	m^2 @ 100% imperv.	0.00 ha	0.4 %
	1	Roof Area	1375.04	m^2 @ 100% imperv.	0.14 ha	27.5 %
					0.14 ha	

645 MARTINS STREET DEVELOPMENT - PRE DEVELOPMENT MODEL SCHEMATIC



Legend

- Junctions
- Outfalls
- Conduits
- Subcatchments

N

50 m

COBIDE ENGINEERING INC

645 MARTINS STREET – PRE DEVELOPMENT SWM MODELLING – MODEL DETAILS


```
[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           11/30/2022
START_TIME           00:00:00
REPORT_START_DATE    11/30/2022
REPORT_START_TIME    00:00:00
END_DATE             12/1/2022
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              8

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

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
SCS_Type_II_38.8mm_2yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_38.8mm_2yr
SCS_Type_II_49.4mm_5yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_49.4mm_5yr
SCS_Type_II_65.3mm_25yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_65.3mm_25yr
SCS_Type_II_71.9mm_50yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_71.9mm_50yr
SCS_Type_II_78.4mm_100yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_78.4mm_100yr
SCS_Type_II_88mm_MTO100Yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_88mm_MTO100Yr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------
-
101              SCS_Type_II_88mm_MTO100Yr J1      2.07     0        150      2        0
102              SCS_Type_II_88mm_MTO100Yr J1      0.5      27.9     198      2.3      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
101              0.01       0.3        0.05       0.05       25         OUTLET
102              0.01       0.25       0.05       0.05       25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
101              72         0.5        7          0          0          CURVE_NUMBER
```

```
102              77         0.5        7          0          0          CURVE_NUMBER

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J1               409.2      1          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF1              409.13     FREE                        NO

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- -----
-----
C1               J1               OF1              15.4       0.013      409.2      409.13     0          0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
C1               CIRCULAR     0.375            0          0          0          1

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;SCS_Type_II_38.8mm design storm, total rainfall = 38.8 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_38.8mm_2yr

;SCS_Type_II_49.4mm design storm, total rainfall = 49.4 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_49.4mm_5yr

;SCS_Type_II_65.3mm design storm, total rainfall = 65.3 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_65.3mm_25yr

;SCS_Type_II_71.9mm design storm, total rainfall = 71.9 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_71.9mm_50yr

;SCS_Type_II_78.4mm design storm, total rainfall = 78.4 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_78.4mm_100yr

;SCS_Type_II_88mm design storm, total rainfall = 88 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_88mm_MTO100Yr

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       520556.537886047 4868693.67327316 520882.338393007 4868899.03726366
UNITS            Meters
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_38.8mm_2yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_38.8mm_2yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.100        38.800
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.071        27.516
Surface Runoff ...........         0.028        10.981
Final Storage ............         0.001         0.301
Continuity Error (%) .....         0.006


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.028         0.283
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.028         0.283
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     4.50 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :   100.00 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ---------------------------------------------------------------------------------------------------------------
  101                       38.80       0.00       0.00      29.69       0.00       8.74       8.74        0.18
15.52   0.225
  102                       38.80       0.00       0.00      18.51      10.82       9.42      20.25        0.10
41.46   0.522


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION     0.03     0.17   409.37     0  03:06        0.17
  OF1                  OUTFALL      0.03     0.16   409.29     0  03:06        0.16


  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type         LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ---------------------------------------------------------------------------------------------------
  J1                   JUNCTION   51.23    51.23     0  03:06       0.283       0.283       0.004
  OF1                  OUTFALL     0.00    51.21     0  03:06           0       0.283       0.000


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.


  **********************
  Node Flooding Summary
  **********************

  No nodes were flooded.


  **********************
  Outfall Loading Summary
  **********************
```

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.86	3.27	51.21	0.283
System	99.86	3.27	51.21	0.283

****
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
C1	CONDUIT	51.21	0 03:06	1.08	0.43	0.45

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.64	0.36	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Feb 13 14:51:14 2023
Analysis ended on: Mon Feb 13 14:51:14 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_49.4mm_5yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_49.4mm_5yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.127        49.400
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.084        32.602
Surface Runoff ...........         0.042        16.494
Final Storage ............         0.001         0.301
Continuity Error (%) .....         0.006


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.042         0.424
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.042         0.424
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
None


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     4.51 sec
Average Time Step           :     5.00 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :   100.00 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ---------------------------------------------------------------------------------------------------------------
  101                       49.40       0.00       0.00      35.27       0.00      13.76      13.76        0.28
28.78   0.279
  102                       49.40       0.00       0.00      21.57      13.78      14.01      27.79        0.14
58.94   0.563


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION     0.04     0.22   409.42     0  03:06        0.22
  OF1                  OUTFALL      0.03     0.21   409.34     0  03:06        0.21


  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type         LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ---------------------------------------------------------------------------------------------------
  J1                   JUNCTION   81.49    81.49     0  03:06       0.424       0.424       0.002
  OF1                  OUTFALL     0.00    81.39     0  03:06           0       0.424       0.000


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.


  **********************
  Node Flooding Summary
  **********************

  No nodes were flooded.


  **********************
  Outfall Loading Summary
  **********************
```

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.88	4.96	81.39	0.424
System	99.88	4.96	81.39	0.424

****
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
C1	CONDUIT	81.39	0 03:06	1.25	0.69	0.57

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.64	0.36	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Feb 13 14:51:57 2023
Analysis ended on: Mon Feb 13 14:51:57 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_65.3mm_25yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_65.3mm_25yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.168        65.300
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.100        38.834
Surface Runoff ...........         0.067        26.155
Final Storage ............         0.001         0.309
Continuity Error (%) .....         0.003


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.067         0.673
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.067         0.673
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (3.70%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     3.57 sec
Average Time Step           :     4.98 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :   100.00 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ---------------------------------------------------------------------------------------------------------------
  101                       65.30       0.00       0.00      42.09       0.00      22.83      22.83        0.47
58.68   0.350
  102                       65.30       0.00       0.00      25.35      18.22      21.70      39.93        0.20
89.25   0.611


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION    0.04     0.32   409.52     0  03:06        0.31
  OF1                  OUTFALL     0.04     0.28   409.41     0  03:06        0.28


  ******************
  Node Inflow Summary
  ******************

  -------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type        LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  -------------------------------------------------------------------------------------------------
  J1                   JUNCTION 140.04   140.04     0  03:06       0.673       0.673       0.001
  OF1                  OUTFALL    0.00   139.90     0  03:06           0       0.673       0.000


  **********************
  Node Surcharge Summary
  **********************

  No nodes were surcharged.


  **********************
  Node Flooding Summary
  **********************

  No nodes were flooded.


  **********************
  Outfall Loading Summary
  **********************
```

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.90	8.26	139.90	0.673
System	99.90	8.26	139.90	0.673

****
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
C1	CONDUIT	139.90	0 03:06	1.50	1.18	0.79

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.66	0.34	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.01	0.01	0.15	0.01

Analysis begun on: Mon Feb 13 14:52:32 2023
Analysis ended on: Mon Feb 13 14:52:32 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_71.9mm_50yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_71.9mm_50yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.185        71.900
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.106        41.133
Surface Runoff ...........         0.078        30.462
Final Storage ............         0.001         0.304
Continuity Error (%) .....         0.000


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.078         0.784
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.078         0.784
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (5.24%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     2.08 sec
Average Time Step           :     4.96 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    99.79 %
      3.155 -  1.991 sec      :     0.21 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total      Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff    Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr       LPS
  ---------------------------------------------------------------------------------------------------------------
  101                        71.90       0.00       0.00      44.62       0.00      26.91      26.91        0.56     75.21   0.374
  102                        71.90       0.00       0.00      26.72      20.07      25.11      45.17        0.23    103.01   0.628


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION    0.05     0.39   409.59     0  03:06        0.39
  OF1                  OUTFALL     0.04     0.30   409.43     0  03:06        0.30


  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type        LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ---------------------------------------------------------------------------------------------------
  J1                   JUNCTION 168.70   168.70     0  03:06       0.784       0.784       0.001
  OF1                  OUTFALL     0.00   168.70     0  03:06           0       0.784       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  ------------------------------------------------------------------
                                          Max. Height   Min. Depth
                                Hours      Above Crown    Below Rim
  Node                 Type  Surcharged        Meters       Meters
  ------------------------------------------------------------------
  J1                   JUNCTION    0.02         0.013        0.612


  ********************
  Node Flooding Summary
  ********************
```

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.91	10.01	168.70	0.784
System	99.91	10.01	168.70	0.784

****
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
C1	CONDUIT	168.70	0 03:06	1.61	1.43	0.90

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.02	0.01	0.22	0.01

Analysis begun on: Mon Feb 13 14:53:10 2023
Analysis ended on: Mon Feb 13 14:53:10 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_78.4mm_100yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_78.4mm_100yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.201        78.400
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.111        43.153
Surface Runoff ...........         0.090        34.942
Final Storage ............         0.001         0.305
Continuity Error (%) .....         0.000


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.090         0.899
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.090         0.899
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (6.68%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     0.02 sec
Average Time Step           :     4.94 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :     0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    98.80 %
      3.155 -  1.991 sec      :     1.20 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total  Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff Runoff   Coeff
  Subcatchment                 mm         mm         mm         mm         mm         mm         mm  10^6 ltr    LPS
  ---------------------------------------------------------------------------------------------------------------
  101                       78.40       0.00       0.00      46.84       0.00      31.19      31.19        0.65  93.56   0.398
  102                       78.40       0.00       0.00      27.90      21.88      28.62      50.50        0.25 117.13   0.644


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION    0.05     0.46   409.66     0  03:06        0.46
  OF1                  OUTFALL     0.04     0.32   409.45     0  03:06        0.32


  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type        LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ---------------------------------------------------------------------------------------------------
  J1                   JUNCTION 199.27   199.27     0  03:06       0.899       0.899       0.001
  OF1                  OUTFALL    0.00   199.37     0  03:06           0       0.899       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  ------------------------------------------------------------------
                                          Max. Height   Min. Depth
                                Hours      Above Crown    Below Rim
  Node                 Type  Surcharged        Meters       Meters
  ------------------------------------------------------------------
  J1                   JUNCTION    0.16         0.083        0.542


  ********************
  Node Flooding Summary
  ********************
```

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.91	12.05	199.37	0.899
System	99.91	12.05	199.37	0.899

****
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
C1	CONDUIT	199.37	0 03:06	1.86	1.69	0.93

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.66	0.34	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.16	0.01	0.36	0.01

Analysis begun on: Mon Feb 13 14:53:48 2023
Analysis ended on: Mon Feb 13 14:53:48 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 2
Number of nodes 2
Number of links 1
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
101	2.07	150.00	0.00	2.0000	SCS_Type_II_88mm_MTO100Yr	J1
102	0.50	198.00	27.90	2.3000	SCS_Type_II_88mm_MTO100Yr	J1

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****

```
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 ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.226        88.000
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.118        45.847
Surface Runoff ...........         0.108        41.847
Final Storage ............         0.001         0.310
Continuity Error (%) .....        -0.004


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.108         1.077
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.108         1.077
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 ......         0.000         0.000
Continuity Error (%) .....         0.000


***************************
Time-Step Critical Elements
***************************
Link C1 (8.69%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
Routing Time Step Summary
************************
Minimum Time Step           :     2.29 sec
Average Time Step           :     4.90 sec
Maximum Time Step           :     5.00 sec
Percent in Steady State     :    -0.00
```

```
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    97.82 %
      3.155 -  1.991 sec      :     2.18 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total  Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm  10^6 ltr    LPS
  ---------------------------------------------------------------------------------------------------------------
  101                       88.00       0.00       0.00      49.79       0.00      37.83      37.83        0.78 124.32   0.430
  102                       88.00       0.00       0.00      29.53      24.56      33.93      58.49        0.29 138.86   0.665


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

  ---------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ---------------------------------------------------------------------------
  J1                   JUNCTION    0.06     0.58   409.78     0  03:06        0.58
  OF1                  OUTFALL     0.05     0.35   409.48     0  03:06        0.35


  ******************
  Node Inflow Summary
  ******************

  ---------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type        LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ---------------------------------------------------------------------------------------------------
  J1                   JUNCTION 248.43   248.43     0  03:06        1.08        1.08      -0.000
  OF1                  OUTFALL    0.00   248.24     0  03:06           0        1.08       0.000


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  ------------------------------------------------------------------
                                          Max. Height   Min. Depth
                                Hours      Above Crown    Below Rim
  Node                 Type  Surcharged        Meters       Meters
  ------------------------------------------------------------------
  J1                   JUNCTION    0.27         0.208        0.417


  ********************
  Node Flooding Summary
  ********************
```

No nodes were flooded.

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.92	15.61	248.24	1.077
System	99.92	15.61	248.24	1.077

****
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
C1	CONDUIT	248.24	0 03:06	2.28	2.10	0.96

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.67	0.33	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C1	0.01	0.27	0.01	0.61	0.01

Analysis begun on: Mon Feb 13 14:54:37 2023
Analysis ended on: Mon Feb 13 14:54:37 2023
Total elapsed time: < 1 sec

Appendix C

POST DEVELOPMENT MODEL AND OUTPUT

645 MARTINS STREET DEVELOPMENT

Table B.1 Parameter Summary Table

Proposed Conditions									
Outlet Location	**Model Catchment ID**	**Description**	**Area (ha)**	**Drainage Channel (m)**	**Flow Length (m)**	**Gradient (%)**	**Total Imperv. (%)**	**Manning's 'n' (Perv.)**	**CN (Perv.)**
Pond/Storage Gallery	201	Townhomes - Main Site	1.74	170	102	2.0	50.4	0.25	77.0
Cork Street	202	Frontage onto Cork Street	0.06	45	13	4.0	64.4	0.25	77.0
Cork Street	203	Frontage onto Cork Street	0.06	33	18	3.0	71.5	0.25	77.0
Cork Street	204	Rear of lots off Martin Street	0.37	110	34	1.3	0.0	0.25	77.0
Cork Street	205	Rear of lots off Martin Street	0.39	198	20	2.3	35.7	0.25	77.0

Table B.2 Site Soils: (as per Ontario Soil Survey Report No. 35 for Wellington County)

Soil Type
Listowel Silt Loam

Hydologic Soil Group
BC

TABLE OF CURVE NUMBERS (CN's)									
Land Use	Hydrologic Soil Type								
	A	AB	B	BC	C	CD	D	Manning's 'n'	
Meadow	50	54	58	64.5	71	74.5	78	0.4	continuous grass
Woodlot	50	55.3	60.5	67	73.5	76.8	80	0.4	forests
Long Grass	55	60	65	72	79	81.5	84	0.3	natural, not maintained
Lawns	60	65.5	71	77	83	86	89	0.25	maintained
Pasture/Range	58	61.5	65	70.5	76	78.5	81	0.17	farm pasture
Crop	66	70	74	78	82	84	86	0.13	farm land
Fallow (bare)	77	82	86	89	91	93	94	0.05	idle farm land (bare)
Built-up	60	65.5	71	77	83	89	89	0.25	Lawns Proposed
Streets, paved	98	98	98	98	98	98	98	0.01	

HYDROLOGIC SOIL TYPE (%) - Proposed Conditions								
Catchment	Hydrologic Soil Type							
	A	AB	B	BC	C	CD	D	TOTAL
201	0	0	0	100	0	0	0	100
202	0	0	0	100	0	0	0	100
203	0	0	0	100	0	0	0	100
204	0	0	0	100	0	0	0	100
205	0	0	0	100	0	0	0	100

LAND USE (%) - Proposed Conditions										
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Imperv. Not Connected (Rooftops)	Imperv. Connected	Total
201	0	0	0	50	0	0	0	30.6	19.8	100
202	0	0	0.0	36	0	0	0	49.4	15.0	100
203	0	0	0	29	0	0	0	58.9	12.6	100
204	0	0	0	100	0	0	0	0.0	0.0	100
205	0	0	0	64	0	0	0	35.3	0.5	100

CURVE NUMBER (CN) - Proposed Conditions											
Catchment	Meadow	Woodlot	Long Grass	Lawns	Pasture Range	Crop	Fallow (Bare)	Built-up	Imperv. Not Connected (Rooftops)	Weighted CN - Pervious	Manning's 'n'
201	64.5	67	72	77	70.5	78	89	77	90	77.0	0.25
202	64.5	67.0	72	77	70.5	78	89	77	90	77.0	0.25
203	64.5	67	72	77	70.5	78	89	77	90	77.0	0.25
204	64.5	67	72	77	70.5	78	89	77	90	77.0	0.25
205	64.5	67	72	77	70.5	78	89	77	90	77.0	0.25

Table B.3: Impervious Area Determination for Subcatchments 201 - 205

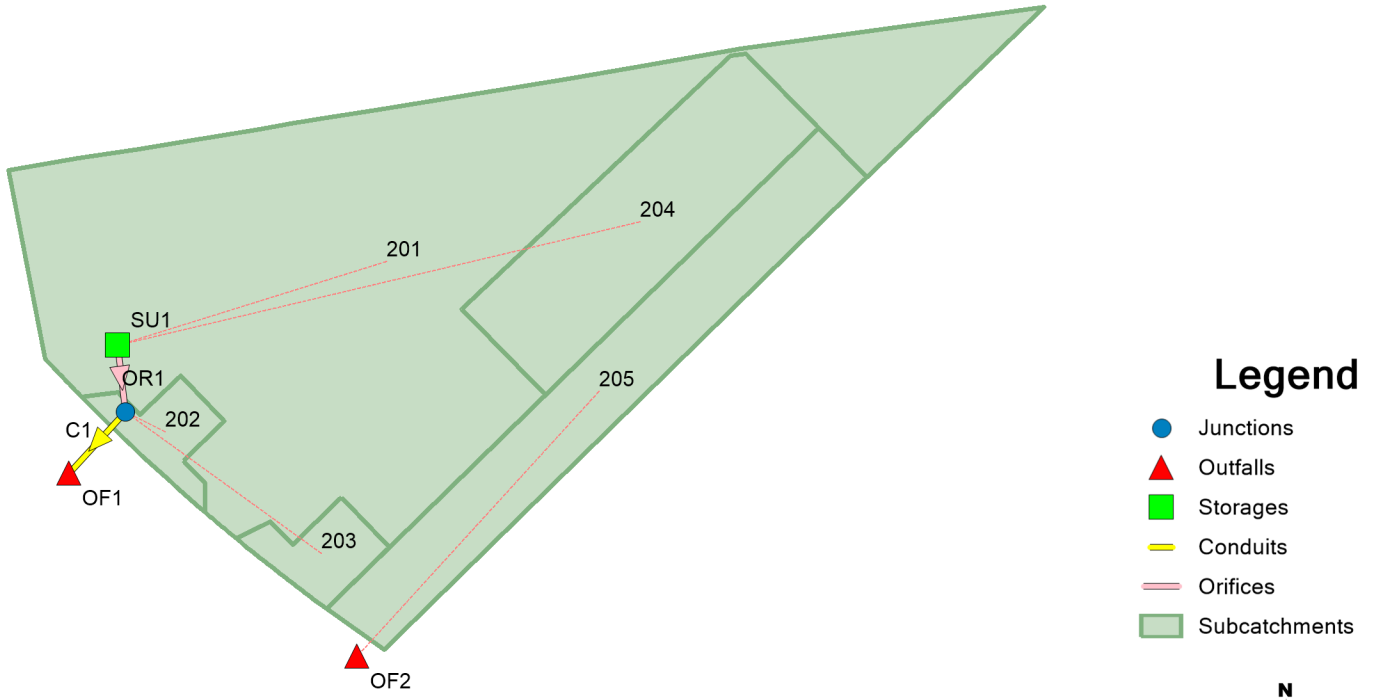
Proposed Conditions

Area of Concern	Total Area (ha)	Impervious Area Connected		Impervious Area Not Connected (Rooftops)		Total (%)
		(ha)	(%)	(ha)	(%)	
201	1.74	0.34	19.8	0.53	30.6	50.4
202	0.06	0.01	15.0	0.03	49.4	64.4
203	0.06	0.01	12.6	0.04	58.9	71.5
204	0.37	0.00	0.0	0.00	0.0	0.0
205	0.39	0.00	0.5	0.14	35.3	35.7

Table B.3 - Impervious Area Determination for Proposed Catchments 201 - 205

Catchment					Imperv. Area	Imperv %
201	1	Road, Sidewalk, Parking	2950.85	m^2 @ 100% imperv.	0.30 ha	17.0 %
	13.5	Driveways	36	m^2 @ 100% imperv.	0.05 ha	2.8 %
	1	Roof Area	5333	m^2 @ 100% imperv.	0.53 ha	30.6 %
					0.88 ha	
202	1	Driveways	42.17	m^2 @ 100% imperv.	0.00 ha	7.0 %
	1	Driveways	48.00	m^2 @ 100% imperv.	0.00 ha	8.0 %
	1	Roof Area	296.12	m^2 @ 100% imperv.	0.03 ha	49.4 %
					0.04 ha	
203	1	Driveways	53.41	m^2 @ 100% imperv.	0.01 ha	8.9 %
	1	Driveways	22.04	m^2 @ 100% imperv.	0.00 ha	3.7 %
	1	Roof Area	353.35	m^2 @ 100% imperv.	0.04 ha	58.9 %
					0.04 ha	
204	0	m of	1	m wide ROW @ 45% imperv.	0.00 ha	0.0 %
	0	Impervious Area	1	m^2 @ 100% imperv.	0.00 ha	0.0 %
	0	Roof Area	1	m^2 @ 100% imperv.	0.00 ha	0.0 %
					0.00 ha	
205	1	Driveway	18.74	m^2 @ 100% imperv.	0.00 ha	0.5 %
	1	Roof Area	1375.04	m^2 @ 100% imperv.	0.14 ha	35.3 %
					0.14 ha	

645 MARTINS STREET DEVELOPMENT - POST DEVELOPMENT MODEL SCHEMATIC



Legend

- Junctions
- Outfalls
- Storages
- Conduits
- Orifices
- Subcatchments

N

50 m

COBIDE ENGINEERING INC

```
[TITLE]
;;Project Title/Notes

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

START_DATE           11/30/2022
START_TIME           00:00:00
REPORT_START_DATE    11/30/2022
REPORT_START_TIME    00:00:00
END_DATE             12/1/2022
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              8

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

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
SCS_Type_II_38.8mm_2yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_38.8mm_2yr
SCS_Type_II_49.4mm_5yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_49.4mm_5yr
SCS_Type_II_65.3mm_25yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_65.3mm_25yr
SCS_Type_II_71.9mm_50yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_71.9mm_50yr
SCS_Type_II_78.4mm_100yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_78.4mm_100yr
SCS_Type_II_88mm_MTO100Yr INTENSITY 0:06     1.0      TIMESERIES SCS_Type_II_88mm_MTO100Yr

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------
-
201              SCS_Type_II_88mm_MTO100Yr SU1      1.74     50.4     170      2        0
202              SCS_Type_II_88mm_MTO100Yr J1       0.0613   64.4     45       4        0
203              SCS_Type_II_88mm_MTO100Yr J1       0.0643   71.5     33       3        0
204              SCS_Type_II_88mm_MTO100Yr SU1      0.37     0        110      1.3      0
205              SCS_Type_II_88mm_MTO100Yr OF2      0.3887   35.7     198      2.3      0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
201              0.01       0.25       0.05       0.05       25         OUTLET
202              0.01       0.25       0.05       0.05       25         OUTLET
203              0.01       0.25       0.05       0.05       25         OUTLET
204              0.01       0.25       0.05       0.05       25         OUTLET
```

```
205              0.01       0.25       0.05       0.05       25         OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
201              77         0.5        7          0          0
202              77         0.5        7          0          0
203              77         0.5        7          0          0
204              77         0.5        7          0          0
205              77         0.5        7          0          0

[JUNCTIONS]
;;Name           Elevation  MaxDepth   InitDepth  SurDepth   Aponded
;;-------------- ---------- ---------- ---------- ---------- ----------
J1               409.2      1          0          0          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
OF1              409.13     FREE                        NO
OF2              0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi
Ksat     IMD
;;-------------- -------- ---------- ---------- ---------- ---------------------------- -------- --------
-------- --------
SU1              409.26   2.24       0          TABULAR    Pond                         0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
-----
C1               J1               OF1              15.4       0.013      409.2      409.13     0          0

[ORIFICES]
;;Name           From Node        To Node          Type         Offset     Qcoeff     Gated    CloseTime
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- ----------
OR1              SU1              J1               SIDE         409.41     0.65       NO       0

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
C1               CIRCULAR     0.375            0          0          0          1
OR1              CIRCULAR     0.2              0          0          0

[LOSSES]
;;Link           Kentry     Kexit      Kavg       Flap Gate  Seepage
;;-------------- ---------- ---------- ---------- ---------- ----------

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
Pond             Storage    0          245.2268939
Pond                        0.0254     245.2268939
Pond                        0.0508     245.2268939
Pond                        0.0762     245.2268939
Pond                        0.1016     245.2268939
Pond                        0.127      245.2268939
Pond                        0.1524     508.041218
Pond                        0.1778     506.97322
Pond                        0.2032     504.437586
Pond                        0.2286     501.6745719
Pond                        0.254      499.0482614
Pond                        0.2794     495.8474095
Pond                        0.3048     492.2813159
Pond                        0.3302     488.7128521
Pond                        0.3556     484.5372142
Pond                        0.381      480.3792707
Pond                        0.4064     475.4982856
Pond                        0.4318     470.6268367
Pond                        0.4572     466.0915875
Pond                        0.4826     459.8779537
```

```
Pond                    0.508      453.9385068
Pond                    0.5334     447.578751
Pond                    0.5588     440.7642347
Pond                    0.5842     433.625874
Pond                    0.6096     426.767811
Pond                    0.635      418.3586015
Pond                    0.6604     406.5607377
Pond                    0.6858     395.9220997
Pond                    0.7112     385.7814932
Pond                    0.7366     373.163407
Pond                    0.762      358.4181444
Pond                    0.7874     340.6824874
Pond                    0.8128     317.1375828
Pond                    0.8382     278.7962763
Pond                    0.8636     264.6248243
Pond                    0.889      251.7748544
Pond                    0.9144     245.2268939
Pond                    0.9398     245.2268939
Pond                    0.9652     245.2268939
Pond                    0.9906     245.2268939
Pond                    1.016      245.2268939
Pond                    1.0414     245.2268939
Pond                    1.0668     245.2268939
Pond                    1.07       5
Pond                    1.4        5
Pond                    1.49       115
Pond                    1.59       315
Pond                    1.69       460
Pond                    1.79       565
Pond                    1.89       650
Pond                    1.99       725
Pond                    2.09       810
Pond                    2.14       850

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
;SCS_Type_II_38.8mm design storm, total rainfall = 38.8 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_38.8mm_2yr

;SCS_Type_II_49.4mm design storm, total rainfall = 49.4 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_49.4mm_5yr

;SCS_Type_II_65.3mm design storm, total rainfall = 65.3 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_65.3mm_25yr

;SCS_Type_II_71.9mm design storm, total rainfall = 71.9 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_71.9mm_50yr

;SCS_Type_II_78.4mm design storm, total rainfall = 78.4 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_78.4mm_100yr

;SCS_Type_II_88mm design storm, total rainfall = 88 mm, rain interval = 6 minutes, rain units = mm/hr.
SCS_Type_II_88mm_MTO100Yr

[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       520556.46295     4868691.77995    520883.91205     4868897.01905
UNITS            Meters
```

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_38.8mm_2yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_38.8mm_2yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_38.8mm_2yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_38.8mm_2yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_38.8mm_2yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are

based on results found at every computational time step,
not just on results from each reporting time step.
****

****
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 ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/30/2022 00:00:00
Ending Date 12/01/2022 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 1
Head Tolerance ..... 0.001524 m

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.102	38.800
Evaporation Loss	0.000	0.000
Infiltration Loss	0.040	15.078
Surface Runoff	0.062	23.699
Final Storage	0.000	0.079
Continuity Error (%)	-0.144	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.062	0.622
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.058	0.581
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	0.004	0.041
Continuity Error (%)	0.000	

****
Time-Step Critical Elements
****
None

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary

```
  ************************
  Minimum Time Step           :     4.50 sec
  Average Time Step           :     5.00 sec
  Maximum Time Step           :     5.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :   100.00 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


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

  ------------------------------------------------------------------------------------------------------------------
----------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ------------------------------------------------------------------------------------------------------------------
----------------
  201                       38.80       0.00       0.00      12.95      19.62       6.23      25.85        0.45
194.08   0.666
  202                       38.80       0.00       0.00       9.14      24.99       4.66      29.65        0.02
9.70   0.764
  203                       38.80       0.00       0.00       7.32      27.76       3.73      31.49        0.02
10.74   0.812
  204                       38.80       0.00       0.00      25.92       0.00      12.77      12.77        0.05
10.52   0.329
  205                       38.80       0.00       0.00      16.51      13.85       8.41      22.26        0.09
39.51   0.574


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

  ------------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ------------------------------------------------------------------------------
  J1                   JUNCTION    0.04     0.18   409.38     0  03:06        0.18
  OF1                  OUTFALL     0.03     0.18   409.31     0  03:06        0.18
  OF2                  OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.19     0.55   409.81     0  03:19        0.55


  ******************
  Node Inflow Summary
  ******************

  ------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type       LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ------------------------------------------------------------------------------------------------
  J1                   JUNCTION  20.45    59.45     0  03:06      0.0385       0.495       0.002
  OF1                  OUTFALL    0.00    59.45     0  03:06           0       0.495       0.000
  OF2                  OUTFALL   39.51    39.51     0  03:00      0.0866      0.0866       0.000
  SU1                  STORAGE  200.75   200.75     0  03:00       0.497       0.497       0.001


  **********************
  Node Surcharge Summary
```

****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.061	7	0	0	0.230	27	0 03:19	49.19

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.81	5.74	59.45	0.495
OF2	36.73	2.72	39.51	0.087
System	68.27	8.46	93.22	0.581

****
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
C1	CONDUIT	59.45	0 03:06	1.13	0.50	0.48
OR1	ORIFICE	49.19	0 03:19			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.62	0.38	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Feb 13 15:29:59 2023
Analysis ended on: Mon Feb 13 15:29:59 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_49.4mm_5yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_49.4mm_5yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_49.4mm_5yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_49.4mm_5yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_49.4mm_5yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are

based on results found at every computational time step,
not just on results from each reporting time step.
****

****
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 ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/30/2022 00:00:00
Ending Date 12/01/2022 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 1
Head Tolerance ..... 0.001524 m

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.130	49.400
Evaporation Loss	0.000	0.000
Infiltration Loss	0.046	17.596
Surface Runoff	0.083	31.795
Final Storage	0.000	0.080
Continuity Error (%)	-0.143	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.084	0.835
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.079	0.794
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	0.004	0.041
Continuity Error (%)	0.000	

****
Time-Step Critical Elements
****
Link C1 (3.88%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary

```
  ************************
  Minimum Time Step           :     4.63 sec
  Average Time Step           :     4.99 sec
  Maximum Time Step           :     5.00 sec
  Percent in Steady State     :     0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :   100.00 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.00 %
      0.792 -  0.500 sec      :     0.00 %


  ***************************
  Subcatchment Runoff Summary
  ***************************
```

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
201	49.40	0.00	0.00	15.10	24.98	9.33	34.31	0.60	256.49	0.695
202	49.40	0.00	0.00	10.65	31.82	6.93	38.75	0.02	12.80	0.784
203	49.40	0.00	0.00	8.53	35.34	5.55	40.89	0.03	14.06	0.828
204	49.40	0.00	0.00	30.32	0.00	18.97	18.97	0.07	18.80	0.384
205	49.40	0.00	0.00	19.24	17.64	12.50	30.14	0.12	55.04	0.610

```
  ******************
  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
J1	JUNCTION	0.04	0.21	409.41	0 03:06	0.21
OF1	OUTFALL	0.04	0.20	409.33	0 03:06	0.20
OF2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
SU1	STORAGE	0.21	0.73	409.99	0 03:23	0.73

```
  ******************
  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
J1	JUNCTION	26.87	75.40	0 03:06	0.0501	0.677	0.001
OF1	OUTFALL	0.00	75.40	0 03:06	0	0.677	0.000
OF2	OUTFALL	55.04	55.04	0 03:00	0.117	0.117	0.000
SU1	STORAGE	269.05	269.05	0 03:00	0.668	0.668	0.001

```
  **********************
  Node Surcharge Summary
```

****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.070	8	0	0	0.308	36	0 03:23	62.89

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.85	7.91	75.40	0.677
OF2	37.39	3.70	55.04	0.117
System	68.62	11.61	124.63	0.794

****
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
C1	CONDUIT	75.40	0 03:06	1.22	0.64	0.55
OR1	ORIFICE	62.89	0 03:23			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.63	0.37	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Feb 13 15:30:54 2023
Analysis ended on: Mon Feb 13 15:30:54 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_65.3mm_25yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_65.3mm_25yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_65.3mm_25yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_65.3mm_25yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_65.3mm_25yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****
NOTE: The summary statistics displayed in this report are

based on results found at every computational time step,
not just on results from each reporting time step.
****

****
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 ..... CURVE_NUMBER
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date 11/30/2022 00:00:00
Ending Date 12/01/2022 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 1
Head Tolerance ..... 0.001524 m

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	0.171	65.300
Evaporation Loss	0.000	0.000
Infiltration Loss	0.054	20.697
Surface Runoff	0.117	44.616
Final Storage	0.000	0.080
Continuity Error (%)	-0.142	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.117	1.172
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.113	1.131
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	0.004	0.041
Continuity Error (%)	0.003	

****
Time-Step Critical Elements
****
Link C1 (8.15%)

****
Highest Flow Instability Indexes
****
All links are stable.

****
Routing Time Step Summary

```
  ************************
  Minimum Time Step           :     1.19 sec
  Average Time Step           :     4.96 sec
  Maximum Time Step           :     5.00 sec
  Percent in Steady State     :    -0.00
  Average Iterations per Step :     2.00
  Percent Not Converging      :     0.00
  Time Step Frequencies       :
      5.000 -  3.155 sec      :    99.99 %
      3.155 -  1.991 sec      :     0.00 %
      1.991 -  1.256 sec      :     0.00 %
      1.256 -  0.792 sec      :     0.01 %
      0.792 -  0.500 sec      :     0.00 %


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

  ---------------------------------------------------------------------------------------------------------------
---------------
                            Total      Total      Total      Total     Imperv       Perv      Total       Total
Peak  Runoff
                           Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff      Runoff
Runoff   Coeff
  Subcatchment                mm         mm         mm         mm         mm         mm         mm    10^6 ltr
LPS
  ---------------------------------------------------------------------------------------------------------------
---------------
  201                        65.30       0.00       0.00      17.78      33.01      14.54      47.56        0.83
357.51   0.728
  202                        65.30       0.00       0.00      12.49      42.06      10.76      52.82        0.03
17.65   0.809
  203                        65.30       0.00       0.00      10.00      46.71       8.61      55.32        0.04
19.21   0.847
  204                        65.30       0.00       0.00      35.65       0.00      29.55      29.55        0.11
34.82   0.453
  205                        65.30       0.00       0.00      22.57      23.32      19.41      42.73        0.17
81.15   0.654


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

  ------------------------------------------------------------------------------
                                Average  Maximum  Maximum  Time of Max    Reported
                                  Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type      Meters   Meters   Meters  days hr:min      Meters
  ------------------------------------------------------------------------------
  J1                   JUNCTION    0.05     0.28   409.48     0  03:09        0.27
  OF1                  OUTFALL     0.05     0.25   409.38     0  03:09        0.25
  OF2                  OUTFALL     0.00     0.00     0.00     0  00:00        0.00
  SU1                  STORAGE     0.26     1.56   410.82     0  03:20        1.56


  ******************
  Node Inflow Summary
  ******************

  ------------------------------------------------------------------------------------------------
                                Maximum  Maximum                  Lateral       Total        Flow
                                Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                 Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type       LPS      LPS  days hr:min    10^6 ltr    10^6 ltr     Percent
  ------------------------------------------------------------------------------------------------
  J1                   JUNCTION  36.87   111.61     0  03:09       0.068       0.964       0.000
  OF1                  OUTFALL    0.00   113.68     0  03:09           0       0.964       0.000
  OF2                  OUTFALL   81.15    81.15     0  03:00       0.166       0.166       0.000
  SU1                  STORAGE  382.39   382.39     0  03:00       0.937       0.937       0.004


  **********************
  Node Surcharge Summary
```

****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.086	10	0	0	0.421	49	0 03:20	103.58

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.87	11.90	113.68	0.964
OF2	38.39	5.46	81.15	0.166
System	69.13	17.36	173.12	1.131

****
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
C1	CONDUIT	113.68	0 03:09	1.40	0.96	0.70
OR1	ORIFICE	103.58	0 03:20			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

No conduits were surcharged.

Analysis begun on: Mon Feb 13 15:31:43 2023
Analysis ended on: Mon Feb 13 15:31:43 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_71.9mm_50yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_71.9mm_50yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_71.9mm_50yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_71.9mm_50yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_71.9mm_50yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****

```
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

***************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.189        71.900
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.057        21.772
Surface Runoff ...........         0.132        50.150
Final Storage ............         0.000         0.080
Continuity Error (%) .....        -0.142


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.132         1.317
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.127         1.275
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 ......         0.004         0.041
Continuity Error (%) .....         0.100


**************************
Time-Step Critical Elements
**************************
Link C1 (9.55%)


*******************************
Highest Flow Instability Indexes
*******************************
All links are stable.


************************
```

Routing Time Step Summary
****

Minimum Time Step	:	3.71 sec
Average Time Step	:	4.94 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.02
Time Step Frequencies	:	
5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
201	71.90	0.00	0.00	18.69	36.35	16.91	53.26	0.93	401.86	0.741
202	71.90	0.00	0.00	13.14	46.32	12.47	58.78	0.04	19.72	0.818
203	71.90	0.00	0.00	10.52	51.43	9.98	61.41	0.04	21.39	0.854
204	71.90	0.00	0.00	37.54	0.00	34.26	34.26	0.13	42.48	0.477
205	71.90	0.00	0.00	23.78	25.67	22.45	48.12	0.19	92.77	0.669

****
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
J1	JUNCTION	0.06	0.30	409.50	0 03:05	0.30
OF1	OUTFALL	0.05	0.27	409.40	0 03:05	0.27
OF2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
SU1	STORAGE	0.29	1.70	410.96	0 03:22	1.70

****
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
J1	JUNCTION	41.11	130.54	0 03:06	0.0756	1.09	-0.000
OF1	OUTFALL	0.00	131.17	0 03:05	0	1.09	0.000
OF2	OUTFALL	92.77	92.77	0 03:00	0.187	0.187	0.000
SU1	STORAGE	432.98	432.98	0 03:00	1.05	1.05	0.125

****

Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.093	11	0	0	0.475	55	0 03:22	109.10

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.88	13.77	131.17	1.087
OF2	38.67	6.29	92.77	0.187
System	69.27	20.06	209.60	1.275

****
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
C1	CONDUIT	131.17	0 03:05	1.47	1.11	0.76
OR1	ORIFICE	109.10	0 03:22			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited

C1	0.01	0.01	0.01	0.08	0.01

Analysis begun on: Mon Feb 13 15:32:46 2023
Analysis ended on: Mon Feb 13 15:32:46 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_78.4mm_100yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_78.4mm_100yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_78.4mm_100yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_78.4mm_100yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_78.4mm_100yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****

```
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

***************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.206        78.400
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.060        22.748
Surface Runoff ...........         0.146        55.683
Final Storage ............         0.000         0.080
Continuity Error (%) .....        -0.142


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.146         1.462
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.142         1.423
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 ......         0.004         0.041
Continuity Error (%) .....        -0.114


**************************
Time-Step Critical Elements
**************************
Link C1 (11.04%)


******************************
Highest Flow Instability Indexes
******************************
All links are stable.


************************
```

Routing Time Step Summary
****

Minimum Time Step	:	3.57 sec
Average Time Step	:	4.91 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.02
Time Step Frequencies	:	
5.000 - 3.155 sec	:	100.00 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.00 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
201	78.40	0.00	0.00	19.54	39.63	19.29	58.92	1.03	446.82	0.752
202	78.40	0.00	0.00	13.73	50.50	14.20	64.70	0.04	21.77	0.825
203	78.40	0.00	0.00	10.99	56.08	11.37	67.45	0.04	23.56	0.860
204	78.40	0.00	0.00	39.18	0.00	39.13	39.13	0.14	50.50	0.499
205	78.40	0.00	0.00	24.84	28.00	25.58	53.58	0.21	104.58	0.683

****
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
J1	JUNCTION	0.06	0.32	409.52	0 03:03	0.31
OF1	OUTFALL	0.05	0.28	409.41	0 03:06	0.28
OF2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
SU1	STORAGE	0.32	1.82	411.08	0 03:25	1.82

****
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
J1	JUNCTION	45.34	139.95	0 03:06	0.0831	1.21	-0.000
OF1	OUTFALL	0.00	139.92	0 03:06	0	1.21	0.000
OF2	OUTFALL	104.58	104.58	0 03:00	0.209	0.209	0.000
SU1	STORAGE	484.65	484.65	0 03:00	1.17	1.17	-0.142

****

Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.102	12	0	0	0.539	63	0 03:25	113.52

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.89	15.71	139.92	1.214
OF2	39.09	7.11	104.58	0.209
System	69.49	22.83	231.28	1.423

****
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
C1	CONDUIT	139.92	0 03:06	1.50	1.18	0.79
OR1	ORIFICE	113.52	0 03:25			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.66	0.34	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited

C1	0.01	0.01	0.01	0.40	0.01

Analysis begun on: Mon Feb 13 15:33:51 2023
Analysis ended on: Mon Feb 13 15:33:51 2023
Total elapsed time: < 1 sec

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

****
Element Count
****
Number of rain gages 6
Number of subcatchments ... 5
Number of nodes 4
Number of links 2
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
SCS_Type_II_38.8mm_2yr	SCS_Type_II_38.8mm_2yr	INTENSITY	6 min.
SCS_Type_II_49.4mm_5yr	SCS_Type_II_49.4mm_5yr	INTENSITY	6 min.
SCS_Type_II_65.3mm_25yr	SCS_Type_II_65.3mm_25yr	INTENSITY	6 min.
SCS_Type_II_71.9mm_50yr	SCS_Type_II_71.9mm_50yr	INTENSITY	6 min.
SCS_Type_II_78.4mm_100yr	SCS_Type_II_78.4mm_100yr	INTENSITY	6 min.
SCS_Type_II_88mm_MTO100Yr	SCS_Type_II_88mm_MTO100Yr	INTENSITY	6 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
201	1.74	170.00	50.40	2.0000	SCS_Type_II_88mm_MTO100Yr	SU1
202	0.06	45.00	64.40	4.0000	SCS_Type_II_88mm_MTO100Yr	J1
203	0.06	33.00	71.50	3.0000	SCS_Type_II_88mm_MTO100Yr	J1
204	0.37	110.00	0.00	1.3000	SCS_Type_II_88mm_MTO100Yr	SU1
205	0.39	198.00	35.70	2.3000	SCS_Type_II_88mm_MTO100Yr	OF2

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	409.20	1.00	0.0	
OF1	OUTFALL	409.13	0.38	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
SU1	STORAGE	409.26	2.24	0.0	

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J1	OF1	CONDUIT	15.4	0.4546	0.0130
OR1	SU1	J1	ORIFICE			

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CIRCULAR	0.38	0.11	0.09	0.38	1	118.22

****

```
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*****************************************************

***************
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 ...... CURVE_NUMBER
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 11/30/2022 00:00:00
Ending Date .............. 12/01/2022 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 ........ 1
Head Tolerance ........... 0.001524 m


*************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
*************************     ---------       -------
Total Precipitation ......         0.231        88.000
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.063        24.047
Surface Runoff ...........         0.168        63.998
Final Storage ............         0.000         0.080
Continuity Error (%) .....        -0.143


*************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
*************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.168         1.681
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........         0.164         1.638
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 ......         0.004         0.041
Continuity Error (%) .....         0.091


**************************
Time-Step Critical Elements
**************************
Link C1 (13.24%)


******************************
Highest Flow Instability Indexes
******************************
All links are stable.


************************
```

Routing Time Step Summary
****

Minimum Time Step	:	1.19 sec
Average Time Step	:	4.88 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.01
Time Step Frequencies	:	
5.000 - 3.155 sec	:	99.99 %
3.155 - 1.991 sec	:	0.00 %
1.991 - 1.256 sec	:	0.00 %
1.256 - 0.792 sec	:	0.01 %
0.792 - 0.500 sec	:	0.00 %

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
201	88.00	0.00	0.00	20.65	44.48	22.94	67.42	1.17	515.35	0.766
202	88.00	0.00	0.00	14.50	56.69	16.85	73.54	0.05	24.84	0.836
203	88.00	0.00	0.00	11.61	62.95	13.49	76.44	0.05	26.80	0.869
204	88.00	0.00	0.00	41.44	0.00	46.48	46.48	0.17	63.04	0.528
205	88.00	0.00	0.00	26.24	31.43	30.36	61.79	0.24	122.56	0.702

****
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
J1	JUNCTION	0.07	0.34	409.54	0 03:01	0.33
OF1	OUTFALL	0.06	0.28	409.41	0 03:02	0.28
OF2	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
SU1	STORAGE	0.36	1.97	411.23	0 03:28	1.97

****
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
J1	JUNCTION	51.64	148.91	0 03:02	0.0943	1.4	-0.000
OF1	OUTFALL	0.00	148.89	0 03:02	0	1.4	0.000
OF2	OUTFALL	122.56	122.56	0 03:00	0.241	0.241	0.000
SU1	STORAGE	564.05	564.05	0 03:00	1.35	1.35	0.114

****

Node Surcharge Summary
****

No nodes were surcharged.

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 m3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
SU1	0.116	14	0	0	0.634	74	0 03:28	118.63

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
OF1	99.90	18.53	148.89	1.397
OF2	39.65	8.36	122.56	0.241
System	69.77	26.89	264.69	1.638

****
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
C1	CONDUIT	148.89	0 03:02	1.53	1.26	0.82
OR1	ORIFICE	118.63	0 03:28			1.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.67	0.33	0.00	0.00	0.00	0.00

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited

C1	0.01	0.01	0.01	0.98	0.01

Analysis begun on: Mon Feb 13 15:34:55 2023
Analysis ended on: Mon Feb 13 15:34:55 2023
Total elapsed time: < 1 sec