

FLOODPLAIN MODELING REPORT

Proposed Industrial Subdivision
1665 Scotch Line
Elmira, Ontario

9 March 2026



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SBM-23-2603

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Topographic Survey prepared by SBM Geomatics Ltd.

Cosine Station Report by the Ontario Ministry of Natural Resources and Forestry

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PCSWMM Sub-Watersheds Output Results (6-hour Chicago 100 Year)

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1. INTRODUCTION

This Floodplain Modeling Report (Report) has been prepared by Strik, Baldinelli, Moniz Ltd. (SBM) to address the requirements of the Grand River Conservation Authority (GRCA), the Township of Woolwich and the Region of Waterloo together, as well as the first submission comments received from GRCA on September 11, 2025, and from GHD on October 10, 2025, as part of the application process for the proposed industrial Draft Plan of Subdivision.

This Report represents a component of the overall application submission and should be read in conjunction with all other submitted documents.

The 55 ha subject site borders the South Field Drive Right of Way (R.O.W.) to the north, industrial/ commercial lots and an active railway line to the west, and farmlands/open space to the east and south. The proposed industrial subdivision will include eight (8) industrial blocks, two (2) stormwater management block, one (1) sanitary pumping station block, one (1) open space block, and seven (7) future development blocks in which Block 15 may be utilized for the future Elmira by-pass and the remaining unused block(s) would be then joined and developed with the adjacent industrial block. The proposed Draft Plan of Subdivision has been provided separately.

The Elmira Drain #1 is a municipal drainage system located within the Township of Woolwich. Overall, the Township is within the Grand River Watershed. Accordingly, areas of flood hazard within the Township are regulated by the GRCA. A cursory review of the GRCA flood hazard areas notes that the Elmira Drain #1 is subject to flooding. This Report assesses flood risks within Drain #1 adjacent to the development site, identifying the limits of flooding for the Regional Storm event. The supporting analysis is based on hydrological and hydraulic modeling, with specific input parameters for both.

2. OBJECTIVES

The objectives of the hydrologic and hydraulic modeling assessments are:

- Generate runoff hydrographs and determine runoff behavior.
- Determine peak flow at the outlet based on the Regulatory Storm events – Hurricane Hazel.
- Confirm the flood elevation levels and the necessary flood protection measures.
- Define the flood impacted areas surrounding the study area.
- Ensure that the proposed development is located at least 15 m beyond the floodplain boundary.

3. STUDY AREA AND WATERSHED

The Elmira Drain #1 watershed includes lands within Township of Mapleton, Township of Wellesley, and Township of Woolwich, draining both urban and agricultural areas. The study area includes the watershed associated with Drain #1, and adjacent areas that may be impacted by flooding during extreme weather events.

The subject site is located south of and adjacent to South Field Drive, east of and adjacent to the Canadian National Railway – see Draft Plan of Subdivision provided separately. Drain #1 is west of the railway corridor and crosses under the South Field Drive R.O.W via an existing 3600mm diameter culvert (CSP) – see “Elmira Drain #1” overall watershed Drawing 1 dated November 2020 prepared by GM BluePlan Engineering Limited provided in **Appendix A**. Drain #1 flows in a northerly direction, is conveyed east under the railway corridor, and ultimately discharges to the Canagagigue Creek.

Figure 1 illustrates the subject watershed area location within the overall Grand River watershed.

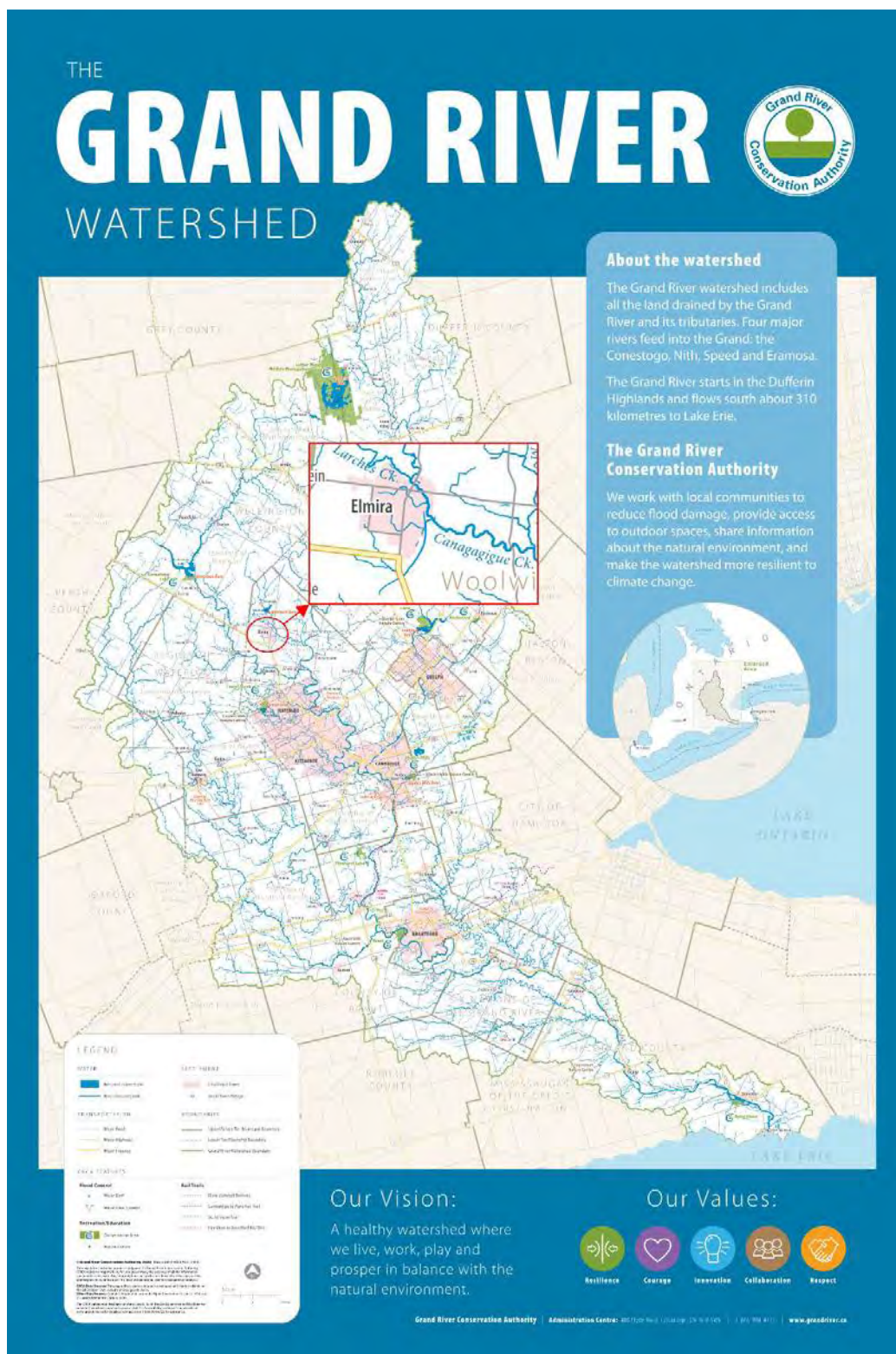


Figure 1: Study Area Location (Source: GRCA Watershed Map and Data, 2025)

4. DESCRIPTION OF WATERSHED

4.1 DRAINAGE NETWORK

The modelled watershed area conveys surface runoff to Canagagigue Creek. The drainage network of the watershed is a critical part of the local hydrological system, designed to convey runoff from the surrounding land areas into the Canagagigue Creek. The watershed drainage network is shown in **Figure 2** below.

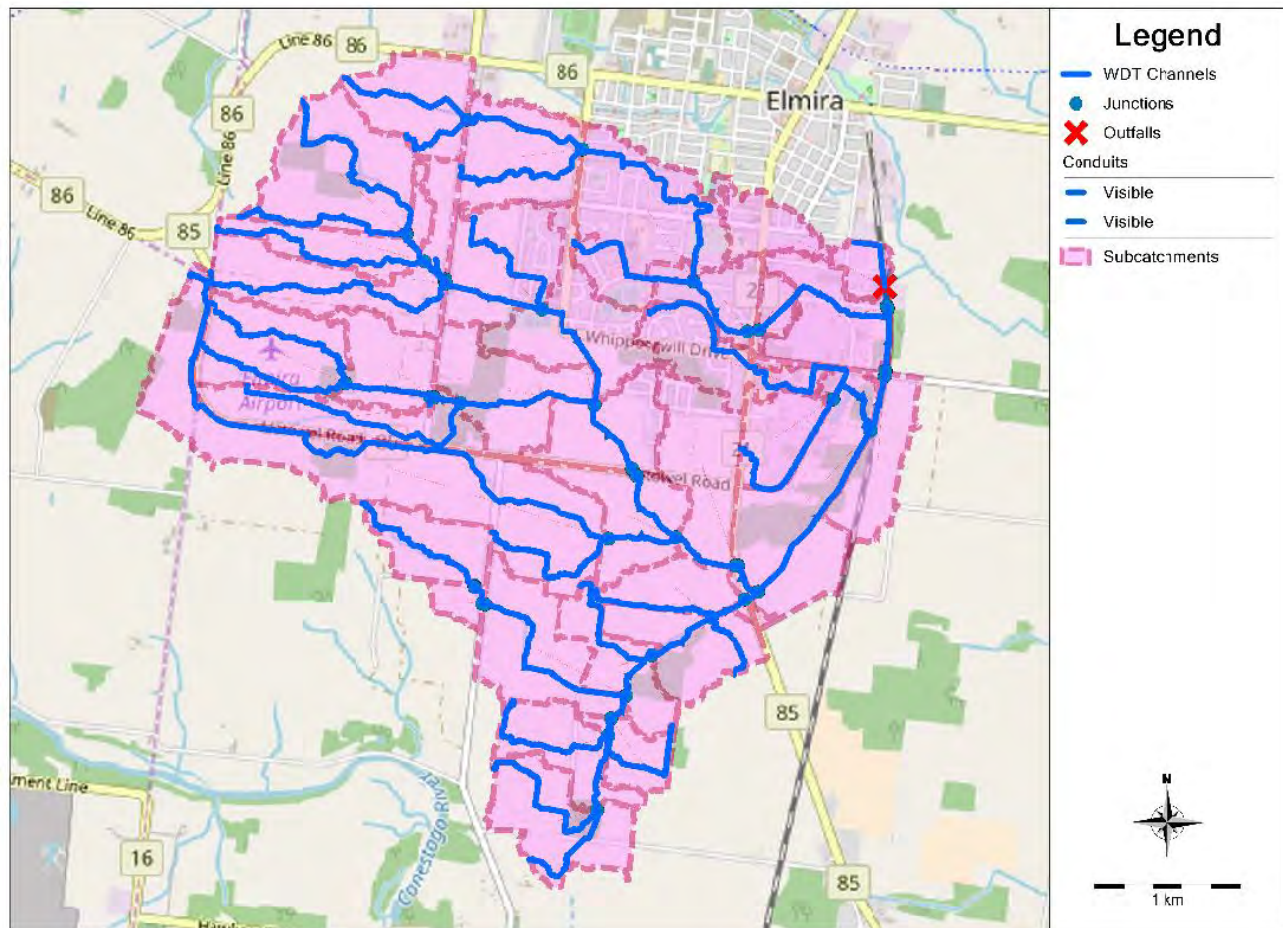


Figure 2: Watershed Drainage Network

4.2 HYDROLOGIC SOIL GROUP

Soil classification data for the study area was provided using the geospatial soils database **Soil Survey Complex**, managed by the Ministry of Agriculture, Food and Rural Affairs (OMAFRA). The OMAFRA data was accessed through the Ontario GeoHub. The soil groups for the watershed vary between Group B, and Group C, and Urban.

5. HYDROLOGIC ANALYSIS AND OUTPUT RESULTS

5.1 HYDROLOGIC MODEL

Hydrologic modelling was performed using the Personal Computer Storm Water Management Model (PCSWMM) software to generate runoff hydrographs and route flows through the catchment areas.

Topographic data is required within the modelling system for discretizing the watershed into smaller subcatchments and other physical parameters such as reaches and flow path slopes. The High-Resolution Digital Elevation Model (HRDEM) data was used, provided through the CanElevation Series website from the Government of Canada. The Digital Elevation Model (DEM) data was derived from LiDAR data collected in 2017/2018. The DEM has a 1.0m grid resolution and is referenced horizontally with the NAD83 CSRS UTM zone 17N horizontal datum and vertically with the CGVD2013 vertical datum. The specific HRDEM map tile used is “dtm_1m_utm17_e_3_82”. See **Figure 3** for a coloured visual of the watershed topography.

Using the PCSWMM watershed delineation tool (WDT), subcatchment limits were identified together with other key characteristics including areas, slopes, flow lengths, channels, drainage network, and other features. Thirty-seven (37) subcatchments were created within the watershed – see **Appendix B** for subcatchment schematic. The 1m grid resolution HRDEM was down sampled to a 5m grid resolution, and the subcatchment slopes were recalculated in the model and used. The detailed subcatchment attributes were then used to estimate surface runoff.

The program's infiltration model includes the option of using the SCS Curve Number method to calculate the amount of infiltration for each subcatchment. This method is applicable to pervious land uses such as cultivated land, lawns, woodlands, and forests. The flow rates derived from the model were used to quantify the surface runoff entering the Elmira Drain #1.

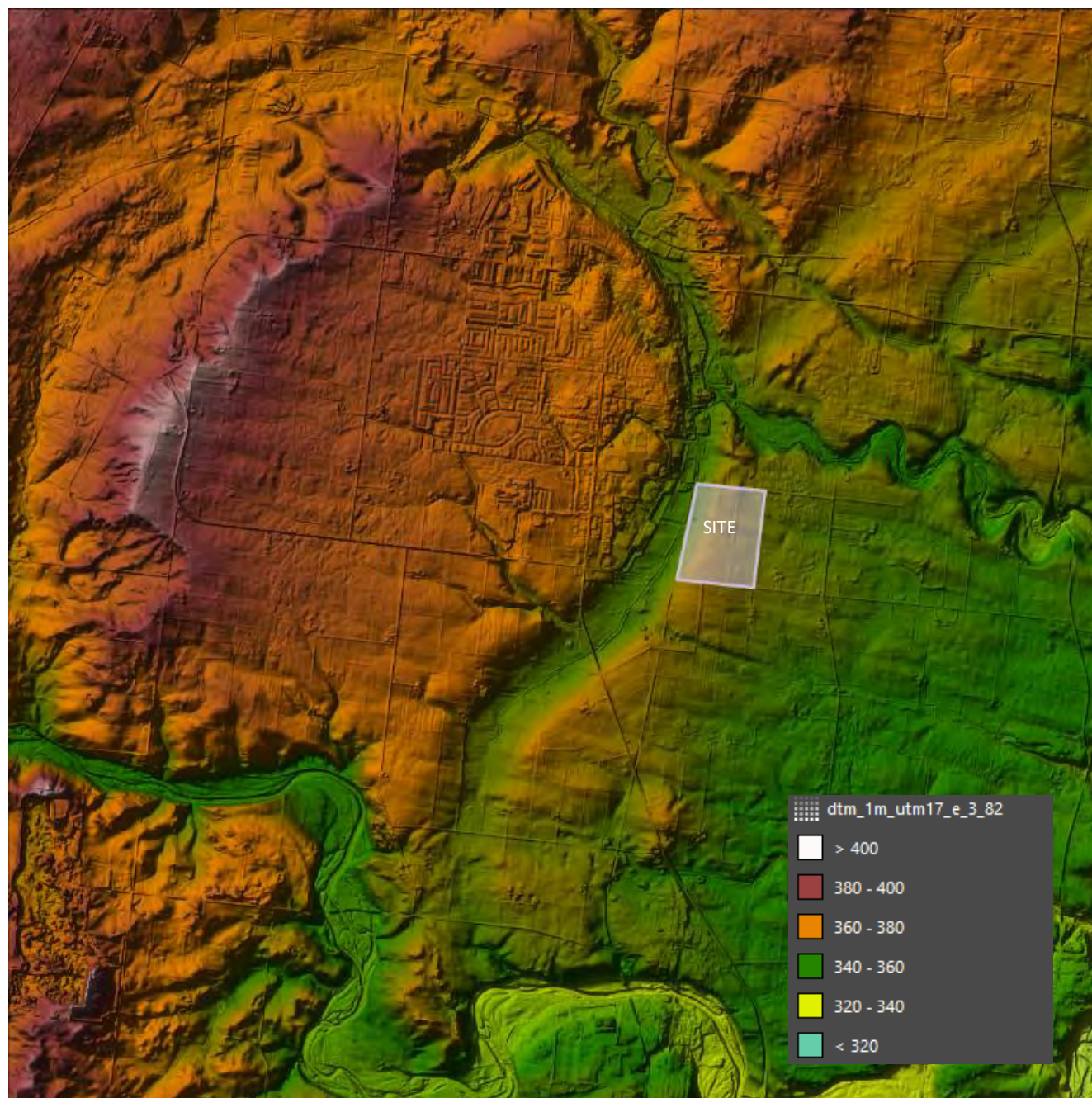


Figure 3: High Resolution Digital Elevation Model (HRDEM)

5.2 RAINFALL DATA

According to the Woolwich Township Engineering Development and Infrastructure Manual, the City of Kitchener's intensity-duration-frequency (IDF) curve shall be used. The City of Kitchener IDF parameters for the 100-year return period is as follows:

Return Period (Years)	Parameters		
	a	b	c
100 Yr	4688.0	17.0	0.9624

Table 1: City of Kitchener IDF Rainfall Distribution

Three (3) different Storms were created for the 100-year storm event. 3-hour and 6-hour Chicago Storms were created using the IDF parameters provided in **Table 1**, and an r-value of 0.38 as per the MTO Drainage Manual Chapter 8. And 6-hour SCS Type II Storm was created using a total rainfall of 93.25mm.

The hyetograph for the Hurricane Hazel storm event was created using parameters as defined in the technical guidelines for flood hazard mapping (March 2017) Table 3.2.12, with a time step of 1 minute for the 48-hour (2880 minutes). The Hurricane Hazel storm event parameters are shown in **Table 2**.

Rainfall (mm)	73	6	4	6	13	17	13	23	13	13	53	38	13
Time (hours)	First 36 th	37 th	38 th	39 th	40 th	41 st	42 nd	43 rd	44 th	45 th	46 th	47 th	48 th

Table 2: Hurricane Hazel Storm Event Parameters

5.3 PCSWMM INPUT PARAMETERS

The watershed area draining into the Elmira Drain #1 covers 1,636 hectares. The land use within the watershed is categorized as follows: agricultural, urban, and roadway, with different runoff coefficients (C) ranging between 0.20 for agricultural areas, 0.85 for urban areas, and 0.90 for roadway areas, resulting in a weighted runoff coefficient (C) ranging between 0.24 and 0.76 and an imperviousness ranging between 5% and 80%.

SCS Curve Numbers for each subcatchment were obtained from Table A.4 SCS Curve Numbers of the Environmental Protection Agency Stormwater Management Model User's Manual Version 5.1 and they are based on the hydrologic soil group and land use description – see **Table 3**.

Depression Storage (Dstore) for impervious and pervious areas of 2.00mm and 3.75mm respectively. These values were obtained from Table A.5 Depression Storage of the Environmental Protection Agency Stormwater Management Model User's Manual Version 5.1.

Manning's roughness coefficient (n) for impervious and pervious areas of 0.011 and 0.15, respectively, were obtained from Table A.6 Manning's n – Overland Flow of the SWMM manual and are defined based on land use.

Sub-watershed	Total Area (ha)	Flow Length (m)	Slope (%)	C-value	Soil Group	% Imp.	Curve Number (CN)	N Imperv	N Perv	Dstore Imperv (mm)	Dstore Perv (mm)
S1	45.43	850	2.211	0.24	BC	5%	74	0.011	0.15	2	3.75
S2	77.94	845	2.312	0.24	B	5%	61	0.011	0.15	2	3.75
S3	70.94	1026	3.684	0.65	Urban	64%	74	0.011	0.15	2	3.75
S4	54.83	695	2.074	0.24	BC	5%	80	0.011	0.15	2	3.75
S5	35.93	414	4.24	0.69	Urban	70%	74	0.011	0.15	2	3.75
S6	56.20	776	3.359	0.38	Urban + BC	25%	74	0.011	0.15	2	3.75
S7	58.05	527	3.443	0.38	Urban + BC	25%	74	0.011	0.15	2	3.75
S8	36.85	994	2.008	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S9	72.74	1176	2.03	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S10	20.01	699	3.416	0.48	Urban	40%	74	0.011	0.15	2	3.75
S11	47.91	399	5.137	0.76	Urban	80%	74	0.011	0.15	2	3.75
S12	25.48	383	4.68	0.41	Urban	30%	74	0.011	0.15	2	3.75
S13	162.69	2856	2.528	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S14	10.56	155	5.756	0.76	Urban	80%	74	0.011	0.15	2	3.75
S15	56.05	802	2.393	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S16	42.00	1346	3.752	0.34	Urban	20%	74	0.011	0.15	2	3.75
S17	37.18	483	2.14	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S18	54.53	566	2.634	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S19	37.95	473	4.25	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S20	43.59	307	4.698	0.27	BC	10%	67.5	0.011	0.15	2	3.75
S21	55.58	7116	3.777	0.27	B	10%	61	0.011	0.15	2	3.75
S22	29.15	998	4.987	0.76	Urban	80%	74	0.011	0.15	2	3.75
S23	50.90	1061	3.398	0.24	C	5%	74	0.011	0.15	2	3.75
S24	86.98	692	4.225	0.27	Urban + A/C	10%	74	0.011	0.15	2	3.75
S25	43.53	346	4.857	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S26	33.43	689	1.604	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S27	58.06	723	2.884	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S28	26.30	909	3.049	0.25	B	5%	61	0.011	0.15	2	3.75
S29	3.73	181	7.957	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S30	8.71	381	1.699	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S31	0.01	7	7.02	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S32	1.52	185	10.14	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S33	44.67	282	3.621	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S34	35.31	255	3.324	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S35	37.36	740	2.522	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S36	20.15	576	2.166	0.24	BC	5%	67.5	0.011	0.15	2	3.75
S37	53.90	703	2.297	0.24	BC	5%	67.5	0.011	0.15	2	3.75

Table 3: Sub-Catchment Parameters

5.4 HYDROLOGIC MODELING RESULTS – PEAK FLOW RATES

Using the above parameters, the flows from the watershed and the proposed industrial development have been calculated under the 100-year using 3-hour Chicago Storm, 6-hour Chicago Storm, and 6-hour SCS Type II Storm and the Regional Storm conditions using Hurricane Hazel – see **Table 4**. Based on PCSWMM output results for each storm, illustrated in **Table 4** below and provided in **Appendix B**, the Hurricane Hazel design storm has the larger peak flow through the outfall and will remain the worst-case scenario in all anticipated incidents.

Return Period (Years)	Flow Rates Upstream (Conduit C4)	Flow Rates after the subject site (Conduit C1)	Flow Rates upstream of the railway track cross section (at the outlet)
100-Year (Chicago 3hr)	38.77	48.35	72.99
100 Year (Chicago 6hr)	40.71	50.65	76.06
100 Year (SCS Type II 6hr)	38.72	46.58	67.84
Hurricane Hazel	99.97	119.01	150.8

Table 4: Summary of Flow Rates (m³/s)

6. HYDRAULIC ANALYSIS AND OUTPUT RESULTS

6.1 HYDRAULIC MODELING

The hydraulic modeling for this project was conducted using Geo-Hydrologic Engineering Centre River Analysis System (HEC-RAS), a software tool developed by the U.S. Army Corps of Engineers. HEC-RAS is commonly used to simulate the flow of water in rivers, streams, and other watercourses.

6.2 GEO-HECRAS INPUT PARAMETERS

Topography within the hydraulic modeling was represented using the HRDEM data. The hydraulic modeling applied steady-state flow conditions. The model incorporated channel geometry, including several cross-sections at various locations along the Elmira Drain. Seven (7) cross sections were taken into consideration for the design. Please refer to the Elmira Drain #1 drawing provided in **Appendix A** for reference on the cross-section locations.

Flood elevation was estimated to be 346.0 at Section 990.6 which is coincident with our outlet. This elevation of 346.0 was used as our starting elevation in the hydraulic analysis while the upstream boundary condition accounted for watershed flow rates, as well as flow rates from the subject site. We were not provided a working version of the Canagagigue Creek HECRAS model. However, we were provided limits of existing Regulatory flooding graphically. When these graphics were superimposed on top off the topographic data within Geo-HECRAS, we identified flood elevations that were slightly less than the starting modelling elevation based on normal flow. Further, under Regional Storm flows the railway becomes a weir. As such, minor differences in flood elevations downstream of the weir will not translate upstream past the railway. The subject site is located further upstream of the railway weir influence. Refer to **Appendix D** for details.

The floodplain mapping was based on the outputs from the hydraulic model. The existing bridge and culvert data from the site were included within the model. To obtain the necessary data, SBM Geomatics Ltd. visited the site and measured the existing culverts on December 24, 2024. The culvert parameters used in the model are shown in **Table 4** below. Please refer to the Elmira Drain #1 overall watershed drawing for the culvert labeling, provided in **Appendix A**.

Culvert #	Type	Barrel #	Size W x H (m)	Material	Location	Upstream Invert (m)	Downstream Invert (m)	Manning's n for Top and Bottom	Exit Loss Coefficient	Entrance Loss Coefficient
1	Elliptical	1	3.60 x 2.0	CSP	Refer to "Elmira Drain #1" Drawing	343.74	343.7	0.021	1	0.9
2	Circular	1	1500mm diameter	Conc.		344.66	344.64	0.013		0.2
3	Elliptical	3	2.00 x 1.6	CSP		343.45	343.37	0.021		0.9

Table 4: Existing Culvert Parameters

The exit loss coefficient is taken as the standard value 1.0. The entrance loss coefficient, derived from the projecting concrete pipe, is set at 0.2 and for the non-concrete pipes at 0.9. Manning's n value of 0.013 was assumed based on the maximum value for a concrete straight culvert and 0.021 for the non-concrete pipe – see **Appendix C** for details.

The model was adjusted for the Regional Storm analysis. Under the Regional Storm conditions the surface runoff flows overtop of the railway corridor from west to east. Under these conditions the railway track functions as a weir. The hydraulic model cross-sections were removed to accommodate this outcome.

6.3 HYDRAULIC MODELING RESULTS

The HEC-RAS model was used to simulate water flow in the Elmira Drain #1 under various storm events, utilizing the above input parameters. The topography data used for identifying the flood elevation is based on the CGVD2013 vertical datum. SBM has confirmed that the engineering drawing was based on the CGVD28 vertical datum. Accordingly, the resulting CGVD2013 flood elevations noted on the engineering drawing have been converted to CGVD28. At this location 0.38m is added to convert from CGVD2013 to CGVD28 based on the Cosine Station Report. Refer to the Cosine Station Report by the Ontario Ministry of Natural Resources and Forestry provided in **Appendix A**.

The results indicate the following:

- **Floodplain Limits:** The floodplain boundaries were delineated based on the hydraulic modeling results. For the Regional Storm event, the floodplain elevation is at 346.66m (CGVD20 13 vertical datum) which is equivalent to **347.04m** (CGVD28 vertical datum). The resulting flood hazard area is identified in **Figure 4**.



Figure 4: Water Surface Elevation During the Regional Storm Event

- **Flood Depths:** Flood depths, which indicate how deep the water will rise in the affected areas, were calculated for the Regional Storm event. The resulting flood hazard depths are identified in **Figure 5**.



Figure 5: Flood Depths under the Regional Storm Event

7. FLOODPLAIN MAPPING

Floodplain mapping was completed using the results from the hydraulic analysis. These maps delineate the flood zones for various return periods. The Regional Storm floodplain mapping is shown in **Figure 6**.

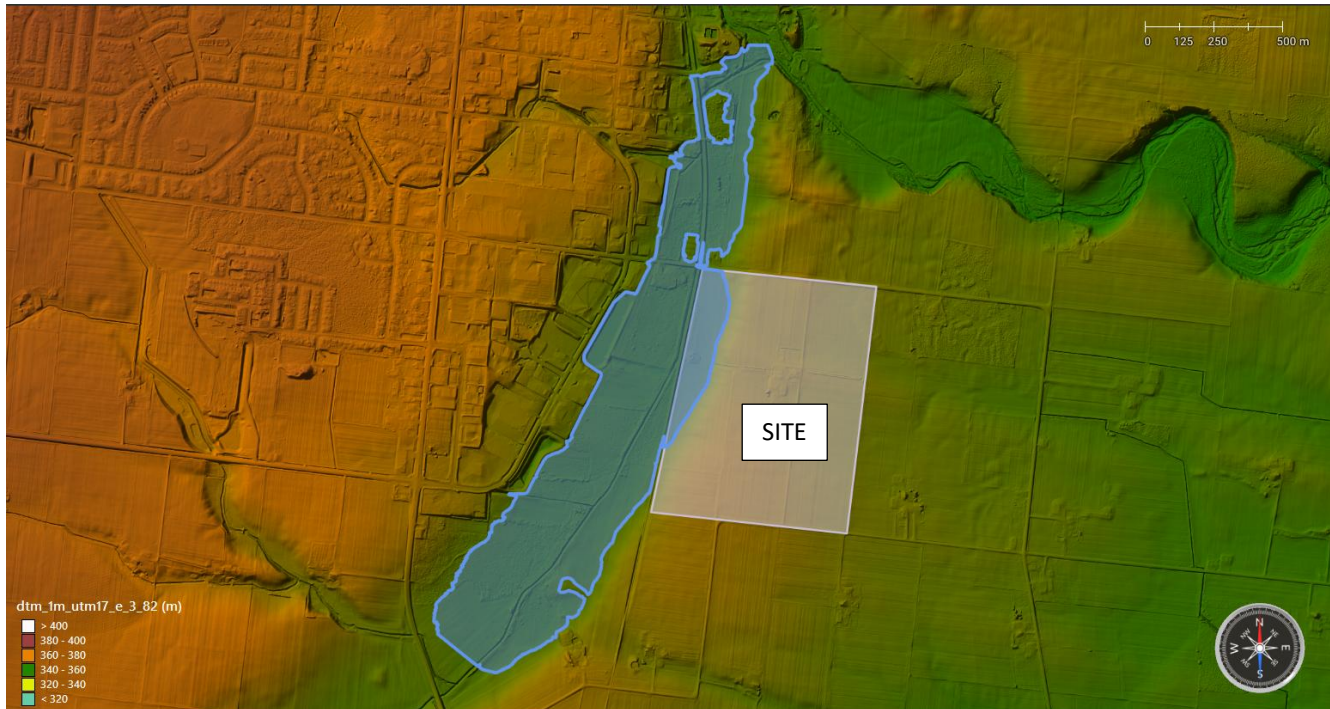


Figure 6: Floodplain Mapping During the Regional Storm Event

8. CONCLUSION

The Elmira Drain #1's floodplain and risk zones have been identified through preparation of hydrological and hydraulic models (PCSWMM and HEC-RAS). The proposed development will have a minimum of 15 meters setback from the modeled floodplain boundary and will therefore be adequately protected from flood risk. The modeling also generally aligns with the GRCA's existing mapping for this area, although updates to that mapping may be warranted to align with the modeled floodplain.

9. LIMITATIONS

This Report was prepared by SBM for the 1000525725 Ontario Inc., the GRCA, the Township of Woolwich, and the Region of Waterloo. Use of this Report by any third party, or any reliance upon its findings, is solely the responsibility of that party. SBM accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions undertaken as a result of this Report. Third party use of this Report, without the express written consent of the Consultant, denies any claims, whether in contract, tort, and/or any other cause of action in law, against the Consultant.

All findings and conclusions presented in this Report are based on information as it appeared during the design period. This Report is not intended to be exhaustive in scope, or to imply a risk-free facility. It should be recognized that the passage of time may alter the designs, opinions, conclusions, and/or recommendations provided herein.

The design was limited to the documents referenced herein. SBM Ltd. accepts no responsibility for the accuracy of the information provided by others. All designs, opinions, conclusions, and/or recommendations presented in this Report are based on the information available at the time of the review.

This document is deemed to be the intellectual property of SBM in accordance with Canadian copyright law.

10. CLOSURE

We trust this Report meets your satisfaction and current needs. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Respectfully submitted,

Strik, Baldinelli, Moniz Ltd.

Planning • Civil • Structural • Mechanical • Electrical

Greig Garland, MBA M.A.Sc. P.Eng. P.E.
Water Resources Engineer, Eng. IV

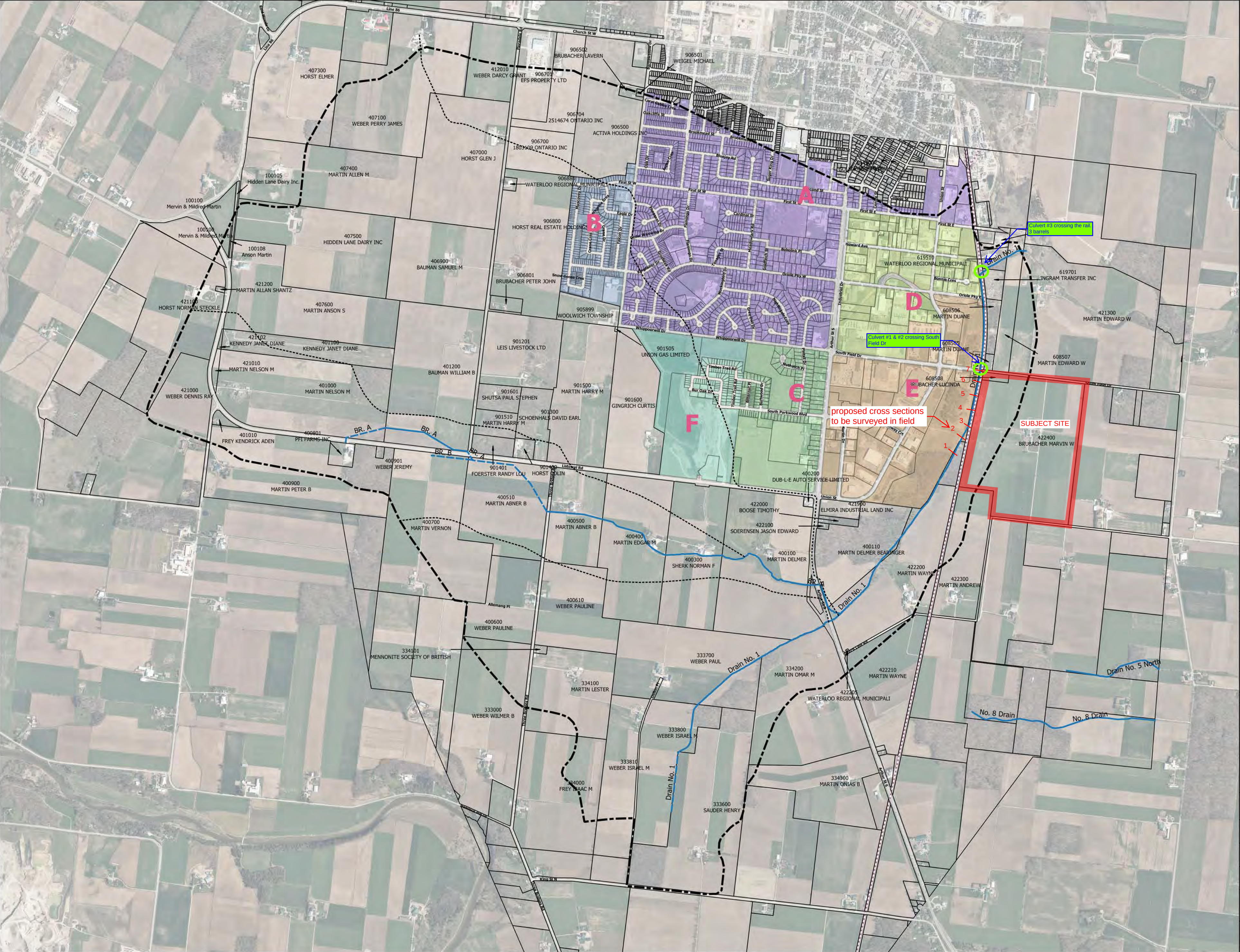


Rawan Safieddine, M.Eng., EIT
Civil Engineering Trainee III

APPENDIX A

“Elmira Drain #1” overall watershed Drawing 1, dated November 2020, prepared by GM BluePlan Engineering Limited

Topographic Survey prepared by SBM Geomatics Ltd.
Cosine Station Report by the Ontario Ministry of Natural Resources and Forestry



Legend

- Drain 1 Catchment
- Drain 1 Sub-Catchment

Block Assessments

- Block A
- Block B
- Block C
- Block D
- Block E
- Block F

Municipal Drain

- Closed Drain
- Open Drain
- Rail

150 0 150 300 450 m

BENCH MARKS:

THE POSITION OF POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRAT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

FOR FINAL REPORT			
NO.	MM/DD/	REVISION DESCRIPTION	CHKD

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER |
LONDON | HAMILTON | GTA
975 WALLACE AVENUE NORTH, LISTOWEL, ON N4W 1M6

ELMIRA DRAIN #1

TOWNSHIP OF WOOLWICH

Overall Watershed

DRAWN BY:	APPROVED BY:	PROJECT NO:	DRAWING NO:
MA	November, 2020	316045	1

[illegible]

	DENOTES EXISTING SPOT ELEVATION
	DENOTES EXISTING CONTOUR ELEVATION
	DENOTES EXISTING CATCH BASIN
	DENOTES EXISTING MAINTENANCE HOLE
	DENOTES EXISTING STORM SEWER LOCATES
	DENOTES EXISTING SANITARY SEWER LOCATES
	DENOTES EXISTING WATERMAIN LOCATES
	DENOTES EXISTING GASLINE LOCATES
	DENOTES EXISTING HYDRO LOCATES
	DENOTES EXISTING BELL LOCATES
	DENOTES EXISTING OVERHEAD WIRES
	DENOTES EXISTING FIRE HYDRANT
	DENOTES EXISTING WATER VALVE
	DENOTES EXISTING BUILDING ENTRANCE
	DENOTES EXISTING BUILDING
	DENOTES EXISTING CONIFEROUS TREE
	DENOTES EXISTING DECIDUOUS TREE
	DENOTES EXISTING SHRUB
	DENOTES EXISTING SAPLING
	DENOTES EXISTING HYDRO POLE
	DENOTES EXISTING ANCHOR
	DENOTES EXISTING GATE
	DENOTES EXISTING BOLLARD
	DENOTES EXISTING FIRE DEPARTMENT CONNECTION
	DENOTES EXISTING LAMP STANDARD
	DENOTES EXISTING SITE BENCHMARK
	DENOTES EXISTING FENCE
	DENOTES EXISTING WOODS OUTLINE
	DENOTES EXISTING POLE
	DENOTES EXISTING STUMP
	DENOTES EXISTING GAS METER
	DENOTES EXISTING ELECTRIC METER
	DENOTES EXISTING WATER SERVICE VALVE
	DENOTES EXISTING CULVERT

NAD-1983:CSRS:CBNV6-2010.0, ORTHOMETRIC ELEVATION: 315.541m

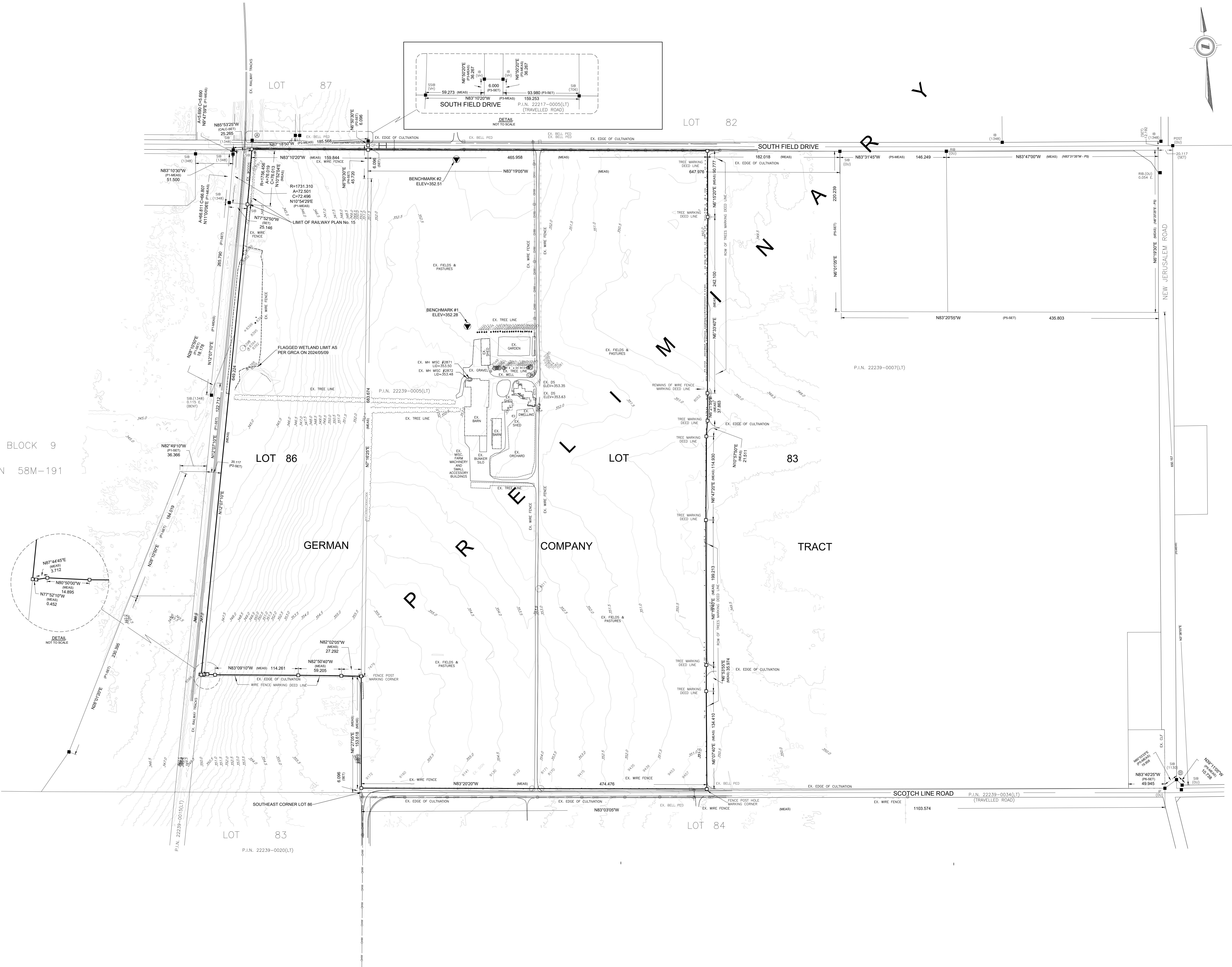
BENCHMARK #1:
MONUMENT TYPE: METAL PIN
LOCATION: NORTH OF BUILDINGS, ADJACENT TO FENCE POST
GEODETTIC ELEVATION (HTv2.0): 352.28m

BENCHMARK #2:
MONUMENT TYPE: METAL PIN
LOCATION: NORTH SIDE OF SUBJECT SITE, ADJACENT TO DRIVEWAY
GEODETTIC ELEVATION (HTv2.0): 352.51m

SCALE - 1:2000

20.0 40.0 80.0 120.0m

SBM GEOMATICS LTD
ONTARIO LAND SURVEYORS



B	DENOTES SURVEY MONUMENT SET
D	DENOTES SURVEY MONUMENT FOUND
CS	CROSS
CR	CORNER
CS	DENOTES IRON BARS
IP	DENOTES IRON PIPE
OU	DENOTES ORIGIN UNKNOWN
RD	DENOTES 16mm DIAMETER ROUND IRON
SCP	DENOTES 19mm STANDARD ROUND POINT
SD	DENOTES 25mm STANDARD IRON BARS
SSB	DENOTES SHORT STANDARD IRON BARS
WT	DENOTES WITNESS
BM	DENOTES BENCHMARK (C.S.B.)
736	DENOTES D. J. HOWE, OLS.
1114	DENOTES D. J. HOWE, OLS.
106	DENOTES D. J. HOWE, OLS.
PH	DENOTES PHOTODUPLICATION
VP	DENOTES VAN WARTEN SURVEYING NUMBER
PL	DENOTES PLANNED IDENTIFY NUMBER
RE	DENOTES REGISTERED
CP	DENOTES REGISTERED COMPLETED PLAN
MB	DENOTES MASON BENCHMARK
MS	DENOTES MEASURED
SET	DENOTES SET
P1	DENOTES SRR-151
P2	DENOTES SRR-205
P3	DENOTES SRR-161
P4	DENOTES RCP 1251
P5	DENOTES SRR-153
NT	DENOTES PLANS NOTED BY JOHN MCTYGE
N1	WY-71.2 (JOHN MCTYGE, 2 1968).

- 1) BEARINGS ARE GRID UTM ZONE 17 NAD83 (CSRS) (V7 EPOCH 2010.0). DERIVED FROM G.N.S.S. OBSERVATIONS FROM THE CANSEL CAN-NET RTN AND ARE REFERRED TO THE CENTRAL MERIDIAN 81°07' WEST LONGITUDE, ZONE 17.
- 2) DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999566608417.
- 3) FOR BEARING COMPARISONS, NO ROTATION WAS APPLIED TO 58R-21169 AS THEY MATCHED.

ALL COORDINATES ARE DERIVED FROM Q.N.S.S. OBSERVATIONS USING THE CANSEL CAN-NET RTHN AND ARE REFERRED TO UTM ZONE 17, NAD83 (CSRS) (v7 EPOCH 2010.0) TO AN URBAN ACCURACY PER SEC. 14(2) OF C.R.E.G. 216/10

POINT ID	NORTHING	EASTING
CAN-NET RTHN RTK BASE GLP2	4821156.75	556066.79
ORP A	4825678.34	536289.09
ORP B	4824662.29	537450.49

COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN

I CERTIFY THAT:

(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEY'S ACT, THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

(2) THE SURVEY WAS COMPLETED ON THE 24th DAY OF DECEMBER, 2024.

PRELIMINARY

DATE _____

GAVIN P.T. SEAMAN
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO ACLS PLAN SUBMISSION FORM NUMBER XXXXXX.



SURVEY BY: JAHJLD	DRAWN BY: JAHJRM	FILE NO: 58MG-23-0095	PLAN NO: 58MG-23-0095
-------------------	------------------	-----------------------	-----------------------

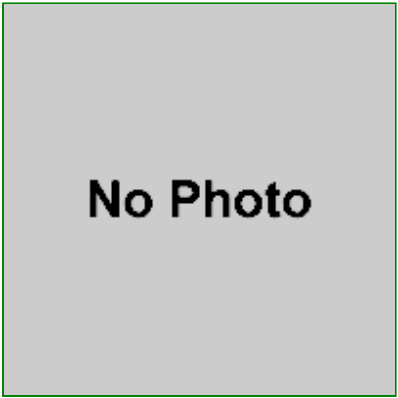
METRIC: DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO INTERNATIONAL FEET BY DIVIDING BY 0.3048

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	Ontario Ministry of Natural Resources and Forestry	COSINE Station Report
		Retrieval Date: 2025-Nov-26
Control Survey Information Exchange		Station: 00819658206
AKA Names: 65-206 Number of Ref Sketches: 0 Networks [usage]:		Known Status: Existing Last Reported Visit: Monument Type: BM Station Type: SPIR

Location Description:

65-206: SPLIT LEVEL GREY BRICK HOUSE ON THE EAST SIDE OF HWY 85, 2.8 KM SOUTH OF THE JCT OF WATERLOO REG RD 86 AND WATERLOO REG RD 21 IN ELMIRA, 5.2 KM NORTH OF CONCRETE BRIDGE ON HWY 85 OVER THE CONESTOGA RIVER AT ST. JACOBS, 0.2 KM SOUTH OF THE JCT OF WATERLOO REG RD 21 AND HWYS 85 AND 86 AND 41.7 M EAST OF CENTERLINE OF HWY 85. TABLET IS SET HORIZONTALLY IN SOUTH FACE OF CONCRETE FOUNDATION, 4.18 M EAST OF SOUTHWEST CORNER AND 30 CM EAST OF AND AT SAME LEVEL AS BASEMENT WINDOW SILL.


Horizontal (Ellipsoidal) Control Data

Datum: NAD-1927:SCAL	Horiz Order: Unclassified	Ellipsoidal Order: Unclassified
Latitude: N43° 34' 30.0xxxxx"	Longitude: W80° 33' 36.0xxxxx"	Ellipsoidal elev: 355.XXX
*UTM Zone: 17 E: E535528.XXX	N: N4824549.XXX	C. S. F.: 0.99955988
*MTM Zone: 10 E: E219182.XXX	N: N4826448.XXX	C. S. F.: 0.99993447
		Mrdl Conv: 0° 18' 11.9"
		Mrdl Conv: -0° 43' 50.5"

Vertical (Geoidal) Control Data

Datum: CGVD2013	Vert Order: First Order	Elevation: 354.895
Geoid:	Meridional defl:	Prime vert defl:
		Undulation:

Datum: CGVD28:78	Vert Order: First Order	Elevation: 355.275
Geoid:	Meridional defl:	Prime vert defl:
		Undulation:

Maintenance / History

Date	Description
2019-Mar-20	MTO

Reference Sketches

Reference sketch for 00819658206 is not available.

APPENDIX B

PCSWMM Sub-Watersheds Layout

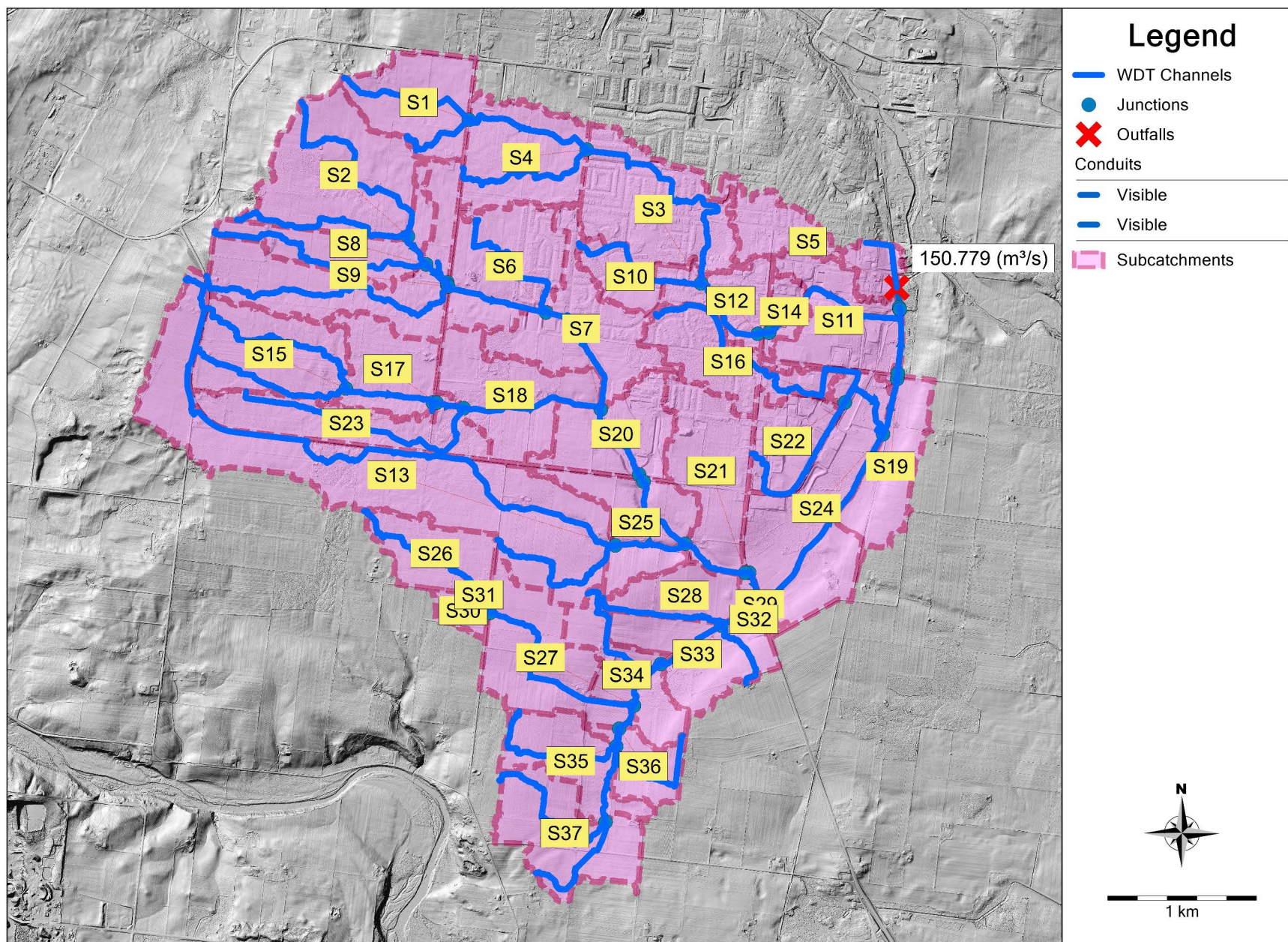
PCSWMM Sub-Watersheds Output Results (3-hour Chicago 100 Year)

PCSWMM Sub-Watersheds Output Results (6-hour Chicago 100 Year)

PCSWMM Sub-Watersheds Output Results (6-hour SCS Type II 100 Year)

PCSWMM Sub-Watersheds Output Results (Regional Storm Event)

PCSWMM Sub-Watersheds Layout



Element Count

Number of rain gages 4
Number of subcatchments ... 37
Number of nodes 43
Number of links 41
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100Yr	Chicago_3h_100Yr	INTENSITY	15 min.
Chicago_6h	Chicago_6h	INTENSITY	15 min.
Industrial_Subdivision	Hurricane_Hazel	INTENSITY	1 min.
SCS_Type_II_6hr	SCS_Type_II_6hr	INTENSITY	6 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	45.43	534.52	5.00	2.2110	Chicago_3h_100Yr	J9
S10	20.01	286.42	40.00	3.4160	Chicago_3h_100Yr	J40
S11	47.91	1199.29	80.00	5.1370	Chicago_3h_100Yr	J82
S12	25.48	666.04	30.00	4.6800	Chicago_3h_100Yr	J13
S13	162.69	569.64	5.00	2.5280	Chicago_3h_100Yr	J49
S14	10.56	681.28	80.00	5.7560	Chicago_3h_100Yr	J6
S15	56.05	699.07	5.00	2.3930	Chicago_3h_100Yr	J45
S16	42.00	312.00	20.00	3.7520	Chicago_3h_100Yr	J47
S17	37.18	769.27	5.00	2.1400	Chicago_3h_100Yr	J26
S18	54.53	963.68	5.00	2.6340	Chicago_3h_100Yr	J73
S19	37.95	801.60	5.00	4.2500	Chicago_3h_100Yr	J81
S2	77.94	922.29	5.00	2.3120	Chicago_3h_100Yr	J17
S20	43.59	1421.03	10.00	4.6980	Chicago_3h_100Yr	J22
S21	55.58	78.11	10.00	3.7770	Chicago_3h_100Yr	J79
S22	29.15	292.08	80.00	4.9870	Chicago_3h_100Yr	J47
S23	50.90	479.92	5.00	3.3980	Chicago_3h_100Yr	J52
S24	86.98	1256.87	10.00	4.2250	Chicago_3h_100Yr	J72
S25	43.53	1256.81	5.00	4.8570	Chicago_3h_100Yr	J76
S26	33.43	485.24	5.00	1.6040	Chicago_3h_100Yr	J32
S27	58.06	803.48	5.00	2.8840	Chicago_3h_100Yr	J70
S28	26.30	289.17	5.00	3.0490	Chicago_3h_100Yr	J60
S29	3.73	206.50	5.00	7.9570	Chicago_3h_100Yr	J75
S3	70.94	691.57	64.00	3.6840	Chicago_3h_100Yr	J40
S30	8.71	228.76	5.00	1.6990	Chicago_3h_100Yr	J35
S31	0.01	10.22	5.00	7.0200	Chicago_3h_100Yr	J33
S32	1.52	82.34	5.00	10.1380	Chicago_3h_100Yr	J16
S33	44.67	1584.24	5.00	3.6210	Chicago_3h_100Yr	J60
S34	35.31	1385.98	5.00	3.3240	Chicago_3h_100Yr	J62
S35	37.36	505.17	5.00	2.5220	Chicago_3h_100Yr	J66
S36	20.15	349.64	5.00	2.1660	Chicago_3h_100Yr	J64
S37	53.90	766.55	5.00	2.2970	Chicago_3h_100Yr	J68
S4	54.83	789.28	5.00	2.0740	Chicago_3h_100Yr	J21
S5	35.93	867.44	70.00	4.2400	Chicago_3h_100Yr	OF1
S6	56.20	724.11	25.00	3.3590	Chicago_3h_100Yr	J38
S7	58.05	1100.81	25.00	3.4430	Chicago_3h_100Yr	J73
S8	36.85	370.69	5.00	2.0080	Chicago_3h_100Yr	J31
S9	72.74	618.46	5.00	2.0300	Chicago_3h_100Yr	J42

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	343.56	2.00	0.0	
J13	JUNCTION	357.07	3.00	0.0	
J16	JUNCTION	344.71	4.00	0.0	
J17	JUNCTION	372.36	3.00	0.0	
J18	JUNCTION	346.41	3.00	0.0	
J2	JUNCTION	343.70	2.00	0.0	
J21	JUNCTION	369.00	3.00	0.0	
J22	JUNCTION	355.76	3.00	0.0	
J23	JUNCTION	355.35	3.00	0.0	
J24	JUNCTION	368.85	3.00	0.0	
J26	JUNCTION	368.55	3.00	0.0	
J28	JUNCTION	369.52	3.00	0.0	
J3	JUNCTION	343.54	2.00	0.0	
J30	JUNCTION	369.22	3.00	0.0	
J31	JUNCTION	370.91	3.00	0.0	
J32	JUNCTION	364.91	3.00	0.0	
J33	JUNCTION	364.88	3.00	0.0	
J35	JUNCTION	363.49	3.42	0.0	
J37	JUNCTION	363.16	4.18	0.0	
J38	JUNCTION	365.47	3.00	0.0	
J4	JUNCTION	343.74	2.00	0.0	
J40	JUNCTION	361.70	3.00	0.0	
J42	JUNCTION	371.33	3.00	0.0	
J45	JUNCTION	372.03	3.00	0.0	
J47	JUNCTION	347.87	3.00	0.0	

J49	JUNCTION	357.12	3.00	0.0
J52	JUNCTION	367.53	3.00	0.0
J6	JUNCTION	355.86	3.00	0.0
J60	JUNCTION	344.92	4.00	0.0
J62	JUNCTION	346.16	3.00	0.0
J64	JUNCTION	347.02	3.00	0.0
J66	JUNCTION	347.29	3.00	0.0
J68	JUNCTION	347.62	3.00	0.0
J70	JUNCTION	346.99	3.00	0.0
J72	JUNCTION	344.18	3.50	0.0
J73	JUNCTION	359.64	3.00	0.0
J75	JUNCTION	344.59	3.50	0.0
J76	JUNCTION	349.72	3.00	0.0
J79	JUNCTION	346.72	3.00	0.0
J81	JUNCTION	344.06	3.50	0.0
J82	JUNCTION	343.70	3.77	0.0
J9	JUNCTION	374.76	3.00	0.0
OF1	OUTFALL	343.39	3.50	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J81	J82	CONDUIT	398.1	0.0216	0.0130
C10	J62	J60	CONDUIT	540.6	0.2285	0.0130
C107	J4	J2	CONDUIT	13.1	0.3046	0.0130
C11	J38	J73	CONDUIT	939.2	0.6203	0.0130
C12	J70	J62	CONDUIT	378.6	0.2208	0.0130
C13	J52	J73	CONDUIT	1002.5	0.7869	0.0130
C14	J42	J38	CONDUIT	708.4	0.8282	0.0130
C15	J26	J52	CONDUIT	189.2	0.5381	0.0130
C16	J31	J42	CONDUIT	209.4	-0.2025	0.0130
C17	J21	J40	CONDUIT	1862.9	0.3921	0.0130
C18	J47	J72	CONDUIT	628.7	0.5871	0.0130
C19	J64	J70	CONDUIT	203.1	0.0138	0.0130
C2	J1	J3	CONDUIT	22.5	0.1243	0.0130
C20	J66	J64	CONDUIT	131.6	0.2022	0.0130
C21	J17	J31	CONDUIT	254.4	0.5700	0.0130
C22	J37	J70	CONDUIT	1572.4	1.1033	0.0130
C23	J35	J37	CONDUIT	15.0	-2.8969	0.0130
C24	J68	J66	CONDUIT	567.9	0.0579	0.0130
C25	J33	J35	CONDUIT	94.2	1.0296	0.0130
C26	J32	J33	CONDUIT	12.7	0.2747	0.0130
C27	J9	J21	CONDUIT	1033.7	0.5572	0.0130
C28	J82	OF1	CONDUIT	149.7	0.2098	0.0130
C3	J72	J81	CONDUIT	429.3	0.0275	0.0130
C31	J79	J75	CONDUIT	284.1	0.7493	0.0130
C31_1	J13	J6	CONDUIT	63.2	1.9145	0.0130
C33	J79	J18	CONDUIT	24.9	1.2597	0.0130
C34	J22	J23	CONDUIT	63.6	0.6457	0.0130
C35	J24	J26	CONDUIT	22.3	1.3574	0.0130
C36	J28	J30	CONDUIT	14.6	2.0524	0.0130
C37	J32	J33	CONDUIT	13.8	0.2533	0.0130
C38	J35	J37	CONDUIT	18.6	1.7900	0.0130
C39	J6	J82	CONDUIT	817.6	1.4536	0.0130
C4	J75	J72	CONDUIT	1369.6	0.0304	0.0130
C40	J16	J75	CONDUIT	105.6	0.1060	0.0130
C41	J60	J16	CONDUIT	271.4	0.0792	0.0130
C42	J45	J26	CONDUIT	678.1	0.5141	0.0130
C5	J76	J79	CONDUIT	494.4	0.6062	0.0130
C6	J49	J76	CONDUIT	513.6	1.4407	0.0130
C7	J22	J76	CONDUIT	646.3	0.9348	0.0130
C8	J40	J13	CONDUIT	616.8	0.7507	0.0130
C9	J73	J22	CONDUIT	560.6	0.6921	0.0130

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	81.38
C10	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	183.98
C107	HORIZ_ELLIPSE	2.00	5.08	0.61	3.60	1	15.54
C11	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	303.16
C12	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	180.89
C13	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	341.45
C14	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	350.29
C15	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	282.35
C16	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.21
C17	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	241.04
C18	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	294.94
C19	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	45.19
C2	HORIZ_ELLIPSE	2.00	5.08	0.61	4.00	1	9.93
C20	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.08
C21	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	290.61
C22	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	404.30
C23	CIRCULAR	3.00	7.07	0.75	3.00	1	76.41
C24	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	92.65
C25	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	390.57
C26	CIRCULAR	3.00	7.07	0.75	3.00	1	23.53
C27	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	287.33
C28	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	253.61
C3	TRAPEZOIDAL	3.00	37.50	1.67	21.50	1	67.29
C31	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	218.30
C31_1	HORIZ_ELLIPSE	2.60	8.58	0.80	3.00	1	78.44
C33	CIRCULAR	3.00	7.07	0.75	3.00	1	50.38
C34	CIRCULAR	3.00	7.07	0.75	3.00	1	36.07
C35	HORIZ_ELLIPSE	3.00	11.42	0.92	3.00	1	96.73
C36	CIRCULAR	3.00	7.07	0.75	3.00	1	64.31

C37	CIRCULAR	3.00	7.07	0.75	3.00	1	22.59
C38	CIRCULAR	3.00	7.07	0.75	3.00	1	60.06
C39	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	464.08
C4	TRAPEZOIDAL	3.50	49.00	1.91	24.50	1	101.19
C40	CIRCULAR	3.00	7.07	0.75	3.00	1	14.62
C41	TRAPEZOIDAL	4.00	64.00	2.18	28.00	1	233.30
C42	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	275.99
C5	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	196.36
C6	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	462.00
C7	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	228.86
C8	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	333.50
C9	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	320.23

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 CMS
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 10/10/2024 00:00:00
Ending Date 10/12/2024 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 8
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	142.475	87.079
Evaporation Loss	0.000	0.000
Infiltration Loss	82.580	50.472
Surface Runoff	57.991	35.444
Final Storage	2.079	1.270
Continuity Error (%)	-0.123	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	57.985	579.856
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	58.124	581.247
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.002
Final Stored Volume	0.062	0.619
Continuity Error (%)	-0.346	

Highest Continuity Errors

Node J31 (1.57%)

Time-Step Critical Elements

Link C26 (6.76%)
Link C38 (4.88%)

Highest Flow Instability Indexes

Link C38 (5)
Link C33 (3)
Link C23 (3)
Link C22 (2)
Link C34 (1)

Routing Time Step Summary

Minimum Time Step : 2.94 sec
Average Time Step : 4.89 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 : 0.01 %
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 CMS	Runoff Coeff
S1	87.08	0.00	0.00	52.48	4.30	29.10	33.39	15.17	1.97	0.383
S10	87.08	0.00	0.00	31.06	34.44	20.51	54.95	11.00	4.26	0.631
S11	87.08	0.00	0.00	9.61	68.88	7.61	76.49	36.65	19.45	0.878
S12	87.08	0.00	0.00	35.02	25.83	25.13	50.95	12.98	4.96	0.585
S13	87.08	0.00	0.00	65.90	4.31	15.68	19.99	32.52	4.50	0.230
S14	87.08	0.00	0.00	9.48	68.87	7.79	76.66	8.10	4.46	0.880
S15	87.08	0.00	0.00	59.10	4.30	22.46	26.76	15.00	2.15	0.307
S16	87.08	0.00	0.00	44.26	17.22	24.41	41.63	17.48	4.58	0.478
S17	87.08	0.00	0.00	57.22	4.29	24.38	28.67	10.66	1.73	0.329
S18	87.08	0.00	0.00	57.43	4.29	24.17	28.46	15.52	2.47	0.327
S19	87.08	0.00	0.00	55.96	4.29	25.69	29.97	11.38	2.11	0.344
S2	87.08	0.00	0.00	65.16	4.30	16.40	20.70	16.13	2.55	0.238
S20	87.08	0.00	0.00	51.53	8.58	25.82	34.40	14.99	4.17	0.395
S21	87.08	0.00	0.00	70.34	8.60	6.96	15.56	8.65	2.53	0.179
S22	87.08	0.00	0.00	9.87	68.79	7.32	76.11	22.19	10.88	0.874
S23	87.08	0.00	0.00	52.48	4.30	29.06	33.36	16.98	2.20	0.383
S24	87.08	0.00	0.00	47.49	8.60	29.84	38.44	33.43	6.90	0.441
S25	87.08	0.00	0.00	54.81	4.29	26.83	31.12	13.55	2.99	0.357
S26	87.08	0.00	0.00	59.31	4.30	22.24	26.54	8.87	1.26	0.305
S27	87.08	0.00	0.00	58.26	4.29	23.34	27.64	16.05	2.41	0.317
S28	87.08	0.00	0.00	64.90	4.30	16.70	20.99	5.52	0.88	0.241
S29	87.08	0.00	0.00	52.92	4.29	28.78	33.07	1.23	0.43	0.380
S3	87.08	0.00	0.00	18.43	55.03	12.49	67.53	47.90	21.51	0.775
S30	87.08	0.00	0.00	56.80	4.29	24.84	29.13	2.54	0.43	0.335
S31	87.08	0.00	0.00	51.04	4.29	31.34	35.63	0.00	0.00	0.409
S32	87.08	0.00	0.00	52.82	4.29	28.94	33.23	0.51	0.19	0.382
S33	87.08	0.00	0.00	54.60	4.29	26.99	31.28	13.97	3.17	0.359
S34	87.08	0.00	0.00	54.49	4.29	27.15	31.43	11.10	2.60	0.361
S35	87.08	0.00	0.00	58.68	4.30	22.95	27.24	10.18	1.49	0.313
S36	87.08	0.00	0.00	57.95	4.29	23.70	27.99	5.64	0.87	0.321
S37	87.08	0.00	0.00	58.68	4.30	22.97	27.26	14.69	2.16	0.313
S4	87.08	0.00	0.00	43.78	4.30	37.81	42.10	23.09	3.10	0.483
S5	87.08	0.00	0.00	14.61	60.27	11.19	71.47	25.68	13.06	0.821
S6	87.08	0.00	0.00	39.70	21.53	24.73	46.26	26.00	7.98	0.531
S7	87.08	0.00	0.00	38.64	21.53	25.78	47.31	27.46	8.91	0.543
S8	87.08	0.00	0.00	60.57	4.30	21.00	25.30	9.32	1.27	0.291
S9	87.08	0.00	0.00	61.40	4.30	20.15	24.46	17.79	2.39	0.281

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	0.00	0.00	343.56	0 00:00	0.00
J13	JUNCTION	0.17	2.79	359.86	0 01:19	2.79
J16	JUNCTION	0.22	2.25	346.96	0 01:39	2.25
J17	JUNCTION	0.02	0.29	372.65	0 01:15	0.29
J18	JUNCTION	0.40	1.44	347.85	0 01:20	1.43
J2	JUNCTION	0.00	0.00	343.70	0 00:00	0.00
J21	JUNCTION	0.04	0.41	369.41	0 01:45	0.41
J22	JUNCTION	0.08	0.99	356.75	0 01:18	0.99
J23	JUNCTION	0.48	1.45	356.80	0 01:18	1.43
J24	JUNCTION	0.00	0.06	368.91	0 01:17	0.06
J26	JUNCTION	0.03	0.36	368.91	0 01:16	0.36
J28	JUNCTION	0.00	0.00	369.52	0 00:00	0.00
J3	JUNCTION	0.00	0.00	343.54	0 00:00	0.00
J30	JUNCTION	0.00	0.00	369.22	0 00:00	0.00
J31	JUNCTION	0.47	1.02	371.93	0 01:16	1.02
J32	JUNCTION	0.04	0.43	365.34	0 01:15	0.43
J33	JUNCTION	0.01	0.17	365.04	0 01:15	0.17
J35	JUNCTION	0.85	1.10	364.59	0 01:20	1.09
J37	JUNCTION	1.19	1.36	364.52	0 01:17	1.36
J38	JUNCTION	0.05	0.67	366.14	0 01:16	0.67
J4	JUNCTION	0.00	0.00	343.74	0 00:00	0.00
J40	JUNCTION	0.06	0.93	362.63	0 01:16	0.93
J42	JUNCTION	0.04	0.41	371.74	0 01:16	0.41
J45	JUNCTION	0.02	0.27	372.30	0 01:15	0.27
J47	JUNCTION	0.03	0.76	348.63	0 01:15	0.76
J49	JUNCTION	0.03	0.31	357.43	0 01:15	0.31
J52	JUNCTION	0.04	0.40	367.93	0 01:18	0.40
J6	JUNCTION	0.05	0.83	356.68	0 01:18	0.83
J60	JUNCTION	0.17	2.05	346.97	0 01:37	2.05
J62	JUNCTION	0.07	0.81	346.97	0 01:33	0.81
J64	JUNCTION	0.07	0.71	347.73	0 01:19	0.71
J66	JUNCTION	0.04	0.46	347.75	0 01:18	0.46

J68	JUNCTION	0.04	0.48	348.10	0	01:16	0.48
J70	JUNCTION	0.06	0.61	347.60	0	01:33	0.61
J72	JUNCTION	0.26	2.29	346.47	0	01:35	2.29
J73	JUNCTION	0.08	0.96	360.60	0	01:17	0.96
J75	JUNCTION	0.24	2.28	346.88	0	01:31	2.28
J76	JUNCTION	0.10	1.14	350.86	0	01:19	1.14
J79	JUNCTION	0.09	1.10	347.83	0	01:20	1.10
J81	JUNCTION	0.27	2.15	346.21	0	01:39	2.15
J82	JUNCTION	0.21	2.01	345.71	0	01:34	2.01
J9	JUNCTION	0.02	0.24	375.00	0	01:16	0.24
OF1	OUTFALL	0.21	2.01	345.40	0	01:35	2.01

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow	
		Lateral	Total			Inflow	Inflow		
		Inflow	Inflow	Occurrence		Volume	Volume	Error	
		CMS	CMS	days	hr:min	10^6 ltr	10^6 ltr	Percent	
J1	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J13	JUNCTION	4.963	30.360	0	01:15	13	110	0.135	
J16	JUNCTION	0.187	12.143	0	01:38	0.505	89.3	0.008	
J17	JUNCTION	2.553	2.553	0	01:15	16.1	16.1	-0.074	
J18	JUNCTION	0.000	0.184	0	01:13	0	0.117	0.000	
J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J21	JUNCTION	3.096	4.752	0	01:15	23.1	38.3	0.678	
J22	JUNCTION	4.173	29.842	0	01:17	15	170	-0.003	
J23	JUNCTION	0.000	0.375	0	01:14	0	0.437	0.000	
J24	JUNCTION	0.000	0.004	0	01:15	0	0.000776	0.195	
J26	JUNCTION	1.727	3.680	0	01:15	10.7	25.7	0.008	
J28	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J3	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J30	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J31	JUNCTION	1.273	3.751	0	01:15	9.32	25.5	1.600	
J32	JUNCTION	1.260	1.260	0	01:15	8.87	8.87	-0.000	
J33	JUNCTION	0.002	1.259	0	01:15	0.00242	8.87	0.017	
J35	JUNCTION	0.429	2.273	0	03:04	2.54	15.8	0.259	
J37	JUNCTION	0.000	3.365	0	01:15	0	15.8	-0.256	
J38	JUNCTION	7.982	13.221	0	01:15	26	68.8	-0.060	
J4	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J40	JUNCTION	25.773	28.209	0	01:15	58.9	96.9	-0.397	
J42	JUNCTION	2.391	5.679	0	01:15	17.8	42.9	0.034	
J45	JUNCTION	2.151	2.151	0	01:15	15	15	-0.015	
J47	JUNCTION	15.456	15.456	0	01:15	39.7	39.7	-1.110	
J49	JUNCTION	4.504	4.504	0	01:15	32.5	32.5	-0.091	
J52	JUNCTION	2.200	5.488	0	01:15	17	42.6	0.075	
J6	JUNCTION	4.461	28.337	0	01:17	8.09	118	-0.115	
J60	JUNCTION	4.052	11.680	0	01:36	19.5	88.6	0.073	
J62	JUNCTION	2.596	8.116	0	01:30	11.1	69	-0.098	
J64	JUNCTION	0.867	3.672	0	01:17	5.64	30.5	-0.025	
J66	JUNCTION	1.495	3.297	0	01:15	10.2	24.9	0.028	
J68	JUNCTION	2.159	2.159	0	01:15	14.7	14.7	-0.055	
J70	JUNCTION	2.410	6.988	0	01:16	16	58	0.048	
J72	JUNCTION	6.900	48.853	0	01:31	33.4	388	0.099	
J73	JUNCTION	11.383	27.949	0	01:15	43	154	-0.008	
J75	JUNCTION	0.433	40.391	0	01:27	1.23	315	0.066	
J76	JUNCTION	2.990	35.048	0	01:17	13.5	216	0.015	
J79	JUNCTION	2.528	36.393	0	01:19	8.65	224	-0.059	
J81	JUNCTION	2.114	48.444	0	01:37	11.4	399	-0.895	
J82	JUNCTION	19.452	70.159	0	01:33	36.6	558	0.343	
J9	JUNCTION	1.970	1.970	0	01:15	15.2	15.2	-0.104	
OF1	OUTFALL	13.063	72.995	0	01:34	25.7	581	0.000	

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
OF1	99.99	4.259	72.995	581.244
System	99.99	4.259	72.995	581.244

Link Flow Summary

Maximum	Time of Max	Maximum	Max/	Max/
Flow	Occurrence	Veloc	Full	Full

Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	48.357	0	01:40	2.77	0.59	0.56
C10	CONDUIT	8.875	0	01:36	1.07	0.05	0.47
C107	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C11	CONDUIT	12.267	0	01:16	2.78	0.04	0.27
C12	CONDUIT	6.042	0	01:33	1.89	0.03	0.24
C13	CONDUIT	5.157	0	01:18	1.69	0.02	0.23
C14	CONDUIT	5.448	0	01:16	2.20	0.02	0.18
C15	CONDUIT	3.482	0	01:16	2.25	0.01	0.13
C16	CONDUIT	3.450	0	01:16	0.94	0.02	0.24
C17	CONDUIT	3.855	0	01:45	1.87	0.02	0.21
C18	CONDUIT	15.118	0	01:15	2.44	0.05	0.45
C19	CONDUIT	3.580	0	01:19	1.13	0.08	0.22
C2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C20	CONDUIT	2.990	0	01:18	1.08	0.02	0.19
C21	CONDUIT	2.492	0	01:15	0.77	0.01	0.22
C22	CONDUIT	1.487	0	01:17	0.98	0.00	0.13
C23	CONDUIT	0.356	0	01:21	0.61	0.00	0.14
C24	CONDUIT	1.935	0	01:17	0.94	0.02	0.16
C25	CONDUIT	1.249	0	01:15	0.91	0.00	0.14
C26	CONDUIT	0.629	0	01:15	1.73	0.03	0.10
C27	CONDUIT	1.740	0	01:16	1.56	0.01	0.10
C28	CONDUIT	70.086	0	01:35	3.87	0.28	0.57
C3	CONDUIT	46.860	0	01:38	2.08	0.70	0.74
C31	CONDUIT	36.285	0	01:20	3.39	0.17	0.65
C31_1	CONDUIT	25.982	0	01:19	4.19	0.33	0.66
C33	CONDUIT	0.184	0	01:13	0.12	0.00	0.42
C34	CONDUIT	0.375	0	01:14	0.19	0.01	0.41
C35	CONDUIT	0.004	0	01:15	0.01	0.00	0.07
C36	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C37	CONDUIT	0.629	0	01:15	1.73	0.03	0.10
C38	CONDUIT	3.114	0	01:15	1.19	0.05	0.41
C39	CONDUIT	28.216	0	01:18	3.54	0.06	0.41
C4	CONDUIT	38.772	0	01:32	1.65	0.38	0.65
C40	CONDUIT	12.245	0	01:40	2.15	0.84	0.75
C41	CONDUIT	12.052	0	01:38	0.54	0.05	0.54
C42	CONDUIT	1.998	0	01:16	1.64	0.01	0.10
C5	CONDUIT	34.725	0	01:19	4.88	0.18	0.45
C6	CONDUIT	4.423	0	01:15	1.70	0.01	0.24
C7	CONDUIT	29.055	0	01:18	4.80	0.13	0.43
C8	CONDUIT	25.829	0	01:16	1.84	0.08	0.62
C9	CONDUIT	26.232	0	01:17	4.58	0.08	0.32

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up		Down		Sub		Sup		Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Crit	
C1	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C107	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	1.00	0.00
C12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C14	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	1.00	0.00
C15	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.97	0.00
C16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.02	0.00
C17	1.00	0.00	0.00	0.00	0.85	0.15	0.00	0.00	0.85	0.00
C18	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.98	0.00
C19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.79	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
C21	1.00	0.00	0.25	0.00	0.75	0.00	0.00	0.00	0.99	0.00
C22	1.00	0.00	0.02	0.00	0.98	0.00	0.00	0.00	0.98	0.00
C23	1.00	0.01	0.01	0.00	0.96	0.00	0.02	0.00	0.00	0.04
C24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.85	0.00
C25	1.00	0.00	0.46	0.00	0.53	0.00	0.00	0.01	0.99	0.00
C26	1.00	0.05	0.01	0.00	0.73	0.21	0.00	0.00	0.00	0.94
C27	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.98	0.00
C28	1.00	0.00	0.00	0.00	0.90	0.10	0.00	0.00	0.07	0.00
C3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.73	0.00
C31	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.97	0.00
C31_1	1.00	0.00	0.00	0.00	0.79	0.21	0.00	0.00	0.00	1.00
C33	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.01
C34	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C35	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	0.00	0.96
C36	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	0.05	0.01	0.00	0.74	0.20	0.00	0.00	0.00	0.93
C38	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.01
C39	1.00	0.00	0.00	0.00	0.14	0.04	0.00	0.83	0.15	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.90	0.00
C40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.44
C41	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.83	0.00
C42	1.00	0.00	0.16	0.00	0.83	0.01	0.00	0.00	0.98	0.00
C5	1.00	0.00	0.00	0.00	0.71	0.29	0.00	0.00	0.85	0.00
C6	1.00	0.00	0.00	0.00	0.89	0.11	0.00	0.00	0.99	0.00
C7	1.00	0.00	0.00	0.00	0.80	0.20	0.00	0.00	0.97	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C9	1.00	0.00	0.00	0.00	0.76	0.24	0.00	0.00	0.98	0.00

Conduit Surcharge Summary

	Hours	Hours
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Conduit	----- Both Ends	Hours Full Upstream	----- Dnstream	Above Full Normal Flow	Capacity Limited
C31_1	0.01	0.17	0.01	0.01	0.01

Analysis begun on: Thu Jan 8 14:24:15 2026
Analysis ended on: Thu Jan 8 14:24:18 2026
Total elapsed time: 00:00:03

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

Element Count

Number of rain gages 4
Number of subcatchments ... 37
Number of nodes 43
Number of links 41
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100Yr	Chicago_3h_100Yr	INTENSITY	15 min.
Chicago_6h	Chicago_6h	INTENSITY	15 min.
Industrial_Subdivision	Hurricane_Hazel	INTENSITY	1 min.
SCS_Type_II_6hr	SCS_Type_II_6hr	INTENSITY	6 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	45.43	534.52	5.00	2.2110	Chicago_6h	J9
S10	20.01	286.42	40.00	3.4160	Chicago_6h	J40
S11	47.91	1199.29	80.00	5.1370	Chicago_6h	J82
S12	25.48	666.04	30.00	4.6800	Chicago_6h	J13
S13	162.69	569.64	5.00	2.5280	Chicago_6h	J49
S14	10.56	681.28	80.00	5.7560	Chicago_6h	J6
S15	56.05	699.07	5.00	2.3930	Chicago_6h	J45
S16	42.00	312.00	20.00	3.7520	Chicago_6h	J47
S17	37.18	769.27	5.00	2.1400	Chicago_6h	J26
S18	54.53	963.68	5.00	2.6340	Chicago_6h	J73
S19	37.95	801.60	5.00	4.2500	Chicago_6h	J81
S2	77.94	922.29	5.00	2.3120	Chicago_6h	J17
S20	43.59	1421.03	10.00	4.6980	Chicago_6h	J22
S21	55.58	78.11	10.00	3.7770	Chicago_6h	J79
S22	29.15	292.08	80.00	4.9870	Chicago_6h	J47
S23	50.90	479.92	5.00	3.3980	Chicago_6h	J52
S24	86.98	1256.87	10.00	4.2250	Chicago_6h	J72
S25	43.53	1256.81	5.00	4.8570	Chicago_6h	J76
S26	33.43	485.24	5.00	1.6040	Chicago_6h	J32
S27	58.06	803.48	5.00	2.8840	Chicago_6h	J70
S28	26.30	289.17	5.00	3.0490	Chicago_6h	J60
S29	3.73	206.50	5.00	7.9570	Chicago_6h	J75
S3	70.94	691.57	64.00	3.6840	Chicago_6h	J40
S30	8.71	228.76	5.00	1.6990	Chicago_6h	J35
S31	0.01	10.22	5.00	7.0200	Chicago_6h	J33
S32	1.52	82.34	5.00	10.1380	Chicago_6h	J16
S33	44.67	1584.24	5.00	3.6210	Chicago_6h	J60
S34	35.31	1385.98	5.00	3.3240	Chicago_6h	J62
S35	37.36	505.17	5.00	2.5220	Chicago_6h	J66
S36	20.15	349.64	5.00	2.1660	Chicago_6h	J64
S37	53.90	766.55	5.00	2.2970	Chicago_6h	J68
S4	54.83	789.28	5.00	2.0740	Chicago_6h	J21
S5	35.93	867.44	70.00	4.2400	Chicago_6h	OF1
S6	56.20	724.11	25.00	3.3590	Chicago_6h	J38
S7	58.05	1100.81	25.00	3.4430	Chicago_6h	J73
S8	36.85	370.69	5.00	2.0080	Chicago_6h	J31
S9	72.74	618.46	5.00	2.0300	Chicago_6h	J42

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	343.56	2.00	0.0	
J13	JUNCTION	357.07	3.00	0.0	
J16	JUNCTION	344.71	4.00	0.0	
J17	JUNCTION	372.36	3.00	0.0	
J18	JUNCTION	346.41	3.00	0.0	
J2	JUNCTION	343.70	2.00	0.0	
J21	JUNCTION	369.00	3.00	0.0	
J22	JUNCTION	355.76	3.00	0.0	
J23	JUNCTION	355.35	3.00	0.0	
J24	JUNCTION	368.85	3.00	0.0	
J26	JUNCTION	368.55	3.00	0.0	
J28	JUNCTION	369.52	3.00	0.0	
J3	JUNCTION	343.54	2.00	0.0	
J30	JUNCTION	369.22	3.00	0.0	
J31	JUNCTION	370.91	3.00	0.0	
J32	JUNCTION	364.91	3.00	0.0	
J33	JUNCTION	364.88	3.00	0.0	
J35	JUNCTION	363.49	3.42	0.0	
J37	JUNCTION	363.16	4.18	0.0	
J38	JUNCTION	365.47	3.00	0.0	
J4	JUNCTION	343.74	2.00	0.0	
J40	JUNCTION	361.70	3.00	0.0	
J42	JUNCTION	371.33	3.00	0.0	
J45	JUNCTION	372.03	3.00	0.0	
J47	JUNCTION	347.87	3.00	0.0	

J49	JUNCTION	357.12	3.00	0.0
J52	JUNCTION	367.53	3.00	0.0
J6	JUNCTION	355.86	3.00	0.0
J60	JUNCTION	344.92	4.00	0.0
J62	JUNCTION	346.16	3.00	0.0
J64	JUNCTION	347.02	3.00	0.0
J66	JUNCTION	347.29	3.00	0.0
J68	JUNCTION	347.62	3.00	0.0
J70	JUNCTION	346.99	3.00	0.0
J72	JUNCTION	344.18	3.50	0.0
J73	JUNCTION	359.64	3.00	0.0
J75	JUNCTION	344.59	3.50	0.0
J76	JUNCTION	349.72	3.00	0.0
J79	JUNCTION	346.72	3.00	0.0
J81	JUNCTION	344.06	3.50	0.0
J82	JUNCTION	343.70	3.77	0.0
J9	JUNCTION	374.76	3.00	0.0
OF1	OUTFALL	343.39	3.50	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J81	J82	CONDUIT	398.1	0.0216	0.0130
C10	J62	J60	CONDUIT	540.6	0.2285	0.0130
C107	J4	J2	CONDUIT	13.1	0.3046	0.0130
C11	J38	J73	CONDUIT	939.2	0.6203	0.0130
C12	J70	J62	CONDUIT	378.6	0.2208	0.0130
C13	J52	J73	CONDUIT	1002.5	0.7869	0.0130
C14	J42	J38	CONDUIT	708.4	0.8282	0.0130
C15	J26	J52	CONDUIT	189.2	0.5381	0.0130
C16	J31	J42	CONDUIT	209.4	-0.2025	0.0130
C17	J21	J40	CONDUIT	1862.9	0.3921	0.0130
C18	J47	J72	CONDUIT	628.7	0.5871	0.0130
C19	J64	J70	CONDUIT	203.1	0.0138	0.0130
C2	J1	J3	CONDUIT	22.5	0.1243	0.0130
C20	J66	J64	CONDUIT	131.6	0.2022	0.0130
C21	J17	J31	CONDUIT	254.4	0.5700	0.0130
C22	J37	J70	CONDUIT	1572.4	1.1033	0.0130
C23	J35	J37	CONDUIT	15.0	-2.8969	0.0130
C24	J68	J66	CONDUIT	567.9	0.0579	0.0130
C25	J33	J35	CONDUIT	94.2	1.0296	0.0130
C26	J32	J33	CONDUIT	12.7	0.2747	0.0130
C27	J9	J21	CONDUIT	1033.7	0.5572	0.0130
C28	J82	OF1	CONDUIT	149.7	0.2098	0.0130
C3	J72	J81	CONDUIT	429.3	0.0275	0.0130
C31	J79	J75	CONDUIT	284.1	0.7493	0.0130
C31_1	J13	J6	CONDUIT	63.2	1.9145	0.0130
C33	J79	J18	CONDUIT	24.9	1.2597	0.0130
C34	J22	J23	CONDUIT	63.6	0.6457	0.0130
C35	J24	J26	CONDUIT	22.3	1.3574	0.0130
C36	J28	J30	CONDUIT	14.6	2.0524	0.0130
C37	J32	J33	CONDUIT	13.8	0.2533	0.0130
C38	J35	J37	CONDUIT	18.6	1.7900	0.0130
C39	J6	J82	CONDUIT	817.6	1.4536	0.0130
C4	J75	J72	CONDUIT	1369.6	0.0304	0.0130
C40	J16	J75	CONDUIT	105.6	0.1060	0.0130
C41	J60	J16	CONDUIT	271.4	0.0792	0.0130
C42	J45	J26	CONDUIT	678.1	0.5141	0.0130
C5	J76	J79	CONDUIT	494.4	0.6062	0.0130
C6	J49	J76	CONDUIT	513.6	1.4407	0.0130
C7	J22	J76	CONDUIT	646.3	0.9348	0.0130
C8	J40	J13	CONDUIT	616.8	0.7507	0.0130
C9	J73	J22	CONDUIT	560.6	0.6921	0.0130

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	81.38
C10	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	183.98
C107	HORIZ_ELLIPSE	2.00	5.08	0.61	3.60	1	15.54
C11	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	303.16
C12	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	180.89
C13	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	341.45
C14	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	350.29
C15	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	282.35
C16	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.21
C17	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	241.04
C18	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	294.94
C19	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	45.19
C2	HORIZ_ELLIPSE	2.00	5.08	0.61	4.00	1	9.93
C20	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.08
C21	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	290.61
C22	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	404.30
C23	CIRCULAR	3.00	7.07	0.75	3.00	1	76.41
C24	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	92.65
C25	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	390.57
C26	CIRCULAR	3.00	7.07	0.75	3.00	1	23.53
C27	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	287.33
C28	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	253.61
C3	TRAPEZOIDAL	3.00	37.50	1.67	21.50	1	67.29
C31	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	218.30
C31_1	HORIZ_ELLIPSE	2.60	8.58	0.80	3.00	1	78.44
C33	CIRCULAR	3.00	7.07	0.75	3.00	1	50.38
C34	CIRCULAR	3.00	7.07	0.75	3.00	1	36.07
C35	HORIZ_ELLIPSE	3.00	11.42	0.92	3.00	1	96.73
C36	CIRCULAR	3.00	7.07	0.75	3.00	1	64.31

C37	CIRCULAR	3.00	7.07	0.75	3.00	1	22.59
C38	CIRCULAR	3.00	7.07	0.75	3.00	1	60.06
C39	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	464.08
C4	TRAPEZOIDAL	3.50	49.00	1.91	24.50	1	101.19
C40	CIRCULAR	3.00	7.07	0.75	3.00	1	14.62
C41	TRAPEZOIDAL	4.00	64.00	2.18	28.00	1	233.30
C42	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	275.99
C5	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	196.36
C6	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	462.00
C7	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	228.86
C8	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	333.50
C9	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	320.23

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 CMS
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 10/10/2024 00:00:00
Ending Date 10/12/2024 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 8
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	152.578	93.254
Evaporation Loss	0.000	0.000
Infiltration Loss	80.228	49.035
Surface Runoff	70.403	43.029
Final Storage	2.113	1.291
Continuity Error (%)	-0.109	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	70.396	703.967
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	70.534	705.343
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.002
Final Stored Volume	0.064	0.638
Continuity Error (%)	-0.286	

Highest Continuity Errors

Node J31 (1.16%)

Time-Step Critical Elements

Link C26 (8.41%)
Link C38 (6.85%)

Highest Flow Instability Indexes

Link C38 (6)
Link C23 (4)
Link C22 (3)
Link C33 (3)
Link C34 (1)

Routing Time Step Summary

Minimum Time Step : 1.58 sec
Average Time Step : 4.86 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 : 99.97 %
3.155 - 1.991 sec : 0.03 %
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 CMS	Runoff Coeff
S1	93.25	0.00	0.00	50.14	4.60	37.30	41.90	19.04	2.08	0.449
S10	93.25	0.00	0.00	30.44	36.90	24.80	61.70	12.35	4.33	0.662
S11	93.25	0.00	0.00	9.77	73.80	8.68	82.49	39.52	19.58	0.885
S12	93.25	0.00	0.00	34.88	27.67	29.59	57.26	14.59	5.12	0.614
S13	93.25	0.00	0.00	62.23	4.61	25.19	29.81	48.49	4.61	0.320
S14	93.25	0.00	0.00	9.70	73.78	8.79	82.57	8.72	4.48	0.885
S15	93.25	0.00	0.00	57.29	4.60	30.13	34.74	19.47	2.27	0.372
S16	93.25	0.00	0.00	42.26	18.45	31.35	49.80	20.92	4.66	0.534
S17	93.25	0.00	0.00	56.11	4.60	31.33	35.93	13.36	1.84	0.385
S18	93.25	0.00	0.00	56.25	4.60	31.20	35.80	19.52	2.63	0.384
S19	93.25	0.00	0.00	55.34	4.59	32.11	36.70	13.93	2.27	0.394
S2	93.25	0.00	0.00	63.81	4.60	23.59	28.20	21.98	2.67	0.302
S20	93.25	0.00	0.00	51.63	9.19	31.25	40.44	17.63	4.44	0.434
S21	93.25	0.00	0.00	68.32	9.21	14.51	23.72	13.19	2.54	0.254
S22	93.25	0.00	0.00	9.90	73.71	8.53	82.24	23.97	10.96	0.882
S23	93.25	0.00	0.00	50.14	4.60	37.28	41.88	21.32	2.33	0.449
S24	93.25	0.00	0.00	46.17	9.21	36.68	45.89	39.92	7.25	0.492
S25	93.25	0.00	0.00	54.70	4.59	32.75	37.35	16.26	3.24	0.400
S26	93.25	0.00	0.00	57.42	4.60	29.99	34.59	11.56	1.33	0.371
S27	93.25	0.00	0.00	56.75	4.60	30.69	35.29	20.49	2.56	0.378
S28	93.25	0.00	0.00	63.60	4.60	23.80	28.40	7.47	0.92	0.305
S29	93.25	0.00	0.00	53.76	4.59	33.80	38.39	1.43	0.47	0.412
S3	93.25	0.00	0.00	18.16	58.97	14.98	73.96	52.46	21.70	0.793
S30	93.25	0.00	0.00	55.84	4.60	31.61	36.21	3.15	0.46	0.388
S31	93.25	0.00	0.00	52.78	4.59	35.10	39.69	0.00	0.00	0.426
S32	93.25	0.00	0.00	53.66	4.59	33.88	38.47	0.58	0.20	0.413
S33	93.25	0.00	0.00	54.63	4.59	32.84	37.43	16.72	3.44	0.401
S34	93.25	0.00	0.00	54.57	4.59	32.93	37.52	13.25	2.82	0.402
S35	93.25	0.00	0.00	56.98	4.60	30.44	35.05	13.09	1.58	0.376
S36	93.25	0.00	0.00	56.51	4.60	30.91	35.51	7.15	0.92	0.381
S37	93.25	0.00	0.00	56.98	4.60	30.45	35.06	18.89	2.28	0.376
S4	93.25	0.00	0.00	41.64	4.60	45.80	50.40	27.63	3.30	0.540
S5	93.25	0.00	0.00	14.75	64.58	12.91	77.49	27.84	13.19	0.831
S6	93.25	0.00	0.00	38.54	23.07	30.49	53.55	30.10	8.16	0.574
S7	93.25	0.00	0.00	37.97	23.07	31.08	54.15	31.43	9.17	0.581
S8	93.25	0.00	0.00	58.26	4.61	29.16	33.77	12.44	1.33	0.362
S9	93.25	0.00	0.00	58.83	4.61	28.58	33.19	24.14	2.49	0.356

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	0.00	0.00	343.56	0 00:00	0.00
J13	JUNCTION	0.21	2.83	359.90	0 02:19	2.83
J16	JUNCTION	0.28	2.31	347.02	0 02:37	2.31
J17	JUNCTION	0.03	0.30	372.66	0 02:15	0.30
J18	JUNCTION	0.44	1.45	347.86	0 02:20	1.45
J2	JUNCTION	0.00	0.00	343.70	0 00:00	0.00
J21	JUNCTION	0.05	0.43	369.43	0 02:38	0.43
J22	JUNCTION	0.10	1.00	356.77	0 02:19	1.00
J23	JUNCTION	0.50	1.45	356.80	0 02:18	1.44
J24	JUNCTION	0.00	0.07	368.92	0 02:17	0.07
J26	JUNCTION	0.04	0.37	368.92	0 02:16	0.37
J28	JUNCTION	0.00	0.00	369.52	0 00:00	0.00
J3	JUNCTION	0.00	0.00	343.54	0 00:00	0.00
J30	JUNCTION	0.00	0.00	369.22	0 00:00	0.00
J31	JUNCTION	0.48	1.04	371.95	0 02:16	1.04
J32	JUNCTION	0.05	0.44	365.35	0 02:15	0.44
J33	JUNCTION	0.02	0.17	365.05	0 02:15	0.17
J35	JUNCTION	0.85	1.11	364.60	0 02:20	1.11
J37	JUNCTION	1.18	1.37	364.53	0 02:18	1.37
J38	JUNCTION	0.07	0.68	366.15	0 02:16	0.68
J4	JUNCTION	0.00	0.00	343.74	0 00:00	0.00
J40	JUNCTION	0.07	0.94	362.64	0 02:16	0.94
J42	JUNCTION	0.05	0.41	371.75	0 02:16	0.41
J45	JUNCTION	0.03	0.27	372.31	0 02:16	0.27
J47	JUNCTION	0.04	0.76	348.63	0 02:15	0.76
J49	JUNCTION	0.05	0.31	357.43	0 02:15	0.31
J52	JUNCTION	0.05	0.41	367.94	0 02:18	0.41
J6	JUNCTION	0.06	0.83	356.69	0 02:18	0.83
J60	JUNCTION	0.22	2.11	347.03	0 02:36	2.11
J62	JUNCTION	0.09	0.87	347.03	0 02:33	0.87
J64	JUNCTION	0.10	0.73	347.75	0 02:19	0.73
J66	JUNCTION	0.05	0.48	347.77	0 02:18	0.48

J68	JUNCTION	0.05	0.50	348.11	0	02:16	0.50
J70	JUNCTION	0.08	0.63	347.62	0	02:34	0.63
J72	JUNCTION	0.36	2.34	346.52	0	02:35	2.34
J73	JUNCTION	0.10	0.98	360.62	0	02:17	0.97
J75	JUNCTION	0.33	2.33	346.93	0	02:30	2.33
J76	JUNCTION	0.13	1.16	350.88	0	02:19	1.16
J79	JUNCTION	0.13	1.13	347.85	0	02:20	1.13
J81	JUNCTION	0.37	2.19	346.25	0	02:38	2.19
J82	JUNCTION	0.28	2.05	345.75	0	02:34	2.05
J9	JUNCTION	0.03	0.25	375.01	0	02:16	0.25
OF1	OUTFALL	0.27	2.04	345.43	0	02:34	2.04

Node Inflow Summary

		Maximum Lateral Inflow CMS	Maximum Total Inflow CMS	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	0.000	0.000	0	00:00	0	0	0.000	ltr
J13	JUNCTION	5.115	30.925	0	02:15	14.6	126	0.111	
J16	JUNCTION	0.202	12.668	0	02:38	0.585	112	0.005	
J17	JUNCTION	2.666	2.666	0	02:15	22	22	-0.042	
J18	JUNCTION	0.000	0.112	0	02:15	0	0.0778	0.000	
J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J21	JUNCTION	3.300	5.052	0	02:15	27.6	46.7	0.561	
J22	JUNCTION	4.437	31.024	0	02:17	17.6	211	-0.003	
J23	JUNCTION	0.000	0.268	0	02:15	0	0.347	0.000	
J24	JUNCTION	0.000	0.004	0	02:15	0	0.00134	0.150	
J26	JUNCTION	1.843	3.899	0	02:15	13.4	32.8	0.007	
J28	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J3	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J30	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J31	JUNCTION	1.331	3.916	0	02:15	12.4	34.5	1.169	
J32	JUNCTION	1.327	1.327	0	02:15	11.6	11.6	-0.000	
J33	JUNCTION	0.002	1.325	0	02:15	0.0027	11.6	0.007	
J35	JUNCTION	0.459	2.270	0	04:02	3.15	20.7	0.100	
J37	JUNCTION	0.000	3.395	0	02:14	0	20.7	-0.257	
J38	JUNCTION	8.161	13.600	0	02:15	30.1	88.3	-0.045	
J4	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J40	JUNCTION	26.028	28.660	0	02:15	64.8	111	-0.340	
J42	JUNCTION	2.490	5.909	0	02:15	24.1	58.2	0.028	
J45	JUNCTION	2.268	2.268	0	02:15	19.5	19.5	-0.011	
J47	JUNCTION	15.618	15.618	0	02:15	44.9	44.9	-0.955	
J49	JUNCTION	4.608	4.608	0	02:15	48.5	48.5	-0.052	
J52	JUNCTION	2.328	5.817	0	02:16	21.3	54.2	0.063	
J6	JUNCTION	4.482	28.811	0	02:17	8.72	135	-0.060	
J60	JUNCTION	4.358	12.449	0	02:35	24.2	112	0.058	
J62	JUNCTION	2.815	8.642	0	02:29	13.2	87.6	-0.075	
J64	JUNCTION	0.921	3.891	0	02:17	7.15	39.1	-0.018	
J66	JUNCTION	1.581	3.485	0	02:15	13.1	32	0.023	
J68	JUNCTION	2.284	2.284	0	02:15	18.9	18.9	-0.043	
J70	JUNCTION	2.555	7.396	0	02:16	20.5	74.4	0.038	
J72	JUNCTION	7.245	51.201	0	02:30	39.9	488	0.079	
J73	JUNCTION	11.800	28.947	0	02:15	51	193	-0.007	
J75	JUNCTION	0.470	42.485	0	02:27	1.43	403	0.047	
J76	JUNCTION	3.238	36.545	0	02:17	16.3	276	0.010	
J79	JUNCTION	2.545	37.841	0	02:19	13.2	289	-0.042	
J81	JUNCTION	2.275	50.731	0	02:37	13.9	501	-0.733	
J82	JUNCTION	19.578	73.169	0	02:33	39.5	679	0.293	
J9	JUNCTION	2.084	2.084	0	02:15	19	19	-0.078	
OF1	OUTFALL	13.193	76.065	0	02:34	27.8	705	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 CMS	Max Flow CMS	Total Volume 10^6 ltr
OF1	99.99	5.106	76.065	705.340
System	99.99	5.106	76.065	705.340

Link Flow Summary

	Maximum Flow	Time of Max Occurrence	Maximum Veloc	Max/ Full	Max/ Full
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Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	50.653	0	02:39	2.81	0.62	0.57
C10	CONDUIT	9.470	0	02:35	1.07	0.05	0.49
C107	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C11	CONDUIT	12.614	0	02:16	2.79	0.04	0.28
C12	CONDUIT	6.454	0	02:34	1.92	0.04	0.25
C13	CONDUIT	5.475	0	02:18	1.72	0.02	0.23
C14	CONDUIT	5.674	0	02:16	2.25	0.02	0.18
C15	CONDUIT	3.698	0	02:16	2.29	0.01	0.13
C16	CONDUIT	3.600	0	02:16	0.96	0.02	0.24
C17	CONDUIT	4.094	0	02:38	1.91	0.02	0.22
C18	CONDUIT	15.275	0	02:15	2.30	0.05	0.46
C19	CONDUIT	3.798	0	02:19	1.15	0.08	0.22
C2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C20	CONDUIT	3.165	0	02:18	1.09	0.02	0.20
C21	CONDUIT	2.601	0	02:15	0.79	0.01	0.22
C22	CONDUIT	1.567	0	02:18	0.99	0.00	0.13
C23	CONDUIT	0.359	0	02:22	0.60	0.00	0.14
C24	CONDUIT	2.051	0	02:17	0.95	0.02	0.16
C25	CONDUIT	1.315	0	02:15	0.94	0.00	0.14
C26	CONDUIT	0.662	0	02:15	1.74	0.03	0.10
C27	CONDUIT	1.843	0	02:16	1.58	0.01	0.11
C28	CONDUIT	73.101	0	02:34	3.92	0.29	0.58
C3	CONDUIT	49.051	0	02:37	2.11	0.73	0.75
C31	CONDUIT	38.081	0	02:20	3.32	0.17	0.67
C31_1	CONDUIT	26.464	0	02:19	4.26	0.34	0.66
C33	CONDUIT	0.112	0	02:15	0.06	0.00	0.43
C34	CONDUIT	0.268	0	02:15	0.13	0.01	0.41
C35	CONDUIT	0.004	0	02:15	0.01	0.00	0.07
C36	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C37	CONDUIT	0.662	0	02:15	1.74	0.03	0.10
C38	CONDUIT	3.130	0	02:14	1.20	0.05	0.41
C39	CONDUIT	28.690	0	02:18	3.51	0.06	0.41
C4	CONDUIT	40.711	0	02:31	1.68	0.40	0.67
C40	CONDUIT	12.894	0	02:39	2.21	0.88	0.77
C41	CONDUIT	12.572	0	02:38	0.54	0.05	0.55
C42	CONDUIT	2.106	0	02:16	1.67	0.01	0.11
C5	CONDUIT	36.227	0	02:19	4.92	0.18	0.46
C6	CONDUIT	4.521	0	02:15	1.66	0.01	0.24
C7	CONDUIT	30.164	0	02:19	4.85	0.13	0.43
C8	CONDUIT	26.251	0	02:16	1.83	0.08	0.62
C9	CONDUIT	27.210	0	02:17	4.62	0.08	0.33

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.97	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C107	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.81	0.19	0.00	0.00	1.00	0.00
C12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C14	1.00	0.00	0.00	0.00	0.67	0.33	0.00	0.00	1.00	0.00
C15	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	0.96	0.00
C16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.04	0.00
C17	1.00	0.00	0.00	0.00	0.78	0.21	0.00	0.00	0.72	0.00
C18	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.97	0.00
C19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.63	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
C21	1.00	0.00	0.20	0.00	0.80	0.00	0.00	0.00	0.99	0.00
C22	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.96	0.00
C23	1.00	0.02	0.01	0.00	0.94	0.00	0.03	0.00	0.00	0.06
C24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.71	0.00
C25	1.00	0.00	0.39	0.00	0.59	0.00	0.00	0.02	0.97	0.00
C26	1.00	0.03	0.01	0.00	0.64	0.32	0.00	0.00	0.00	0.83
C27	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.96	0.00
C28	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.09	0.00
C3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.58	0.00
C31	1.00	0.00	0.00	0.00	0.96	0.04	0.00	0.00	0.96	0.00
C31_1	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.00	1.00
C33	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.03
C34	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.04
C35	1.00	0.00	0.92	0.00	0.08	0.00	0.00	0.00	0.00	0.94
C36	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	0.03	0.01	0.00	0.65	0.31	0.00	0.00	0.00	0.82
C38	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C39	1.00	0.00	0.00	0.00	0.19	0.04	0.00	0.77	0.21	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.88	0.00
C40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.61
C41	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
C42	1.00	0.00	0.06	0.00	0.93	0.01	0.00	0.00	0.98	0.00
C5	1.00	0.00	0.00	0.00	0.56	0.44	0.00	0.00	0.79	0.00
C6	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.98	0.00
C7	1.00	0.00	0.00	0.00	0.71	0.29	0.00	0.00	0.96	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C9	1.00	0.00	0.00	0.00	0.61	0.39	0.00	0.00	0.96	0.00

Conduit Surcharge Summary

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

C31_1	0.01	0.19	0.01	0.01	0.01

Analysis begun on: Thu Jan 8 14:25:09 2026
Analysis ended on: Thu Jan 8 14:25:12 2026
Total elapsed time: 00:00:03

Element Count

Number of rain gages 4
Number of subcatchments ... 37
Number of nodes 43
Number of links 41
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100Yr	Chicago_3h_100Yr	INTENSITY	15 min.
Chicago_6h	Chicago_6h	INTENSITY	15 min.
Industrial_Subdivision	Hurricane_Hazel	INTENSITY	1 min.
SCS_Type_II_6hr	SCS_Type_II_6hr	INTENSITY	6 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	45.43	534.52	5.00	2.2110	SCS_Type_II_6hr	J9
S10	20.01	286.42	40.00	3.4160	SCS_Type_II_6hr	J40
S11	47.91	1199.29	80.00	5.1370	SCS_Type_II_6hr	J82
S12	25.48	666.04	30.00	4.6800	SCS_Type_II_6hr	J13
S13	162.69	569.64	5.00	2.5280	SCS_Type_II_6hr	J49
S14	10.56	681.28	80.00	5.7560	SCS_Type_II_6hr	J6
S15	56.05	699.07	5.00	2.3930	SCS_Type_II_6hr	J45
S16	42.00	312.00	20.00	3.7520	SCS_Type_II_6hr	J47
S17	37.18	769.27	5.00	2.1400	SCS_Type_II_6hr	J26
S18	54.53	963.68	5.00	2.6340	SCS_Type_II_6hr	J73
S19	37.95	801.60	5.00	4.2500	SCS_Type_II_6hr	J81
S2	77.94	922.29	5.00	2.3120	SCS_Type_II_6hr	J17
S20	43.59	1421.03	10.00	4.6980	SCS_Type_II_6hr	J22
S21	55.58	78.11	10.00	3.7770	SCS_Type_II_6hr	J79
S22	29.15	292.08	80.00	4.9870	SCS_Type_II_6hr	J47
S23	50.90	479.92	5.00	3.3980	SCS_Type_II_6hr	J52
S24	86.98	1256.87	10.00	4.2250	SCS_Type_II_6hr	J72
S25	43.53	1256.81	5.00	4.8570	SCS_Type_II_6hr	J76
S26	33.43	485.24	5.00	1.6040	SCS_Type_II_6hr	J32
S27	58.06	803.48	5.00	2.8840	SCS_Type_II_6hr	J70
S28	26.30	289.17	5.00	3.0490	SCS_Type_II_6hr	J60
S29	3.73	206.50	5.00	7.9570	SCS_Type_II_6hr	J75
S3	70.94	691.57	64.00	3.6840	SCS_Type_II_6hr	J40
S30	8.71	228.76	5.00	1.6990	SCS_Type_II_6hr	J35
S31	0.01	10.22	5.00	7.0200	SCS_Type_II_6hr	J33
S32	1.52	82.34	5.00	10.1380	SCS_Type_II_6hr	J16
S33	44.67	1584.24	5.00	3.6210	SCS_Type_II_6hr	J60
S34	35.31	1385.98	5.00	3.3240	SCS_Type_II_6hr	J62
S35	37.36	505.17	5.00	2.5220	SCS_Type_II_6hr	J66
S36	20.15	349.64	5.00	2.1660	SCS_Type_II_6hr	J64
S37	53.90	766.55	5.00	2.2970	SCS_Type_II_6hr	J68
S4	54.83	789.28	5.00	2.0740	SCS_Type_II_6hr	J21
S5	35.93	867.44	70.00	4.2400	SCS_Type_II_6hr	OF1
S6	56.20	724.11	25.00	3.3590	SCS_Type_II_6hr	J38
S7	58.05	1100.81	25.00	3.4430	SCS_Type_II_6hr	J73
S8	36.85	370.69	5.00	2.0080	SCS_Type_II_6hr	J31
S9	72.74	618.46	5.00	2.0300	SCS_Type_II_6hr	J42

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	343.56	2.00	0.0	
J13	JUNCTION	357.07	3.00	0.0	
J16	JUNCTION	344.71	4.00	0.0	
J17	JUNCTION	372.36	3.00	0.0	
J18	JUNCTION	346.41	3.00	0.0	
J2	JUNCTION	343.70	2.00	0.0	
J21	JUNCTION	369.00	3.00	0.0	
J22	JUNCTION	355.76	3.00	0.0	
J23	JUNCTION	355.35	3.00	0.0	
J24	JUNCTION	368.85	3.00	0.0	
J26	JUNCTION	368.55	3.00	0.0	
J28	JUNCTION	369.52	3.00	0.0	
J3	JUNCTION	343.54	2.00	0.0	
J30	JUNCTION	369.22	3.00	0.0	
J31	JUNCTION	370.91	3.00	0.0	
J32	JUNCTION	364.91	3.00	0.0	
J33	JUNCTION	364.88	3.00	0.0	
J35	JUNCTION	363.49	3.42	0.0	
J37	JUNCTION	363.16	4.18	0.0	
J38	JUNCTION	365.47	3.00	0.0	
J4	JUNCTION	343.74	2.00	0.0	
J40	JUNCTION	361.70	3.00	0.0	
J42	JUNCTION	371.33	3.00	0.0	
J45	JUNCTION	372.03	3.00	0.0	
J47	JUNCTION	347.87	3.00	0.0	

J49	JUNCTION	357.12	3.00	0.0
J52	JUNCTION	367.53	3.00	0.0
J6	JUNCTION	355.86	3.00	0.0
J60	JUNCTION	344.92	4.00	0.0
J62	JUNCTION	346.16	3.00	0.0
J64	JUNCTION	347.02	3.00	0.0
J66	JUNCTION	347.29	3.00	0.0
J68	JUNCTION	347.62	3.00	0.0
J70	JUNCTION	346.99	3.00	0.0
J72	JUNCTION	344.18	3.50	0.0
J73	JUNCTION	359.64	3.00	0.0
J75	JUNCTION	344.59	3.50	0.0
J76	JUNCTION	349.72	3.00	0.0
J79	JUNCTION	346.72	3.00	0.0
J81	JUNCTION	344.06	3.50	0.0
J82	JUNCTION	343.70	3.77	0.0
J9	JUNCTION	374.76	3.00	0.0
OF1	OUTFALL	343.39	3.50	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J81	J82	CONDUIT	398.1	0.0216	0.0130
C10	J62	J60	CONDUIT	540.6	0.2285	0.0130
C107	J4	J2	CONDUIT	13.1	0.3046	0.0130
C11	J38	J73	CONDUIT	939.2	0.6203	0.0130
C12	J70	J62	CONDUIT	378.6	0.2208	0.0130
C13	J52	J73	CONDUIT	1002.5	0.7869	0.0130
C14	J42	J38	CONDUIT	708.4	0.8282	0.0130
C15	J26	J52	CONDUIT	189.2	0.5381	0.0130
C16	J31	J42	CONDUIT	209.4	-0.2025	0.0130
C17	J21	J40	CONDUIT	1862.9	0.3921	0.0130
C18	J47	J72	CONDUIT	628.7	0.5871	0.0130
C19	J64	J70	CONDUIT	203.1	0.0138	0.0130
C2	J1	J3	CONDUIT	22.5	0.1243	0.0130
C20	J66	J64	CONDUIT	131.6	0.2022	0.0130
C21	J17	J31	CONDUIT	254.4	0.5700	0.0130
C22	J37	J70	CONDUIT	1572.4	1.1033	0.0130
C23	J35	J37	CONDUIT	15.0	-2.8969	0.0130
C24	J68	J66	CONDUIT	567.9	0.0579	0.0130
C25	J33	J35	CONDUIT	94.2	1.0296	0.0130
C26	J32	J33	CONDUIT	12.7	0.2747	0.0130
C27	J9	J21	CONDUIT	1033.7	0.5572	0.0130
C28	J82	OF1	CONDUIT	149.7	0.2098	0.0130
C3	J72	J81	CONDUIT	429.3	0.0275	0.0130
C31	J79	J75	CONDUIT	284.1	0.7493	0.0130
C31_1	J13	J6	CONDUIT	63.2	1.9145	0.0130
C33	J79	J18	CONDUIT	24.9	1.2597	0.0130
C34	J22	J23	CONDUIT	63.6	0.6457	0.0130
C35	J24	J26	CONDUIT	22.3	1.3574	0.0130
C36	J28	J30	CONDUIT	14.6	2.0524	0.0130
C37	J32	J33	CONDUIT	13.8	0.2533	0.0130
C38	J35	J37	CONDUIT	18.6	1.7900	0.0130
C39	J6	J82	CONDUIT	817.6	1.4536	0.0130
C4	J75	J72	CONDUIT	1369.6	0.0304	0.0130
C40	J16	J75	CONDUIT	105.6	0.1060	0.0130
C41	J60	J16	CONDUIT	271.4	0.0792	0.0130
C42	J45	J26	CONDUIT	678.1	0.5141	0.0130
C5	J76	J79	CONDUIT	494.4	0.6062	0.0130
C6	J49	J76	CONDUIT	513.6	1.4407	0.0130
C7	J22	J76	CONDUIT	646.3	0.9348	0.0130
C8	J40	J13	CONDUIT	616.8	0.7507	0.0130
C9	J73	J22	CONDUIT	560.6	0.6921	0.0130

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	81.38
C10	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	183.98
C107	HORIZ_ELLIPSE	2.00	5.08	0.61	3.60	1	15.54
C11	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	303.16
C12	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	180.89
C13	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	341.45
C14	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	350.29
C15	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	282.35
C16	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.21
C17	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	241.04
C18	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	294.94
C19	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	45.19
C2	HORIZ_ELLIPSE	2.00	5.08	0.61	4.00	1	9.93
C20	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.08
C21	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	290.61
C22	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	404.30
C23	CIRCULAR	3.00	7.07	0.75	3.00	1	76.41
C24	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	92.65
C25	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	390.57
C26	CIRCULAR	3.00	7.07	0.75	3.00	1	23.53
C27	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	287.33
C28	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	253.61
C3	TRAPEZOIDAL	3.00	37.50	1.67	21.50	1	67.29
C31	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	218.30
C31_1	HORIZ_ELLIPSE	2.60	8.58	0.80	3.00	1	78.44
C33	CIRCULAR	3.00	7.07	0.75	3.00	1	50.38
C34	CIRCULAR	3.00	7.07	0.75	3.00	1	36.07
C35	HORIZ_ELLIPSE	3.00	11.42	0.92	3.00	1	96.73
C36	CIRCULAR	3.00	7.07	0.75	3.00	1	64.31

C37	CIRCULAR	3.00	7.07	0.75	3.00	1	22.59
C38	CIRCULAR	3.00	7.07	0.75	3.00	1	60.06
C39	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	464.08
C4	TRAPEZOIDAL	3.50	49.00	1.91	24.50	1	101.19
C40	CIRCULAR	3.00	7.07	0.75	3.00	1	14.62
C41	TRAPEZOIDAL	4.00	64.00	2.18	28.00	1	233.30
C42	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	275.99
C5	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	196.36
C6	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	462.00
C7	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	228.86
C8	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	333.50
C9	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	320.23

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 CMS
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 10/10/2024 00:00:00
Ending Date 10/12/2024 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 8
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	152.571	93.250
Evaporation Loss	0.000	0.000
Infiltration Loss	84.744	51.795
Surface Runoff	65.809	40.222
Final Storage	2.078	1.270
Continuity Error (%)	-0.039	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	65.880	658.810
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	65.994	659.944
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.002
Final Stored Volume	0.062	0.624
Continuity Error (%)	-0.267	

Highest Continuity Errors

Node J31 (1.30%)

Time-Step Critical Elements

Link C26 (7.94%)
Link C38 (5.85%)

Highest Flow Instability Indexes

Link C38 (6)
Link C23 (3)
Link C33 (3)
Link C22 (2)
Link C34 (1)

Routing Time Step Summary

Minimum Time Step : 2.83 sec
Average Time Step : 4.87 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 : 0.01 %
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 CMS	Runoff Coeff
S1	93.25	0.00	0.00	53.50	4.60	33.91	38.51	17.49	1.92	0.413
S10	93.25	0.00	0.00	31.73	36.84	23.50	60.34	12.07	4.11	0.647
S11	93.25	0.00	0.00	9.91	73.69	8.51	82.20	39.38	19.32	0.881
S12	93.25	0.00	0.00	35.93	27.63	28.52	56.15	14.31	4.81	0.602
S13	93.25	0.00	0.00	67.84	4.61	19.57	24.18	39.34	4.43	0.259
S14	93.25	0.00	0.00	9.77	73.69	8.66	82.35	8.70	4.68	0.883
S15	93.25	0.00	0.00	60.62	4.60	26.82	31.42	17.61	2.05	0.337
S16	93.25	0.00	0.00	45.12	18.42	28.46	46.88	19.69	4.41	0.503
S17	93.25	0.00	0.00	58.63	4.60	28.74	33.33	12.39	1.72	0.357
S18	93.25	0.00	0.00	58.84	4.60	28.53	33.12	18.06	2.45	0.355
S19	93.25	0.00	0.00	57.38	4.59	30.00	34.59	13.13	2.18	0.371
S2	93.25	0.00	0.00	67.16	4.60	20.24	24.84	19.36	2.42	0.266
S20	93.25	0.00	0.00	53.07	9.19	29.79	38.98	16.99	4.09	0.418
S21	93.25	0.00	0.00	73.44	9.20	9.40	18.59	10.33	2.25	0.199
S22	93.25	0.00	0.00	10.13	73.58	8.27	81.85	23.86	9.70	0.878
S23	93.25	0.00	0.00	53.50	4.60	33.87	38.48	19.59	2.15	0.413
S24	93.25	0.00	0.00	48.41	9.20	34.37	43.57	37.90	6.52	0.467
S25	93.25	0.00	0.00	56.33	4.59	31.07	35.66	15.52	3.15	0.382
S26	93.25	0.00	0.00	60.83	4.60	26.59	31.19	10.43	1.19	0.334
S27	93.25	0.00	0.00	59.68	4.60	27.71	32.30	18.76	2.35	0.346
S28	93.25	0.00	0.00	66.90	4.60	20.55	25.15	6.61	0.83	0.270
S29	93.25	0.00	0.00	54.76	4.59	32.75	37.34	1.39	0.45	0.400
S3	93.25	0.00	0.00	18.86	58.87	14.28	73.14	51.89	19.22	0.784
S30	93.25	0.00	0.00	58.21	4.59	29.19	33.79	2.94	0.43	0.362
S31	93.25	0.00	0.00	52.98	4.60	34.71	39.31	0.00	0.00	0.422
S32	93.25	0.00	0.00	54.55	4.59	32.88	37.47	0.57	0.19	0.402
S33	93.25	0.00	0.00	56.23	4.59	31.21	35.80	15.99	3.35	0.384
S34	93.25	0.00	0.00	56.12	4.59	31.35	35.94	12.69	2.74	0.385
S35	93.25	0.00	0.00	60.10	4.60	27.31	31.91	11.92	1.44	0.342
S36	93.25	0.00	0.00	59.37	4.60	28.06	32.66	6.58	0.85	0.350
S37	93.25	0.00	0.00	60.10	4.60	27.33	31.93	17.21	2.08	0.342
S4	93.25	0.00	0.00	44.37	4.60	43.00	47.60	26.10	3.14	0.510
S5	93.25	0.00	0.00	15.03	64.48	12.58	77.06	27.69	12.86	0.826
S6	93.25	0.00	0.00	40.52	23.03	28.51	51.54	28.97	7.77	0.553
S7	93.25	0.00	0.00	39.48	23.03	29.52	52.55	30.50	8.66	0.564
S8	93.25	0.00	0.00	62.09	4.60	25.30	29.91	11.02	1.20	0.321
S9	93.25	0.00	0.00	63.03	4.60	24.42	29.02	21.11	2.28	0.311

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	0.00	0.00	343.56	0 00:00	0.00
J13	JUNCTION	0.20	2.68	359.75	0 03:09	2.68
J16	JUNCTION	0.26	2.22	346.93	0 03:19	2.22
J17	JUNCTION	0.03	0.28	372.64	0 03:01	0.28
J18	JUNCTION	0.42	1.42	347.83	0 03:10	1.42
J2	JUNCTION	0.00	0.00	343.70	0 00:00	0.00
J21	JUNCTION	0.05	0.41	369.41	0 03:22	0.41
J22	JUNCTION	0.09	0.98	356.74	0 03:08	0.98
J23	JUNCTION	0.50	1.40	356.75	0 03:09	1.40
J24	JUNCTION	0.00	0.06	368.91	0 03:07	0.06
J26	JUNCTION	0.03	0.36	368.91	0 03:07	0.36
J28	JUNCTION	0.00	0.00	369.52	0 00:00	0.00
J3	JUNCTION	0.00	0.00	343.54	0 00:00	0.00
J30	JUNCTION	0.00	0.00	369.22	0 00:00	0.00
J31	JUNCTION	0.47	1.01	371.92	0 03:06	1.01
J32	JUNCTION	0.04	0.42	365.33	0 03:06	0.42
J33	JUNCTION	0.02	0.16	365.04	0 03:06	0.16
J35	JUNCTION	0.85	1.10	364.59	0 03:10	1.09
J37	JUNCTION	1.18	1.37	364.52	0 03:08	1.36
J38	JUNCTION	0.06	0.66	366.12	0 03:06	0.66
J4	JUNCTION	0.00	0.00	343.74	0 00:00	0.00
J40	JUNCTION	0.07	0.89	362.59	0 03:06	0.89
J42	JUNCTION	0.04	0.40	371.74	0 03:06	0.40
J45	JUNCTION	0.03	0.26	372.30	0 03:06	0.26
J47	JUNCTION	0.04	0.72	348.59	0 03:02	0.72
J49	JUNCTION	0.04	0.31	357.42	0 03:01	0.31
J52	JUNCTION	0.04	0.41	367.94	0 03:08	0.41
J6	JUNCTION	0.06	0.80	356.66	0 03:08	0.80
J60	JUNCTION	0.20	2.01	346.93	0 03:19	2.01
J62	JUNCTION	0.08	0.78	346.94	0 03:24	0.78
J64	JUNCTION	0.09	0.72	347.74	0 03:09	0.72
J66	JUNCTION	0.05	0.47	347.76	0 03:09	0.47

J68	JUNCTION	0.05	0.49	348.10	0	03:06	0.49
J70	JUNCTION	0.07	0.62	347.61	0	03:14	0.62
J72	JUNCTION	0.31	2.26	346.43	0	03:24	2.26
J73	JUNCTION	0.09	0.95	360.59	0	03:07	0.95
J75	JUNCTION	0.29	2.28	346.87	0	03:20	2.28
J76	JUNCTION	0.12	1.14	350.86	0	03:09	1.14
J79	JUNCTION	0.11	1.10	347.82	0	03:10	1.10
J81	JUNCTION	0.32	2.12	346.18	0	03:27	2.12
J82	JUNCTION	0.25	1.95	345.65	0	03:23	1.95
J9	JUNCTION	0.03	0.24	375.01	0	03:07	0.24
OF1	OUTFALL	0.24	1.95	345.34	0	03:24	1.95

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow	
		Lateral	Total			Inflow	Inflow		
		Inflow	Inflow	Occurrence		Volume	Volume	Error	
		CMS	CMS	days	hr:min	10^6 ltr	10^6 ltr	Percent	
J1	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J13	JUNCTION	4.806	27.980	0	03:06	14.3	122	0.101	
J16	JUNCTION	0.195	11.614	0	03:30	0.571	104	0.004	
J17	JUNCTION	2.424	2.424	0	03:00	19.4	19.4	-0.037	
J18	JUNCTION	0.000	0.078	0	03:02	0	0.0644	0.000	
J2	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J21	JUNCTION	3.144	4.889	0	03:06	26.1	43.7	0.530	
J22	JUNCTION	4.089	29.303	0	03:07	17	196	-0.003	
J23	JUNCTION	0.000	0.128	0	03:01	0	0.19	0.000	
J24	JUNCTION	0.000	0.005	0	03:00	0	0.000828	0.209	
J26	JUNCTION	1.724	3.683	0	03:06	12.4	30	0.006	
J28	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J3	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J30	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J31	JUNCTION	1.196	3.560	0	03:01	11	30.5	1.317	
J32	JUNCTION	1.195	1.195	0	03:06	10.4	10.4	-0.000	
J33	JUNCTION	0.002	1.193	0	03:06	0.00269	10.4	0.011	
J35	JUNCTION	0.433	2.268	0	04:57	2.95	19	0.094	
J37	JUNCTION	0.000	3.462	0	03:06	0	19	-0.272	
J38	JUNCTION	7.768	12.188	0	03:06	29	80.1	-0.046	
J4	JUNCTION	0.000	0.000	0	00:00	0	0	0.000	ltr
J40	JUNCTION	23.330	24.823	0	03:00	64	107	-0.311	
J42	JUNCTION	2.277	5.513	0	03:06	21.1	51.2	0.025	
J45	JUNCTION	2.050	2.050	0	03:06	17.6	17.6	-0.012	
J47	JUNCTION	14.110	14.110	0	03:00	43.6	43.6	-0.779	
J49	JUNCTION	4.433	4.433	0	03:00	39.4	39.4	-0.059	
J52	JUNCTION	2.146	5.633	0	03:06	19.6	49.6	0.063	
J6	JUNCTION	4.685	26.552	0	03:07	8.7	131	-0.023	
J60	JUNCTION	4.152	11.105	0	03:15	22.6	103	0.065	
J62	JUNCTION	2.742	8.297	0	03:13	12.7	80.6	-0.084	
J64	JUNCTION	0.851	3.816	0	03:07	6.59	35.7	-0.017	
J66	JUNCTION	1.441	3.367	0	03:06	11.9	29.2	0.025	
J68	JUNCTION	2.083	2.083	0	03:06	17.2	17.2	-0.047	
J70	JUNCTION	2.346	7.247	0	03:06	18.8	68	0.043	
J72	JUNCTION	6.516	47.373	0	03:20	37.9	448	0.073	
J73	JUNCTION	10.824	26.972	0	03:06	48.6	178	-0.006	
J75	JUNCTION	0.454	40.515	0	03:16	1.4	366	0.036	
J76	JUNCTION	3.146	34.848	0	03:08	15.5	250	0.010	
J79	JUNCTION	2.247	36.048	0	03:09	10.3	261	-0.038	
J81	JUNCTION	2.176	46.830	0	03:25	13.1	461	-0.635	
J82	JUNCTION	19.321	65.407	0	03:22	39.4	634	0.226	
J9	JUNCTION	1.922	1.922	0	03:06	17.5	17.5	-0.081	
OF1	OUTFALL	12.856	67.836	0	03:23	27.7	660	0.000	

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
OF1	99.99	4.760	67.836	659.941
System	99.99	4.760	67.836	659.941

Link Flow Summary

	Maximum	Time of Max	Maximum	Max/	Max/
	Flow	Occurrence	Veloc	Full	Full

Link	Type	CMS	days	hr:min	m/sec	Flow	Depth
C1	CONDUIT	46.586	0	03:29	2.75	0.57	0.55
C10	CONDUIT	8.437	0	03:28	1.11	0.05	0.46
C107	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C11	CONDUIT	11.744	0	03:06	2.73	0.04	0.27
C12	CONDUIT	6.228	0	03:14	1.90	0.03	0.23
C13	CONDUIT	5.352	0	03:08	1.67	0.02	0.23
C14	CONDUIT	5.372	0	03:06	2.21	0.02	0.18
C15	CONDUIT	3.553	0	03:07	2.24	0.01	0.13
C16	CONDUIT	3.357	0	03:06	0.93	0.02	0.24
C17	CONDUIT	3.773	0	03:22	1.85	0.02	0.21
C18	CONDUIT	13.702	0	03:02	2.18	0.05	0.44
C19	CONDUIT	3.718	0	03:09	1.15	0.08	0.22
C2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C20	CONDUIT	3.082	0	03:09	1.09	0.02	0.20
C21	CONDUIT	2.379	0	03:01	0.79	0.01	0.22
C22	CONDUIT	1.524	0	03:08	1.02	0.00	0.13
C23	CONDUIT	0.358	0	03:12	0.61	0.00	0.14
C24	CONDUIT	1.977	0	03:07	0.94	0.02	0.16
C25	CONDUIT	1.184	0	03:06	0.89	0.00	0.14
C26	CONDUIT	0.596	0	03:06	1.71	0.03	0.10
C27	CONDUIT	1.782	0	03:07	1.59	0.01	0.10
C28	CONDUIT	65.443	0	03:24	3.81	0.26	0.56
C3	CONDUIT	45.303	0	03:26	2.06	0.67	0.73
C31	CONDUIT	36.170	0	03:10	3.27	0.17	0.65
C31_1	CONDUIT	24.465	0	03:09	3.98	0.31	0.65
C33	CONDUIT	0.078	0	03:02	0.06	0.00	0.42
C34	CONDUIT	0.128	0	03:01	0.11	0.00	0.40
C35	CONDUIT	0.005	0	03:00	0.02	0.00	0.07
C36	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C37	CONDUIT	0.596	0	03:06	1.71	0.03	0.10
C38	CONDUIT	3.181	0	03:06	1.21	0.05	0.41
C39	CONDUIT	26.439	0	03:08	3.41	0.06	0.39
C4	CONDUIT	38.721	0	03:21	1.68	0.38	0.64
C40	CONDUIT	11.896	0	03:31	2.14	0.81	0.75
C41	CONDUIT	11.538	0	03:30	0.54	0.05	0.53
C42	CONDUIT	1.973	0	03:06	1.62	0.01	0.10
C5	CONDUIT	34.590	0	03:10	4.88	0.18	0.45
C6	CONDUIT	4.306	0	03:01	1.62	0.01	0.23
C7	CONDUIT	28.775	0	03:09	4.78	0.13	0.42
C8	CONDUIT	23.751	0	03:06	1.86	0.07	0.59
C9	CONDUIT	25.685	0	03:07	4.53	0.08	0.32

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up		Down		Sub		Sup		Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Crit	
C1	1.00	0.00	0.00	0.00	0.02	0.00	0.00	0.98	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C107	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	1.00	0.00
C12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C14	1.00	0.00	0.00	0.00	0.78	0.22	0.00	0.00	1.00	0.00
C15	1.00	0.00	0.00	0.00	0.86	0.14	0.00	0.00	0.97	0.00
C16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.03	0.00
C17	1.00	0.00	0.00	0.00	0.83	0.17	0.00	0.00	0.86	0.00
C18	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.98	0.00
C19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.73	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
C21	1.00	0.00	0.21	0.00	0.79	0.00	0.00	0.00	0.99	0.00
C22	1.00	0.00	0.03	0.00	0.97	0.00	0.00	0.00	0.97	0.00
C23	1.00	0.01	0.02	0.00	0.94	0.00	0.03	0.00	0.00	0.05
C24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
C25	1.00	0.00	0.41	0.00	0.58	0.00	0.00	0.01	0.98	0.00
C26	1.00	0.03	0.01	0.00	0.70	0.26	0.00	0.00	0.00	0.90
C27	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.98	0.00
C28	1.00	0.00	0.00	0.00	0.88	0.12	0.00	0.00	0.09	0.00
C3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.67	0.00
C31	1.00	0.00	0.00	0.00	0.96	0.03	0.00	0.00	0.97	0.00
C31_1	1.00	0.00	0.00	0.00	0.73	0.27	0.00	0.00	0.00	1.00
C33	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C34	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C35	1.00	0.00	0.93	0.00	0.07	0.00	0.00	0.00	0.00	0.93
C36	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	0.03	0.01	0.00	0.71	0.25	0.00	0.00	0.00	0.90
C38	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C39	1.00	0.00	0.00	0.00	0.16	0.05	0.00	0.79	0.18	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.89	0.00
C40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.41
C41	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.80	0.00
C42	1.00	0.00	0.11	0.00	0.88	0.01	0.00	0.00	0.98	0.00
C5	1.00	0.00	0.00	0.00	0.65	0.35	0.00	0.00	0.81	0.00
C6	1.00	0.00	0.00	0.00	0.87	0.13	0.00	0.00	0.99	0.00
C7	1.00	0.00	0.00	0.00	0.75	0.25	0.00	0.00	0.97	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C9	1.00	0.00	0.00	0.00	0.70	0.30	0.00	0.00	0.97	0.00

Conduit Surcharge Summary

	Hours	Hours
--	-------	-------

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

C31_1	0.01	0.11	0.01	0.01	0.01

Analysis begun on: Thu Jan 8 14:25:47 2026
Analysis ended on: Thu Jan 8 14:25:49 2026
Total elapsed time: 00:00:02

Regional Storm Event - Hurricane Hazel

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

WARNING 01: wet weather time step reduced to recording interval for Rain Gage Industrial_Subdivision

Element Count

Number of rain gages 4
Number of subcatchments ... 37
Number of nodes 43
Number of links 41
Number of pollutants 0
Number of land uses 0

Raingage Summary

Name	Data Source	Data Type	Recording Interval
Chicago_3h_100Yr	Chicago_3h_100Yr	INTENSITY	15 min.
Chicago_6h	Chicago_6h	INTENSITY	15 min.
Industrial_Subdivision_Hurricane_Hazel		INTENSITY	1 min.
SCS_Type_II_6hr	SCS_Type_II_6hr	INTENSITY	6 min.

Subcatchment Summary

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
S1	45.43	534.52	5.00	2.2110	Industrial_Subdivision	J9
S10	20.01	286.42	40.00	3.4160	Industrial_Subdivision	J40
S11	47.91	1199.29	80.00	5.1370	Industrial_Subdivision	J82
S12	25.48	666.04	30.00	4.6800	Industrial_Subdivision	J13
S13	162.69	569.64	5.00	2.5280	Industrial_Subdivision	J49
S14	10.56	681.28	80.00	5.7560	Industrial_Subdivision	J6
S15	56.05	699.07	5.00	2.3930	Industrial_Subdivision	J45
S16	42.00	312.00	20.00	3.7520	Industrial_Subdivision	J47
S17	37.18	769.27	5.00	2.1400	Industrial_Subdivision	J26
S18	54.53	963.68	5.00	2.6340	Industrial_Subdivision	J73
S19	37.95	801.60	5.00	4.2500	Industrial_Subdivision	J81
S2	77.94	922.29	5.00	2.3120	Industrial_Subdivision	J17
S20	43.59	1421.03	10.00	4.6980	Industrial_Subdivision	J22
S21	55.58	78.11	10.00	3.7770	Industrial_Subdivision	J79
S22	29.15	292.08	80.00	4.9870	Industrial_Subdivision	J47
S23	50.90	479.92	5.00	3.3980	Industrial_Subdivision	J52
S24	86.98	1256.87	10.00	4.2250	Industrial_Subdivision	J72
S25	43.53	1256.81	5.00	4.8570	Industrial_Subdivision	J76
S26	33.43	485.24	5.00	1.6040	Industrial_Subdivision	J32
S27	58.06	803.48	5.00	2.8840	Industrial_Subdivision	J70
S28	26.30	289.17	5.00	3.0490	Industrial_Subdivision	J60
S29	3.73	206.50	5.00	7.9570	Industrial_Subdivision	J75
S3	70.94	691.57	64.00	3.6840	Industrial_Subdivision	J40
S30	8.71	228.76	5.00	1.6990	Industrial_Subdivision	J35
S31	0.01	10.22	5.00	7.0200	Industrial_Subdivision	J33
S32	1.52	82.34	5.00	10.1380	Industrial_Subdivision	J16
S33	44.67	1584.24	5.00	3.6210	Industrial_Subdivision	J60
S34	35.31	1385.98	5.00	3.3240	Industrial_Subdivision	J62
S35	37.36	505.17	5.00	2.5220	Industrial_Subdivision	J66
S36	20.15	349.64	5.00	2.1660	Industrial_Subdivision	J64
S37	53.90	766.55	5.00	2.2970	Industrial_Subdivision	J68
S4	54.83	789.28	5.00	2.0740	Industrial_Subdivision	J21
S5	35.93	867.44	70.00	4.2400	Industrial_Subdivision	OF1
S6	56.20	724.11	25.00	3.3590	Industrial_Subdivision	J38
S7	58.05	1100.81	25.00	3.4430	Industrial_Subdivision	J73
S8	36.85	370.69	5.00	2.0080	Industrial_Subdivision	J31
S9	72.74	618.46	5.00	2.0300	Industrial_Subdivision	J42

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
J1	JUNCTION	343.56	2.00	0.0	
J13	JUNCTION	357.07	3.00	0.0	
J16	JUNCTION	344.71	4.00	0.0	
J17	JUNCTION	372.36	3.00	0.0	
J18	JUNCTION	346.41	3.00	0.0	
J2	JUNCTION	343.70	2.00	0.0	
J21	JUNCTION	369.00	3.00	0.0	
J22	JUNCTION	355.76	3.00	0.0	
J23	JUNCTION	355.35	3.00	0.0	
J24	JUNCTION	368.85	3.00	0.0	
J26	JUNCTION	368.55	3.00	0.0	
J28	JUNCTION	369.52	3.00	0.0	
J3	JUNCTION	343.54	2.00	0.0	
J30	JUNCTION	369.22	3.00	0.0	
J31	JUNCTION	370.91	3.00	0.0	
J32	JUNCTION	364.91	3.00	0.0	
J33	JUNCTION	364.88	3.00	0.0	
J35	JUNCTION	363.49	3.42	0.0	
J37	JUNCTION	363.16	4.18	0.0	
J38	JUNCTION	365.47	3.00	0.0	
J4	JUNCTION	343.74	2.00	0.0	
J40	JUNCTION	361.70	3.00	0.0	
J42	JUNCTION	371.33	3.00	0.0	
J45	JUNCTION	372.03	3.00	0.0	

J47	JUNCTION	347.87	3.00	0.0
J49	JUNCTION	357.12	3.00	0.0
J52	JUNCTION	367.53	3.00	0.0
J6	JUNCTION	355.86	3.00	0.0
J60	JUNCTION	344.92	4.00	0.0
J62	JUNCTION	346.16	3.00	0.0
J64	JUNCTION	347.02	3.00	0.0
J66	JUNCTION	347.29	3.00	0.0
J68	JUNCTION	347.62	3.00	0.0
J70	JUNCTION	346.99	3.00	0.0
J72	JUNCTION	344.18	3.50	0.0
J73	JUNCTION	359.64	3.00	0.0
J75	JUNCTION	344.59	3.50	0.0
J76	JUNCTION	349.72	3.00	0.0
J79	JUNCTION	346.72	3.00	0.0
J81	JUNCTION	344.06	3.50	0.0
J82	JUNCTION	343.70	3.77	0.0
J9	JUNCTION	374.76	3.00	0.0
OF1	OUTFALL	343.39	3.50	0.0

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J81	J82	CONDUIT	398.1	0.0216	0.0130
C10	J62	J60	CONDUIT	540.6	0.2285	0.0130
C107	J4	J2	CONDUIT	13.1	0.3046	0.0130
C11	J38	J73	CONDUIT	939.2	0.6203	0.0130
C12	J70	J62	CONDUIT	378.6	0.2208	0.0130
C13	J52	J73	CONDUIT	1002.5	0.7869	0.0130
C14	J42	J38	CONDUIT	708.4	0.8282	0.0130
C15	J26	J52	CONDUIT	189.2	0.5381	0.0130
C16	J31	J42	CONDUIT	209.4	-0.2025	0.0130
C17	J21	J40	CONDUIT	1862.9	0.3921	0.0130
C18	J47	J72	CONDUIT	628.7	0.5871	0.0130
C19	J64	J70	CONDUIT	203.1	0.0138	0.0130
C2	J1	J3	CONDUIT	22.5	0.1243	0.0130
C20	J66	J64	CONDUIT	131.6	0.2022	0.0130
C21	J17	J31	CONDUIT	254.4	0.5700	0.0130
C22	J37	J70	CONDUIT	1572.4	1.1033	0.0130
C23	J35	J37	CONDUIT	15.0	-2.8969	0.0130
C24	J68	J66	CONDUIT	567.9	0.0579	0.0130
C25	J33	J35	CONDUIT	94.2	1.0296	0.0130
C26	J32	J33	CONDUIT	12.7	0.2747	0.0130
C27	J9	J21	CONDUIT	1033.7	0.5572	0.0130
C28	J82	OF1	CONDUIT	149.7	0.2098	0.0130
C3	J72	J81	CONDUIT	429.3	0.0275	0.0130
C31	J79	J75	CONDUIT	284.1	0.7493	0.0130
C31_1	J13	J6	CONDUIT	63.2	1.9145	0.0130
C33	J79	J18	CONDUIT	24.9	1.2597	0.0130
C34	J22	J23	CONDUIT	63.6	0.6457	0.0130
C35	J24	J26	CONDUIT	22.3	1.3574	0.0130
C36	J28	J30	CONDUIT	14.6	2.0524	0.0130
C37	J32	J33	CONDUIT	13.8	0.2533	0.0130
C38	J35	J37	CONDUIT	18.6	1.7900	0.0130
C39	J6	J82	CONDUIT	817.6	1.4536	0.0130
C4	J75	J72	CONDUIT	1369.6	0.0304	0.0130
C40	J16	J75	CONDUIT	105.6	0.1060	0.0130
C41	J60	J16	CONDUIT	271.4	0.0792	0.0130
C42	J45	J26	CONDUIT	678.1	0.5141	0.0130
C5	J76	J79	CONDUIT	494.4	0.6062	0.0130
C6	J49	J76	CONDUIT	513.6	1.4407	0.0130
C7	J22	J76	CONDUIT	646.3	0.9348	0.0130
C8	J40	J13	CONDUIT	616.8	0.7507	0.0130
C9	J73	J22	CONDUIT	560.6	0.6921	0.0130

Cross Section Summary

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	81.38
C10	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	183.98
C107	HORIZ_ELLIPSE	2.00	5.08	0.61	3.60	1	15.54
C11	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	303.16
C12	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	180.89
C13	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	341.45
C14	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	350.29
C15	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	282.35
C16	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.21
C17	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	241.04
C18	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	294.94
C19	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	45.19
C2	HORIZ_ELLIPSE	2.00	5.08	0.61	4.00	1	9.93
C20	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	173.08
C21	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	290.61
C22	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	404.30
C23	CIRCULAR	3.00	7.07	0.75	3.00	1	76.41
C24	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	92.65
C25	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	390.57
C26	CIRCULAR	3.00	7.07	0.75	3.00	1	23.53
C27	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	287.33
C28	TRAPEZOIDAL	3.50	47.25	1.88	24.00	1	253.61
C3	TRAPEZOIDAL	3.00	37.50	1.67	21.50	1	67.29
C31	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	218.30
C31_1	HORIZ_ELLIPSE	2.60	8.58	0.80	3.00	1	78.44
C33	CIRCULAR	3.00	7.07	0.75	3.00	1	50.38
C34	CIRCULAR	3.00	7.07	0.75	3.00	1	36.07
C35	HORIZ_ELLIPSE	3.00	11.42	0.92	3.00	1	96.73

C36	CIRCULAR	3.00	7.07	0.75	3.00	1	64.31
C37	CIRCULAR	3.00	7.07	0.75	3.00	1	22.59
C38	CIRCULAR	3.00	7.07	0.75	3.00	1	60.06
C39	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	464.08
C4	TRAPEZOIDAL	3.50	49.00	1.91	24.50	1	101.19
C40	CIRCULAR	3.00	7.07	0.75	3.00	1	14.62
C41	TRAPEZOIDAL	4.00	64.00	2.18	28.00	1	233.30
C42	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	275.99
C5	TRAPEZOIDAL	2.50	26.25	1.40	18.00	1	196.36
C6	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	462.00
C7	TRAPEZOIDAL	2.50	25.00	1.37	17.50	1	228.86
C8	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	333.50
C9	TRAPEZOIDAL	3.00	36.00	1.64	21.00	1	320.23

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 CMS
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 10/10/2024 00:00:00
Ending Date 10/12/2024 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00
Wet Time Step 00:01:00
Dry Time Step 00:05:00
Routing Time Step 5.00 sec
Variable Time Step YES
Maximum Trials 8
Number of Threads 8
Head Tolerance 0.001500 m

*****	Volume	Depth
Runoff Quantity Continuity	hectare-m	mm
*****	-----	-----
Total Precipitation	466.079	284.863
Evaporation Loss	0.000	0.000
Infiltration Loss	111.704	68.272
Surface Runoff	295.647	180.697
Final Storage	58.974	36.044
Continuity Error (%)	-0.053	

*****	Volume	Volume
Flow Routing Continuity	hectare-m	10^6 ltr
*****	-----	-----
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	295.372	2953.748
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	278.334	2783.372
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.002
Final Stored Volume	17.425	174.254
Continuity Error (%)	-0.131	

Highest Continuity Errors

Node J60 (2.42%)
Node J21 (1.88%)
Node J72 (1.87%)
Node J75 (1.61%)
Node J62 (1.50%)

Time-Step Critical Elements

Link C38 (33.56%)
Link C26 (25.31%)

Highest Flow Instability Indexes

Link C38 (11)
Link C23 (5)
Link C22 (3)
Link C33 (1)

Routing Time Step Summary

Minimum Time Step : 0.50 sec
Average Time Step : 4.51 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 : 89.97 %
3.155 - 1.991 sec : 9.93 %
1.991 - 1.256 sec : 0.05 %
1.256 - 0.792 sec : 0.03 %
0.792 - 0.500 sec : 0.03 %

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 CMS	Runoff Coeff
S1	284.86	0.00	0.00	64.56	14.12	164.27	178.39	81.04	4.42	0.626
S10	284.86	0.00	0.00	40.77	112.22	115.13	227.35	45.50	2.56	0.798
S11	284.86	0.00	0.00	13.59	224.53	41.50	266.03	127.46	6.94	0.934
S12	284.86	0.00	0.00	47.57	84.58	139.72	224.30	57.15	3.38	0.787
S13	284.86	0.00	0.00	81.28	14.07	110.08	124.15	201.98	12.02	0.436
S14	284.86	0.00	0.00	13.59	225.55	42.03	267.59	28.26	1.53	0.939
S15	284.86	0.00	0.00	81.28	14.12	150.88	165.00	92.49	5.25	0.579
S16	284.86	0.00	0.00	54.36	56.14	137.80	193.94	81.45	4.37	0.681
S17	284.86	0.00	0.00	81.28	14.14	160.55	174.68	64.96	3.85	0.613
S18	284.86	0.00	0.00	81.28	14.13	159.53	173.67	94.70	5.58	0.610
S19	284.86	0.00	0.00	81.28	14.14	166.52	180.66	68.57	4.22	0.634
S2	284.86	0.00	0.00	98.26	14.12	133.23	147.36	114.84	6.83	0.517
S20	284.86	0.00	0.00	77.01	28.28	163.77	192.05	83.71	5.32	0.674
S21	284.86	0.00	0.00	93.09	27.85	67.29	95.14	52.88	3.11	0.334
S22	284.86	0.00	0.00	13.59	222.82	40.49	263.31	76.75	4.19	0.924
S23	284.86	0.00	0.00	64.56	14.12	164.09	178.21	90.72	4.95	0.626
S24	284.86	0.00	0.00	61.16	28.23	168.08	196.31	170.75	9.77	0.689
S25	284.86	0.00	0.00	81.28	14.15	171.26	185.41	80.72	5.15	0.651
S26	284.86	0.00	0.00	81.28	14.12	149.68	163.80	54.76	3.12	0.575
S27	284.86	0.00	0.00	81.28	14.13	155.45	169.58	98.46	5.67	0.595
S28	284.86	0.00	0.00	98.26	14.12	134.80	148.92	39.16	2.32	0.523
S29	284.86	0.00	0.00	81.28	14.16	178.17	192.33	7.17	0.48	0.675
S3	284.86	0.00	0.00	24.46	178.34	69.96	248.31	176.15	9.71	0.872
S30	284.86	0.00	0.00	81.28	14.14	162.74	176.88	15.41	0.93	0.621
S31	284.86	0.00	0.00	81.28	14.10	184.83	198.93	0.01	0.00	0.698
S32	284.86	0.00	0.00	81.28	14.16	178.67	192.83	2.93	0.20	0.677
S33	284.86	0.00	0.00	81.28	14.15	171.88	186.03	83.10	5.33	0.653
S34	284.86	0.00	0.00	81.28	14.15	172.47	186.63	65.89	4.24	0.655
S35	284.86	0.00	0.00	81.28	14.13	153.43	167.55	62.60	3.57	0.588
S36	284.86	0.00	0.00	81.28	14.13	157.22	171.35	34.52	2.01	0.602
S37	284.86	0.00	0.00	81.28	14.13	153.51	167.64	90.35	5.15	0.588
S4	284.86	0.00	0.00	49.33	14.13	183.28	197.41	108.25	5.76	0.693
S5	284.86	0.00	0.00	20.39	196.47	61.51	257.98	92.70	5.14	0.906
S6	284.86	0.00	0.00	50.97	70.28	139.36	209.64	117.82	6.59	0.736
S7	284.86	0.00	0.00	50.97	70.40	144.64	215.04	124.82	7.21	0.755
S8	284.86	0.00	0.00	81.28	14.11	142.83	156.94	57.83	3.33	0.551
S9	284.86	0.00	0.00	81.28	14.11	137.97	152.07	110.61	6.42	0.534

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	0.00	0.00	343.56	0 00:00	0.00
J13	JUNCTION	0.71	2.67	359.74	1 22:05	2.67
J16	JUNCTION	0.95	3.75	348.46	1 23:02	3.75
J17	JUNCTION	0.12	0.51	372.87	1 23:01	0.51
J18	JUNCTION	0.73	2.16	348.57	1 23:02	2.16
J2	JUNCTION	0.00	0.00	343.70	0 00:00	0.00
J21	JUNCTION	0.18	0.68	369.68	1 23:01	0.68
J22	JUNCTION	0.35	1.30	357.06	1 22:05	1.30
J23	JUNCTION	0.75	1.71	357.06	1 22:05	1.71
J24	JUNCTION	0.03	0.29	369.14	1 22:02	0.29
J26	JUNCTION	0.14	0.59	369.14	1 22:02	0.59
J28	JUNCTION	0.00	0.00	369.52	0 00:00	0.00
J3	JUNCTION	0.00	0.00	343.54	0 00:00	0.00
J30	JUNCTION	0.00	0.00	369.22	0 00:00	0.00
J31	JUNCTION	0.64	1.48	372.39	1 23:01	1.48
J32	JUNCTION	0.18	0.71	365.62	1 23:01	0.71
J33	JUNCTION	0.07	0.28	365.16	1 23:01	0.28
J35	JUNCTION	0.89	1.17	364.66	1 23:08	1.17
J37	JUNCTION	1.22	1.50	364.65	1 23:01	1.50
J38	JUNCTION	0.23	0.91	366.37	1 23:01	0.91
J4	JUNCTION	0.00	0.00	343.74	0 00:00	0.00
J40	JUNCTION	0.24	0.85	362.55	1 22:02	0.85
J42	JUNCTION	0.17	0.73	372.06	1 23:01	0.73
J45	JUNCTION	0.11	0.45	372.49	1 23:01	0.45
J47	JUNCTION	0.15	0.56	348.43	1 22:01	0.56
J49	JUNCTION	0.12	0.53	357.65	1 23:01	0.53
J52	JUNCTION	0.17	0.67	368.20	1 23:01	0.67
J6	JUNCTION	0.22	0.79	356.64	1 22:04	0.79

J60	JUNCTION	0.78	3.54	348.46	1	23:02	3.54
J62	JUNCTION	0.39	2.31	348.47	1	23:02	2.31
J64	JUNCTION	0.35	1.45	348.47	1	23:01	1.45
J66	JUNCTION	0.22	1.19	348.47	1	23:01	1.19
J68	JUNCTION	0.20	0.93	348.55	1	23:01	0.93
J70	JUNCTION	0.30	1.44	348.43	1	23:02	1.44
J72	JUNCTION	1.03	3.32	347.50	1	23:02	3.32
J73	JUNCTION	0.34	1.28	360.92	1	22:05	1.28
J75	JUNCTION	0.99	3.42	348.01	1	23:04	3.42
J76	JUNCTION	0.42	1.55	351.27	1	22:06	1.55
J79	JUNCTION	0.43	1.85	348.57	1	23:01	1.85
J81	JUNCTION	1.00	3.09	347.15	1	23:02	3.09
J82	JUNCTION	0.83	2.78	346.48	1	23:01	2.78
J9	JUNCTION	0.10	0.40	375.16	1	23:01	0.40
OF1	OUTFALL	0.82	2.78	346.17	1	23:01	2.78

Node Inflow Summary

Node	Type	Maximum	Maximum	Time of Max		Lateral	Total	Flow
		Lateral	Total			Inflow	Inflow	Balance
		Inflow	Inflow	Occurrence		Volume	Volume	Error
		CMS	CMS	days hr:min		10^6 ltr	10^6 ltr	Percent
J1	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J13	JUNCTION	3.382	24.831	1 22:01		57.1	460	0.898
J16	JUNCTION	0.195	29.364	1 23:01		2.93	519	1.108
J17	JUNCTION	6.830	6.830	1 23:01		115	115	0.215
J18	JUNCTION	0.000	0.013	1 21:36		0	0.081	0.000
J2	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J21	JUNCTION	5.759	10.056	1 22:01		108	188	1.912
J22	JUNCTION	5.323	52.603	1 22:04		83.7	936	0.378
J23	JUNCTION	0.000	0.028	1 21:11		0	0.167	0.000
J24	JUNCTION	0.000	0.002	1 21:06		0	0.00523	46.961
J26	JUNCTION	3.848	9.000	1 22:01		64.9	157	0.518
J28	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J3	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J30	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J31	JUNCTION	3.333	10.160	1 23:01		57.8	172	1.041
J32	JUNCTION	3.118	3.118	1 23:01		54.7	54.7	0.017
J33	JUNCTION	0.001	3.118	1 23:01		0.0135	54.7	0.084
J35	JUNCTION	0.925	3.992	1 22:01		15.4	76.3	0.189
J37	JUNCTION	0.000	3.986	1 22:01		0	76.2	0.961
J38	JUNCTION	6.593	22.261	1 23:01		118	397	0.767
J4	JUNCTION	0.000	0.000	0 00:00		0	0	0.000 ltr
J40	JUNCTION	12.277	21.841	1 22:01		222	406	0.845
J42	JUNCTION	6.420	16.563	1 23:01		110	281	0.477
J45	JUNCTION	5.253	5.253	1 23:01		92.4	92.4	0.511
J47	JUNCTION	8.558	8.558	1 22:01		158	158	0.328
J49	JUNCTION	12.023	12.023	1 23:01		202	202	0.308
J52	JUNCTION	4.949	13.798	1 22:01		90.6	247	0.597
J6	JUNCTION	1.531	25.537	1 22:01		28.2	484	0.261
J60	JUNCTION	7.593	29.461	1 22:57		122	529	2.476
J62	JUNCTION	4.242	23.096	1 23:01		65.8	413	1.521
J64	JUNCTION	2.006	10.452	1 22:45		34.5	185	0.494
J66	JUNCTION	3.569	8.612	1 22:45		62.5	152	0.830
J68	JUNCTION	5.154	5.154	1 22:01		90.3	90.3	0.891
J70	JUNCTION	5.670	19.887	1 23:01		98.4	352	1.430
J72	JUNCTION	9.774	115.820	1 23:01		171	2.08e+03	1.902
J73	JUNCTION	12.789	47.942	1 22:01		219	859	0.822
J75	JUNCTION	0.477	100.222	1 23:02		7.17	1.78e+03	1.632
J76	JUNCTION	5.150	67.753	1 22:04		80.7	1.21e+03	0.524
J79	JUNCTION	3.112	70.671	1 23:01		52.8	1.26e+03	0.266
J81	JUNCTION	4.225	119.070	1 23:01		68.5	2.11e+03	0.845
J82	JUNCTION	6.938	147.111	1 23:01		127	2.7e+03	0.313
J9	JUNCTION	4.420	4.420	1 23:01		81	81	0.795
OF1	OUTFALL	5.141	150.779	1 23:01		92.7	2.78e+03	0.000

Node Surcharge Summary

No nodes were surcharged.

Node Flooding Summary

No nodes were flooded.

Outfall Loading Summary

Outfall Node	Flow	Avg	Max	Total
	Freq	Flow	Flow	Volume
	Pcnt	CMS	CMS	10^6 ltr
OF1	99.96	22.634	150.779	2783.359
System	99.96	22.634	150.779	2783.359

Link Flow Summary

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

C1	CONDUIT	119.011	1	23:03	3.50	1.46	0.83
C10	CONDUIT	22.874	1	23:04	0.98	0.12	0.89
C107	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C11	CONDUIT	22.226	1	23:01	3.26	0.07	0.36
C12	CONDUIT	19.673	1	23:01	2.15	0.11	0.63
C13	CONDUIT	13.779	1	23:01	2.40	0.04	0.32
C14	CONDUIT	16.543	1	23:01	3.71	0.05	0.27
C15	CONDUIT	8.943	1	22:02	2.90	0.03	0.21
C16	CONDUIT	10.144	1	23:01	1.46	0.06	0.37
C17	CONDUIT	9.999	1	23:01	2.59	0.04	0.25
C18	CONDUIT	8.511	1	22:01	0.62	0.03	0.59
C19	CONDUIT	10.409	1	23:01	1.40	0.23	0.48
C2	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C20	CONDUIT	8.524	1	23:02	1.29	0.05	0.44
C21	CONDUIT	6.827	1	23:01	1.15	0.02	0.33
C22	CONDUIT	3.958	1	23:01	1.09	0.01	0.29
C23	CONDUIT	0.353	1	21:02	0.60	0.00	0.18
C24	CONDUIT	5.092	1	22:45	1.05	0.05	0.35
C25	CONDUIT	3.118	1	23:01	1.33	0.01	0.17
C26	CONDUIT	1.559	1	23:01	2.04	0.07	0.17
C27	CONDUIT	4.416	1	23:01	1.76	0.02	0.18
C28	CONDUIT	147.069	1	23:01	4.68	0.58	0.79
C3	CONDUIT	115.494	1	23:03	3.08	1.72	1.00
C31	CONDUIT	70.605	1	23:02	3.43	0.32	0.87
C31_1	CONDUIT	24.311	1	22:05	3.97	0.31	0.65
C33	CONDUIT	0.013	1	21:36	0.03	0.00	0.67
C34	CONDUIT	0.028	1	21:11	0.06	0.00	0.50
C35	CONDUIT	0.002	1	21:06	0.00	0.00	0.15
C36	CONDUIT	0.000	0	00:00	0.00	0.00	0.00
C37	CONDUIT	1.559	1	23:01	2.04	0.07	0.17
C38	CONDUIT	3.832	1	23:08	1.27	0.06	0.44
C39	CONDUIT	25.524	1	22:04	2.10	0.05	0.54
C4	CONDUIT	99.967	1	23:04	2.19	0.99	0.96
C40	CONDUIT	29.440	1	23:17	4.16	2.01	1.00
C41	CONDUIT	29.220	1	23:01	0.59	0.13	0.91
C42	CONDUIT	5.249	1	23:01	2.21	0.02	0.17
C5	CONDUIT	67.675	1	22:06	5.35	0.34	0.68
C6	CONDUIT	12.003	1	23:01	1.98	0.03	0.35
C7	CONDUIT	52.560	1	22:05	5.43	0.23	0.57
C8	CONDUIT	21.521	1	22:02	1.51	0.06	0.59
C9	CONDUIT	47.609	1	22:05	5.38	0.15	0.43

Flow Classification Summary

Conduit	Adjusted /Actual Length	----- Fraction of Time in Flow Class -----								
		Up		Down	Sub	Sup	Up	Down	Norm	Inlet
		Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C10	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.91	0.00
C107	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.00	0.00	0.00	0.72	0.28	0.00	0.00	1.00	0.00
C12	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.95	0.00
C13	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C14	1.00	0.00	0.00	0.00	0.38	0.62	0.00	0.00	1.00	0.00
C15	1.00	0.00	0.00	0.00	0.47	0.53	0.00	0.00	0.95	0.00
C16	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.08	0.00
C17	1.00	0.00	0.00	0.00	0.84	0.16	0.00	0.00	1.00	0.00
C18	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.98	0.00
C19	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.84	0.00
C21	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.99	0.00
C22	1.00	0.00	0.07	0.00	0.93	0.00	0.00	0.00	0.92	0.00
C23	1.00	0.03	0.05	0.00	0.91	0.00	0.01	0.00	0.00	0.53
C24	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.10	0.00
C25	1.00	0.00	0.00	0.00	0.97	0.00	0.00	0.03	0.97	0.00
C26	1.00	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.00	0.63
C27	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.96	0.00
C28	1.00	0.00	0.00	0.00	0.72	0.28	0.00	0.00	0.06	0.00
C3	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.00	0.00	0.00	0.97	0.03	0.00	0.00	0.91	0.00
C31_1	1.00	0.00	0.00	0.00	0.14	0.86	0.00	0.00	0.00	1.00
C33	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.03
C34	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.04
C35	1.00	0.00	0.81	0.00	0.19	0.00	0.00	0.00	0.00	0.00
C36	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	0.00	0.00	0.00	0.02	0.98	0.00	0.00	0.00	0.61
C38	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.07
C39	1.00	0.00	0.00	0.00	0.49	0.21	0.00	0.30	0.66	0.00
C4	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.75	0.00
C40	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.02
C41	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.30	0.00
C42	1.00	0.00	0.00	0.00	0.78	0.22	0.00	0.00	0.98	0.00
C5	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.05	0.00
C6	1.00	0.00	0.00	0.00	0.98	0.02	0.00	0.00	0.99	0.00
C7	1.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.98	0.00
C8	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00
C9	1.00	0.00	0.00	0.00	0.01	0.99	0.00	0.00	0.94	0.00

Conduit Surcharge Summary

Conduit	-----			Hours	Hours
	----- Hours Full -----		-----	Above Full	Capacity
	Both Ends	Upstream		Normal Flow	Limited
C1	0.01	0.01	0.01	2.29	0.01
C10	0.01	0.01	1.99	0.01	0.01
C18	0.01	0.01	1.81	0.01	0.01
C3	1.26	1.81	1.26	2.46	1.26
C31	0.01	0.01	2.65	0.01	0.01
C31_1	0.01	0.38	0.01	0.01	0.01
C40	2.09	2.32	2.09	2.52	2.09

Analysis begun on: Thu Jan 8 14:08:27 2026
Analysis ended on: Thu Jan 8 14:08:29 2026
Total elapsed time: 00:00:02

APPENDIX C

Downstream Boundary Condition
Culvert Exit Loss Coefficient
Culvert Entrance Loss Coefficient
Culvert Manning's Roughness n

Steady Flow Data

River Reach Data [2 Profiles]

Downstream Boundary Conditions Upstream Boundary Conditions Flow Data Interior Change Gate Openings

Select river reach

River name: Main Drain

Reach name: 1 Pick

Profile	Profile Name	Boundary Condition	Boundary Details
1	100-Year	Water Surface Elev	Known WSEL = 346
2	Hurricane_Hazel	Water Surface Elev	Known WSEL = 346
3			
4			
5			
6			
7			

Downstream Boundary Condition

Culvert Exit Loss Coefficients

Culvert Exit Loss Coefficients

Exit losses are computed as a coefficient times the change in velocity head from just inside the culvert, at the downstream end, to the cross section just downstream of the culvert. The equation for computing exit losses is as follows:

$$h_{ex} = k_{ex} \left(\frac{a_{ex} V_{ex}^2}{2g} - \frac{a_2 V_2^2}{2g} \right)$$

Where:

- h_{ex} = Energy loss due to exit
- k_{ex} = Exit loss coefficient
- V_{ex} = Velocity inside of culvert at exit

For a sudden expansion of flow, such as in a typical culvert, the exit loss coefficient k_{ex} is normally set to 1.0. In general, exit loss coefficients can vary between 0.3 to 1.0. The exit loss coefficient should be reduced as the transition becomes less abrupt.

Source: HEC-RAS Reference Manual

Culvert Exit Loss Coefficient

Culvert Entrance Loss Coefficients	
Culvert Type and Entrance Design	Loss Coefficient
Pipe, Concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, square cut end	0.5
Headwall or headwall with wingwalls	
Socket end of pipe (groove-end)	0.2
Square-edge	0.5
Rounded (radius = 1/12 barrel diameter)	0.2
Mitered to conform to fill slope	0.7
End section conforming to fill slope ¹	0.5
Beveled edges, 33.7° or 45° angle	0.2
Side-tapered or slope-tapered inlet	0.2
Pipe or Pipe Arch, Corrugated Metal	
Project from fill (no headwall)	0.9
Headwall or headwall with wingwalls square edge	0.5
Mitered to conform to fill slope, paved or unpaved slope	0.7
End section conforming to fill slope ¹	0.5
Beveled edges, 33.7° or 45° angle	0.2
Side-tapered or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges (radius = 1/12 barrel diameter)	0.2
Beveled edges on 3 sides	0.2
Wingwalls at 30° or 75° angle to barrel	
Square-edged at crown	0.4
Crown edge rounded (radius = 1/12 barrel diameter)	0.2
Beveled top edge	0.2
Wingwalls at 10° or 25° angle to barrel	
Square-edged at crown	0.5
Wingwalls parallel (extension of sides)	
Square-edged at crown	0.7
Side-tapered or slope-tapered inlet	0.2
Source: Normann, J. M., Houghtalen, R. J., and Johnston, W. J., 1985, "Hydraulic Design of Highway Culverts," Hydraulic Design Series No. 5, FHWA Federal Highway Administration, McLean, VA	
1. "End-section conforming to fill slope" made of either metal or concrete are the sections commonly	

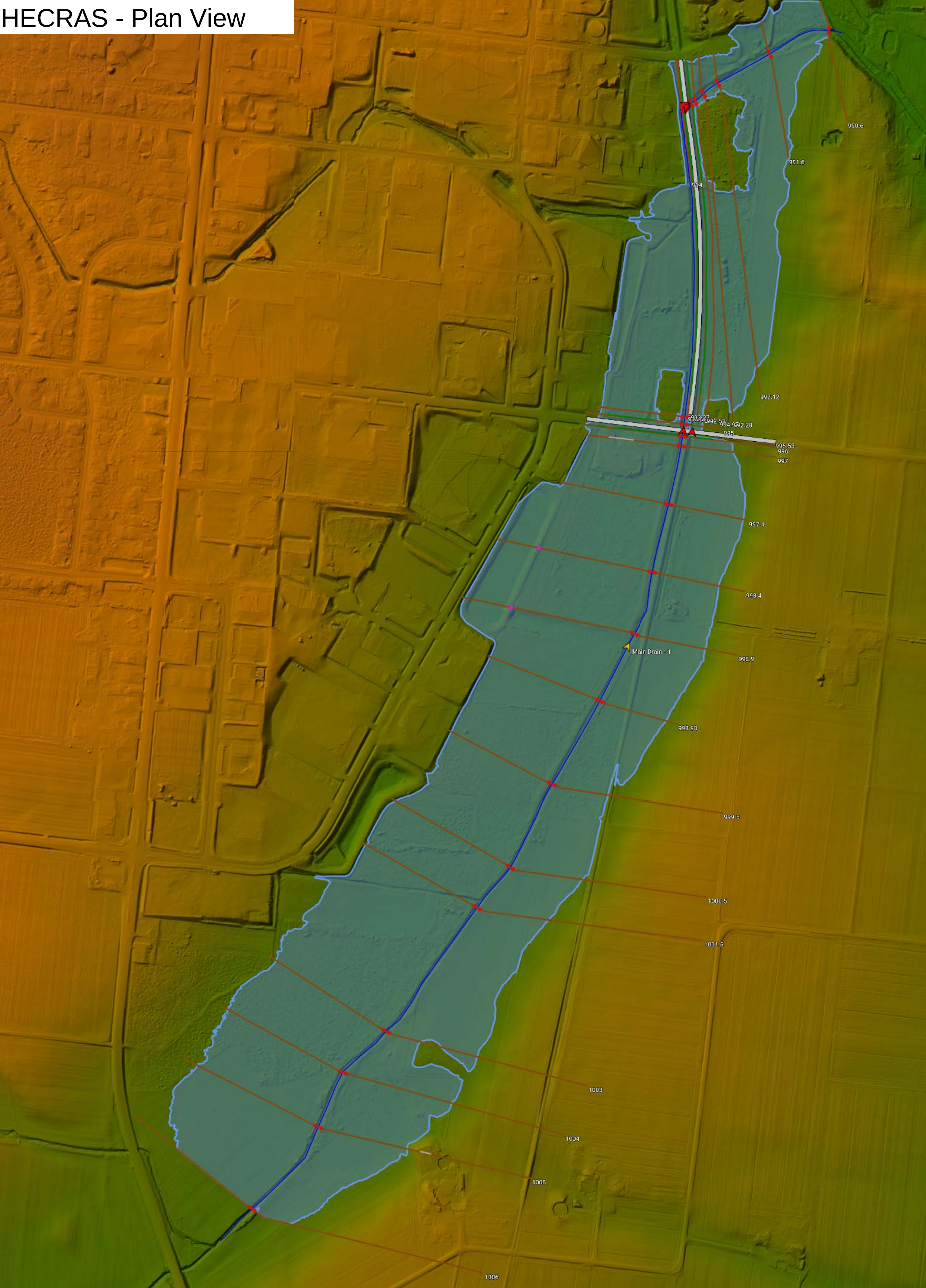
Culvert Entrance Loss Coefficient

Culvert Manning's Roughness n			
Type of Pipe and Description	Minimum	Normal	Maximum
A. Manning's "n" for Closed Conduits Flowing Partly Full¹			
1. Corrugated Metal			
a. Subdrain	0.017	0.019	0.021
b. Storm Drain	0.021	0.024	0.030
2. Cement			
a. Neat, surface	0.010	0.011	0.013
b. Mortar	0.011	0.013	0.015
3. Concrete			
a. Culvert, straight and free of debris	0.010	0.011	0.013
b. Culvert with bends, connections, and some debris	0.011	0.013	0.014
c. Finished	0.011	0.012	0.014
d. Sewer with manholes, inlet, etc., straight	0.013	0.015	0.017
e. Unfinished, steel form	0.012	0.013	0.014
f. Unfinished, smooth wood form	0.012	0.014	0.016
g. Unfinished, rough wood form	0.015	0.017	0.020
4. Brickwork			
a. Glazed	0.011	0.013	0.015
b. Lined with cement mortar	0.012	0.015	0.017
c. Sanitary sewers coated with sewage slime with bends and connections	0.012	0.013	0.016
d. Paved invert, sewer, smooth bottom	0.016	0.019	0.020
e. Rubble masonry, cemented	0.018	0.025	0.030
Type of Pipe and Diameter	Unpaved	25% Paved	Fully Paved
B. Manning's "n" for Corrugated Metal Pipe²			
1. Annular 2.67 x 2 in. (all diameters)	0.024	0.021	0.021
2. Helical 1.50 x 1/4 in.			
a. 8 inch diameter	0.012		
b. 10 inch diameter	0.014		
3. Helical 2.67 x 2 in.			
a. 12 inch diameter	0.011		
b. 18 inch diameter	0.014		

Culvert Manning's Roughness n

APPENDIX D

HECRAS Plan View of the Model
HECRAS Output Summary Table



HEC-RAS Plan: Default Scenario River: Main Drain Reach: 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	1006	100-Year	40.71	344.21	346.39		346.40	0.000267	0.61	96.45	189.77	0.17
1	1006	Hurricane_Hazel	99.97	344.21	346.70		346.72	0.000383	0.84	164.07	245.47	0.21
1	1005	100-Year	40.71	344.37	346.39		346.39	0.000006	0.10	412.82	404.87	0.03
1	1005	Hurricane_Hazel	99.97	344.37	346.70		346.71	0.000015	0.18	540.05	416.18	0.04
1	1004	100-Year	40.71	344.19	346.39		346.39	0.000006	0.11	482.22	436.00	0.03
1	1004	Hurricane_Hazel	99.97	344.19	346.70		346.70	0.000016	0.20	619.74	455.39	0.05
1	1003	100-Year	40.71	344.20	346.39		346.39	0.000023	0.22	297.70	303.27	0.05
1	1003	Hurricane_Hazel	99.97	344.20	346.70		346.70	0.000063	0.40	403.14	374.86	0.09
1	1001.5	100-Year	40.71	344.15	346.39		346.39	0.000012	0.16	373.34	315.80	0.04
1	1001.5	Hurricane_Hazel	99.97	344.15	346.68		346.69	0.000035	0.31	468.33	322.86	0.07
1	1000.5	100-Year	40.71	344.24	346.39		346.39	0.000009	0.14	404.57	320.19	0.03
1	1000.5	Hurricane_Hazel	99.97	344.24	346.68		346.68	0.000029	0.28	500.36	327.23	0.06
1	999.5	100-Year	40.71	344.22	346.38		346.38	0.000026	0.24	292.61	274.57	0.06
1	999.5	Hurricane_Hazel	99.97	344.22	346.67		346.68	0.000072	0.45	372.39	276.32	0.10
1	998.98	100-Year	40.71	344.07	346.38		346.38	0.000006	0.13	487.45	335.61	0.03
1	998.98	Hurricane_Hazel	99.97	344.07	346.67		346.67	0.000022	0.26	584.65	343.76	0.06
1	998.9	100-Year	40.71	344.06	346.38	344.88	346.38	0.000005	0.12	473.78	358.69	0.03
1	998.9	Hurricane_Hazel	99.97	344.06	346.67	345.03	346.67	0.000012	0.19	718.46	451.76	0.04
1	998.4	100-Year	40.71	344.08	346.38	344.77	346.38	0.000004	0.10	511.41	330.50	0.02
1	998.4	Hurricane_Hazel	99.97	344.08	346.66	344.91	346.67	0.000010	0.18	726.27	413.50	0.04
1	997.4	100-Year	40.71	344.00	346.38		346.38	0.000005	0.11	472.75	326.07	0.03
1	997.4	Hurricane_Hazel	99.97	344.00	346.66		346.66	0.000017	0.23	566.31	334.71	0.05
1	997	100-Year	50.65	344.01	346.37		346.38	0.000058	0.38	211.79	216.45	0.09
1	997	Hurricane_Hazel	119.01	344.01	346.64		346.66	0.000148	0.66	271.34	221.58	0.14
1	996	100-Year	50.65	345.24	346.37	345.88	346.38	0.000049	0.23	255.63	252.31	0.07
1	996	Hurricane_Hazel	119.01	345.24	346.64	345.88	346.65	0.000132	0.45	326.20	272.63	0.13
1	995.53	Culvert										
1	995	100-Year	50.65	344.02	346.07		346.09	0.000372	0.80	107.72	135.56	0.21
1	995	Hurricane_Hazel	119.01	344.02	346.18		346.24	0.001603	1.75	123.28	158.34	0.44
1	994.97	100-Year	50.65	343.99	346.07		346.08	0.000211	0.63	130.56	129.49	0.16
1	994.97	Hurricane_Hazel	119.01	343.99	346.17		346.22	0.000907	1.37	144.08	140.88	0.33
1	994	100-Year	76.06	343.22	346.07		346.07	0.000007	0.17	457.80	220.93	0.03
1	994	Hurricane_Hazel	150.80	343.22	346.18		346.18	0.000022	0.31	481.14	221.59	0.06
1	993.62	100-Year	76.06	343.41	346.07	345.60	346.07	0.000012	0.20	757.76	651.04	0.04
1	993.62	Hurricane_Hazel	150.80	343.41	346.18	345.60	346.18	0.000037	0.36	827.33	652.75	0.07
1	993.27	Culvert										
1	992.62	100-Year	76.06	343.05	346.03	345.30	346.03	0.000005	0.14	1010.77	655.89	0.03
1	992.62	Hurricane_Hazel	150.80	343.05	346.13	345.58	346.13	0.000016	0.25	1071.48	656.24	0.05
1	992.52	100-Year	76.06	343.10	346.03		346.03	0.000014	0.23	660.87	511.38	0.05
1	992.52	Hurricane_Hazel	150.80	343.10	346.12		346.13	0.000044	0.42	707.49	514.98	0.08
1	992.28	100-Year	76.06	343.13	346.03		346.03	0.000016	0.23	598.23	455.48	0.05
1	992.28	Hurricane_Hazel	150.80	343.13	346.12		346.13	0.000050	0.43	639.10	456.51	0.09
1	992.12	100-Year	76.06	343.20	346.03		346.03	0.000015	0.23	571.27	408.73	0.05
1	992.12	Hurricane_Hazel	150.80	343.20	346.12		346.12	0.000048	0.42	607.14	411.71	0.08
1	991.6	100-Year	76.06	342.91	346.03		346.03	0.000051	0.43	282.01	255.84	0.09
1	991.6	Hurricane_Hazel	150.80	342.91	346.10		346.11	0.000163	0.78	300.49	255.95	0.16
1	990.6	100-Year	76.06	342.89	346.00	344.50	346.02	0.000148	0.75	142.71	69.45	0.15
1	990.6	Hurricane_Hazel	150.80	342.89	346.00	344.79	346.06	0.000582	1.48	142.71	69.45	0.29

APPENDIX E

Existing Culvert Photographs

Culvert 1



December 24, 2024 3:50 p.m.

Culvert 2



December 24, 2024 1:55 p.m.

Culvert 3



Culvert 2 & 3



Culvert 3 (3 barrels)



December 24, 2024 2:31 p.m.