Functional Servicing and Stormwater Management Design Report

302-306 Edinburgh Road South

City of Guelph, Ontario

Submitted to:
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January 14, 2025
Project No. 2408455

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Senior Project Manager

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1. Introduction

This Functional Servicing and Stormwater Management Design Report has been prepared to document the proposed site servicing and stormwater management design for the residential development at 302-306 Edinburgh Road South in the City of Guelph.

The Owner is required to have a Professional Engineer design a stormwater management system and have the said Engineer supervise and certify that the stormwater management system was installed in accordance with the approvals issued by the City of Guelph.

Topographic survey was completed by Van Harten Land Surveyors in November 2024. The Site Grading and Servicing Plans have been prepared by GEI Consultants Canada Ltd. dated January 2025.

2. Site Information

The site (302-306 Edinburgh Road South) consists of two (2) existing residential buildings along with the associated driveways. The site is approximately 0.364 ha in size and is located along Edinburgh Road South, approximately 70m east of the intersection of Edinburgh Road South and Young Street.

The site is bound by existing residential development to the north, east and west and Edinburgh Road South to the south.

3. Proposed Development

This proposed development consists of four (4) semi-detached dwellings (8 units total, each with a basement), along with driveway access to Edinburgh Road South.

3.1. Sanitary Servicing

The existing dwellings at 302-306 Edinburgh Road South are serviced by individual sanitary service laterals extended from the existing 300mm diameter sanitary sewer located on Edinburgh Road South.

Sanitary service for the proposed development will be provided via the extension of eight (8) 100mm diameter sanitary service laterals extended from the existing 300mm diameter sanitary sewer on Edinburgh Road South.

The following table summarizes the flows discharging from the site to the municipal sanitary sewer system. Sanitary sewer design sheets are found in Appendix A.

Table No. 1: Anticipated Sanitary Design Flows to Edinburgh Road South

	Anticipated Sanitary Design Flow
Average Domestic Sanitary Sewer Flow (16 units @ 3.4 people per unit, @ 300 L/capita/day)	0.000194 m^3/s
Peak Sanitary Sewer Flow (PF=4, based on Harmon's Formula)	0.000778 m^3/s
Extraneous Flow	0.000091 m^3/s
Total Sanitary Flow	0.000869 m^3/s
Existing 300mm diameter Sanitary Sewer Capacity	**0.049 m^3/s**

Therefore, the anticipated sanitary sewer flow discharging to the existing 300mm diameter sanitary sewer on Edinburgh Road South is 0.000869m^3/s.

3.2. Storm Servicing

Currently, stormwater runoff generated from the site sheetflows overland towards the Edinburgh Road South right-of-way and to the adjacent properties to the north, east and west.

Following development, runoff generated from the rooftops and rear yard landscaped areas will be directed to proposed infiltration galleries located in the rear yard area. Any runoff exceeding the capacity of the proposed infiltration galleries will sheetflow overland to the Edinburgh Road South via a swale located along the west boundary of Parcel 1. Runoff generated from the front yard areas, and driveways will sheetflow overland to the Edinburgh Road South right-of-way.

The site's complete stormwater management design is described in Section 4.

3.3. Watermain Servicing

The existing dwellings at 302-306 Edinburgh Road South are currently serviced via individual water service laterals extended from the existing 200mm diameter watermain located on Edinburgh Road South.

Water service for the proposed development will be provided via the extension of eight (8) 50mm diameter water service laterals extended from the existing 200mm diameter watermain on Edinburgh Road South.

As per the City of Guelph Water and Wastewater Servicing Master Plan (dated June 5, 2023), the residential water servicing demand is 228 liters per capita per day (167 L/c/d residential + 61 L/c/day non-revenue water). Based on an occupancy of 4 people per unit, the total daily water demand per unit is 912 L/day. Therefore, the anticipated water demand is 14,592 L/day for the 16 units (8 units, each with a basement unit).

3.4. Foundation Drainage

Foundation drainage for the proposed development will be provided via sump pumps discharging to grade at the rear of each unit. No storm service laterals are proposed.

4. Stormwater Management

4.1. Design Criteria

From the City of Guelph Development Engineering Manual (dated October 2023), see Appendix G (Figure 4.2 Stormwater Control Criteria), 302-306 Edinburgh Road South is located within Policy Area 13. On this basis, the stormwater management criteria for the site are as follows:

1. Maintain predevelopment recharge rate, volume and hydroperiods under post-development conditions,
2. Provide a minimum of 5mm of volume control,
3. Provide an enhanced level water quality treatment and,
4. Control post-development peak flows to the pre-development level for all design storm events (2-100 year).

The City of Guelph Chicago Storm parameters used to model the 2-year to 100-year design storm events for the site are summarized in the following Table No. 2. These parameters are consistent with the City of Guelph Stormwater Management Master Plan (dated March 2023).

Table No. 2: City of Guelph - Chicago Storm Parameters

Coefficient	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
a	563.699	750.423	855.183	972.202	1054.539	1122.601
b	1.5	1.5	1.5	1.5	1.5	1.5
c	0.766	0.769	0.764	0.752	0.746	0.738
r	0.4	0.4	0.4	0.4	0.4	0.4
Duration (min)	240	240	240	240	240	240

The Horton infiltration method was used in the MIDUSS model. The following parameters summarized in Table No. 3 were used according to the City of Guelph Standards:

Table No. 3: MIDUSS Horton Parameters

	Impervious Areas	Pervious Areas
Maximum Infiltration (mm/hr)	0.0	75.0
Minimum Infiltration (mm/hr)	0.0	12.5
Lag Constant (hr)	0.00	0.25
Depression Storage (mm)	1.5	5.0

4.2. Existing Conditions

Under existing conditions, the 0.364-hectare site has been modelled as three (3) catchments (see Figure No. 1). The existing condition MIDUSS modelling files are included in Appendix B.

Catchment 101 (0.3270 hectares 38% impervious) represents the existing driveway, existing covered porch, existing walkway, existing landscaped area in the front yard, existing garage and shed in the rear yard and the existing building at 302 and 306 Edinburgh Road South. Runoff generated from this catchment currently sheetflows overland towards the Edinburgh Road South right-of-way.

Catchment 102 (0.0130 hectares 0% impervious) represents the existing landscaped area in the rear yard at 302 Edinburgh Road South. Runoff generated from this catchment currently sheetflows overland to the adjacent property to the west.

Catchment 103 (0.0240 hectares 0% impervious) represents the existing landscaped area and existing shed in the rear yard at 306 Edinburgh Road South. Runoff generated from this catchment currently sheetflows overland to the adjacent properties to the north and east.

4.2.1. Existing Condition Flow Rates

The hydrologic model MIDUSS was used to create the design storm runoff hydrographs and to route the hydrographs. A summary of the existing conditions peak flow rates from the site during the 2 to 100-year design storm events are provided in Table No. 4 below. The existing conditions MIDUSS output file is attached in Appendix B.

Table No. 4: Existing Condition Flow Rates

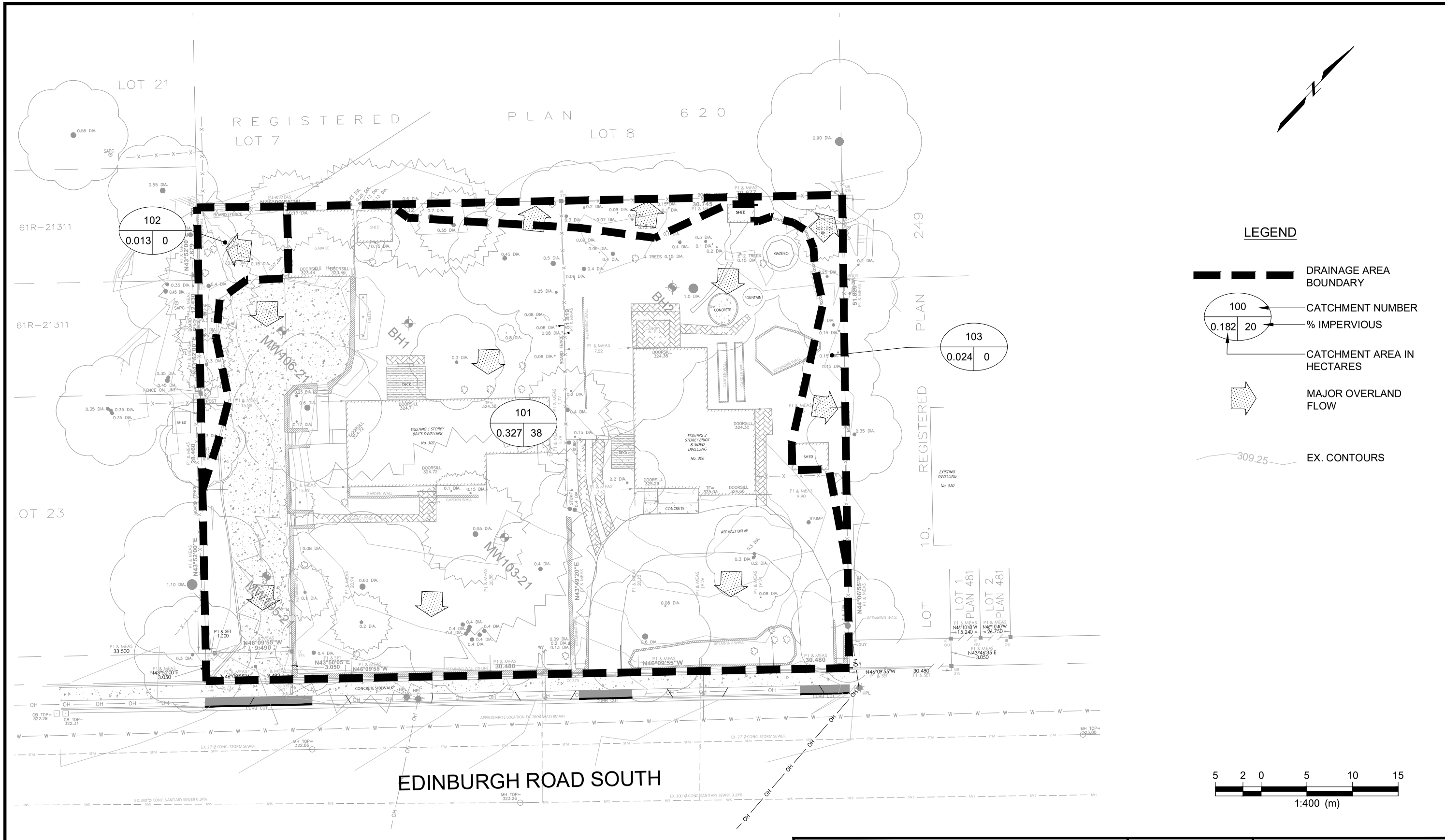
	Peak Flow Rate (m^3/sec)					
	2-Year	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**
Catchment 101	0.034	0.048	0.057	0.070	0.080	0.090
Catchment 102	0.000	0.001	0.001	0.002	0.002	0.003
Catchment 103	0.001	0.002	0.002	0.003	0.004	0.005
Total Flow from Site	**0.034**	**0.049**	**0.059**	**0.074**	**0.085**	**0.096**

4.3. Allowable Release Rates

The City of Guelph criteria for Policy Area 13 requires that all post-development peak flows generated from the site be controlled to the pre-development level for all design storm events (2-100 year). Therefore, the allowable release rates from the site are as follows:

Table No. 5: Allowable Flow Rates

	Peak Flow Rate (m^3/sec)					
	2-Year	**5-Year**	**10-Year**	**25-Year**	**50-Year**	**100-Year**
Total Flow from Site	0.034	0.049	0.059	0.074	0.085	0.096



LEGEND

- DRAINAGE AREA BOUNDARY
- 100 / 0.182 | 20 — CATCHMENT NUMBER; % IMPERVIOUS; CATCHMENT AREA IN HECTARES
- MAJOR OVERLAND FLOW
- 309.25 — EX. CONTOURS

5 2 0 5 10 15
1:400 (m)

SOURCE:

1. PLAN BASED ON MAP PREPARED BY VAN HARTEN SURVEYING INC.
2. SITE PLAN PREPARED BY GROEN DESIGN & DRAFTING SERVICES.

CITY OF GUELPH	GEI Consultants	EXISTING CONDITIONS DRAINAGE AREAS
302-306 EDINBURGH ROAD	PROJECT 2408455	2024-12-03 FIGURE # 1

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4.4. Post-Development Conditions

For post-development analysis purposes, 302-306 Edinburgh Road South (0.364 hectares) was modelled as three (3) drainage catchments. The post-development drainage catchments are shown on Figure No. 2. The post-development MIDUSS computer modeling and stage-storage-discharge tables are attached in Appendix B.

Catchment 201 (0.1150-hectares, 50% impervious) represents the front yards and driveways in the front of the proposed semi-detached dwellings. Runoff generated from Catchment 201 will sheetflow overland to the Edinburgh Road South right-of-way uncontrolled.

Catchment 202 (0.2488-hectares, 45% impervious) represents the rooftop and rear yard area of Parcel 1 to 8. Runoff from Catchment 202 will sheetflow overland to the proposed infiltration galleries in the rear yard of Parcel 1 to 8. Runoff from Catchment 202 which exceeds the capacity of the infiltration galleries will sheetflow overland to the Edinburgh Road South right-of-way vie swale located west of Parcel 1.

The infiltration galleries located in the rear yards of Parcel 1 to 8, provides a storage volume of 25.60 m^3. A blanket easement will be provided for drainage across Parcel 1 to 8. The alignment of infiltration galleries has shown on the engineering drawings.

All roof downspouts from Catchments 202 are to be directed to the rear yard areas. No roof downspouts are to be directed to the side yards. In addition to this, all runoff directed to the side yard area has been minimized to match existing drainage patterns.

Catchment 203 (0.0002-hectares, 0% impervious) represents the landscaped area in the rear yard of Parcel 1. Runoff generated from this catchment will sheetflow overland to the adjacent property to the west.

The parameters utilized in the Post-Development Condition Analysis are summarized in Table No. 6.

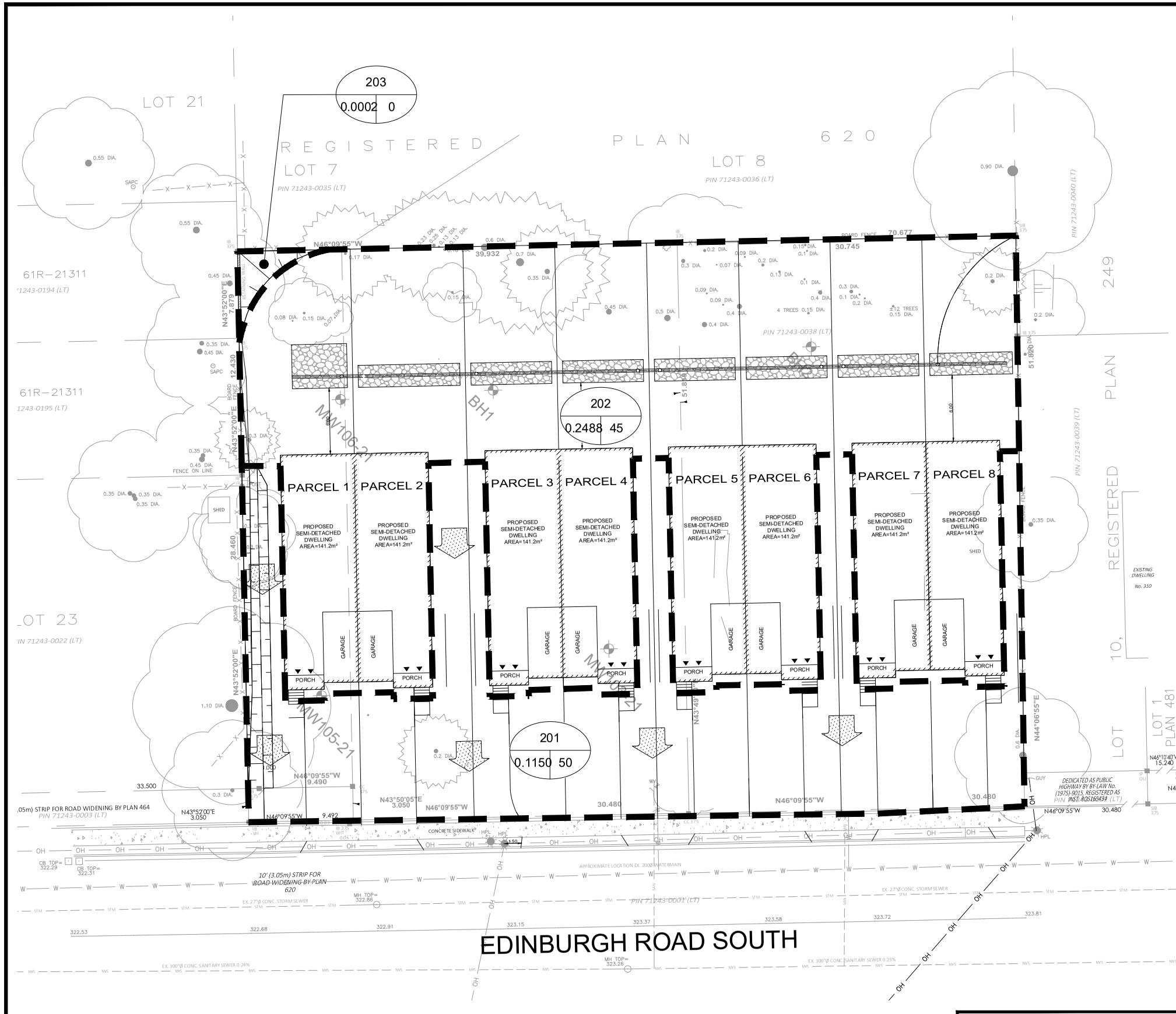
Table No. 6: Proposed Drainage Areas:

Catchment	Area (Hectares)	Impervious Area (Hectares)	Imperviousness (%)
Catchment 201	0.1150	0.0575	50
Catchment 202	0.2488	0.1120	45
Catchment 203	0.0002	0.0000	0

4.5. Routing – Post-Development Conditions

The hydrologic model MIDUSS was used to create the design storm runoff hydrographs and to route the hydrographs.

The routing results for the proposed underground infiltration galleries are summarized in Table No. 7 below.



SOURCE:

1. PLAN BASED ON MAP PREPARED BY VAN HARTEN SURVEYING INC.
2. SITE PLAN PREPARED BY GROEN DESIGN & DRAFTING SERVICES.

CITY OF GUELPH	GEI Consultants	POST DEVELOPMENT DRAINAGE AREAS
302-306 EDINBURGH ROAD	PROJECT 2408455	2025-01-09 FIGURE # 2

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Table No. 7: Infiltration Gallery No.1 to 8 (Catchment 202, Parcel 1 to 8) - Stage-Storage-Discharge Capacity

Storage and Control	Available Capacity			Actual Capacity Used		
	Peak Flow m^3/s	Storage Volume m^3	Storage Elevation m	Peak Flow m^3/s	Storage Volume m^3	Storage Elevation m
Bottom of Infiltration Galleries	0.000	0.000	321.450	---	---	---
Top of Infiltration Galleries	0.001	25.600	322.050	---	---	---
T/G of Inline Drain	0.001	26.313	323.310	---	---	---
2 Year	---	---	---	0.002	27.596	323.430
Weir	0.001	27.590	323.430	---	---	---
5 Year	---	---	---	0.015	27.849	323.446
10 Year	---	---	---	0.028	28.110	323.463
25 Year	---	---	---	0.040	28.566	323.492
50 Year	---	---	---	0.049	28.766	323.504
100 Year	---	---	---	0.056	29.033	323.521
Overflow	0.085	29.172	323.530	---	---	---

A summary of the post-development condition flow rates for the 2-year to 100-year design storm events are provided in Table No. 8 below:

Table No. 8: Post-Development Condition Flow Rates For 2 to 100 Year Design Storm Events

	Flow Rate (m^3/sec)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Catchment 201	0.015	0.022	0.026	0.031	0.035	0.039
Catchment 202	0.002	0.015	0.028	0.040	0.049	0.056
Catchment 203	0.000	0.000	0.000	0.000	0.000	0.000
Total	**0.017**	**0.023**	**0.043**	**0.059**	**0.071**	**0.081**

A comparison of the existing condition flow rates, allowable release rates and post-development flow rates from the site for the 2-year to 100-year design storm events are provided in Table No. 9 below.

Table No. 9: Comparison of Existing Peak Flows and Post-Development Flow Rate from The Site

	Flow Rate (m^3/sec)					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Existing Condition Total Flow off site	0.034	0.049	0.059	0.074	0.085	0.096
Allowable Release Rate	0.034	0.049	0.059	0.074	0.085	0.096
Post-Development Condition Total Flow off-site	0.017	0.023	0.043	0.059	0.071	0.081

As shown in Table No. 9 above, all post-development flow rates from the site (for the 2 to 100-year design storm events) have been attenuated to be less than the existing condition flow rates, and the allowable release rates.

4.6. Volume Retention

As per the City of Guelph criteria a minimum of 5mm volume control is to be provided. Based on the area of the proposed development (0.364 ha), 18.20 m^3 of runoff is to be retained on site to comply with the 5mm of volume control.

On-site retention for this development will be provided via infiltration galleries located in the rear yard of Parcel 1 to Parcel 8. The proposed infiltration galleries in the rear yards of Parcel 1 to Parcel 8 provide a storage volume of 25.60m^3.

Therefore, eight (8) infiltration galleries have been designed to capture and retain 25.60m^3 of runoff from the site.

The following table summarizes the retention storage volume provided in each infiltration gallery.

Table No. 10: Post-Development Required and Proposed Retention Storage Volume

Lot Number	Required Retention Volume (m^3)	Provided Retention Volume (m^3)
Parcel 1 – Infiltration Gallery 1	2.35	3.2
Parcel 2 – Infiltration Gallery 2	2.35	3.2
Parcel 3 – Infiltration Gallery 3	2.25	3.2
Parcel 4 – Infiltration Gallery 4	2.25	3.2
Parcel 5 – Infiltration Gallery 5	2.25	3.2
Parcel 6 – Infiltration Gallery 6	2.25	3.2
Parcel 7 – Infiltration Gallery 7	2.25	3.2
Parcel 8 – Infiltration Gallery 8	2.25	3.2
Total Retention	**18.20**	**25.60**

Therefore, based on Table 10, the first 5mm of rainfall on-site has been retained on site.

4.7. Quality Control Treatment

Quality control treatment for runoff generated from the site will be provided by directing runoff over grassed surfaces prior to discharge from the site.

5. Water Balance

In order to determine the hydraulic conductivity of the on-site soil, a Guelph Permeameter test was completed for 302-306 Edinburgh Road South by CMT Engineering Ltd. on November 5, 2024. Four separate tests were completed at two (2) Test Locations, associated with 302-306 Edinburgh Road South, and were run at depths of 2.4m and 3.9m below the existing grade. The results of the Guelph Permeameter completed by CMT Engineering Ltd., and the calculated design infiltration rate for 302-306 Edinburgh Road South are shown below. CMT Engineering Ltd.'s complete Guelph Permeameter Test report is attached as Appendix C.

The design infiltration rate was determined through the process specified in Appendix C of the CVC / TRCA Low Impact Development Stormwater Management Planning and Design Guide V1.0 (dated 2011). The Safety Correction Factor is per Table C2 and the conversion of hydraulic conductivity (cm/s) to infiltration rate (mm/hr) is as per Figure C1.

Table No. 11: Permeameter Test Results and Design Infiltration Rate

Test Location	Approximate Bottom of Gallery		Below Gallery		Ratio of Infiltration Rate at Gallery Bottom to Below Gallery	Safety Factor	Design Infiltration Rate (mm/hr)
	Hydraulic Conductivity (cm/s)	Infiltration Rate (mm/hr)	Hydraulic Conductivity (cm/s)	Infiltration Rate (mm/hr)			
I	8.39E-4	70.5	3.94E-4	58.2	1.21	2.5	28.2
II	9.32E-4	73.1	7.23E-4	67.3	1.09	2.5	29.2

Under existing conditions, the annual recharge volume for the site is 774 m^3/year. As provided in the Monthly Water Balance calculations (Thornthwaite and Mather), under post development conditions, the 0.364-ha site provides a total recharge volume of 2048 m^3 via the infiltration galleries. The infiltration galleries were located to ensure the required 1.0 m separation from the high groundwater level was maintained. Monthly water balance summary for all catchments is shown in the Table 12 below.

Therefore, the proposed development provides a total of 2048 m^3 of recharge annually, which is more than 774 m^3 provided under existing conditions. The required annual post-development recharge volume for the site meets the required volume recharge for Policy Area 13 from the City's Development Engineering Manual (dated October 2023).

The complete Monthly Water Balance calculation is provided in the Appendix D.

Table No. 12: Monthly Water Balance Summary

Month	Existing Recharge Volume (m^3)				Proposed Recharge Volume (m^3)			
	Catchment			Total	Catchment			Total
	101	102	103		201	202	203	
Jan	16	1	2	18	5	41	0	46
Feb	8	0	1	9	2	21	0	23
Mar	4	0	1	5	1	11	0	12
Apr	72	4	8	84	21	187	0	208
May	185	11	20	217	54	485	0	539
Jun	109	5	10	125	33	294	0	327
Jul	73	3	5	80	23	201	0	225
Aug	53	1	3	57	18	151	0	169
Sep	38	1	1	40	13	111	0	125
Oct	26	0	1	27	9	77	0	86
Nov	65	3	6	75	19	173	0	192
Dec	32	2	3	37	10	86	0	96
Total	681	33	60	**774**	209	1,838	1	**2,048**

6. Erosion Protection and Sediment Control

A silt fence is to be installed along the perimeter of the property. The silt fence serves to minimize the opportunity for sediment to leave the site.

Upon completion of the grading, any area not subject to active construction within 30 days will be topsoiled and hydroseeded as per OPSS PROV 804. Inspection and maintenance of all silt fencing will start after installation is complete. The silt fence will be inspected on a weekly basis during active construction or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the silt fence found to need repair.

Once construction and landscaping has been substantially completed, the silt fence will be removed, any accumulated sediment will be removed, and the landscaping will be completed. After construction of the complete development, erosion and sediment transport will be minimal.

7. Conclusions

In summary, the features of the design for the proposed development are as follows:

1. Sanitary service for each Parcel will be provided by individual 100mm diameter sanitary service lateral extended from the existing 300mm diameter sanitary sewer on Edinburgh Road South.
2. Water service for each Parcel will be provided by individual 50mm diameter water service lateral extended from the existing 200mm diameter watermain on Edinburgh Road South.
3. Foundation drainage will be provided via a sump pump discharging to grade at the rear of each unit. No storm service laterals are proposed.
4. The first 5mm of rainfall on-site has been retained in the proposed depression storage and bioretention swale on-site.
5. All post-development flow rates from the site (for the 2 to 100-year design storm events) have been attenuated to be less than the existing condition flow rates.
6. All roof downspouts from Catchments 202 are to be directed to the rear yard areas. No roof downspouts are to be directed to the side yards.
7. All runoff directed to the side yards match existing drainage patterns.
8. The 302-306 Edinburgh Road South annual water balance recharge volume is 2048 m^3per year, approximately 1274 m^3 more than the existing condition recharge volume of 774 m^3 per year.

All of which is respectfully submitted.

GEI Consultants Canada Ltd.

[redacted]

[redacted]

Senior Project Manager

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Appendix A Sanitary Sewer Flow Calculation

A.1. Sanitary Sewer Flow Calculations

A.1. Sanitary Sewer Flow Calculations

PROJECT: 302-306 Edinburgh Road South

City of Guelph

SANITARY SEWER DESIGN

Residential: 0.00347 L/s/cap

City of Guelph

DATE: January 10, 2025

DESIGNED BY: H.B

CHECKED BY: A.E.K

Sheet 1 of 1

Q(i) = Cum. Area (ha) * Infiltration Rate / 1000

Infiltration Rate: 0.25 L/ha/s

Peaking Factor : F = 1 + (14/(4+P^0.5))

P = Population/1000

Manning Equation: Full Cap.= (D/2/1000)^2*Pi*(D/4/1000)^0.667*(1/n)*(S/100)^0.5

D = Diameter (mm)

S = Slope (%)

n = 0.013 (PVC & Concrete), 0.016 (Vitrified Clay)

Average Daily Flow

Per Person = 300 L/p/d

Minimum Full Velocity= 0.6 m/s

n = 0.013

Max Peak Fac. = 4.000

Min Peak Fac. = 4.000

	From	To	RESIDENTIAL AREA AND POPULATION								Commercial		Industustrial		Institutional		C+I+I	Peak Extraneous Flow	Total Flow	Pipe					
			Area	Number of Units	Proposed Density	Population	Cumulative		Peak Factor	Peak Flow	Area	Cum. Area	Area	Cum. Area	Area	Cum. Area	Peak Flow			Distance	Diameter	Slope	Capacity (Full)	Velocity	
			(ha)		(p/unit)		Area	Population		(m^3/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(m^3/s)	Q(i) = (m^3/s)	(m^3/s)	(m)	(mm)	(%)	(m^3/s)	Full (m/s)	Actual (m/s)
Edinburgh Road South	Parcel 1	Ex. 300mm dia San	0.047	2	3.4	6.8	0.047	6.8	4.000	9.44E-05								0.000012	0.000106	26.1	100	2.00	0.0073	0.929	0.000
	Parcel 2	Ex. 300mm dia San	0.047	2	3.4	6.8	0.094	14.0	4.000	0.000194								0.000024	0.000218	26.2	100	2.00	0.0073	0.929	0.214
	Parcel 3	Ex. 300mm dia San	0.045	2	3.4	6.8	0.139	21.0	4.000	0.000292								0.000035	0.000326	26.4	100	2.00	0.0073	0.929	0.214
	Parcel 4	Ex. 300mm dia San	0.045	2	3.4	6.8	0.184	28.0	4.000	0.000389								0.000046	0.000435	26.5	100	2.00	0.0073	0.929	0.214
	Parcel 5	Ex. 300mm dia San	0.045	2	3.4	6.8	0.229	35.0	4.000	0.000486								0.000057	0.000543	26.6	100	2.00	0.0073	0.929	0.214
	Parcel 6	Ex. 300mm dia San	0.045	2	3.4	6.8	0.274	42.0	4.000	0.000583								0.000069	0.000652	26.7	100	2.00	0.0073	0.929	0.214
	Parcel 7	Ex. 300mm dia San	0.045	2	3.4	6.8	0.319	49.0	4.000	0.000681								0.000080	0.000760	26.7	100	2.00	0.0073	0.929	0.214
	Parcel 8	Ex. 300mm dia San	0.045	2	3.4	6.8	0.364	56.0	4.000	0.000778								0.000091	0.000869	26.8	100	2.00	0.0073	0.929	0.214

Appendix B Stage-Storage-Discharge Tables, Hydraulic Modelling Output Files

B.1. Stage-Storage-Discharge Tables

B.2. Existing Condition MIDUSS Modelling Output Files

B.3. Post-development MIDUSS Modelling Output Files

B.1. Stage-Storage-Discharge Tables

302-306 Edinburgh Road South
City of Guelph
Our File: 2408455
Revised : January 2025

CATCHMENT 202 - INFILTRATION GALLERIES

STAGE STORAGE VOLUME CALCULATIONS

ELEV (m)	DEPTH (m)	SURFACE AREA (sq m)	INCR. VOLUME (cu m)	ACCUM. STORAGE VOLUME (cu m)	
320.13	0.000	0.0	0.000	0.000	Seasonal High Groundwater Elevation
321.45	0.000	128.0	0.000	0.000	Bottom of Gallery
321.55	0.100	128.0	4.267	4.267	
321.65	0.200	128.0	4.267	8.533	
321.75	0.300	128.0	4.267	12.800	
321.85	0.400	128.0	4.267	17.067	
321.95	0.500	128.0	4.267	21.333	
322.05	0.600	128.0	4.267	25.600	Top of Gallery
322.35	0.900	0.6	0.170	25.770	
322.65	1.200	0.6	0.170	25.939	
322.95	1.500	0.6	0.170	26.109	
323.31	1.860	0.6	0.204	26.313	T/G of inline drain
323.33	1.875	9.3	0.074	26.386	
323.43	1.980	13.6	1.204	27.590	Weir
323.53	2.080	18.0	1.582	29.172	Overflow

BOTTOM INFILTRATION ONLY

L(dw) =	60.00	m
W(dw) =	2.13	m
Perimeter=	124.27	m
D(dw) =	0.60	m
A(c) =	128.00	sq m
VOL(dw)=	76.80	cu m
VOL(st)=	25.60	cu m
K =	29.20	mm/hr
K =	8.11E-06	m/s

OVERFLOW WEIR

Q =	0.085	cu m/s
d1 =	1.980	m
h =	2.080	m
H =	0.100	m
2g =	19.620	
L =	2.000	m

(BH2 Design Infiltration Rate as per Geotechnical Investigation Report)

302-306 Edinburgh Road South
City of Guelph
Our File: 2408455
Revised : January 2025

CATCHMENT 202 - INFILTRATION GALLERIES

BOTTOM INFILTRATION ONLY - EACH INFILTRATION GALLERY

	GALLERY 1	GALLERY 2	GALLERY 3	GALLERY 4	GALLERY 5	GALLERY 6	GALLERY 7	GALLERY 8	Total	
L(dw) =	4.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	60.00	m
W(dw) =	4.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.13	m
Perimeter=	16.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	124.27	m
D(dw) =	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	m
A(c) =	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	128.00	sq m
VOL(dw)=	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6	76.8	cu m
VOL(st)=	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	25.6	cu m
K =	29.20	29.20	29.20	29.20	29.20	29.20	29.20	29.20	29.20	mm/hr
K =	8.11E-06	8.11E-06	8.11E-06	8.11E-06	8.11E-06	8.11E-06	8.11E-06	8.11E-06	8.11E-06	m/s

STAGE/STORAGE/DISCHARGE TABLE

ELEV.	STAGE	STORAGE VOLUME	INFILTRATION DISCHARGE	WEIR DISCHARGE	TOTAL DISCHARGE	
(m)	(m)	(m^3)	(m^3/s)	(m^3/s)	(m^3/s)	
321.45	0.000	0.000	0.00000	0.000	0.00000	Bottom of Gallery
321.55	0.100	4.267	0.00104	0.000	0.00104	
321.65	0.200	8.533	0.00104	0.000	0.00104	
321.75	0.300	12.800	0.00104	0.000	0.00104	
321.85	0.400	17.067	0.00104	0.000	0.00104	
321.95	0.500	21.333	0.00104	0.000	0.00104	
322.05	0.600	25.600	0.00104	0.000	0.00104	Top of Gallery
322.35	0.900	25.770	0.00105	0.000	0.00105	
322.65	1.200	25.939	0.00105	0.000	0.00105	
322.95	1.500	26.109	0.00106	0.000	0.00106	
323.31	1.860	26.313	0.00106	0.000	0.00106	T/G of inline drain
323.33	1.875	26.386	0.00114	0.000	0.00114	
323.43	1.980	27.590	0.00125	0.000	0.00125	Weir
323.53	2.080	29.172	0.00000	0.085	0.08471	Overflow

B.2. Existing Condition MIDUSS Modelling Output Files

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:                      2408455 - Existing.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:             12/18/2024 at 3:46:59 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      563.699   Coefficient A"
"        1.500   Constant B"
"        0.766   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          129.248    mm/hr"
"             Total depth                 33.713    mm"
"            4   2hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.172   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.839   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.034     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  18.289     1.616      5.792      minutes"
"             Time to Centroid       163.465    118.678    129.896    minutes"
"             Rainfall depth         33.713     33.713     33.713     mm"
"             Rainfall volume        68.35      41.89      110.24     c.m"
"             Rainfall losses        27.918     5.423      19.370     mm"
"             Runoff depth           5.795      28.290     14.343     mm"
"             Runoff volume          11.75      35.15      46.90      c.m"
"             Runoff coefficient     0.172      0.839      0.425      "
"             Maximum flow           0.003      0.033      0.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.034     0.034     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.034     0.034     0.034     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.034    c.m/sec"
             Hydrograph volume            46.901    c.m"
                      0.034     0.034     0.034     0.034"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.034     0.000     0.034     0.034"
 33          CATCHMENT 102"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          102   Catchment 102"
        0.000   % Impervious"
        0.013   Total Area"
        5.000   Flow length"
        2.000   Overland Slope"
        0.013   Pervious Area"
        5.000   Pervious length"
        2.000   Pervious slope"
        0.000   Impervious Area"
        5.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.172   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.000   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                      0.000     0.000     0.034     0.034 c.m/sec"
             Catchment 102          Pervious   Impervious Total Area "
             Surface Area           0.013      0.000      0.013      hectare"
             Time of concentration  7.961      0.703      7.961      minutes"
             Time to Centroid       147.889    0.000      147.889    minutes"
             Rainfall depth         33.713     33.713     33.713     mm"
             Rainfall volume        4.38       0.00       4.38       c.m"
             Rainfall losses        27.924     33.713     27.924     mm"
             Runoff depth           5.789      0.000      5.789      mm"
             Runoff volume          0.75       0.00       0.75       c.m"
             Runoff coefficient     0.172      0.000      0.172      "
             Maximum flow           0.000      0.000      0.000      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                      0.000     0.000     0.034     0.034"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                      0.000     0.000     0.000     0.034"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.034    c.m/sec"
             Hydrograph volume            47.654    c.m"
                      0.000     0.000     0.000     0.034"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.000     0.000     0.000     0.034"
 33          CATCHMENT 103"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          103   Catchment 103"
        0.000   % Impervious"
        0.024   Total Area"
```

```
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.172   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.001     0.000     0.000     0.034 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  7.961      0.703      7.961      minutes"
"             Time to Centroid       147.889    117.275    147.888    minutes"
"             Rainfall depth         33.713     33.713     33.713     mm"
"             Rainfall volume        8.09       0.00       8.09       c.m"
"             Rainfall losses        27.924     6.727      27.924     mm"
"             Runoff depth           5.789      26.986     5.789      mm"
"             Runoff volume          1.39       0.00       1.39       c.m"
"             Runoff coefficient     0.172      0.000      0.172      "
"             Maximum flow           0.001      0.000      0.001      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.001     0.001     0.000     0.034"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.001     0.001     0.001     0.034"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.034    c.m/sec"
"             Hydrograph volume           49.043    c.m"
"                    0.001     0.001     0.001     0.034"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.034    c.m/sec"
"             Hydrograph volume           49.043    c.m"
"                    0.001     0.034     0.001     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.034    c.m/sec"
"             Hydrograph volume           49.043    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.124    hectare"
"             Total % impervious                      34.137"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                    Sunday, February 07, 2010"
"           10   Units used:                                        ie METRIC"
"                Job folder:                C:\Users\hbhatt\Desktop\MIDUSS\"
"                                          2408455 - 302-306 Edinburgh Road"
"                Output filename:                2408455 - Existing 5yr.out"
"                Licensee name:                                          gmbp"
"                Company                                                    "
"                Date & Time last used:           12/18/2024 at 3:51:08 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      750.423   Coefficient A"
"        1.500   Constant B"
"        0.769   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          171.091    mm/hr"
"             Total depth                 44.147    mm"
"            4   5hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.867   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.048     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  13.688     1.430      5.236      minutes"
"             Time to Centroid       153.660    117.147    128.483    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        89.50      54.86      144.36     c.m"
"             Rainfall losses        33.590     5.889      23.063     mm"
"             Runoff depth           10.558     38.258     21.084     mm"
"             Runoff volume          21.40      47.54      68.94      c.m"
"             Runoff coefficient     0.239      0.867      0.478      "
"             Maximum flow           0.008      0.046      0.048      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.048     0.048     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.048     0.048     0.048     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.048    c.m/sec"
             Hydrograph volume            68.944    c.m"
                      0.048     0.048     0.048     0.048"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.048     0.000     0.048     0.048"
 33          CATCHMENT 102"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          102   Catchment 102"
        0.000   % Impervious"
        0.013   Total Area"
        5.000   Flow length"
        2.000   Overland Slope"
        0.013   Pervious Area"
        5.000   Pervious length"
        2.000   Pervious slope"
        0.000   Impervious Area"
        5.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.238   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.000   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                      0.001     0.000     0.048     0.048 c.m/sec"
             Catchment 102          Pervious   Impervious Total Area "
             Surface Area           0.013      0.000      0.013      hectare"
             Time of concentration  5.958      0.622      5.958      minutes"
             Time to Centroid       141.572    116.271    141.572    minutes"
             Rainfall depth         44.147     44.147     44.147     mm"
             Rainfall volume        5.74       0.00       5.74       c.m"
             Rainfall losses        33.624     7.826      33.624     mm"
             Runoff depth           10.523     36.321     10.524     mm"
             Runoff volume          1.37       0.00       1.37       c.m"
             Runoff coefficient     0.238      0.000      0.238      "
             Maximum flow           0.001      0.000      0.001      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                      0.001     0.001     0.048     0.048"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                      0.001     0.001     0.001     0.048"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.048    c.m/sec"
             Hydrograph volume            70.312    c.m"
                      0.001     0.001     0.001     0.048"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.001     0.000     0.001     0.048"
 33          CATCHMENT 103"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          103   Catchment 103"
        0.000   % Impervious"
        0.024   Total Area"
```

```
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.238   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.002     0.000     0.001     0.048 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  5.958      0.622      5.958      minutes"
"             Time to Centroid       141.572    116.271    141.572    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        10.60      0.00       10.60      c.m"
"             Rainfall losses        33.624     7.826      33.624     mm"
"             Runoff depth           10.523     36.321     10.524     mm"
"             Runoff volume          2.53       0.00       2.53       c.m"
"             Runoff coefficient     0.238      0.000      0.238      "
"             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.002     0.002     0.001     0.048"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.002     0.002     0.002     0.048"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.049    c.m/sec"
"             Hydrograph volume            72.838    c.m"
"                    0.002     0.002     0.002     0.049"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.049    c.m/sec"
"             Hydrograph volume            72.838    c.m"
"                    0.002     0.049     0.002     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.049    c.m/sec"
"             Hydrograph volume            72.838    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                    0.364    hectare"
"             Total Impervious area                   0.124    hectare"
"             Total % impervious                     34.137"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                    Sunday, February 07, 2010"
"           10   Units used:                                        ie METRIC"
"                Job folder:                C:\Users\hbhatt\Desktop\MIDUSS\"
"                                          2408455 - 302-306 Edinburgh Road"
"                Output filename:               2408455 - Existing 10yr.out"
"                Licensee name:                                          gmbp"
"                Company                                                    "
"                Date & Time last used:           12/18/2024 at 3:52:07 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      855.183   Coefficient A"
"        1.500   Constant B"
"        0.764   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          196.822    mm/hr"
"             Total depth                 51.710    mm"
"            5   10hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.282   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.880   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.057     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  11.934     1.346      4.982      minutes"
"             Time to Centroid       149.897    116.646    128.066    minutes"
"             Rainfall depth         51.710     51.710     51.710     mm"
"             Rainfall volume        104.84     64.25      169.09     c.m"
"             Rainfall losses        37.114     6.182      25.360     mm"
"             Runoff depth           14.596     45.528     26.350     mm"
"             Runoff volume          29.59      56.57      86.16      c.m"
"             Runoff coefficient     0.282      0.880      0.510      "
"             Maximum flow           0.012      0.054      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.057     0.057     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.057     0.057     0.057     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.057    c.m/sec"
             Hydrograph volume            86.164    c.m"
                      0.057     0.057     0.057     0.057"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.057     0.000     0.057     0.057"
 33          CATCHMENT 102"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          102   Catchment 102"
        0.000   % Impervious"
        0.013   Total Area"
        5.000   Flow length"
        2.000   Overland Slope"
        0.013   Pervious Area"
        5.000   Pervious length"
        2.000   Pervious slope"
        0.000   Impervious Area"
        5.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.282   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.000   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                      0.001     0.000     0.057     0.057 c.m/sec"
             Catchment 102          Pervious   Impervious Total Area "
             Surface Area           0.013      0.000      0.013      hectare"
             Time of concentration  5.194      0.586      5.194      minutes"
             Time to Centroid       139.231    115.983    139.230    minutes"
             Rainfall depth         51.710     51.710     51.710     mm"
             Rainfall volume        6.72       0.00       6.72       c.m"
             Rainfall losses        37.133     8.587      37.133     mm"
             Runoff depth           14.577     43.123     14.577     mm"
             Runoff volume          1.89       0.00       1.89       c.m"
             Runoff coefficient     0.282      0.000      0.282      "
             Maximum flow           0.001      0.000      0.001      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                      0.001     0.001     0.057     0.057"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                      0.001     0.001     0.001     0.057"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.058    c.m/sec"
             Hydrograph volume            88.059    c.m"
                      0.001     0.001     0.001     0.058"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                      0.001     0.000     0.001     0.058"
 33          CATCHMENT 103"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          103   Catchment 103"
        0.000   % Impervious"
        0.024   Total Area"
```

```
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.282   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.002     0.000     0.001     0.058 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  5.194      0.586      5.194      minutes"
"             Time to Centroid       139.231    115.983    139.230    minutes"
"             Rainfall depth         51.710     51.710     51.710     mm"
"             Rainfall volume        12.41      0.00       12.41      c.m"
"             Rainfall losses        37.133     8.587      37.133     mm"
"             Runoff depth           14.577     43.123     14.577     mm"
"             Runoff volume          3.50       0.00       3.50       c.m"
"             Runoff coefficient     0.282      0.000      0.282      "
"             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.002     0.002     0.001     0.058"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.002     0.002     0.002     0.058"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.059    c.m/sec"
"             Hydrograph volume           91.557    c.m"
"                    0.002     0.002     0.002     0.059"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.059    c.m/sec"
"             Hydrograph volume           91.557    c.m"
"                    0.002     0.059     0.002     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.059    c.m/sec"
"             Hydrograph volume           91.557    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.124    hectare"
"             Total % impervious                      34.137"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename:                 2408455 - Existing 25yr.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:            12/18/2024 at 3:52:59 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      972.202   Coefficient A"
"        1.500   Constant B"
"        0.752   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          228.875    mm/hr"
"             Total depth                 62.786    mm"
"            5   25hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.337   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.895   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.070     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  10.327     1.262      4.709      minutes"
"             Time to Centroid       146.776    116.413    127.960    minutes"
"             Rainfall depth         62.786     62.786     62.786     mm"
"             Rainfall volume        127.29     78.02      205.31     c.m"
"             Rainfall losses        41.654     6.598      28.333     mm"
"             Runoff depth           21.132     56.188     34.453     mm"
"             Runoff volume          42.84      69.82      112.66     c.m"
"             Runoff coefficient     0.337      0.895      0.549      "
"             Maximum flow           0.018      0.064      0.070      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.070     0.070     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.070     0.070     0.070     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.070    c.m/sec"
             Hydrograph volume           112.662    c.m"
                    0.070     0.070     0.070     0.070"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.070     0.000     0.070     0.070"
" 33         CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.013   Total Area"
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.013   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.335   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.002     0.000     0.070     0.070 c.m/sec"
             Catchment 102          Pervious   Impervious Total Area "
             Surface Area           0.013      0.000      0.013      hectare"
             Time of concentration  4.495      0.549      4.495      minutes"
             Time to Centroid       137.491    115.841    137.491    minutes"
             Rainfall depth         62.786     62.786     62.786     mm"
             Rainfall volume        8.16       0.00       8.16       c.m"
             Rainfall losses        41.728     9.659      41.728     mm"
             Runoff depth           21.058     53.127     21.058     mm"
             Runoff volume          2.74       0.00       2.74       c.m"
             Runoff coefficient     0.335      0.000      0.335      "
             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.002     0.002     0.070     0.070"
" 40         HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
                    0.002     0.002     0.002     0.070"
" 40         HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.072    c.m/sec"
             Hydrograph volume           115.400    c.m"
                    0.002     0.002     0.002     0.072"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.002     0.000     0.002     0.072"
" 33         CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103"
"        0.000   % Impervious"
"        0.024   Total Area"
```

```
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.335   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.003     0.000     0.002     0.072 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  4.495      0.549      4.495      minutes"
"             Time to Centroid       137.491    115.841    137.491    minutes"
"             Rainfall depth         62.786     62.786     62.786     mm"
"             Rainfall volume        15.07      0.00       15.07      c.m"
"             Rainfall losses        41.728     9.659      41.728     mm"
"             Runoff depth           21.058     53.127     21.058     mm"
"             Runoff volume          5.05       0.00       5.05       c.m"
"             Runoff coefficient     0.335      0.000      0.335      "
"             Maximum flow           0.003      0.000      0.003      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.003     0.003     0.002     0.072"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.003     0.003     0.003     0.072"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.074    c.m/sec"
"             Hydrograph volume          120.454    c.m"
"                     0.003     0.003     0.003     0.074"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.074    c.m/sec"
"             Hydrograph volume          120.454    c.m"
"                     0.003     0.074     0.003     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.074    c.m/sec"
"             Hydrograph volume          120.454    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                    0.364    hectare"
"             Total Impervious area                   0.124    hectare"
"             Total % impervious                     34.137"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                    Sunday, February 07, 2010"
"           10   Units used:                                        ie METRIC"
"                Job folder:                C:\Users\hbhatt\Desktop\MIDUSS\"
"                                          2408455 - 302-306 Edinburgh Road"
"                Output filename:               2408455 - Existing 50yr.out"
"                Licensee name:                                          gmbp"
"                Company                                                    "
"                Date & Time last used:           12/18/2024 at 3:53:46 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1054.539   Coefficient A"
"        1.500   Constant B"
"        0.746   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          251.085    mm/hr"
"             Total depth                 70.383    mm"
"           5   50hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.370   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.902   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.080     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  9.525      1.214      4.545      minutes"
"             Time to Centroid       145.042    116.207    127.764    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        142.69     87.46      230.15     c.m"
"             Rainfall losses        44.357     6.903      30.125     mm"
"             Runoff depth           26.025     63.479     40.258     mm"
"             Runoff volume          52.76      78.88      131.64     c.m"
"             Runoff coefficient     0.370      0.902      0.572      "
"             Maximum flow           0.025      0.071      0.080      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.080     0.080     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.080     0.080     0.080     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.080    c.m/sec"
             Hydrograph volume           131.644    c.m"
                    0.080     0.080     0.080     0.080"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.080     0.000     0.080     0.080"
" 33         CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.013   Total Area"
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.013   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.367   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.002     0.000     0.080     0.080 c.m/sec"
             Catchment 102          Pervious   Impervious Total Area "
             Surface Area           0.013      0.000      0.013      hectare"
             Time of concentration  4.146      0.528      4.146      minutes"
             Time to Centroid       136.539    115.699    136.538    minutes"
             Rainfall depth         70.383     70.383     70.383     mm"
             Rainfall volume        9.15       0.00       9.15       c.m"
             Rainfall losses        44.577     10.446     44.577     mm"
             Runoff depth           25.806     59.937     25.806     mm"
             Runoff volume          3.35       0.00       3.35       c.m"
             Runoff coefficient     0.367      0.000      0.367      "
             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.002     0.002     0.080     0.080"
" 40         HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
                    0.002     0.002     0.002     0.080"
" 40         HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.082    c.m/sec"
             Hydrograph volume           134.998    c.m"
                    0.002     0.002     0.002     0.082"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.002     0.000     0.002     0.082"
" 33         CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103"
"        0.000   % Impervious"
"        0.024   Total Area"
```

```
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.367   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.004     0.000     0.002     0.082 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  4.146      0.528      4.146      minutes"
"             Time to Centroid       136.539    115.699    136.538    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        16.89      0.00       16.89      c.m"
"             Rainfall losses        44.577     10.446     44.577     mm"
"             Runoff depth           25.806     59.937     25.806     mm"
"             Runoff volume          6.19       0.00       6.19       c.m"
"             Runoff coefficient     0.367      0.000      0.367      "
"             Maximum flow           0.004      0.000      0.004      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.004     0.004     0.002     0.082"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.004     0.004     0.004     0.082"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.085    c.m/sec"
"             Hydrograph volume          141.192    c.m"
"                     0.004     0.004     0.004     0.085"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.085    c.m/sec"
"             Hydrograph volume          141.192    c.m"
"                     0.004     0.085     0.004     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.085    c.m/sec"
"             Hydrograph volume          141.192    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.124    hectare"
"             Total % impervious                      34.137"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename:                2408455 - Existing 100yr.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:             12/18/2024 at 3:54:31 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"

"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1122.601   Coefficient A"
"        1.500   Constant B"
"        0.738   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          271.357    mm/hr"
"             Total depth                 78.288    mm"
"           6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Catchment 101"
"       38.000   % Impervious"
"        0.327   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.203   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.124   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.402   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.908   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.090     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           0.203      0.124      0.327      hectare"
"             Time of concentration  8.898      1.175      4.416      minutes"
"             Time to Centroid       143.694    116.081    127.671    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        158.72     97.28      256.00     c.m"
"             Rainfall losses        46.790     7.240      31.761     mm"
"             Runoff depth           31.497     71.047     46.526     mm"
"             Runoff volume          63.86      88.28      152.14     c.m"
"             Runoff coefficient     0.402      0.908      0.594      "
"             Maximum flow           0.032      0.078      0.090      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.090     0.090     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.090     0.090     0.090     0.000"
```

```
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.090    c.m/sec"
"             Hydrograph volume           152.141    c.m"
"                    0.090     0.090     0.090     0.090"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.090     0.000     0.090     0.090"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.013   Total Area"
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.013   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.396   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.003     0.000     0.090     0.090 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.013      0.000      0.013      hectare"
"             Time of concentration  3.873      0.511      3.873      minutes"
"             Time to Centroid       135.965    115.631    135.965    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        10.18      0.00       10.18      c.m"
"             Rainfall losses        47.297     11.154     47.297     mm"
"             Runoff depth           30.991     67.133     30.991     mm"
"             Runoff volume          4.03       0.00       4.03       c.m"
"             Runoff coefficient     0.396      0.000      0.396      "
"             Maximum flow           0.003      0.000      0.003      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.003     0.003     0.090     0.090"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.003     0.003     0.003     0.090"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.092    c.m/sec"
"             Hydrograph volume           156.170    c.m"
"                    0.003     0.003     0.003     0.092"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.003     0.000     0.003     0.092"
" 33          CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103"
"        0.000   % Impervious"
```

```
"        0.024   Total Area"
"        5.000   Flow length"
"        2.000   Overland Slope"
"        0.024   Pervious Area"
"        5.000   Pervious length"
"        2.000   Pervious slope"
"        0.000   Impervious Area"
"        5.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.396   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.005     0.000     0.003     0.092 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.024      0.000      0.024      hectare"
"             Time of concentration  3.873      0.511      3.873      minutes"
"             Time to Centroid       135.965    115.631    135.965    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        18.79      0.00       18.79      c.m"
"             Rainfall losses        47.297     11.154     47.297     mm"
"             Runoff depth           30.991     67.133     30.991     mm"
"             Runoff volume          7.44       0.00       7.44       c.m"
"             Runoff coefficient     0.396      0.000      0.396      "
"             Maximum flow           0.005      0.000      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.005     0.005     0.003     0.092"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.005     0.005     0.005     0.092"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          163.608    c.m"
"                     0.005     0.005     0.005     0.096"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          163.608    c.m"
"                     0.005     0.096     0.005     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          163.608    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.124    hectare"
"             Total % impervious                       34.137"
" 19          EXIT"
```

B.3. Post-development MIDUSS Modelling Output Files

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:          2408455 - Post Development 2yr.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:             1/14/2025 at 11:30:46 AM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     240.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     563.699   Coefficient A"
"       1.500   Constant B"
"       0.766   Exponent C"
"       0.400   Fraction R"
"     240.000   Duration"
"       1.000   Time step multiplier"
"            Maximum intensity          129.248    mm/hr"
"            Total depth                 33.713    mm"
"           4   2hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"      50.000   % Impervious"
"       0.115   Total Area"
"      20.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      20.000   Pervious length"
"       2.000   Pervious slope"
"       0.058   Impervious Area"
"      20.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.172   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.839   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.015     0.000     0.000     0.000 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           0.058      0.058      0.115      hectare"
"            Time of concentration  18.289     1.616      4.451      minutes"
"            Time to Centroid       163.465    118.678    126.292    minutes"
"            Rainfall depth         33.713     33.713     33.713     mm"
"            Rainfall volume        19.38      19.38      38.77      c.m"
"            Rainfall losses        27.918     5.423      16.670     mm"
"            Runoff depth           5.795      28.290     17.042     mm"
"            Runoff volume          3.33       16.27      19.60      c.m"
"            Runoff coefficient     0.172      0.839      0.506      "
"            Maximum flow           0.001      0.015      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.015     0.015     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.015     0.015     0.015     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.015    c.m/sec"
             Hydrograph volume            19.599    c.m"
                    0.015     0.015     0.015     0.015"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.015     0.000     0.015     0.015"
" 33         CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.172   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.834   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.031     0.000     0.015     0.015 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  15.389     1.360      4.180      minutes"
             Time to Centroid       159.109    118.182    126.410    minutes"
             Rainfall depth         33.713     33.713     33.713     mm"
             Rainfall volume        46.13      37.74      83.88      c.m"
             Rainfall losses        27.923     5.589      17.873     mm"
             Runoff depth           5.790      28.123     15.840     mm"
             Runoff volume          7.92       31.49      39.41      c.m"
             Runoff coefficient     0.172      0.834      0.470      "
             Maximum flow           0.003      0.031      0.031      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.031     0.031     0.015     0.015"
" 40         HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
                    0.031     0.031     0.031     0.015"
" 40         HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.046    c.m/sec"
             Hydrograph volume            59.008    c.m"
                    0.031     0.031     0.031     0.046"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.031     0.000     0.031     0.046"
" 33         CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Catchment 203"
"        0.000   % Impervious"
"        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.169   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.000     0.000     0.031     0.046 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  3.490      0.308      3.490      minutes"
"             Time to Centroid       141.495    117.144    141.495    minutes"
"             Rainfall depth         33.713     33.713     33.713     mm"
"             Rainfall volume        0.07       0.00       0.07       c.m"
"             Rainfall losses        28.029     8.193      28.029     mm"
"             Runoff depth           5.683      25.520     5.683      mm"
"             Runoff volume          0.01       0.00       0.01       c.m"
"             Runoff coefficient     0.169      0.000      0.169      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.000     0.000     0.031     0.046"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.000     0.000     0.000     0.046"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.046    c.m/sec"
"             Hydrograph volume            59.020    c.m"
"                     0.000     0.000     0.000     0.046"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.046    c.m/sec"
"             Hydrograph volume            59.020    c.m"
"                     0.000     0.046     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.046    c.m/sec"
"             Hydrograph volume            59.020    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.169    hectare"
"             Total % impervious                       46.555"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:          2408455 - Post Development 5yr.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:             1/14/2025 at 11:38:44 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"      750.423   Coefficient A"
"        1.500   Constant B"
"        0.769   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          171.091    mm/hr"
"             Total depth                 44.147    mm"
"            4   5hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.867   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.022     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  13.688     1.430      4.081      minutes"
"             Time to Centroid       153.660    117.147    125.044    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        25.38      25.38      50.77      c.m"
"             Rainfall losses        33.590     5.889      19.739     mm"
"             Runoff depth           10.558     38.258     24.408     mm"
"             Runoff volume          6.07       22.00      28.07      c.m"
"             Runoff coefficient     0.239      0.867      0.553      "
"             Maximum flow           0.002      0.021      0.022      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.022     0.022     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.022     0.022     0.022     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.022    c.m/sec"
             Hydrograph volume            28.069    c.m"
                      0.022     0.022     0.022     0.022"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                      0.022     0.000     0.022     0.022"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.861   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                      0.044     0.000     0.022     0.022 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  11.518     1.203      3.820      minutes"
             Time to Centroid       150.203    116.893    125.344    minutes"
             Rainfall depth         44.147     44.147     44.147     mm"
             Rainfall volume        60.46      49.47      109.93     c.m"
             Rainfall losses        33.575     6.133      21.226     mm"
             Runoff depth           10.573     38.014     22.921     mm"
             Runoff volume          14.48      42.60      57.07      c.m"
             Runoff coefficient     0.239      0.861      0.519      "
             Maximum flow           0.006      0.042      0.044      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                      0.044     0.044     0.022     0.022"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
                      0.044     0.044     0.044     0.022"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.066    c.m/sec"
             Hydrograph volume            85.143    c.m"
                      0.044     0.044     0.044     0.066"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                      0.044     0.000     0.044     0.066"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Catchment 203"
"        0.000   % Impervious"
"        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.237   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.000     0.000     0.044     0.066 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  2.612      0.273      2.612      minutes"
"             Time to Centroid       136.249    115.644    136.248    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        0.09       0.00       0.09       c.m"
"             Rainfall losses        33.694     9.703      33.694     mm"
"             Runoff depth           10.454     34.445     10.454     mm"
"             Runoff volume          0.02       0.00       0.02       c.m"
"             Runoff coefficient     0.237      0.000      0.237      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.000     0.000     0.044     0.066"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.000     0.000     0.000     0.066"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume            85.164    c.m"
"                     0.000     0.000     0.000     0.066"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume            85.164    c.m"
"                     0.000     0.066     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume            85.164    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:          2408455 - Post Development 10yr.out"
"                Licensee name:                                            gmbp"
"                Company                                                      "
"                Date & Time last used:             1/14/2025 at 11:39:41 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      855.183   Coefficient A"
"        1.500   Constant B"
"        0.764   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          196.822    mm/hr"
"             Total depth                 51.710    mm"
"           5   10hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.282   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.880   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.026     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  11.934     1.346      3.916      minutes"
"             Time to Centroid       149.897    116.646    124.718    minutes"
"             Rainfall depth         51.710     51.710     51.710     mm"
"             Rainfall volume        29.73      29.73      59.47      c.m"
"             Rainfall losses        37.114     6.182      21.648     mm"
"             Runoff depth           14.596     45.528     30.062     mm"
"             Runoff volume          8.39       26.18      34.57      c.m"
"             Runoff coefficient     0.282      0.880      0.581      "
"             Maximum flow           0.003      0.025      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.026     0.026     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.026     0.026     0.026     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.026    c.m/sec"
             Hydrograph volume            34.571    c.m"
                    0.026     0.026     0.026     0.026"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.026     0.000     0.026     0.026"
 33          CATCHMENT 202"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          202   Catchment 202"
       45.000   % Impervious"
        0.249   Total Area"
       15.000   Flow length"
        2.000   Overland Slope"
        0.137   Pervious Area"
       15.000   Pervious length"
        2.000   Pervious slope"
        0.112   Impervious Area"
       15.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.281   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.874   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                    0.052     0.000     0.026     0.026 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  10.042     1.133      3.645      minutes"
             Time to Centroid       147.036    116.441    125.070    minutes"
             Rainfall depth         51.710     51.710     51.710     mm"
             Rainfall volume        70.82      57.94      128.76     c.m"
             Rainfall losses        37.185     6.518      23.385     mm"
             Runoff depth           14.524     45.192     28.325     mm"
             Runoff volume          19.89      50.64      70.53      c.m"
             Runoff coefficient     0.281      0.874      0.548      "
             Maximum flow           0.009      0.050      0.052      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                    0.052     0.052     0.026     0.026"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                    0.052     0.052     0.052     0.026"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.078    c.m/sec"
             Hydrograph volume           105.099    c.m"
                    0.052     0.052     0.052     0.078"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.052     0.000     0.052     0.078"
 33          CATCHMENT 203"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          203   Catchment 203"
        0.000   % Impervious"
        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.279   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.000     0.000     0.052     0.078 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  2.277      0.257      2.277      minutes"
"             Time to Centroid       134.659    115.102    134.659    minutes"
"             Rainfall depth         51.710     51.710     51.710     mm"
"             Rainfall volume        0.10       0.00       0.10       c.m"
"             Rainfall losses        37.260     10.784     37.260     mm"
"             Runoff depth           14.450     40.926     14.450     mm"
"             Runoff volume          0.03       0.00       0.03       c.m"
"             Runoff coefficient     0.279      0.000      0.279      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.000     0.000     0.052     0.078"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.000     0.000     0.000     0.078"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.078    c.m/sec"
"             Hydrograph volume          105.128    c.m"
"                     0.000     0.000     0.000     0.078"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.078    c.m/sec"
"             Hydrograph volume          105.128    c.m"
"                     0.000     0.078     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.078    c.m/sec"
"             Hydrograph volume          105.128    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.170    hectare"
"             Total % impervious                      46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:          2408455 - Post Development 25yr.out"
"                Licensee name:                                            gmbp"
"                Company                                                      "
"                Date & Time last used:             1/14/2025 at 11:41:31 AM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     240.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     972.202   Coefficient A"
"       1.500   Constant B"
"       0.752   Exponent C"
"       0.400   Fraction R"
"     240.000   Duration"
"       1.000   Time step multiplier"
"            Maximum intensity          228.875    mm/hr"
"            Total depth                 62.786    mm"
"           5   25hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"      50.000   % Impervious"
"       0.115   Total Area"
"      20.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      20.000   Pervious length"
"       2.000   Pervious slope"
"       0.058   Impervious Area"
"      20.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.337   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.895   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.031     0.000     0.000     0.000 c.m/sec"
"            Catchment 201          Pervious   Impervious Total Area "
"            Surface Area           0.058      0.058      0.115      hectare"
"            Time of concentration  10.327     1.262      3.739      minutes"
"            Time to Centroid       146.776    116.413    124.712    minutes"
"            Rainfall depth         62.786     62.786     62.786     mm"
"            Rainfall volume        36.10      36.10      72.20      c.m"
"            Rainfall losses        41.654     6.598      24.126     mm"
"            Runoff depth           21.132     56.188     38.660     mm"
"            Runoff volume          12.15      32.31      44.46      c.m"
"            Runoff coefficient     0.337      0.895      0.616      "
"            Maximum flow           0.005      0.030      0.031      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.031     0.031     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.031     0.031     0.031     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.031    c.m/sec"
             Hydrograph volume            44.459    c.m"
                    0.031     0.031     0.031     0.031"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.031     0.000     0.031     0.031"
 33          CATCHMENT 202"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          202   Catchment 202"
       45.000   % Impervious"
        0.249   Total Area"
       15.000   Flow length"
        2.000   Overland Slope"
        0.137   Pervious Area"
       15.000   Pervious length"
        2.000   Pervious slope"
        0.112   Impervious Area"
       15.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.338   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.887   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                    0.064     0.000     0.031     0.031 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  8.689      1.062      3.484      minutes"
             Time to Centroid       144.072    116.080    124.968    minutes"
             Rainfall depth         62.786     62.786     62.786     mm"
             Rainfall volume        85.99      70.35      156.34     c.m"
             Rainfall losses        41.592     7.105      26.073     mm"
             Runoff depth           21.194     55.681     36.713     mm"
             Runoff volume          29.03      62.39      91.42      c.m"
             Runoff coefficient     0.338      0.887      0.585      "
             Maximum flow           0.015      0.059      0.064      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                    0.064     0.064     0.031     0.031"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                    0.064     0.064     0.064     0.031"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.096    c.m/sec"
             Hydrograph volume           135.875    c.m"
                    0.064     0.064     0.064     0.096"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.064     0.000     0.064     0.096"
 33          CATCHMENT 203"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          203   Catchment 203"
        0.000   % Impervious"
        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.334   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.064     0.096 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  1.970      0.241      1.970      minutes"
"             Time to Centroid       133.258    114.688    133.258    minutes"
"             Rainfall depth         62.786     62.786     62.786     mm"
"             Rainfall volume        0.13       0.00       0.13       c.m"
"             Rainfall losses        41.836     12.425     41.836     mm"
"             Runoff depth           20.950     50.361     20.950     mm"
"             Runoff volume          0.04       0.00       0.04       c.m"
"             Runoff coefficient     0.334      0.000      0.334      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.000     0.000     0.064     0.096"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.000     0.000     0.000     0.096"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          135.917    c.m"
"                    0.000     0.000     0.000     0.096"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          135.917    c.m"
"                    0.000     0.096     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.096    c.m/sec"
"             Hydrograph volume          135.917    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.170    hectare"
"             Total % impervious                      46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                           2408455 - 302-306 Edinburgh Road"
"                Output filename:          2408455 - Post Development 50yr.out"
"                Licensee name:                                            gmbp"
"                Company                                                      "
"                Date & Time last used:             1/14/2025 at 11:43:04 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1054.540   Coefficient A"
"        1.500   Constant B"
"        0.746   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          251.085    mm/hr"
"             Total depth                 70.383    mm"
"           5   50hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.370   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.902   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.035     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  9.525      1.214      3.631      minutes"
"             Time to Centroid       145.042    116.207    124.591    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        40.47      40.47      80.94      c.m"
"             Rainfall losses        44.357     6.903      25.630     mm"
"             Runoff depth           26.025     63.480     44.753     mm"
"             Runoff volume          14.96      36.50      51.47      c.m"
"             Runoff coefficient     0.370      0.902      0.636      "
"             Maximum flow           0.007      0.033      0.035      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                     0.035     0.035     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                     0.035     0.035     0.035     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.035    c.m/sec"
             Hydrograph volume            51.465    c.m"
                      0.035     0.035     0.035     0.035"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                      0.035     0.000     0.035     0.035"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.371   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.893   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                      0.071     0.000     0.035     0.035 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  8.015      1.021      3.375      minutes"
             Time to Centroid       142.643    115.806    124.838    minutes"
             Rainfall depth         70.383     70.383     70.383     mm"
             Rainfall volume        96.39      78.86      175.25     c.m"
             Rainfall losses        44.297     7.533      27.753     mm"
             Runoff depth           26.086     62.850     42.630     mm"
             Runoff volume          35.72      70.42      106.15     c.m"
             Runoff coefficient     0.371      0.893      0.606      "
             Maximum flow           0.022      0.065      0.071      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                      0.071     0.071     0.035     0.035"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
                      0.071     0.071     0.071     0.035"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.106    c.m/sec"
             Hydrograph volume           157.613    c.m"
                      0.071     0.071     0.071     0.106"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                      0.071     0.000     0.071     0.106"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Catchment 203"
"        0.000   % Impervious"
"        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.365   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.071     0.106 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  1.818      0.232      1.818      minutes"
"             Time to Centroid       132.479    114.416    132.479    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        0.14       0.00       0.14       c.m"
"             Rainfall losses        44.670     13.578     44.670     mm"
"             Runoff depth           25.712     56.805     25.713     mm"
"             Runoff volume          0.05       0.00       0.05       c.m"
"             Runoff coefficient     0.365      0.000      0.365      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.000     0.000     0.071     0.106"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.000     0.000     0.000     0.106"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.106    c.m/sec"
"             Hydrograph volume          157.665    c.m"
"                    0.000     0.000     0.000     0.106"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.106    c.m/sec"
"             Hydrograph volume          157.665    c.m"
"                    0.000     0.106     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.106    c.m/sec"
"             Hydrograph volume          157.665    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                 C:\Users\hbhatt\Desktop\MIDUSS\"
"                                          2408455 - 302-306 Edinburgh Road"
"                Output filename:       2408455 - Post Development 100yr.out"
"                Licensee name:                                           gmbp"
"                Company                                                     "
"                Date & Time last used:             1/14/2025 at 11:45:51 AM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"            1   Chicago storm"
"     1122.601   Coefficient A"
"        1.500   Constant B"
"        0.738   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          271.357    mm/hr"
"             Total depth                 78.288    mm"
"            6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.402   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.908   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.039     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  8.898      1.175      3.547      minutes"
"             Time to Centroid       143.694    116.081    124.562    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        45.02      45.02      90.03      c.m"
"             Rainfall losses        46.790     7.240      27.015     mm"
"             Runoff depth           31.497     71.047     51.272     mm"
"             Runoff volume          18.11      40.85      58.96      c.m"
"             Runoff coefficient     0.402      0.908      0.655      "
"             Maximum flow           0.009      0.036      0.039      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.039     0.039     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.039     0.039     0.039     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.039    c.m/sec"
             Hydrograph volume            58.963    c.m"
                    0.039     0.039     0.039     0.039"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.039     0.000     0.039     0.039"
 33          CATCHMENT 202"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          202   Catchment 202"
       45.000   % Impervious"
        0.249   Total Area"
       15.000   Flow length"
        2.000   Overland Slope"
        0.137   Pervious Area"
       15.000   Pervious length"
        2.000   Pervious slope"
        0.112   Impervious Area"
       15.000   Impervious length"
        2.000   Impervious slope"
        0.250   Pervious Manning 'n'"
       75.000   Pervious SCS Curve No."
        0.401   Pervious Runoff coefficient"
        0.100   Pervious Ia/S coefficient"
        8.467   Pervious Initial abstraction"
        0.015   Impervious Manning 'n'"
       98.000   Impervious SCS Curve No."
        0.898   Impervious Runoff coefficient"
        0.100   Impervious Ia/S coefficient"
        0.518   Impervious Initial abstraction"
                    0.079     0.000     0.039     0.039 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  7.487      0.989      3.285      minutes"
             Time to Centroid       141.549    115.622    124.782    minutes"
             Rainfall depth         78.288     78.288     78.288     mm"
             Rainfall volume        107.21     87.72      194.94     c.m"
             Rainfall losses        46.856     7.972      29.358     mm"
             Runoff depth           31.432     70.316     48.930     mm"
             Runoff volume          43.05      78.79      121.83     c.m"
             Runoff coefficient     0.401      0.898      0.625      "
             Maximum flow           0.027      0.071      0.079      c.m/sec"
 40          HYDROGRAPH Add Runoff "
            4   Add Runoff "
                    0.079     0.079     0.039     0.039"
 40          HYDROGRAPH Copy to Outflow"
            8   Copy to Outflow"
                    0.079     0.079     0.079     0.039"
 40          HYDROGRAPH   Combine    1"
            6   Combine "
            1   Node #"
                 Flows off-site"
             Maximum flow                  0.119    c.m/sec"
             Hydrograph volume           180.798    c.m"
                    0.079     0.079     0.079     0.119"
 40          HYDROGRAPH Start - New Tributary"
            2   Start - New Tributary"
                    0.079     0.000     0.079     0.119"
 33          CATCHMENT 203"
            1   Triangular SCS"
            1   Equal length"
            1   SCS method"
          203   Catchment 203"
        0.000   % Impervious"
        0.000   Total Area"
```

```
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.396   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.079     0.119 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  1.698      0.224      1.698      minutes"
"             Time to Centroid       132.048    114.252    132.048    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        0.16       0.00       0.16       c.m"
"             Rainfall losses        47.254     14.793     47.254     mm"
"             Runoff depth           31.034     63.494     31.034     mm"
"             Runoff volume          0.06       0.00       0.06       c.m"
"             Runoff coefficient     0.396      0.000      0.396      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.000     0.000     0.079     0.119"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.000     0.000     0.000     0.119"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.119    c.m/sec"
"             Hydrograph volume          180.860    c.m"
"                    0.000     0.000     0.000     0.119"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                 0.119    c.m/sec"
"             Hydrograph volume          180.860    c.m"
"                    0.000     0.119     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                 0.119    c.m/sec"
"             Hydrograph volume          180.860    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                     0.364    hectare"
"             Total Impervious area                    0.170    hectare"
"             Total % impervious                      46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename: 2408455 - Post Development Controlled 2yr.out"
"                Licensee name:                                            gmbp"
"                Company                                                      "
"                Date & Time last used:             1/10/2025 at 1:28:12 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      563.699   Coefficient A"
"        1.500   Constant B"
"        0.766   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          129.248    mm/hr"
"             Total depth                 33.713    mm"
"           4   2hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.172   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.839   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.015     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  18.289     1.616      4.451      minutes"
"             Time to Centroid       163.465    118.678    126.292    minutes"
"             Rainfall depth         33.713     33.713     33.713     mm"
"             Rainfall volume        19.38      19.38      38.77      c.m"
"             Rainfall losses        27.918     5.423      16.670     mm"
"             Runoff depth           5.795      28.290     17.042     mm"
"             Runoff volume          3.33       16.27      19.60      c.m"
"             Runoff coefficient     0.172      0.839      0.506      "
"             Maximum flow           0.001      0.015      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.015     0.015     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.015     0.015     0.015     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.015    c.m/sec"
             Hydrograph volume            19.599    c.m"
                    0.015     0.015     0.015     0.015"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.015     0.000     0.015     0.015"
" 33         CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.172   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.834   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.031     0.000     0.015     0.015 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  15.389     1.360      4.180      minutes"
             Time to Centroid       159.109    118.182    126.410    minutes"
             Rainfall depth         33.713     33.713     33.713     mm"
             Rainfall volume        46.17      37.78      83.94      c.m"
             Rainfall losses        27.923     5.589      17.873     mm"
             Runoff depth           5.790      28.124     15.840     mm"
             Runoff volume          7.93       31.51      39.44      c.m"
             Runoff coefficient     0.172      0.834      0.470      "
             Maximum flow           0.003      0.031      0.031      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.031     0.031     0.015     0.015"
" 54         POND DESIGN"
"        0.031   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"         39.4   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
                  Level Discharge    Volume"
                321.450     0.000     0.000"
                321.550   0.00104     4.267"
                321.650   0.00104     8.533"
                321.750   0.00104    12.800"
                321.850   0.00104    17.067"
                321.950   0.00104    21.333"
                322.050   0.00104    25.600"
                322.350   0.00105    25.770"
                322.650   0.00105    25.939"
                322.950   0.00106    26.109"
```

```
"               323.310   0.00106    26.313"
"               323.325   0.00114    26.386"
"               323.430   0.00125    27.590"
"               323.530   0.08471    29.172"
"            Peak outflow                 0.002    c.m/sec"
"            Maximum level              323.430    metre"
"            Maximum storage             27.596    c.m"
"            Centroidal lag               6.394   hours"
"                 0.031     0.031     0.002     0.015 c.m/sec"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                 0.017    c.m/sec"
"            Hydrograph volume           59.060    c.m"
"                    0.031     0.031     0.002     0.017"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.031     0.000     0.002     0.017"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   Catchment 203"
"       0.000   % Impervious"
"       0.000   Total Area"
"       2.000   Flow length"
"       5.000   Overland Slope"
"       0.000   Pervious Area"
"       2.000   Pervious length"
"       5.000   Pervious slope"
"       0.000   Impervious Area"
"       2.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.169   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.002     0.017 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.000      0.000      hectare"
"            Time of concentration  3.490      0.308      3.490      minutes"
"            Time to Centroid       141.495    117.144    141.495    minutes"
"            Rainfall depth         33.713     33.713     33.713     mm"
"            Rainfall volume        0.07       0.00       0.07       c.m"
"            Rainfall losses        28.029     8.193      28.029     mm"
"            Runoff depth           5.683      25.520     5.683      mm"
"            Runoff volume          0.01       0.00       0.01       c.m"
"            Runoff coefficient     0.169      0.000      0.169      "
"            Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.000     0.000     0.002     0.017"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.000     0.000     0.000     0.017"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                 0.017    c.m/sec"
"            Hydrograph volume           59.071    c.m"
"                    0.000     0.000     0.000     0.017"
```

```
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.017    c.m/sec"
"             Hydrograph volume            59.071    c.m"
"                    0.000     0.017     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.017    c.m/sec"
"             Hydrograph volume            59.071    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename: 2408455 - Post Development Controlled 5yr.out"
"                Licensee name:                                            gmbp"
"                Company                                                      "
"                Date & Time last used:             1/10/2025 at 1:31:37 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      750.423   Coefficient A"
"        1.500   Constant B"
"        0.769   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          171.091    mm/hr"
"             Total depth                 44.147    mm"
"           4   5hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.867   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.022     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  13.688     1.430      4.081      minutes"
"             Time to Centroid       153.660    117.147    125.044    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        25.38      25.38      50.77      c.m"
"             Rainfall losses        33.590     5.889      19.739     mm"
"             Runoff depth           10.558     38.258     24.408     mm"
"             Runoff volume          6.07       22.00      28.07      c.m"
"             Runoff coefficient     0.239      0.867      0.553      "
"             Maximum flow           0.002      0.021      0.022      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.022     0.022     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.022     0.022     0.022     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.022    c.m/sec"
"             Hydrograph volume            28.069    c.m"
"                    0.022     0.022     0.022     0.022"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.022     0.000     0.022     0.022"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.239   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.861   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.044     0.000     0.022     0.022 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area "
"             Surface Area           0.137      0.112      0.249      hectare"
"             Time of concentration  11.518     1.203      3.820      minutes"
"             Time to Centroid       150.203    116.893    125.344    minutes"
"             Rainfall depth         44.147     44.147     44.147     mm"
"             Rainfall volume        60.46      49.47      109.93     c.m"
"             Rainfall losses        33.575     6.133      21.226     mm"
"             Runoff depth           10.573     38.014     22.921     mm"
"             Runoff volume          14.48      42.60      57.07      c.m"
"             Runoff coefficient     0.239      0.861      0.519      "
"             Maximum flow           0.006      0.042      0.044      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.044     0.044     0.022     0.022"
" 54          POND DESIGN"
"        0.044   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"         57.1   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                321.450     0.000     0.000"
"                321.550   0.00104     4.267"
"                321.650   0.00104     8.533"
"                321.750   0.00104    12.800"
"                321.850   0.00104    17.067"
"                321.950   0.00104    21.333"
"                322.050   0.00104    25.600"
"                322.350   0.00105    25.770"
"                322.650   0.00105    25.939"
"                322.950   0.00106    26.109"
```

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"               323.310   0.00106    26.313"
"               323.325   0.00114    26.386"
"               323.430   0.00125    27.590"
"               323.530   0.08471    29.172"
"            Peak outflow                 0.015    c.m/sec"
"            Maximum level              323.446    metre"
"            Maximum storage             27.849    c.m"
"            Centroidal lag               5.128   hours"
"                 0.044     0.044     0.015     0.022 c.m/sec"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                 0.023    c.m/sec"
"            Hydrograph volume           86.448    c.m"
"                    0.044     0.044     0.015     0.023"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.044     0.000     0.015     0.023"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   Catchment 203"
"       0.000   % Impervious"
"       0.000   Total Area"
"       2.000   Flow length"
"       5.000   Overland Slope"
"       0.000   Pervious Area"
"       2.000   Pervious length"
"       5.000   Pervious slope"
"       0.000   Impervious Area"
"       2.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.237   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.015     0.023 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.000      0.000      hectare"
"            Time of concentration  2.612      0.273      2.612      minutes"
"            Time to Centroid       136.249    115.644    136.248    minutes"
"            Rainfall depth         44.147     44.147     44.147     mm"
"            Rainfall volume        0.09       0.00       0.09       c.m"
"            Rainfall losses        33.694     9.703      33.694     mm"
"            Runoff depth           10.454     34.445     10.454     mm"
"            Runoff volume          0.02       0.00       0.02       c.m"
"            Runoff coefficient     0.237      0.000      0.237      "
"            Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.000     0.000     0.015     0.023"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.000     0.000     0.000     0.023"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                 0.023    c.m/sec"
"            Hydrograph volume           86.469    c.m"
"                    0.000     0.000     0.000     0.023"
```

```
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.023    c.m/sec"
"             Hydrograph volume            86.469    c.m"
"                     0.000     0.023     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.023    c.m/sec"
"             Hydrograph volume            86.469    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename:2408455 - Post Development Controlled 10yr.out"
"                Licensee name:                                             gmbp"
"                Company                                                       "
"                Date & Time last used:             1/10/2025 at 1:32:53 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      855.183   Coefficient A"
"        1.500   Constant B"
"        0.764   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          196.822    mm/hr"
"             Total depth                 51.710    mm"
"           5   10hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.282   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.880   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.026     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  11.934     1.346      3.916      minutes"
"             Time to Centroid       149.897    116.646    124.718    minutes"
"             Rainfall depth         51.710     51.710     51.710     mm"
"             Rainfall volume        29.73      29.73      59.47      c.m"
"             Rainfall losses        37.114     6.182      21.648     mm"
"             Runoff depth           14.596     45.528     30.062     mm"
"             Runoff volume          8.39       26.18      34.57      c.m"
"             Runoff coefficient     0.282      0.880      0.581      "
"             Maximum flow           0.003      0.025      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.026     0.026     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.026     0.026     0.026     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.026    c.m/sec"
             Hydrograph volume            34.571    c.m"
                    0.026     0.026     0.026     0.026"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.026     0.000     0.026     0.026"
" 33         CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.281   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.874   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.052     0.000     0.026     0.026 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  10.042     1.133      3.645      minutes"
             Time to Centroid       147.036    116.441    125.070    minutes"
             Rainfall depth         51.710     51.710     51.710     mm"
             Rainfall volume        70.82      57.94      128.76     c.m"
             Rainfall losses        37.185     6.518      23.385     mm"
             Runoff depth           14.524     45.192     28.325     mm"
             Runoff volume          19.89      50.64      70.53      c.m"
             Runoff coefficient     0.281      0.874      0.548      "
             Maximum flow           0.009      0.050      0.052      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.052     0.052     0.026     0.026"
" 54         POND DESIGN"
"        0.052   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"         70.5   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
                  Level Discharge    Volume"
                321.450     0.000     0.000"
                321.550   0.00104     4.267"
                321.650   0.00104     8.533"
                321.750   0.00104    12.800"
                321.850   0.00104    17.067"
                321.950   0.00104    21.333"
                322.050   0.00104    25.600"
                322.350   0.00105    25.770"
                322.650   0.00105    25.939"
                322.950   0.00106    26.109"
```

```
"               323.310   0.00106    26.313"
"               323.325   0.00114    26.386"
"               323.430   0.00125    27.590"
"               323.530   0.08471    29.172"
"            Peak outflow                  0.028    c.m/sec"
"            Maximum level               323.463    metre"
"            Maximum storage              28.110    c.m"
"            Centroidal lag                4.502   hours"
"                 0.052     0.052     0.028     0.026 c.m/sec"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                  0.043    c.m/sec"
"            Hydrograph volume           108.567    c.m"
"                    0.052     0.052     0.028     0.043"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.052     0.000     0.028     0.043"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   Catchment 203"
"       0.000   % Impervious"
"       0.000   Total Area"
"       2.000   Flow length"
"       5.000   Overland Slope"
"       0.000   Pervious Area"
"       2.000   Pervious length"
"       5.000   Pervious slope"
"       0.000   Impervious Area"
"       2.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.279   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.028     0.043 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.000      0.000      hectare"
"            Time of concentration  2.277      0.257      2.277      minutes"
"            Time to Centroid       134.659    115.102    134.659    minutes"
"            Rainfall depth         51.710     51.710     51.710     mm"
"            Rainfall volume        0.10       0.00       0.10       c.m"
"            Rainfall losses        37.260     10.784     37.260     mm"
"            Runoff depth           14.450     40.926     14.450     mm"
"            Runoff volume          0.03       0.00       0.03       c.m"
"            Runoff coefficient     0.279      0.000      0.279      "
"            Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.000     0.000     0.028     0.043"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.000     0.000     0.000     0.043"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                  0.043    c.m/sec"
"            Hydrograph volume           108.596    c.m"
"                    0.000     0.000     0.000     0.043"
```

```
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.043    c.m/sec"
"             Hydrograph volume           108.596    c.m"
"                    0.000     0.043     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.043    c.m/sec"
"             Hydrograph volume           108.596    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename:2408455 - Post Development Controlled 25yr.out"
"                Licensee name:                                             gmbp"
"                Company                                                       "
"                Date & Time last used:             1/10/2025 at 1:34:25 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      972.202   Coefficient A"
"        1.500   Constant B"
"        0.752   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          228.875    mm/hr"
"             Total depth                 62.786    mm"
"           5   25hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.337   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.895   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.031     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  10.327     1.262      3.739      minutes"
"             Time to Centroid       146.776    116.413    124.712    minutes"
"             Rainfall depth         62.786     62.786     62.786     mm"
"             Rainfall volume        36.10      36.10      72.20      c.m"
"             Rainfall losses        41.654     6.598      24.126     mm"
"             Runoff depth           21.132     56.188     38.660     mm"
"             Runoff volume          12.15      32.31      44.46      c.m"
"             Runoff coefficient     0.337      0.895      0.616      "
"             Maximum flow           0.005      0.030      0.031      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.031     0.031     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.031     0.031     0.031     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.031    c.m/sec"
"             Hydrograph volume            44.459    c.m"
"                    0.031     0.031     0.031     0.031"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.031     0.000     0.031     0.031"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.338   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.887   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.064     0.000     0.031     0.031 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area "
"             Surface Area           0.137      0.112      0.249      hectare"
"             Time of concentration  8.689      1.062      3.484      minutes"
"             Time to Centroid       144.072    116.080    124.968    minutes"
"             Rainfall depth         62.786     62.786     62.786     mm"
"             Rainfall volume        85.99      70.35      156.34     c.m"
"             Rainfall losses        41.592     7.105      26.073     mm"
"             Runoff depth           21.194     55.681     36.713     mm"
"             Runoff volume          29.03      62.39      91.42      c.m"
"             Runoff coefficient     0.338      0.887      0.585      "
"             Maximum flow           0.015      0.059      0.064      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.064     0.064     0.031     0.031"
" 54          POND DESIGN"
"        0.064   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"         91.4   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                321.450     0.000     0.000"
"                321.550   0.00104     4.267"
"                321.650   0.00104     8.533"
"                321.750   0.00104    12.800"
"                321.850   0.00104    17.067"
"                321.950   0.00104    21.333"
"                322.050   0.00104    25.600"
"                322.350   0.00105    25.770"
"                322.650   0.00105    25.939"
"                322.950   0.00106    26.109"
```

```
"               323.310   0.00106    26.313"
"               323.325   0.00114    26.386"
"               323.430   0.00125    27.590"
"               323.530   0.08471    29.172"
"            Peak outflow                  0.040    c.m/sec"
"            Maximum level               323.492    metre"
"            Maximum storage              28.566    c.m"
"            Centroidal lag                4.140   hours"
"                 0.064     0.064     0.040     0.031 c.m/sec"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                  0.059    c.m/sec"
"            Hydrograph volume           133.709    c.m"
"                    0.064     0.064     0.040     0.059"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.064     0.000     0.040     0.059"
" 33         CATCHMENT 203"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         203   Catchment 203"
"       0.000   % Impervious"
"       0.000   Total Area"
"       2.000   Flow length"
"       5.000   Overland Slope"
"       0.000   Pervious Area"
"       2.000   Pervious length"
"       5.000   Pervious slope"
"       0.000   Impervious Area"
"       2.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.334   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.000   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.040     0.059 c.m/sec"
"            Catchment 203          Pervious   Impervious Total Area "
"            Surface Area           0.000      0.000      0.000      hectare"
"            Time of concentration  1.970      0.241      1.970      minutes"
"            Time to Centroid       133.258    114.688    133.258    minutes"
"            Rainfall depth         62.786     62.786     62.786     mm"
"            Rainfall volume        0.13       0.00       0.13       c.m"
"            Rainfall losses        41.836     12.425     41.836     mm"
"            Runoff depth           20.950     50.361     20.950     mm"
"            Runoff volume          0.04       0.00       0.04       c.m"
"            Runoff coefficient     0.334      0.000      0.334      "
"            Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.000     0.000     0.040     0.059"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.000     0.000     0.000     0.059"
" 40         HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"            Maximum flow                  0.059    c.m/sec"
"            Hydrograph volume           133.751    c.m"
"                    0.000     0.000     0.000     0.059"
```

```
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.059    c.m/sec"
"             Hydrograph volume           133.751    c.m"
"                    0.000     0.059     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.059    c.m/sec"
"             Hydrograph volume           133.751    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
"                Output filename:2408455 - Post Development Controlled 50yr.out"
"                Licensee name:                                             gmbp"
"                Company                                                       "
"                Date & Time last used:             1/10/2025 at 1:35:33 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     1054.539   Coefficient A"
"        1.500   Constant B"
"        0.746   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          251.085    mm/hr"
"             Total depth                 70.383    mm"
"           5   50hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"       50.000   % Impervious"
"        0.115   Total Area"
"       20.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       20.000   Pervious length"
"        2.000   Pervious slope"
"        0.058   Impervious Area"
"       20.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.370   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.902   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.035     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  9.525      1.214      3.631      minutes"
"             Time to Centroid       145.042    116.207    124.591    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        40.47      40.47      80.94      c.m"
"             Rainfall losses        44.357     6.903      25.630     mm"
"             Runoff depth           26.025     63.479     44.752     mm"
"             Runoff volume          14.96      36.50      51.47      c.m"
"             Runoff coefficient     0.370      0.902      0.636      "
"             Maximum flow           0.007      0.033      0.035      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.035     0.035     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.035     0.035     0.035     0.000"
" 40          HYDROGRAPH   Combine    1"
```

```
"            6   Combine "
"            1   Node #"
                 Flows off-site"
             Maximum flow                  0.035    c.m/sec"
             Hydrograph volume            51.465    c.m"
                    0.035     0.035     0.035     0.035"
" 40         HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
                    0.035     0.000     0.035     0.035"
" 33         CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.371   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.893   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
                    0.071     0.000     0.035     0.035 c.m/sec"
             Catchment 202          Pervious   Impervious Total Area "
             Surface Area           0.137      0.112      0.249      hectare"
             Time of concentration  8.015      1.021      3.375      minutes"
             Time to Centroid       142.643    115.806    124.838    minutes"
             Rainfall depth         70.383     70.383     70.383     mm"
             Rainfall volume        96.39      78.86      175.25     c.m"
             Rainfall losses        44.297     7.533      27.753     mm"
             Runoff depth           26.086     62.850     42.630     mm"
             Runoff volume          35.72      70.42      106.15     c.m"
             Runoff coefficient     0.371      0.893      0.606      "
             Maximum flow           0.022      0.065      0.071      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"            4   Add Runoff "
                    0.071     0.071     0.035     0.035"
" 54         POND DESIGN"
"        0.071   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"        106.1   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
                  Level Discharge    Volume"
                321.450     0.000     0.000"
                321.550   0.00104     4.267"
                321.650   0.00104     8.533"
                321.750   0.00104    12.800"
                321.850   0.00104    17.067"
                321.950   0.00104    21.333"
                322.050   0.00104    25.600"
                322.350   0.00105    25.770"
                322.650   0.00105    25.939"
                322.950   0.00106    26.109"
```

```
"                323.310   0.00106    26.313"
"                323.325   0.00114    26.386"
"                323.430   0.00125    27.590"
"                323.530   0.08471    29.172"
"             Peak outflow                  0.049    c.m/sec"
"             Maximum level               323.504    metre"
"             Maximum storage              28.766    c.m"
"             Centroidal lag                3.948   hours"
"                  0.071     0.071     0.049     0.035 c.m/sec"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.071    c.m/sec"
"             Hydrograph volume           151.454    c.m"
"                     0.071     0.071     0.049     0.071"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                     0.071     0.000     0.049     0.071"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Catchment 203"
"        0.000   % Impervious"
"        0.000   Total Area"
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.365   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                     0.000     0.000     0.049     0.071 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  1.818      0.232      1.818      minutes"
"             Time to Centroid       132.480    114.416    132.480    minutes"
"             Rainfall depth         70.383     70.383     70.383     mm"
"             Rainfall volume        0.14       0.00       0.14       c.m"
"             Rainfall losses        44.670     13.578     44.670     mm"
"             Runoff depth           25.712     56.805     25.712     mm"
"             Runoff volume          0.05       0.00       0.05       c.m"
"             Runoff coefficient     0.365      0.000      0.365      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                     0.000     0.000     0.049     0.071"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                     0.000     0.000     0.000     0.071"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.071    c.m/sec"
"             Hydrograph volume           151.505    c.m"
"                     0.000     0.000     0.000     0.071"
```

```
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
                 Flows off-site"
"             Maximum flow                  0.071    c.m/sec"
"             Hydrograph volume           151.505    c.m"
"                    0.000     0.071     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.071    c.m/sec"
"             Hydrograph volume           151.505    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                       0.364    hectare"
"             Total Impervious area                      0.170    hectare"
"             Total % impervious                        46.554"
" 19          EXIT"
```

```
"                MIDUSS Output ------------------------------------------------>"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                      Sunday, February 07, 2010"
"           10   Units used:                                          ie METRIC"
"                Job folder:                  C:\Users\hbhatt\Desktop\MIDUSS\"
"                                            2408455 - 302-306 Edinburgh Road"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     240.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"    1122.601   Coefficient A"
"       1.500   Constant B"
"       0.738   Exponent C"
"       0.400   Fraction R"
"     240.000   Duration"
"       1.000   Time step multiplier"
"             Maximum intensity          271.357    mm/hr"
"             Total depth                 78.288    mm"
"           6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 201"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         201   Catchment 201"
"      50.000   % Impervious"
"       0.115   Total Area"
"      20.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      20.000   Pervious length"
"       2.000   Pervious slope"
"       0.058   Impervious Area"
"      20.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      75.000   Pervious SCS Curve No."
"       0.402   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.467   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.908   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.039     0.000     0.000     0.000 c.m/sec"
"             Catchment 201          Pervious   Impervious Total Area "
"             Surface Area           0.058      0.058      0.115      hectare"
"             Time of concentration  8.898      1.175      3.547      minutes"
"             Time to Centroid       143.694    116.081    124.562    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        45.02      45.02      90.03      c.m"
"             Rainfall losses        46.790     7.240      27.015     mm"
"             Runoff depth           31.497     71.047     51.272     mm"
"             Runoff volume          18.11      40.85      58.96      c.m"
"             Runoff coefficient     0.402      0.908      0.655      "
"             Maximum flow           0.009      0.036      0.039      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.039     0.039     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.039     0.039     0.039     0.000"
" 40          HYDROGRAPH   Combine    1"
"           6   Combine "
"           1   Node #"
"               Flows off-site"
"             Maximum flow                0.039    c.m/sec"
```

```
"             Hydrograph volume            58.963    c.m"
"                    0.039     0.039     0.039     0.039"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.039     0.000     0.039     0.039"
" 33          CATCHMENT 202"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          202   Catchment 202"
"       45.000   % Impervious"
"        0.249   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.137   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.112   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.401   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.898   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.079     0.000     0.039     0.039 c.m/sec"
"             Catchment 202          Pervious   Impervious Total Area "
"             Surface Area           0.137      0.112      0.249      hectare"
"             Time of concentration  7.487      0.989      3.285      minutes"
"             Time to Centroid       141.549    115.622    124.782    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        107.21     87.72      194.94     c.m"
"             Rainfall losses        46.856     7.972      29.358     mm"
"             Runoff depth           31.432     70.316     48.930     mm"
"             Runoff volume          43.05      78.79      121.83     c.m"
"             Runoff coefficient     0.401      0.898      0.625      "
"             Maximum flow           0.027      0.071      0.079      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.079     0.079     0.039     0.039"
" 54          POND DESIGN"
"        0.079   Current peak flow    c.m/sec"
"        0.016   Target outflow    c.m/sec"
"        121.8   Hydrograph volume    c.m"
"          14.   Number of stages"
"        0.000   Minimum water level    metre"
"        3.000   Maximum water level    metre"
"        0.000   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                321.450     0.000     0.000"
"                321.550   0.00104     4.267"
"                321.650   0.00104     8.533"
"                321.750   0.00104    12.800"
"                321.850   0.00104    17.067"
"                321.950   0.00104    21.333"
"                322.050   0.00104    25.600"
"                322.350   0.00105    25.770"
"                322.650   0.00105    25.939"
"                322.950   0.00106    26.109"
"                323.310   0.00106    26.313"
"                323.325   0.00114    26.386"
"                323.430   0.00125    27.590"
"                323.530   0.08471    29.172"
```

```
"             Peak outflow                  0.056    c.m/sec"
"             Maximum level               323.521    metre"
"             Maximum storage              29.033    c.m"
"             Centroidal lag                3.671   hours"
"                  0.079     0.079     0.056     0.039 c.m/sec"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume           176.670    c.m"
"                    0.079     0.079     0.056     0.081"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.079     0.000     0.056     0.081"
" 33          CATCHMENT 203"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          203   Catchment 203"
"        0.000   % Impervious"
"        0.000   Total Area"
"        2.000   Flow length"
"        5.000   Overland Slope"
"        0.000   Pervious Area"
"        2.000   Pervious length"
"        5.000   Pervious slope"
"        0.000   Impervious Area"
"        2.000   Impervious length"
"        5.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       75.000   Pervious SCS Curve No."
"        0.396   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.467   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.000   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.000     0.000     0.056     0.081 c.m/sec"
"             Catchment 203          Pervious   Impervious Total Area "
"             Surface Area           0.000      0.000      0.000      hectare"
"             Time of concentration  1.698      0.224      1.698      minutes"
"             Time to Centroid       132.048    114.252    132.048    minutes"
"             Rainfall depth         78.288     78.288     78.288     mm"
"             Rainfall volume        0.16       0.00       0.16       c.m"
"             Rainfall losses        47.254     14.793     47.254     mm"
"             Runoff depth           31.034     63.494     31.034     mm"
"             Runoff volume          0.06       0.00       0.06       c.m"
"             Runoff coefficient     0.396      0.000      0.396      "
"             Maximum flow           0.000      0.000      0.000      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.000     0.000     0.056     0.081"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.000     0.000     0.000     0.081"
" 40          HYDROGRAPH   Combine    1"
"            6   Combine "
"            1   Node #"
"                Flows off-site"
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume           176.732    c.m"
"                    0.000     0.000     0.000     0.081"
" 40          HYDROGRAPH   Confluence    1"
"            7   Confluence "
"            1   Node #"
"                Flows off-site"
```

```
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume           176.732    c.m"
"                     0.000     0.081     0.000     0.000"
" 64          SHOW TABLE"
"            2   Flow hydrograph"
"            4   Inflow Hydrograph"
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume           176.732    c.m"
" 38          START/RE-START TOTALS 1"
"            3   Runoff Totals on EXIT"
"             Total Catchment area                      0.364    hectare"
"             Total Impervious area                     0.170    hectare"
"             Total % impervious                       46.554"
" 19          EXIT"
```

Appendix C Geotechnical Report

C.1. In-situ Infiltration Testing and Monitoring Well Installation, completed by CMT Engineering inc. (dated November 5,2024)

C.2. Water Level Reading Letter, by CMT Engineering inc. (dated December 17,2024)

C.1. In-situ Infiltration Testing and Monitoring Well Installation, completed by CMT Engineering inc. (dated November 5,2024)

GEOTECHNICAL INVESTIGATION

INSITU INFILTRATION TESTING AND MONITORING WELL INSTALLATION
302 AND 306 EDINBURGH ROAD SOUTH
GUELPH, ONTARIO

CMT Project 24-664.R01

Prepared For:

Mezcon Construction Ltd.

November 5, 2024

CMT Engineering Inc.
[redacted]
St. Clements, Ontario
Tel: [redacted]
Fax:
www.cmtinc.net

November 5, 2024 24-664.R01

Mezcon Construction Ltd.
[redacted] Surrey Street East
Guelph, Ontario,
[redacted]

Attention: Mr. Zachary Fisher

Dear Zachary:

Re: Monitoring Well Installation and Infiltration Testing
302 and 306 Edinburgh Road South
Guelph, Ontario

As requested, CMT Engineering Inc. conducted a geotechnical investigation which included monitoring well installation and in-situ infiltration testing at the above-referenced site, and we are pleased to present the enclosed report.

We trust that this information meets your present requirements, and we thank you for allowing us to undertake this project. Should you have any questions, please do not hesitate to contact our office.

Yours truly,

[redacted]

Jake Feeney, P.Eng.

tb

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1.0 INTRODUCTION

The services of CMT Engineering Inc. (CMT Inc.) were retained by Mr. Zachary Fisher of Mezcon Construction Ltd. to conduct a geotechnical investigation including monitoring well installation and in-situ infiltration testing for the proposed infiltration galleries to be constructed to service the site redevelopment at 302 and 306 Edinburgh Road South, in Guelph, Ontario.

A geotechnical investigation was previously completed by MTE for the subject site with the findings and recommendations provided in the report titled "*Geotechnical Investigation Report, Proposed Residential Development, 302 & 306 Edinburgh Road South, Guelph, Ontario",* MTE File Number 49495-100-rev100, and dated November 3, 2021. This report should be read in conjunction with the previously issued geotechnical report for the site.

It is understood that the proposed residential development requires insitu permeability testing in accordance with the Low Impact Development Stormwater Management Planning and Design Guide (LIDSMPDG) at the proposed infiltration gallery locations. Two (2) infiltration galleries are proposed for the site. Currently, the location and size of the proposed infiltration gallery(s) has not been determined. As such, in-situ permeability testing was conducted at depths of 2.4 m (7.9 ft) and 3.9 m (12.8 ft) below the ground surface. The location of the site is shown on Drawing 1.

The purpose of the geotechnical investigation was to assess the existing soil and groundwater conditions encountered in the boreholes advanced in the general locations of the proposed stormwater infiltration galleries. Included in the assessment are the soil classification and groundwater observations; soil parameters for design of infiltration galleries; and a summary of the laboratory test results.

The recommendations in this report are solely based on the soil conditions encountered in the boreholes located at the subject site.

2.0 EXISTING SITE CONDITIONS

The subject site contains two existing residential buildings with associated driveways. The site is bounded by residential properties in all directions and Edinburgh Road South to the southwest. The general site topography is relatively flat in elevation.

3.0 FIELD AND LABORATORY PROCEDURES

Prior to the commencement of the field drilling program, underground service locates were organized by CMT Inc. to ensure that underground utilities would not be damaged.

The field investigation was conducted on October 7, 2024, and comprised the advancement of two (2) boreholes (referenced as Boreholes 1 and 2), utilizing a Geoprobe 7822DT drillrig operated by CMT Drilling Inc. The boreholes were advanced to approximate depths ranging from 3.90 m (12.8 ft) to 4.57 m (15.0 ft) below the existing grade in the locations of the proposed infiltration galleries.

Boreholes 1 and 2 were advanced utilizing Macro core (MC5) direct push soil sampling, in accordance with ASTM D6282/D6282M-14 "Standard Guide for Direct Push Soil Sampling". Technical staff from CMT Inc. observed the drilling operation and collected and logged the recovered soil samples. A small portion of each sample was placed in a sealed, marked jar for moisture content determinations.

Representative samples from the following depths were submitted to the CMT Inc. laboratory in St. Clements, Ontario for grain size analyses:

- Borehole 1 – approximate depth 1.52 m to 3.05 m (5.00 ft to 10.00 ft),
- Borehole 1 – approximate depth 3.51 m to 4.57 (11.50 ft to 15.00 ft),
- Borehole 2 – approximate depth 1.52 m to 3.05 m (5.00 ft to 10.00 ft),
- Borehole 2 – approximate depth 3.35 m to 4.57 m (11.00 ft to 15.00 ft).

The borehole logs are provided in Appendix A and the grain size analyses are provided in Appendix B.

One (1) monitoring well was installed in Borehole 2 by CMT Inc and three (3) monitoring wells were installed during the MTE geotechnical investigation (referenced as MW103-21, MW105-21 and MW 106-21). The monitoring well at Borehole 2 comprised a 25 mm (1.0 inch) diameter PVC pipe with a 1.52 m (5.0 ft) long slotted screen. The monitoring well screen was backfilled with filter sand, and riser pipes backfilled with bentonite. The monitoring wells were installed in accordance with the Ontario Water Resources Act, Regulation 903 (O. Reg. 903) by well technicians licensed by the Ministry of the Environment, Conservation and Parks (MECP). The well records are provided in Appendix D.

The ground surface elevation at the borehole locations were surveyed by CMT Inc. following drilling on October 7, 2024. Borehole 1 was determined to have a ground surface elevation of about 324.16 m above sea level, while Borehole 2 was determined to have a ground surface elevation of about 324.23 m above sea level. The location of the boreholes are shown on Drawing 2.

4.0 SUBSOIL CONDITIONS

The soils encountered in the boreholes are described briefly below and a more detailed stratigraphic description is provided on the borehole logs in Appendix A. The following paragraphs have been simplified into terms of major soil strata. The soil boundaries indicated have been inferred from observations of sampling and drilling resistance and typically represent transitions from one soil type to another rather than exact planes of geological change. Further, the subsurface conditions are anticipated to vary beyond the borehole locations.

4.1. Topsoil

Dark brown, silty, organic topsoil was encountered at the surface of Boreholes 1 and 2. The topsoil ranged in thickness from approximately 150 mm to 300 mm, however the topsoil thickness should be expected to vary throughout the site. Materials noted as topsoil in this report were classified based on visual and textural evidence. Testing of organic content or for other nutrients was not carried out.

4.2. Silty Sand Fill

Brown silty sand fill with trace gravel was encountered underlying the topsoil at Borehole 2. The silty sand fill was considered to be moist, with a moisture content of about 9.9%. The silty sand fill was approximately 1,370 mm in thickness at the borehole location.

4.3. Gravel and Sand/Gravelly Sand

Brown gravel and sand to gravelly sand with trace silt and clay, was observed underlying the topsoil at Borehole 1 and underlying the silty sand fill at Borehole 2. The gravel and sand/gravelly sand was considered to be moist, with moisture contents ranging from about 1.5% to 3.7% (average 2.4%).

4.4. Clayey Silt

Brown clayey silt with some sand to sandy and trace gravel was encountered underlying the gravel and sand/gravelly sand at Boreholes 1 and 2. The clayey silt was considered to be moist, with moisture contents ranging from about 11.7% to 12.9% (average 12.3%).

4.5. Groundwater

In total, four (4) monitoring wells were installed on the subject site during the geotechnical investigations to measure the static groundwater levels. The water levels were measured by MTE and CMT Inc. personnel following installation on October 28, 2021, September 17, 2024, and subsequently on October 28, 2024.

The measured elevation of water in the monitoring wells, the estimated zone of wet to saturated soils, as well as the ground surface and bottom of borehole elevation, are provided in the following table:

Borehole No.	Ground Surface Elevation (m)	Measured Elevation of Water in Monitoring Well on October 28, 2021 (m)	Measured Elevation of Water in Monitoring Well on September 17, 2024 (m)	Measured Elevation of Water in Monitoring Well on October 28, 2024 (m)	Approximate Zone of Wet to Saturated Soils (m)	Approx. Bottom of Monitoring Well Elevation (m)
BH2	324.23	N/A	N/A	320.13 (4.10)	-	319.66
MW103-21	324.00	318.70	319.74	319.63 (4.37)	-	317.40
MW105-21	323.10	317.20	318.43	318.33 (4.77)	-	316.90
MW106-21	323.40	316.40	317.59	317.64 (5.76)	-	316.00

Groundwater conditions are generally dependent on the amount of precipitation, control of surface water, as well as the time of year, and can fluctuate significantly in elevation and volume.

5.0 DISCUSSION AND RECOMMENDATIONS

This section of the report provides an interpretation of the factual geotechnical data obtained during the investigation and is intended for the guidance of the owner and design engineer. Where comments are made on construction, they are provided only to highlight those aspects which could affect the design of the project. Contractors bidding on or undertaking the work should make their own independent interpretation of the factual subsurface information provided as it affects their proposed construction means and methods, equipment selection, scheduling, pricing, and the like.

Utilizing the information gathered during the geotechnical investigation and assuming that the borehole information is representative of the subsoil conditions throughout the site, the following comments and recommendations are provided.

5.1. Soil Design Parameters

The following table provides the estimated soil design parameters for imported granular fill, as well as the existing native soils encountered on-site. It should be noted that earth pressure coefficients (Ka, Kp, Ko) provided are for flat ground surface conditions and will differ for areas with slopes or embankments.

The estimated soil design parameters can be utilized for the design of perimeter shoring, foundations and retaining walls, lateral earth pressure calculations, as required:

Soil Type	Soil Density (kg/m^3)	Friction Angle (Degree)	Coefficient of Active Pressure (K_a)	Coefficient of Passive Pressure (K_p)	Coefficient of At-Rest Pressure (K_o)	Coefficient of Friction (μ)	Cohesion (kPa)
Imported Granular 'A' (OPSS 1010)	2,100	34°	0.28	3.54	0.44	0.45	0
Imported Granular 'B' (OPSS 1010)	2,050	32°	0.31	3.25	0.47	0.41	0
Silty Sand Fill	1,800	28°	0.36	2.77	0.53	0.35	0
Gravel and Sand	1,900	34°	0.28	3.54	0.44	0.45	0
Clayey Silt	1,800 to 1,900	28° to 32°	0.36 to 0.31	2.77 to 3.25	0.53 to 0.47	0.35 to 0.42	0 to 10

5.2. Infiltration Testing

Appendix C of the LIDSWMP recommends that at least one infiltration test should be conducted at the bottom elevation of the infiltration pit, plus one additional test at every soil horizon encountered within 1.5 m below the bottom elevation (a minimum of two tests per infiltration pit). Appendix C of the LIDSWMP also recommends that one test hole should be advanced for an infiltration pit with a footprint of less than 50 m^2.

The infiltration testing program was conducted on October 7, 2024, and was comprised of two (2) Guelph Permeameter Constant Head infiltration tests in Boreholes 1 and 2, in accordance with ASTM D5126 Section 4.1.6. The infiltration testing was conducted in

Borehole 1 at depths of about 2.4 m (7.9 ft) and 3.9 m (12.8 ft), and in Borehole 2 at depths of about 2.4 m (7.9 ft) and 3.9 m (12.8 ft). The test hole diameters were approximately 5.72 cm (2.25 in). Constant head permeability testing was conducted using a constant head setting of 10 cm.

The field hydraulic conductivity was converted to infiltration rates using Figure C1 of the LIDSWMP. Based on information gathered from the permeameter testing and borehole data, the following table provides the field saturated hydraulic conductivity, infiltration rate, test location and soil type for each test:

Test Location and Depth (m)	Approx. Elevation of Test (m)	Guelph Permeameter Field Hydraulic Conductivity (K_{fs}) (cm/sec)	No Safety Factor Applied - Infiltration Rate (mm/hour)	Soil Type
BH 1 (2.4)	321.76	8.39×10^{-4}	70.5	Gravelly Sand
BH 1 (3.9)	320.26	3.94×10^{-4}	58.2	Clayey Sandy Silt
BH 2 (2.4)	321.83	9.32×10^{-4}	73.1	Gravel and Sand
BH 2 (3.9)	320.33	7.23×10^{-4}	67.3	Clayey Silt

In order to determine the design infiltration rate, the ratio of the infiltration rate at the proposed bottom of the infiltration pit and the infiltration rate of the least permeable soil horizon within 1.5 m below the proposed bottom elevation of the infiltration gallery is calculated. As per LIDSWMP, the applicable safety factor from Table C2 is applied to the infiltration rate at the proposed base of the infiltration pit. As per Table 3.4.1 of the LIDSWMP, the minimum distance between the base of the infiltration trench and the elevation of the high-water table or bedrock is 1.0 m.

The following table provides the ratio of infiltration rates, safety correction factor and design infiltration rate for the proposed infiltration pit locations:

Proposed Infiltration Pit Location	Proposed Bottom of Infiltration Pit Elevation (m)	Ratio of Infiltration Rates	Safety Correction Factor	Design Infiltration Rate (mm/hour)
BH1	321.76	1.21	2.5	28.2
BH2	321.83	1.09	2.5	29.2

It is required that an inspection of the infiltration gallery base be conducted prior to backfilling to ensure that the soils encountered are consistent with the borehole data so suitable infiltration rates are achieved.

All infiltration structures must be designed as per the City of Guelph Development Engineering Manual, October 2023 (DEM), and the Low Impact Development Stormwater Management Planning and Design Guide (LIDSWMP), as required.

Based on the soil and groundwater data obtained during the geotechnical investigations and monitoring well installations, the highest groundwater elevation measured was at elevation of approximately 320.13 m or approximately 4.1 m (13.5 ft) below the ground surface and anticipated to be below (the target infiltration depths. As per the D.E.M., CMT Inc. will continue to monitor the ground water elevation in the monitoring wells installed at the site on a regular basis in order to collect additional groundwater data through the site development process.

In addition to the above requirements of the DEM, CMT Engineering Inc. recommends the following:

- That each downspout entering the infiltration gallery have a strainer/leaf deflector as well as a rainwater leader overflow outlet just above grade that is equipped with a splash pad to direct water away from the foundation.
- That regular inspection/maintenance of the downspout strainer/leaf deflector is performed to ensure continuous operation and reduce the potential for the accumulation of sediment that can impede the functionality of the infiltration gallery.

The field data sheets for the in-situ infiltration testing can be found in Appendix C of this report.

6.0 LIMITATIONS OF THE INVESTIGATION

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review our recommendations when the drawings and specifications are complete, or if the proposed construction should differ from that mentioned in this report.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments are based on the results obtained at the test locations only. It is therefore assumed that these results are representative of the subsoil conditions across the site. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations.

It should be noted that this report specifically addresses geotechnical aspects of the project and does not include any investigations or assessments relating to potential subsurface

contamination. As such, there should be no assumptions or conclusions derived from this report with respect to potential soil or water contamination. Soil or water contamination is generally caused by the presence of xenobiotic (human-made) chemicals or other alteration processes in the natural soil and groundwater environment. If necessary, the investigation, assessment and rehabilitation of soil and water contaminants should be undertaken by qualified environmental specialists.

The samples obtained during the geotechnical investigation will be stored for a period of three months, after which time they will be disposed of unless alternative arrangements are made.

This report is intended solely for the client named. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the reliability of such third parties. The factual data, interpretation, and recommendations in this report pertain to a specific project as described in this report and are not applicable to any other project or site location. If the project is modified in concept, location or elevation, deviates from the assumptions stated herein, CMT Inc. should be given an opportunity to confirm that the recommendations are still valid. The subject geotechnical exploration and this report address only the geotechnical aspects of the proposed project; potential environmental impacts or related issues are beyond the defined scope of this work and have not been addressed.

We trust that this report meets with your present requirements. Should you have any questions, please do not hesitate to contact our office.

[redacted]

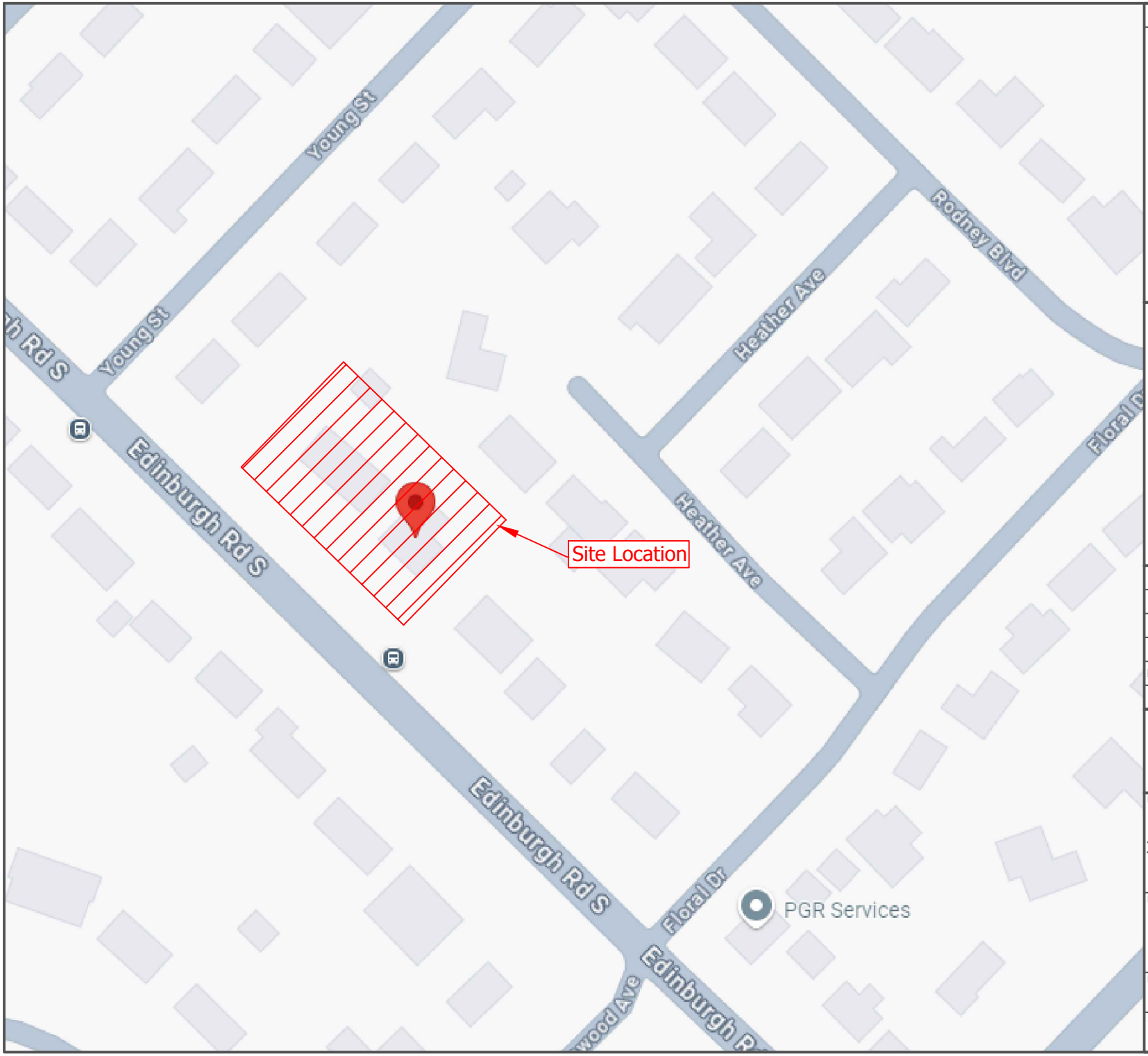
Jake Feeney, P.Eng

tb

Reviewed by:

[redacted]

Nathan Chortos, P.Eng.
Senior Geotechnical Engineer



NOTES:

Base map provided by Google.

N

NO.	DESCRIPTION	DATE

REVISIONS

CMT ENGINEERING INC.
[redacted] Industrial Crescent, Unit 1
St. Clements, Ontario [redacted]
www.cmtinc.net

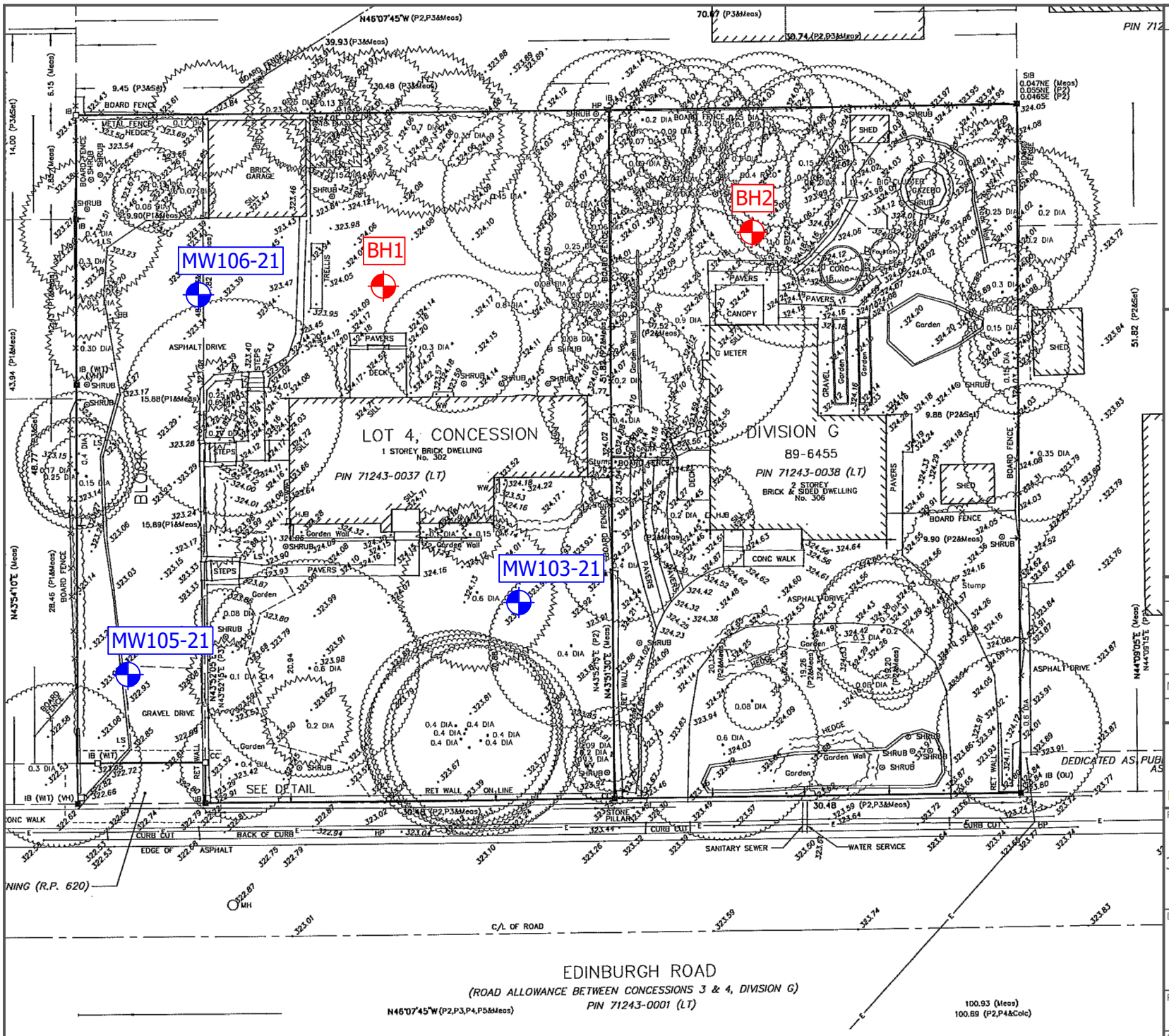
PROJECT:

IN-SITU PERMEAMETER TESTING
302 and 306 Edinburgh Road South
Guelph, Ontario

DRAWING TITLE:

SITE LOCATION MAP

PROJECT NO.:	DATE:
24-664	October 24, 2024
SCALE:	DRAWING NO.
N.T.S.	1



NOTES:

Base map provided by Client

Legend

CMT Borehole

MTE Monitoring Well

NO.	DESCRIPTION	DATE

REVISIONS

CMT ENGINEERING INC.

[redacted]

PROJECT:

IN-SITU PERMEAMETER TESTING
302 and 306 Edinburgh Road South
Guelph, Ontario

DRAWING TITLE:

AERIAL VIEW SHOWING
BOREHOLE LOCATIONS

PROJECT NO.:	DATE:
24-664	October 24, 2024
SCALE:	DRAWING NO.
N.T.S.	2

APPENDIX A

BOREHOLE LOGS

CMT Engineering Inc.
[redacted]
St. Clements, Ontario [redacted]
Telephone: [redacted]
Fax: [redacted]

BORHOLE NUMBER 1

PROJECT: In-Situ Permeameter Testing
PROJECT ADDRESS: 302 and 306 Edinburgh Road South
PROJECT NUMBER: 24-664
PROJECT LOCATION: Guelph, Ontario
DRILLING DATE: 24-10-7
GROUND ELEVATION: 324.16 m
DRILLING CONTRACTOR: CMT DRILLING INC.
LOGGED BY: J. Feeney
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
		Topsoil: Dark brown, silty, organic topsoil, moist (300 mm)	0.00, 324.16					
		Gravelly Sand: Brown gravelly sand, trace silt and clay, moist	0.30, 323.86	MC5 1	100	2.1		
1								
				MC5 2	100	3.7		
2								
3				MC5 3	100	12.9		
		Clayey Silt: Brown, clayey, sandy silt, trace gravel, moist	3.51, 320.65					

Borehole open to about 3.90 m below the ground surface. No accumulated groundwater or seepage observed upon completion.

Bottom of borehole at 3.90 m, Elevation 320.26 m.

SPT N VALUE: 10 20 30 40
POCKET PEN. (kPa): 90 180 270 360
MOISTURE CONTENT (%): 12 24 36 48

BOREHOLE LOG WITH WELL2 24-644.GPJ CMT_TEMPLATE_2020-05-15.GDT 24-10-29

CMT Engineering Inc.
[redacted] Industrial Crescent
St. Clements, Ontario, [redacted]
Telephone: [redacted]
Fax: [redacted]

BOREHOLE NUMBER 2

PROJECT: In-Situ Permeameter Testing
PROJECT ADDRESS: 302 and 306 Edinburgh Road South
PROJECT NUMBER: 24-664
PROJECT LOCATION: Guelph, Ontario
DRILLING DATE: 24-10-7
GROUND ELEVATION: 324.23 m
DRILLING CONTRACTOR: CMT Drilling Inc.
LOGGED BY: J. Feeney
DRILLING EQUIPMENT: Geoprobe 7822DT
SAMPLING METHOD: MC5

DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	Depth, Elevation (m)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	SPT N VALUE / POCKET PEN. (kPa) / MOISTURE CONTENT (%)	WELL DIAGRAM
0		**Topsoil:** Dark brown, silty, organic topsoil, moist (150 mm)	0.00, 324.23				SPT N VALUE: 10 20 30 40	
		Silty Sand Fill: Brown silty sand fill, trace gravel, moist (1,370 mm)	0.15, 324.08	MC5 1	100		POCKET PEN. (kPa): 90 180 270 360	25mm Riser
1							MOISTURE CONTENT (%): 12 24 36 48	
							9.9	Bentonite Seal
		Gravel and Sand: Brown gravel and sand, trace silt and clay, moist	1.52, 322.71	MC5 2	100			
2							1.5	
3								#2 Sand Pack
		Clayey Silt: Brown, clayey silt, some sand, trace gravel, moist	3.35, 320.88	MC5 3	100			25mm Screen
4							11.7	Water level measured at 4.10 m bgs (320.13 m) on October 28, 2024
		Bottom of borehole at 4.57 m, Elevation 319.66 m.						

APPENDIX B

GRAIN SIZE ANALYSES

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	23.7	8.0	36.8	22.4	6.7	2.4

SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	2	1.52-3.05m	gravelly sand, trace silt and clay	SW-SM
				Sampled by JF of CMT Engineering Inc. October 7, 2024	
				Tested by JM of CMT Engineering Inc. October 8, 2024	

CMT Engineering Inc.

St. Clements, ON

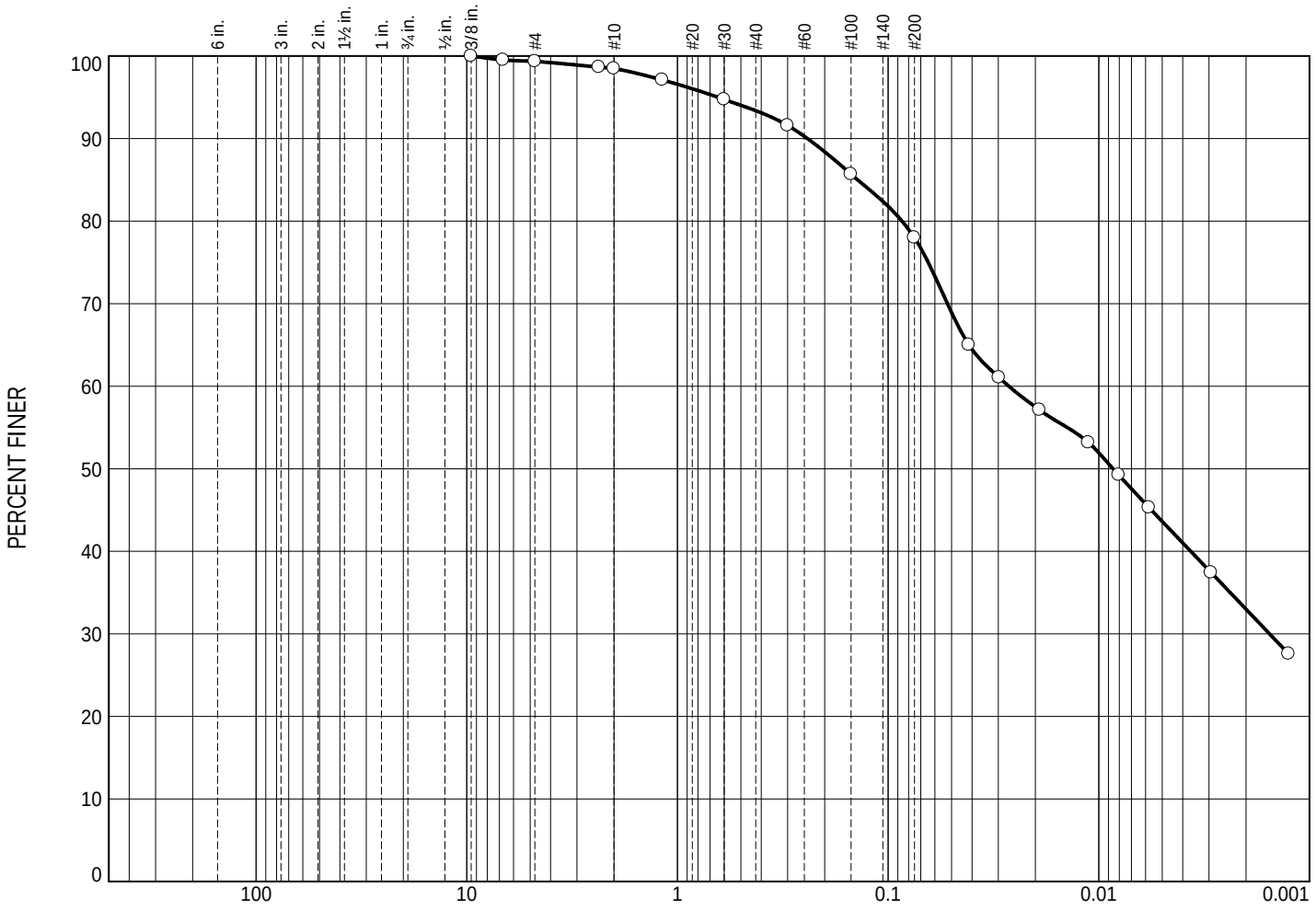
Client: Mezcon Construction Ltd.

Project: 302 and 306 Edinburgh Road South, Guelph, Ontario

Project No.: 24-664

Figure 1

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.7	0.8	5.1	15.4	45.0	33.0

SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH1	3	3.51-4.57m	clayey, sandy silt, trace gravel	ML
				Sampled by JF of CMT Engineering Inc. October 7, 2024	
				Tested by JM of CMT Engineering Inc. October 8, 2024	

CMT Engineering Inc.

St. Clements, ON

Client: Mezcon Construction Ltd.

Project: 302 and 306 Edinburgh Road South, Guelph, Ontario

Project No.: 24-664

Figure 2

Particle Size Distribution Report

	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	45.4	3.3	25.4	14.2	8.9	2.8

SOIL DATA

	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH2	2	1.52-3.05m	gravel and sand, trace silt and clay	GP-GM
				Sampled by JF of CMT Engineering Inc. October 7, 2024	
				Tested by JM of CMT Engineering Inc. October 8, 2024	

CMT Engineering Inc.

St. Clements, ON

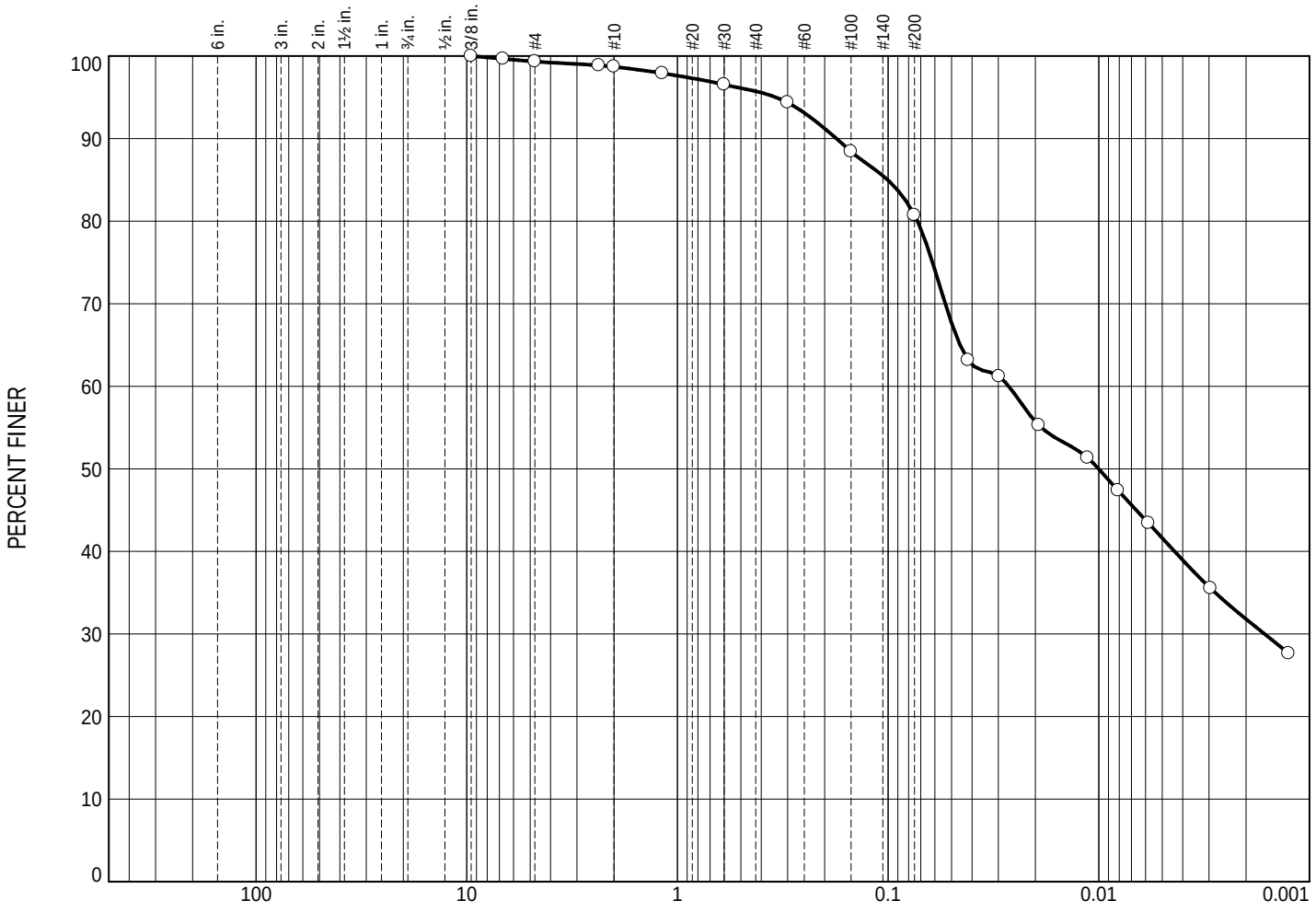
Client: Mezcon Construction Ltd.

Project: 302 and 306 Edinburgh Road South, Guelph, Ontario

Project No.: 24-664

Figure 3

Particle Size Distribution Report



	% Cobbles	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.7	0.6	3.0	15.0	48.9	31.8

SOIL DATA					
	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	BH2	3	3.35-4.57m	clayey silt, some sand, trace gravel	ML
				Sampled by JF of CMT Engineering Inc. October 7, 2024	
				Tested by JM of CMT Engineering Inc. October 8, 2024	

CMT Engineering Inc.

St. Clements, ON

Client: Mezcon Construction Ltd.

Project: 302 and 306 Edinburgh Road South, Guelph, Ontario

Project No.: 24-664

Figure 4

APPENDIX C

GUELPH PERMEAMETER FIELD SHEETS

Guelph Permeameter Field Data Sheet

Test #: 1 **upper/lower**

Project:	Infiltration Testing	Job No:	24-664
Address:	302 & 306 Edinburgh Rd. S., Guelph	Tech:	J. Feeney
Depth of Test	2.4 m	Date:	07-Oct-24
Soil Type:	Gravelly Sand	BH:	1 notch up/notch dwn
Water Height:	10 cm	Hole Diameter:	5.72 cm 35.22cm^2/2.16cm^2

[1] Elapsed Time min	[2] Reading cm	[3] Change in Height cm	[4] Change in time min	[5] = [3]/[4] Infiltration rate cm/min	Notes
0.5	5.5				
1	6	0.5	0.5	1	
1.5	6.5	0.5	0.5	1	
2	7.1	0.6	0.5	1.2	
2.5	7.6	0.5	0.5	1	
3	8.2	0.6	0.5	1.2	
3.5	8.8	0.6	0.5	1.2	
4	9.3	0.5	0.5	1	
4.5	9.8	0.5	0.5	1	
5	10.3	0.5	0.5	1	
5.5	10.8	0.5	0.5	1	
6	11.1	0.3	0.5	0.6	
6.5	11.7	0.6	0.5	1.2	
7	12.3	0.6	0.5	1.2	
7.5	12.6	0.3	0.5	0.6	
8	13	0.4	0.5	0.8	
8.5	13.5	0.5	0.5	1	
9	14	0.5	0.5	1	
9.5	14.5	0.5	0.5	1	
10	14.9	0.4	0.5	0.8	
11	15.8	0.9	1	0.9	
12	16.6	0.8	1	0.8	
13	17.6	1	1	1	
14	18.4	0.8	1	0.8	
15	19.3	0.9	1	0.9	
16	20.2	0.9	1	0.9	
17	21.1	0.9	1	0.9	
18	22	0.9	1	0.9	
19	23	1	1	1	
20	24	1	1	1	

Notes:

1) If there is less than 4mm in 20 minutes (0.2 mm/minute) the field hydraulic conductivity is less than 1.0x10^-6 cm/sec. After 3 to 5 consistent infiltration rate readings the infiltration rate is at steady state.

a) Ensure tight seal before filling

b) Ensure rubber stopper is back in permeameter (after filling) before breaking seal

Guelph Permeameter Field Data Sheet

Test #: 2 **upper/lower**

Project:	Infiltration Testing	Job No:	24-664
Address:	302 & 306 Edinburgh Rd. S., Guelph	Tech:	J. Feeney
Depth of Test	3.9 m	Date:	07-Oct-24
Soil Type:	Clayey Sandy Silt	BH:	1 notch up/notch dwn
Water Height:	10 cm	Hole Diameter:	5.72 cm 35.22cm^2/2.16cm^2

[1] Elapsed Time min	[2] Reading cm	[3] Change in Height cm	[4] Change in time min	[5] = [3]/[4] Infiltration rate cm/min	Notes
0.5	1.5				
1	1.5	0	0.5	0	
2	2.5	1	1	1	
3	3.1	0.6	1	0.6	
4	3.7	0.6	1	0.6	
5	4.3	0.6	1	0.6	
6	4.9	0.6	1	0.6	
7	5.5	0.6	1	0.6	
8	6.1	0.6	1	0.6	
9	6.6	0.5	1	0.5	
10	7.2	0.6	1	0.6	
12	8.3	1.1	2	0.55	
14	9.4	1.1	2	0.55	
16	10.6	1.2	2	0.6	
18	11.8	1.2	2	0.6	
20	13	1.2	2	0.6	

Notes:

1) If there is less than 4mm in 20 minutes (0.2 mm/minute) the field hydraulic conductivity is less than 1.0x10^-6 cm/sec. After 3 to 5 consistent infiltration rate readings the infiltration rate is at steady state.

a) Ensure tight seal before filling

b) Ensure rubber stopper is back in permeameter (after filling) before breaking seal

Guelph Permeameter Field Data Sheet

Test #: 3 **upper/lower**

Project:	Infiltration Testing	Job No:	24-664
Address:	302 & 306 Edinburgh Rd. S., Guelph	Tech:	J. Feeney
Depth of Test	2.4 m	Date:	07-Oct-24
Soil Type:	Gravel and Sand	BH:	2 notch up/notch dwn
Water Height:	10 cm	Hole Diameter:	5.72 cm 35.22cm^2/2.16cm^2

[1] Elapsed Time min	[2] Reading cm	[3] Change in Height cm	[4] Change in time min	[5] = [3]/[4] Infiltration rate cm/min	Notes
0.5	4.5				
1	5.5	1	0.5	2	
1.5	6	0.5	0.5	1	
2	6.5	0.5	0.5	1	
2.5	7.2	0.7	0.5	1.4	
3	8	0.8	0.5	1.6	
3.5	8.5	0.5	0.5	1	
4	9	0.5	0.5	1	
4.5	9.5	0.5	0.5	1	
5	10.1	0.6	0.5	1.2	
5.5	10.5	0.4	0.5	0.8	
6	11	0.5	0.5	1	
6.5	11.5	0.5	0.5	1	
7	12.1	0.6	0.5	1.2	
7.5	12.5	0.4	0.5	0.8	
8	13	0.5	0.5	1	
8.5	13.5	0.5	0.5	1	
9	14	0.5	0.5	1	
9.5	14.5	0.5	0.5	1	
10	15	0.5	0.5	1	
10.5	15.5	0.5	0.5	1	
11	16	0.5	0.5	1	
11.5	16.5	0.5	0.5	1	
12	17	0.5	0.5	1	
12.5	17.5	0.5	0.5	1	
13	18	0.5	0.5	1	
13.5	18.5	0.5	0.5	1	
14	19	0.5	0.5	1	
15	19.8	0.8	1	0.8	
16	20.9	1.1	1	1.1	

Notes:

1) If there is less than 4mm in 20 minutes (0.2 mm/minute) the field hydraulic conductivity is less than 1.0x10^-6 cm/sec. After 3 to 5 consistent infiltration rate readings the infiltration rate is at steady state.

a) Ensure tight seal before filling

b) Ensure rubber stopper is back in permeameter (after filling) before breaking seal

Guelph Permeameter Field Data Sheet

Test #: 4 **upper/lower**

Project:	Infiltration Testing	Job No:	24-664
Address:	302 & 306 Edinburgh Rd. S., Guelph	Tech:	J. Feeney
Depth of Test	3.9 m	Date:	07-Oct-24
Soil Type:	Clayey Silt	BH:	2 notch up/notch dwn
Water Height:	10 cm	Hole Diameter:	5.72 cm 35.22cm^2/2.16cm^2

[1] Elapsed Time min	[2] Reading cm	[3] Change in Height cm	[4] Change in time min	[5] = [3]/[4] Infiltration rate cm/min	Notes
0.5	2.9				
1	3.7	0.8	0.5	1.6	
1.5	4.3	0.6	0.5	1.2	
2	5	0.7	0.5	1.4	
3	6.4	1.4	1	1.4	
4	7.6	1.2	1	1.2	
5	8.8	1.2	1	1.2	
6	10.1	1.3	1	1.3	
7	11	0.9	1	0.9	
8	12.3	1.3	1	1.3	
9	13.3	1	1	1	
10	14.5	1.2	1	1.2	
12	16.7	2.2	2	1.1	
14	18.8	2.1	2	1.05	
16	21	2.2	2	1.1	
18	23.2	2.2	2	1.1	
20	25.4	2.2	2	1.1	

Notes:

1) If there is less than 4mm in 20 minutes (0.2 mm/minute) the field hydraulic conductivity is less than 1.0x10^-6 cm/sec. After 3 to 5 consistent infiltration rate readings the infiltration rate is at steady state.

a) Ensure tight seal before filling

b) Ensure rubber stopper is back in permeameter (after filling) before breaking seal

APPENDIX D

WELL RECORDS

General Instructions and Explanations for completing a Well Record

A completed electronic Well Record Form must be delivered to the well purchaser and the owner of the land on which the well is situated within 14 days after the date on which the well's structural stage is complete. The electronic Well Record must also be forwarded within 30 days after the date on which the well's structural stage is complete to the ministry through email to the following email address: WellRecordSubmission@ontario.ca

False and Misleading Information

Subsection 98(2) of the *Ontario Water Resources Act*, R.S.O. 1990 c. O. 40, states that:

"No person shall orally, in writing or electronically, give or submit false or misleading information in any statement, document or data, to any provincial officer, the Minister, the Ministry or the Agency, any employee in or agent of the Ministry or the Agency, or any person involved in carrying out a program of the Ministry or the Agency in respect of any matter related to this Act or the regulations."

Further, subsection 98(3) of the Act states that:

"No person shall include false or misleading information in any document or data required to be created, stored or submitted under this Act."

Measurements

All measurements must be recorded in the specified unit, metric or imperial by checking off the applicable box on the top of the form. You must use the checked unit consistently throughout the well record. Measurements must be reported to 1/10th of a metre if the unit is a metre. All measurements of depth must be referenced to ground surface.

Well Owner's Information

A "well owner" means the owner of land upon which a well is situated and includes a tenant or lessee of the land and a well purchaser. If the "well owner" is an individual, record the owner's last name and first name or if the "well owner" is a business, government or other organization, record the name in the "organization" area.

Well Location

Street Number/Name and City/town/Village must be provided, if available.

Geographic Township, Concession and Lot must be reported if the well is located in an area where such information exists.

UTM Coordinates must be recorded each time a Well Record is completed. Click the button [Test UTM in Map] to use the UTM Coordinates to plot the location to Google map. This allows verification of the UTM Coordinates. This will also automatically populate the County/District.

Municipal Plan and Sublet Number may be provided, if available.

Overburden and Bedrock Materials

For each formation encountered during construction, choose words from the lists that best describe the formation on the basis of general colour, most common material, other materials, and general description of the formation.

General Colours are White, Yellow, Grey, Brown, Blue, Red, Green and Black.

Examples of Materials are: Fill, Silt, Top Soil, Coarse Sand, Slate, Muck, Gravel, Limestone, Dolomite, Quartzite, Peat, Stones, Fine Sand, Shale, Granite, Clay, Boulders, Medium Sand, Sandstone, and Greenstone.

Some definitions are as follows:

- Clay: Composed of very fine particles. Forms dense hard lumps or clods when dry and a very elastic putty-like mass when wet. It can be rolled between fingers to form a long, flexible ribbon.
- Silt: Grain size, midway between sand and clay. It may form clods which, when broken, feel soft and floury. When moist, it will form a cast that can be handled freely without breaking. Rolled between thumb and finger, it will not "ribbon" but will give a broken appearance.

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- Sand: Grains are loose and granular and may be seen and felt readily. Squeezed in the hand when dry, it falls apart when the pressure is released. Squeezed when moist, it will form a cast that will crumble when touched. Should be listed as fine sand, medium sand or coarse sand.
- Gravel: Rock fragments greater than 0.3 cm in diameter.

Examples of General Descriptions are Loose, Cemented, Previously Dug or Bored, Porous, Layered, Previously Drilled, Dense, Soft, Wood Fragments, Packed, Hard.

Abandonment

To report abandonment of a well, check off the applicable box in Type on the top of the form. Details of abandonment must be recorded in the Abandonment and Sealing Section. Additional comments may be entered in the comments box under the Information section.

Annular Space

Record all material placed in the annular space around the single casing or around the permanent outer casing. If the well is a telescoped well [i.e., a well with an outer casing and inner casing(s)] or if the well is a multi-level nested test hole, report the depth from, depth to, material and volume placed for the annular space between two different sized casings or between the inner casing(s) and the side of the well in the “Comments” area of this electronic well record form.

Method of Construction

If the equipment used to construct the well is not on the list, check “Other (specify)” and record the type of equipment, check each equipment that applies.

Well Use

If the well’s use is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple uses, check each use that applies.

Status of Well

If the well’s status is not provided on the list, check “Other (specify)” and record the use of the well. If the well has multiple statuses, check each use that applies.

Construction Record – Casing and Open Hole

Use negative values to report the top of casing above ground surface. For example, if the top of the casing is 0.4 metres above the ground surface and the bottom of the casing 6.0 metres below the ground surface, record the casing “Depth From” as -0.4.

If the top of casing is located below the ground surface (e.g., if a test hole is constructed and the top of casing is located below the ground surface in a flush mounted well vault), report the top of the casing from below ground surface. For example, if the top of the casing is 0.1 metres below the ground surface and the bottom of the casing is 6 metres below the ground surface, record the casing “Depth From” as 0.1.

Note: If a drive shoe is used, the shoe is considered casing and it must be reported if the shoe has a different inside diameter thickness.

If a portion of the well was created an open hole, record the location of the open hole on a separate row, including the diameter and the depth (top and bottom of open hole) from the ground surface.

Construction Record – Well Screen

A “well screen” means perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone. Therefore, the length of a well screen includes any slotted or perforated area and unsealed area of pipe or tiles.

Water Details

- if groundwater was located, record the depth from the ground surface to the location of the groundwater resource, and
- record if the groundwater quality is “Untested,” “Fresh” (i.e., not salty), or “Other (specify).” If “Other (specify)” is recorded, use the “Other (specify)” dropdown list toselect the type of groundwater (e.g., salty, blackish water, yellowish water, mineralized, etc.).

Check off “Gas” if natural gas was encountered during well construction.

Note: Natural gas encounters need to be immediately reported to the ministry at 1-800-268-6060, well purchaser and the owner of the land.

Results of Well Yield Testing

Check off “Pumping Discontinued” if pumping was discontinued before 1 hour of continuous pumping. Explain the reason why pumping was discontinued or in some cases not performed (e.g., the well went dry, impossible to install pump in small diameter well, static water level from test hole or dewatering well was obtained and is reported instead of completing a yield test etc.).

Note: Equipment breakdown is not an acceptable reason for checking off “Pumping Discontinued” on the well record form. If groundwater in the well is flowing out of the well, provide the rate of flow, and check off “Flowing Well” (i.e., static water level above the ground surface).

In the “Results of Well Yield Testing” section of the well record form, record:

- the depth to the intake of the pump,
- the rate of pumping and duration of pumping period during the yield test,
- the final water level when pumping stops,
- water level measurements made during pumping (drawdown) and recovery. All water level measurements must be referenced from below the ground surface for each time interval specified in the drawdown and recovery boxes.

If the water level measurements remain the same over a period of time, continue to measure and report the same water level measurement for the remaining pumping or recovery time intervals.

If pumping continuously for at least 1 hour, but the design of the well does not allow for water level measurements (e.g., driven point well), the person constructing the well is not required to report drawdown or recovery water level measurements.

Map of Well Location

In the “Map of Well Location” section of the well record form, click the map area to attach a map of the well location. The map must show sufficient information to locate the well, including:

- a mark on the map showing the well,
- a scale on the map, and
- where available, the name of the structure, street or surface water body nearest to the well.

Note: More than one map can be added to the well record form by clicking on “Add Map (+)” to add an additional map.

Information

Record any additional information (e.g., observations, tests, additional licensed well technicians who worked on the well, additional annular space details for a telescoped well or a multi-level nested test hole, reasons for not providing a well owner information package) in the comments area.

Declaration

Check the declaration statement to confirm that the person constructing the well agrees with the following statement: “I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate”.

Validate

Click the validate button. If there is no missing information, you will be asked to enter the well tag again to make sure the well tag is entered correctly (only enter the numeric portion of the tag number). The audit number will then be changed from “**incomplete**” to an assigned audit number. The signature field will then be available. Click on “signature” to enter the well technician’s electronic signature. For instructions on how to create an electronic signature, please visit the Adobe Digital IDs website using the following link: https://helpx.adobe.com/acrobat/using/digital-ids.html

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A 408616

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
Mezcon Construction Ltd	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	[redacted]	Surrey St	Guelph

Country	Province	Postal Code	Telephone Number
Canada	ON	[redacted]	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	306	Edinburgh Rd S	

Lot	Concession	County/District/Municipality
		`

City/Town	Province	Postal Code
Guelph	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	561156	4819640	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 15 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Sand	Gravel		0	15

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	8	3/8 Holeplug	0.27
8	15	#2 Sand	0.24

5. Method of Construction *

☐ Cable Tool ☐ Rotary (Conventional) ☐ Rotary (Reverse) ☐ Boring ☐ Air percussion ☐ Diamond
☐ Jetting ☐ Driving ☐ Digging ☐ Rotary (Air) ☐ Augering ☑ Direct Push
☐ Other (specify) _____

6. Well Use *

☐ Public ☐ Industrial ☐ Cooling & Air Conditioning
☐ Domestic ☐ Commercial ☐ Not Used
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Dewatering
☐ Other (specify) _____

7. Status of Well *

☐ Water Supply ☐ Replacement Well ☐ Test Hole
☐ Recharge Well ☐ Dewatering Well ☑ Observation and/or Monitoring Hole
☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality
☐ Abandoned, other (specify) _____
☐ Other (specify) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
1	Plastic	0.133	0	10

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
1.315	Plastic	10	10	15

10. Water Details

Water found at Depth (ft)	☐ Gas	Kind of water ☐ Fresh ☐ Untested ☐ Other

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	15	3.5

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain _____

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)														

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☐ Clear and sand free ☐ Other (specify)

Pump intake set at (ft)	Pumping rate (GPM)	Duration of pumping hrs + min	Final water level end of pumping (ft)	Disinfected? * ☐ Yes ☑ No

Recommended pump depth (ft)	Recommended pump rate (GPM)	Well production (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		2024/10/07

Comments

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *	Well Contractor's License Number *
CMT Drilling Inc	7366

Business Address

Unit Number	Street Number	Street Name *
1	[redacted]	Industrial Crescent

City/Town/Village *	Province	Postal Code *
St Clements	ON	[redacted]

Business Telephone Number	Business Email Address
[redacted]	[redacted]

Last Name of Well Technician *	First Name of Well Technician *	Well Technician's License Number *
Black	Chris	3711

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Black	Chris	[redacted]

Signature		Date Submitted (yyyy/mm/dd)
Chris Black	Digitally signed by Chris Black Date: 2024.11.12 14:28:54 -05'00'	2024/11/12

17. Ministry Use Only

Audit Number

2O2K ZE4S

C.2. Water Level Reading Letter, by CMT Engineering inc. (dated December 17,2024)

CMT Engineering Inc.
[redacted] Industrial Crescent,
St. Clements, Ontario [redacted]
[redacted]
www.cmtinc.net

December 17, 2024 24-664.R02

Mezcon Construction Ltd.
[redacted] Surrey Street East
Guelph, Ontario,
[redacted]

Attention: Mr. Zachary Fisher

Dear Zachary:

Re: Water Level Readings
302 and 306 Edinburgh Road South
Guelph, Ontario

As requested, CMT Engineering Inc. (CMT Inc.) has obtained water level readings from the monitoring wells (installed by CMT Inc. and MTE) located at 302 and 306 Edinburgh Road South in Guelph, Ontario.

Monitoring wells were installed at Borehole 2, Borehole 103-21, Borehole 105-21 and Borehole 106-21 at the above referenced site.

The following table details the approximate measured water levels and elevations, as well as the dates the water levels were obtained:

Borehole No.	Ground Surface Elevation (m)	Measured Elevation of Water in Monitoring Well on October 28, 2021 (m)	Measured Elevation of Water in Monitoring Well on September 17, 2024 (m)	Measured Elevation of Water in Monitoring Well on October 28, 2024 (m)	Measured Elevation of Water in Monitoring Well on December 17, 2024 (m)
BH2	324.23	N/A	N/A	320.13 (4.10)	319.83 (4.40)
MW103-21	324.00	318.70 (5.30)	319.74 (4.26)	319.63 (4.37)	319.58 (4.42)
MW105-21	323.10	317.20 (5.90)	318.43 (4.67)	318.33 (4.77)	318.13 (4.97)
MW106-21	323.40	316.40 (7.00)	317.59 (5.81)	317.64 (5.76)	317.21 (6.19)

Yours truly,

[redacted]

Jake Feeney, P. Eng.
tb

Appendix D Water Balance Tables

D.1. Monthly Water Balance (Thornthwaite and Mather) Tables

D.1. Monthly Water Balance (Thornthwaite and Mather) Tables

302-306 Edinburgh Road South
City of Guelph
Table 1 - Existing Condition Monthly Water Balance
Catchment 101
Project No: 2408455

EXISTING CONDITION

Total Site Area = 0.327 ha
Percent Impervious = 38.0%

Soil Type: Guelph Loam
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Runoff Factor = 0.60

Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration	Correction Factors	Adjusted Potential Evapotrans-piration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotrans-piration	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Through Pervious Surfaces	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	0.0	0.0	11.9	0.0	11.9	7	23	16	0
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	0.0	0.0	5.9	0.0	5.9	4	12	8	0
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	2	6	4	0
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	22.7	7.6	55.6	29.0	25.7	54.7	33	107	72	0
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	56.7	18.9	23.2	26.1	115.7	141.8	85	278	185	0
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	102.5	76.8	30.7	25.7	25.9	57.8	83.7	50	164	109	0
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	109.0	81.7	46.0	27.3	26.6	28.9	55.5	33	109	73	0
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	100.4	75.3	36.3	25.1	25.9	14.5	40.4	24	79	53	0
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	71.8	53.8	18.0	18.0	21.9	7.3	29.2	18	57	38	0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	37.1	27.8	9.3	10.3	16.1	4.0	20.1	12	39	26	0
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	7.3	2.4	79.0	47.6	2.1	49.7	30	97	65	0
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	0.0	0.0	23.8	1.0	24.8	15	49	32	0
Total		**33.9**				**923.2**	**352.0**				**536.3**	**402.0**	**169.2**	**264.2**	**263.9**	**257.0**	**520.9**	**286**	**1,022**	**681**	**0**

Total Recharge **681**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum

Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

302-306 Edinburgh Road South
City of Guelph
Table 2 - Existing Condition Monthly Water Balance
Catchment 102
Project No: 2408455

EXISTING CONDITION

Total Site Area = 0.013 ha
Percent Impervious = 0.0%

Soil Type: Guelph Loam
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Runoff Factor = 0.36

Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration	Correction Factors	Adjusted Potential Evapotrans-piration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotrans-piration	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Through Pervious Surfaces	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	0.0	0.0	9.7	0.0	9.7	3	0	1	0
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	0.0	0.0	4.8	0.0	4.8	2	0	0	0
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	1	0	0	0
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	30.2	0.0	48.1	25.2	25.7	50.9	18	2	4	0
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	75.6	0.0	4.3	14.8	115.7	130.4	46	6	11	0
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	102.5	102.5	5.0	0.0	7.4	57.8	65.2	23	3	5	0
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	109.0	109.0	18.7	0.0	3.7	28.9	32.6	12	2	3	0
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	100.4	100.4	11.2	0.0	1.8	14.5	16.3	6	1	1	0
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	71.8	71.8	0.0	0.0	0.9	7.3	8.2	3	0	1	0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	37.1	37.1	0.0	1.0	1.0	4.0	5.0	2	0	0	0
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	9.7	0.0	76.6	38.8	2.1	40.9	15	2	3	0
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	0.0	0.0	19.4	1.0	20.4	7	1	2	0
Total		**33.9**				**923.2**	**352.0**				**536.3**	**536.3**	**34.9**	**129.9**	**130.8**	**257.0**	**387.8**	**286**	**18**	**33**	**0**

Total Recharge	**33**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

302-306 Edinburgh Road South
City of Guelph
Table 3 - Existing Condition Monthly Water Balance
Catchment 103
Project No: 2408455

EXISTING CONDITION

Soil Type: Guelph Loam
Runoff Factor = 0.36

Total Site Area = 0.024 ha
Percent Impervious = 0.0%

Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration	Correction Factors	Adjusted Potential Evapotrans-piration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Pervious ET	Actual Evapotrans-piration	Moisture Deficit	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Through Pervious Surfaces	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	0.0	0.0	9.7	0.0	9.7	3	1	2	0
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	0.0	0.0	4.8	0.0	4.8	2	0	1	0
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	3.3	1	0	1	0
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	30.2	0.0	48.1	25.2	25.7	50.9	18	4	8	0
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	75.6	0.0	4.3	14.8	115.7	130.4	46	11	20	0
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	102.5	102.5	5.0	0.0	7.4	57.8	65.2	23	6	10	0
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	109.0	109.0	18.7	0.0	3.7	28.9	32.6	12	3	5	0
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	100.4	100.4	11.2	0.0	1.8	14.5	16.3	6	1	3	0
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	71.8	71.8	0.0	0.0	0.9	7.3	8.2	3	1	1	0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	37.1	37.1	0.0	1.0	1.0	4.0	5.0	2	0	1	0
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	9.7	0.0	76.6	38.8	2.1	40.9	15	3	6	0
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	0.0	0.0	19.4	1.0	20.4	7	2	3	0
Total		**33.9**				**923.2**	**352.0**				**536.3**	**536.3**	**34.9**	**129.9**	**130.8**	**257.0**	**387.8**	**286**	**33**	**60**	**0**

Total Recharge	**60**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum

Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

302-306 Edinburgh Road South
City of Guelph
Table 4 - Post-Development Condition Monthly Water Balance
Catchment 201
Project No: 2408455

POST-DEVELOPMENT CONDITION

Total Site Area = 0.115 ha
Percent Impervious = 50.0%

Soil Type: Guelph Loam
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Runoff Factor = 0.68
Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature (°C)	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration (mm)	Correction Factors	Adjusted Potential Evapotrans-piration (mm)	Average Precipitation (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (mm)	ΔS (mm)	Actual Evapotrans-piration (mm)	Moisture Surplus (mm)	Water Runoff (mm)	Snow Melt Runoff (mm)	Total Recharge & Runoff (mm)	Actual Runoff (mm)	Runoff Volume (m^3)	Recharge Through Pervious Surfaces (m^3)	Enhanced Recharge (m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	12.6	0.0	12.6	9	10	5	0
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	6.3	0.0	6.3	4	5	2	0
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	3.3	0.0	3.3	2	3	1	0
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	20.3	58.0	30.2	25.7	55.9	38	44	21	0
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	50.7	29.2	29.7	115.7	145.4	98	113	54	0
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	68.7	33.8	31.7	57.8	89.6	61	70	33	0
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	73.1	35.9	33.8	28.9	62.7	42	49	23	0
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	67.3	33.1	33.4	14.5	47.9	32	37	18	0
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	48.1	23.6	28.5	7.3	35.8	24	28	13	0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	24.8	13.2	20.9	4.0	24.9	17	19	9	0
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	6.5	79.8	50.3	2.1	52.4	36	41	19	0
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	25.2	1.0	26.2	18	20	10	0
Total		**33.9**				**923.2**	**352.0**				**359.6**	**306.6**	**306.0**	**257.0**	**563.0**	**286**	**439**	**209**	**0**
																	Total Recharge		**209**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

302-306 Edinburgh Road South
City of Guelph
Table 5 - Post-Development Condition Monthly Water Balance
Catchment 202
Project No: 2408455

POST-DEVELOPMENT CONDITION

Total Site Area = 0.249 ha
Percent Impervious = 45.0%

Soil Type: Guelph Loam
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Runoff Factor = 0.65
Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration	Correction Factors	Adjusted Potential Evapotrans-piration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Actual Evapotrans-piration	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Through Pervious Surfaces	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	12.3	0.0	12.3	8	20	11	31
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	6.1	0.0	6.1	4	10	5	15
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	3.3	0.0	3.3	2	5	3	8
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	21.3	57.0	29.7	25.7	55.4	36	89	49	138
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	53.2	26.7	28.2	115.7	143.9	93	231	127	358
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	72.1	30.4	29.3	57.8	87.1	56	140	77	217
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	76.7	32.3	30.8	28.9	59.7	39	96	53	149
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	70.6	29.8	30.3	14.5	44.8	29	72	40	111
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	50.5	21.3	25.8	7.3	33.1	21	53	29	82
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	26.1	12.0	18.9	4.0	22.9	15	37	20	57
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	6.8	79.5	49.2	2.1	51.3	33	82	45	128
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	24.6	1.0	25.6	17	41	23	64
Total		**33.9**				**923.2**	**352.0**				**377.3**	**288.9**	**288.5**	**257.0**	**545.4**	**286**	**876**	**481**	**1,357**
																	Total Recharge		**1,838**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

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Table 6: Monthly Enhanced Infiltration at Parcel 1 to 8
Catchment 202
Project No: 2408455

Parcel 1 to 8 - Design of Infiltration Structure #1 to 8

Length =	60.00	m
Wdith =	2.13	m
Depth=	0.60	m
Contact Area	127.80	sq m
Volume of Clear Stone =	76.68	cu m
Clear Stone Void Ratio=	0.33333	

Storage = 25.56

Total Storage Volume of Structure = 25.56 cu m

A = contact area of structure =	127.80	sq m	Contact Area taken as the bottom of the structure.
V = runoff volume to be infiltrated =	25.56	cu m	
P = percolation rate of native soils =	29.20	mm/h	
n = porosity of storage media (weighted) =	0.33		
T = retention time =	Solve for T		

T = (1000 x V) / (P x n x A) = 20.76 hours or 0.9 day draindown period

Contributing Area	0.25	ha		
Recharge Time	20.76	hours	/	0.86 days
Recharge Volume Potential	25.56	m^3		

Month	Total Recharge & Runoff (mm)	No. of days	Max Potential Recharge (m^3)	Available Recharge (m^3)	Enhanced Recharge (m^3)
Jan	12.3	31	916	31	31
Feb	6.1	28	828	15	15
Mar	3.3	31	916	8	8
Apr	55.4	30	887	138	138
May	143.9	31	916	358	358
Jun	87.1	30	887	217	217
Jul	59.7	31	916	149	149
Aug	44.8	31	916	111	111
Sep	33.1	30	887	82	82
Oct	22.9	31	916	57	57
Nov	51.3	30	887	128	128
Dec	25.6	31	916	64	64
Total	**545.4**	**365**	**10,788**	**1,357**	**1,357**

302-306 Edinburgh Road South
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Table 4 - Post-Development Condition Monthly Water Balance
Catchment 201
Project No: 2408455

POST-DEVELOPMENT CONDITION

Total Site Area = 0.000 ha
Percent Impervious = 0.0%

Soil Type: Guelph Loam
Vegetation: Urban lawns
Root Zone Depth = 0.5m
Soil Moisture Retention Capacity = 75mm

Runoff Factor = 0.36
Evapotranspiration Factor for Impervious Surfaces = 0.34

Month	Daily Average Temperature	Monthly Heat Index	Unadjusted Daily Potential Evapotrans-piration	Correction Factors	Adjusted Potential Evapotrans-piration	Average Precipitation	P-PE	Accum. Pot. Water Loss	Storage	ΔS	Actual Evapotrans-piration	Moisture Surplus	Water Runoff	Snow Melt Runoff	Total Recharge & Runoff	Actual Runoff	Runoff Volume	Recharge Through Pervious Surfaces	Enhanced Recharge
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-7.6	0.0	0.0	24.3	0.0	56.4	56.4		209.1	0.0	0.0	0.0	9.7	0.0	9.7	3	0	0	0
Feb	-6.9	0.0	0.0	24.6	0.0	50.8	50.8		259.9	0.0	0.0	0.0	4.8	0.0	4.8	2	0	0	0
Mar	-1.3	0.0	0.0	30.6	0.0	72.1	72.1		332.0	0.0	0.0	0.0	3.3	0.0	3.3	1	0	0	0
Apr	5.9	1.3	0.9	33.6	30.2	78.3	48.1		75.0	0.0	30.2	48.1	25.2	25.7	50.9	18	0	0	0
May	12.3	3.9	2.0	37.8	75.6	79.9	4.3		75.0	0.0	75.6	4.3	14.8	115.7	130.4	46	0	0	0
Jun	16.9	6.3	2.8	38.4	107.5	76.0	-31.5	-31.5	48.5	-26.5	102.5	0.0	7.4	57.8	65.2	23	0	0	0
Jul	19.7	8.0	3.3	38.7	127.7	88.5	-39.2	-70.7	28.0	-20.5	109.0	0.0	3.7	28.9	32.6	12	0	0	0
Aug	18.6	7.3	3.1	36.0	111.6	95.9	-15.7	-86.4	23.5	-4.5	100.4	0.0	1.8	14.5	16.3	6	0	0	0
Sep	14.1	4.8	2.3	31.2	71.8	92.1	20.3		43.8	20.3	71.8	0.0	0.9	7.3	8.2	3	0	0	0
Oct	7.9	2.0	1.3	28.5	37.1	69.2	32.2		75.0	31.2	37.1	1.0	1.0	4.0	5.0	2	0	0	0
Nov	2.4	0.3	0.4	24.3	9.7	86.3	76.6		75.0	0.0	9.7	76.6	38.8	2.1	40.9	15	0	0	0
Dec	-4.0	0.0	0.0	23.1	0.0	77.7	77.7		152.7	0.0	0.0	0.0	19.4	1.0	20.4	7	0	0	0
Total		**33.9**				**923.2**	**352.0**				**536.3**	**129.9**	**130.8**	**257.0**	**387.8**	**286**	**0**	**1**	**0**
																	Total Recharge		**1**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1971-2000 for the Guelph Arboretum
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*

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Table 7 - Monthly Water Balance Summary
Project No: 2408455

Month	**Existing** Recharge Volume (m^3)			**Proposed** Recharge Volume (m^3)			**Total**		
	Catchment 101	Catchment 102	Catchment 103	Catchment 201	Catchment 202	Catchment 202	**Required** Recharge Volume (m^3)	Proposed **Recharge** Volume (m^3)	(%)
Jan	16	1	2	5	41	0	18	46	258%
Feb	8	0	1	2	21	0	9	23	258%
Mar	4	0	1	1	11	0	5	12	242%
Apr	72	4	8	21	187	0	84	208	248%
May	185	11	20	54	485	0	217	539	249%
Jun	109	5	10	33	294	0	125	327	261%
Jul	73	3	5	23	201	0	80	225	279%
Aug	53	1	3	18	151	0	57	169	298%
Sep	38	1	1	13	111	0	40	125	311%
Oct	26	0	1	9	77	0	27	86	314%
Nov	65	3	6	19	173	0	75	192	258%
Dec	32	2	3	10	86	0	37	96	258%
Total	**681**	**33**	**60**	**209**	**1,838**	**1**	**774**	**2,048**	**265%**