



Functional Servicing and
Stormwater Management Design Report for:

19 East Mill Street
Township of Centre Wellington (Elora)

GMBP File: 421133

Revised March 2023



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FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT DESIGN REPORT

19 EAST MILL STREET

TOWNSHIP OF CENTRE WELLINGTON (ELORA)

REVISED MARCH 2023

GMBP FILE: 421133

1. INTRODUCTION

This revised functional servicing report has been prepared by GM BluePlan Engineering Limited to document the servicing requirements for the proposed development at East Mill Street in the Township of Centre Wellington (Elora), and to include a stormwater management tank rather than a stormwater management facility in the design.

The 0.30-hectare site is bound by East Mill Street to the north, existing residential development to the east and west, and Grand River to the south. The intent of the Owner at this time is to develop a proposed four (4) storey commercial and residential building, an existing two (2) storey commercial building, and a proposed single residential building to be severed from the property.

A topographic survey of 19 East Mill Street was completed by Van Harten Surveying Inc. (dated November 30, 2020). The site plan was provided by Fryett Turner Architects (dated January 27, 2023).

2. PROPOSED DEVELOPMENT

2.1 Site Grading

The site generally slopes in a north to south direction toward Grand River. The lowest elevation of the site is 371.28 m at the southeast limit of the site along Grand River. The highest elevation on the site is 378.08 at the northeast limit of the site along East Mill Street right-of-way. The centreline road elevation along East Mill Street across the frontage of the site ranges from 378.20 m (approximately) to 377.30m (approximately).

The grade and elevations of the site, along with the internal driving aisles and finished floor elevation of each proposed building will be controlled by the existing centreline road elevation of East Mill Street, the existing Geddes Street parking lot, and the floodplain elevation. The site will be graded to match the existing elevations along the property limits.

The site currently sits within a Grand River Conservation Authority Regulated area and is partially within the Regulatory Floodplain for Grand River. All residential floors have been placed above the existing elevations on the site within the floodplain.

2.2 Water Supply

Servicing for the proposed residential and commercial building will be provided via the extension of one (1) 150mm diameter watermain from the existing 150mm diameter watermain in the East Mill Street right-of-way. A 50mm diameter water service lateral will be extended from the proposed residential and commercial building to service the existing commercial building at the rear of the property.

The proposed detached residential building is proposed to be severed as part of the applications and will be serviced from the extension of one (1) 25mm diameter watermain from the existing 150mm diameter watermain in the East Mill Street right-of-way.

Existing water services for the property will be appropriately abandoned.

The following table provides the average day and maximum day water demands for the development.

Table No. 1: Water Supply Estimates

Unit Type	Population	Water Demand	
		Average Day	Maximum Day (Peaking Factor = 2)
Building A: Commercial and Residential Building (18 residential units @ 2.5 people/unit, 350 L/cap/d; 0.024 ha of commercial space @ 0.6 L/s/ha)	45	0.197 L/s	0.394 L/s
Building B: Commercial (0.028 ha @ 0.6 L/s/ha)	N/A	0.017 L/s	0.034 L/s
Building C: Proposed Single Detached Residential Dwelling (1 unit, 3.5 people per unit @ 350 L/c/day)	4	0.016 L/s	0.032 L/s
Total Domestic Water Demand	50	0.230 L/s	0.460 L/s

The design of the firefighting system has been based on Part II of the Water Supply for Public Fire Protection prepared by the Fire Underwriter's Survey (1999). Based on this, the minimum water supply is calculated as follows:

$$F \left(\frac{\text{litres}}{\text{minute}} \right) = 220 \times C \times \sqrt{A}$$

Where:

F = the required fire flow in litres per minute

C = coefficient related to the type of construction ranging from 0.6 (fire resistive) to 1.5 (very combustible)

A = the total flow area in square metres (including all storeys, but excluding basements at least 50% below grade)

The estimated fire flow demand for the site is 150 L/s based on a wood construction and limited combustibility for the commercial and residential building. A copy of the fire flow analysis has been included in **Appendix A**.

2.3 Sanitary Service

Sanitary service for the proposed commercial and residential building will be provided via a 200mm diameter connection to the existing 375mm diameter sanitary sewer on East Mill Street (located in the northerly boulevard on East Mill Street). A 150mm diameter sanitary service lateral will be extended from the proposed residential and commercial building to service the existing commercial building at the rear of the property.

The proposed detached residential building is proposed to be severed as part of the applications and will be serviced from the extension of one (1) 100mm diameter sanitary sewer to the existing 375mm diameter sanitary sewer in the East Mill Street right-of-way.

Existing sanitary services for the property will be appropriately abandoned.

The capacity of the existing 375mm diameter sanitary sewer on East Mill Street has been calculated to be 0.129 m³/s (approximately), assuming a minimum grade of 0.50%.

The following is a summary of the anticipated sanitary design flows contributing to the existing 375mm diameter trunk sanitary sewer:

Table No. 2: Anticipated Sanitary Flows to Existing Trunk Sanitary Sewer

	Anticipated Sanitary Design Flow
Building A: Proposed Commercial and Residential Building (18 residential units @ 2.5 people/unit, 350 L/cap/d, Peaking Factor of 4.32; 0.024 ha of commercial space @ 0.6 L/s/ha, Peaking Factor of 2.5)	0.863 L/s
Building B: Commercial (0.028 ha @ 0.6 L/s/ha, Peaking Factor of 2.5)	0.045 L/s
Building C: Proposed Single Detached Residential Dwelling (1 unit, 3.5 people per unit @ 350 L/c/day, Peaking Factor of 4.45)	0.072 L/s
Infiltration Flows (0.30 ha @ 0.15 L/s/ha)	0.050 L/s
Total Anticipated Peak Flows	1.03 L/s
375mm diameter Sewer Capacity (assuming a minimum slope of 0.5%)	129 L/s

The proposed flows account for approximately 0.8% of the existing sanitary sewer’s capacity. Therefore, the existing 375mm diameter sanitary sewer is expected to have sufficient capacity to convey the anticipated design flows from the development. The sanitary sewer design sheet has been included in **Appendix B**.

2.4 Storm Service

Storm service for the site will be provided via a 300mm diameter storm sewer connected to the existing 600mm diameter storm sewer in the Geddes Street Parking Lot west of the site, before ultimately discharging to the Grand River. The storm sewer design sheet has been included in **Appendix B**.

The capacity of the 600mm diameter storm sewer in the Geddes Street Parking Lot is 0.856 m³/s, based on an approximate slope of 1.8%. All post-development flows will be attenuated on-site through underground storage prior to discharge to the existing 600mm diameter storm sewer in the Geddes Street Parking Lot.

3. STORMWATER MANAGEMENT DESIGN

3.1 Stormwater Management Criteria

A summary of the stormwater management design criteria to be applied to the development are as follows:

1. Post-development peak flows rates are to be attenuated to existing conditions peak flow rates for the 2 to 100-year design storms.
2. Quality control, Enhanced level (80% TSS removal) is to be provided on-site.
3. The major overland flow route shall be designed to convey the 100-year storm event.

As per the Township of Centre Wellington development standards, MIDUSS modelling is required to demonstrate the performance for the 2-year to 100-year design events.

The Township of Centre Wellington (Fergus) mass rainfall data was used to model the full range of design storm events. The Chicago storm parameters and the total depth of rainfall for the 2-year up to the 100-year storm are shown in Table No. 3.

Table No. 3: Chicago Storm Parameters

Parameter	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
a =	695.047	1,459.072	2,327.596	3,701.648	5,089.418	6933.019
b =	6.387	13.690	19.500	25.500	30.000	34.669
c =	0.793	0.850	0.894	0.937	0.967	0.998
R =	0.380	0.380	0.380	0.380	0.380	0.380
td =	180	180	180	180	180	180
Rainfall depth (mm)	33.014	49.792	61.359	75.581	86.737	97.935

The Horton infiltration method was used in the MIDUSS model with the parameters summarized within Table No. 4.

Table No. 4: MIDUSS Horton Parameters

Parameter	Impervious Areas	Pervious Areas
Maximum Infiltration (mm/hr)	0.0	75.0
Minimum Infiltration (mm/hr)	0.0	12.5
Lag Constant (hr)	0.05	0.25
Depression Storage (mm)	1.5	5.0

3.2 Existing Condition Drainage Areas

For the existing condition analysis, the site was analyzed as one (1) drainage catchment (see Figure No. 1).

Catchment 10 (0.30-hectares, 33% Impervious) represents the existing condition of the site, including the existing residential dwelling, buildings, existing asphalt and gravel areas, and landscaped areas. Under existing conditions, runoff generated from Catchment 10 sheetflows overland towards Grand River.

In summary, the existing condition flow rates from the site are as follows:

Table No. 5: Existing Condition Flow Rates

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Catchment 10	0.020 m ³ /s	0.031 m ³ /s	0.048 m ³ /s	0.067 m ³ /s	0.082 m ³ /s	0.102 m ³ /s
Total	0.020 m³/s	0.031 m³/s	0.048 m³/s	0.067 m³/s	0.082 m³/s	0.102 m³/s

3.3 Allowable Release Rates

The allowable release rates from the site will be equivalent to the existing condition levels. Therefore, the allowable release rates from the 0.30-hectare drainage area under post-development conditions are as follows:

Table No. 6: Allowable Release Rates

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Allowable Release Rate	0.020 m ³ /s	0.031 m ³ /s	0.048 m ³ /s	0.067 m ³ /s	0.082 m ³ /s	0.102 m ³ /s

3.4 Post-Development Analysis

For the post-development condition analysis, the site was analyzed as two (2) drainage catchment (see Figure No. 2).

Catchment 100 (0.26-hectares, 48% impervious) represents the proposed post-development condition of the site, including buildings and landscaped and asphalt areas. Runoff generated from Catchment 100 will be directed to the proposed stormwater management tank, ultimately discharging via an existing storm sewer outlet to Grand River.

The on-site stormwater management tank will consist of a subsurface Brentwood StormTank (or approved equivalent). The on-site stormwater management (10m L x 12m W x 0.30m H) will provide approximately 49 m³ of storage, based on the manufacturer's suggested void space ratio of 97%. Discharge from the stormwater management tank will be via a 200 mm orifice plate in the downstream catchbasin, ultimately discharging to the existing storm sewer outlet to Grand River.

Catchment 200 (0.04-hectares, 0% impervious) represents the landscaped areas at the south limits of the site. Runoff generated from Catchment 200 will sheetflow overland uncontrolled to Grand River.

Quality Control for the site will not be required as the majority of the site is composed of rooftop and landscaped areas which are considered to generate "clean" runoff.

3.4.1 Post-Development Conditions Routing

The hydrologic model MIDUSS was used to create the storm runoff hydrographs and to route the hydrographs. A copy of the hydrologic modelling is included in **Appendix C**.

Table No. 7: Stormwater Management Tank Routing

	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 Tank	0.000	0.0	373.15	---	---	---
2-Year	---	---	---	0.013	12.3	373.23
5-Year	---	---	---	0.022	22.5	373.29
10-Year	---	---	---	0.030	31.4	373.34
25-Year	---	---	---	0.037	42.4	373.41
Top of Tank	0.041	49.0	373.45	---	---	---
50-Year	---	---	---	0.067	49.1	373.86
T/G	0.077	49.2	374.05	---	---	---
100-Year	---	---	---	0.078	50.5	374.08
Weir	0.081	61.6	374.15	---	---	---
Overflow	0.129	78.2	374.20	---	---	---

The following table summarizes the post-development flow rates from the site.

Table No. 8: Post-Development Condition Flow Rates

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Catchment 100 (controlled)	0.013 m ³ /s	0.022 m ³ /s	0.030 m ³ /s	0.037 m ³ /s	0.067 m ³ /s	0.078 m ³ /s
Catchment 200 (uncontrolled)	0.000 m ³ /s	0.005 m ³ /s	0.007 m ³ /s	0.010 m ³ /s	0.012 m ³ /s	0.015 m ³ /s
Total Post-Development Flow Rate	0.013 m³/s	0.026 m³/s	0.034 m³/s	0.043 m³/s	0.074 m³/s	0.090 m³/s

The following table compares the post-development flow rates from the site to the allowable release rates.

Table No. 9: Comparison of Flow Rates

	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Allowable Release Rate	0.020 m ³ /s	0.031 m ³ /s	0.048 m ³ /s	0.067 m ³ /s	0.082 m ³ /s	0.102 m ³ /s
Total Post-Development Flow Rate	0.013 m ³ /s	0.026 m ³ /s	0.034 m ³ /s	0.043 m ³ /s	0.074 m ³ /s	0.090 m ³ /s

Therefore, the post-development flow rates from the site have been attenuated to less than the allowable release rates.

4. EROSION AND SEDIMENT CONTROL PLAN

A silt fence will be installed along the property boundary in all locations where runoff will discharge from the site to adjacent lands. The silt fence will serve to minimize the opportunity for water borne sediments to be washed on to the adjacent properties.

Upon completion of the grading, any area not subject to active construction within 30 days will be topsoiled and hydroseeded as per OPSS 572.

Once manholes, catchbasins or inlet risers have been installed, the grates will be wrapped in woven geotextile filter cloth. This feature will be maintained until all building and landscaping has been completed.

Inspection and maintenance of all silt fencing will start after installation is complete. The 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 facility 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 will not occur and sediment transport will be minimal.

5. MAINTENANCE PLAN

To ensure that the stormwater management system continues to function as designed and constructed, we recommend that the following inspections and maintenance activities be completed on an annual basis:

1. Is there any noticeable damage to the asphalt and grassed areas (i.e. erosion, blockages)? If yes, complete any necessary repairs.
2. Inspect all roof drains and associated piping. Remove and dispose of any accumulated sediment trash/litter debris (i.e. leaves).
3. Inspect the oil/grit structure and complete any necessary maintenance/repair activities as identified by the manufacturer.
4. Inspect all catchbasins and manholes. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).
5. Inspect all overflow locations. Remove and dispose of any accumulated sediment trash/litter, debris (i.e. sediment, garbage, leaves, etc.).

Please note that any structures identified during the annual inspection to be worn, missing or damaged are to be repaired or replaced within 48 hours.

6. CONCLUSIONS

In summary:

- Water supply for the residential and commercial building will be provided via the extension of one (1) 150mm diameter watermain from the existing 150mm watermain in the East Mill Street right-of-way. A 50mm diameter water service lateral will be extended from the proposed residential and commercial building to service the existing commercial building. A 25mm diameter water service will be extended from the existing 150mm diameter watermain in the East Mill Street right-of-way for the detached residential property. All existing services for the property will be abandoned.
- Sanitary services for the commercial and residential building will be provided via the extension of a 200mm diameter sanitary sewer to the existing 375mm diameter sanitary sewer in the East Mill Street right-of-way. A 150mm diameter sanitary service lateral will be extended from the proposed commercial and residential building to service the existing commercial building at the rear of the property. A 100mm diameter sanitary sewer service lateral will be extended from the detached residential dwelling to the existing 375mm diameter sanitary sewer in the East Mill Street right-of-way.
- Storm service will be provided via the construction of on-site storm sewers to direct runoff to the proposed on-site stormwater management facility, ultimately discharging via an existing storm sewer outlet to Grand River.
- All post-development flows generated from the development will be attenuated to the existing condition levels prior to discharge from the site.
- Quality control measures will not be required as the proposed development consists mainly of rooftop and landscaped areas which are considered to generate "clean" runoff.
- Prior to construction, a silt fence will be installed along the property boundary in all locations where runoff will discharge from the site to adjacent lands. This will minimize the transport of sediment off-site during the construction period.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

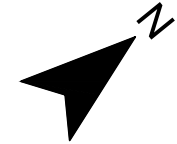
Reviewed By:



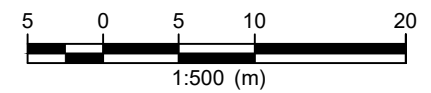
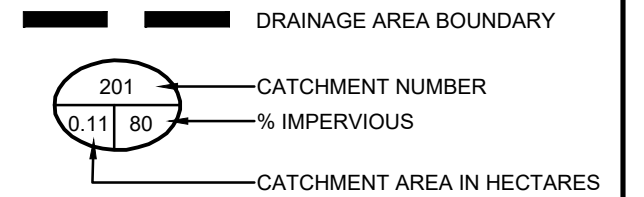
Sarah Primmer, P.Eng.



19 MILL STREET EAST
TOWNSHIP OF CENTRE
WELLINGTON (ELORA)



LEGEND

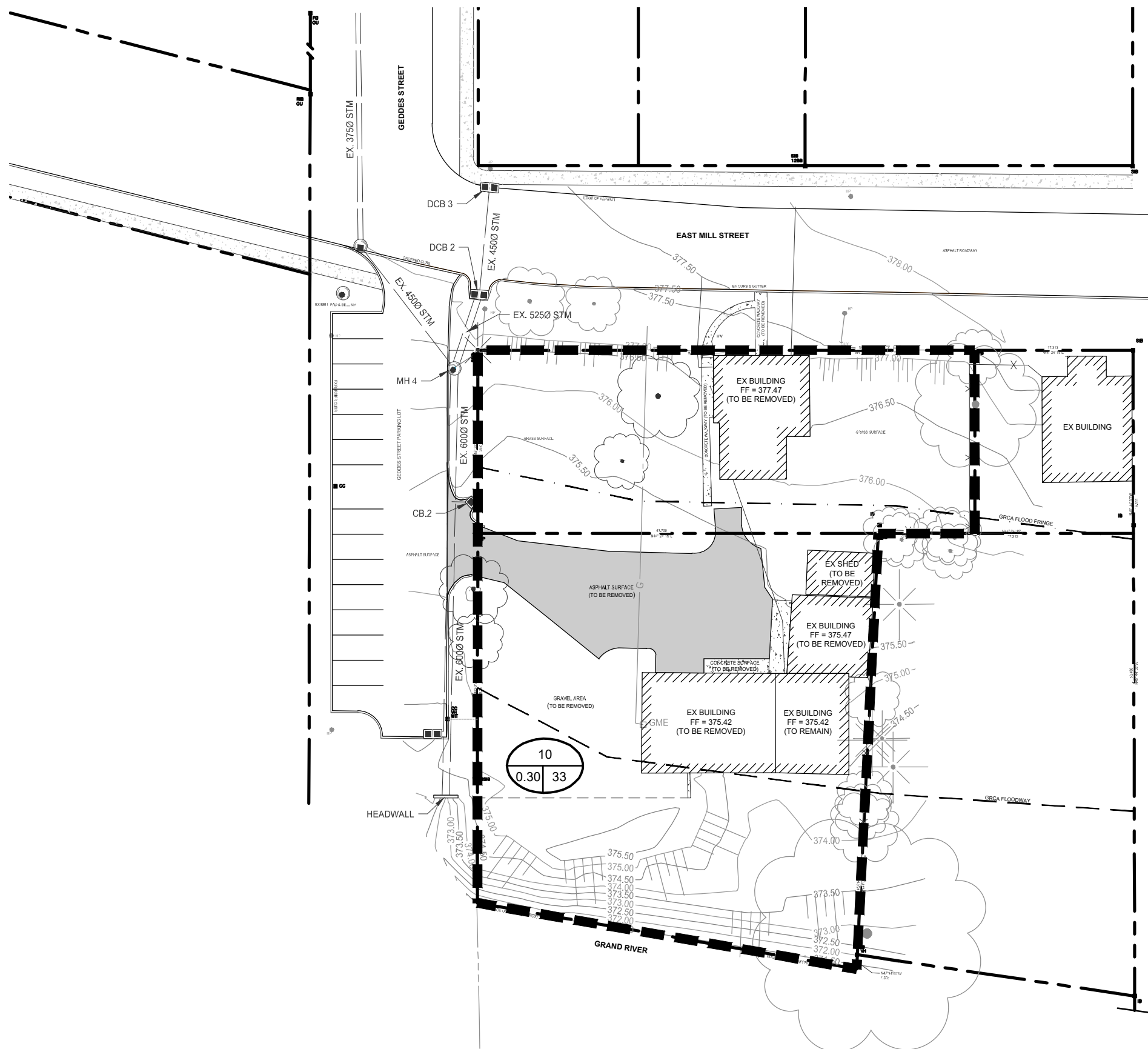


EXISTING CONDITIONS
DRAINAGE AREA PLAN

Figure No. 1

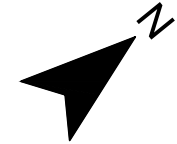


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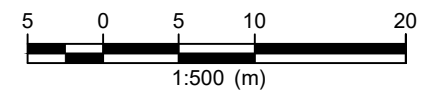
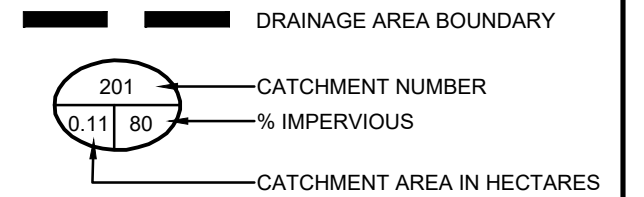


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19 MILL STREET EAST
TOWNSHIP OF CENTRE
WELLINGTON (ELORA)



LEGEND

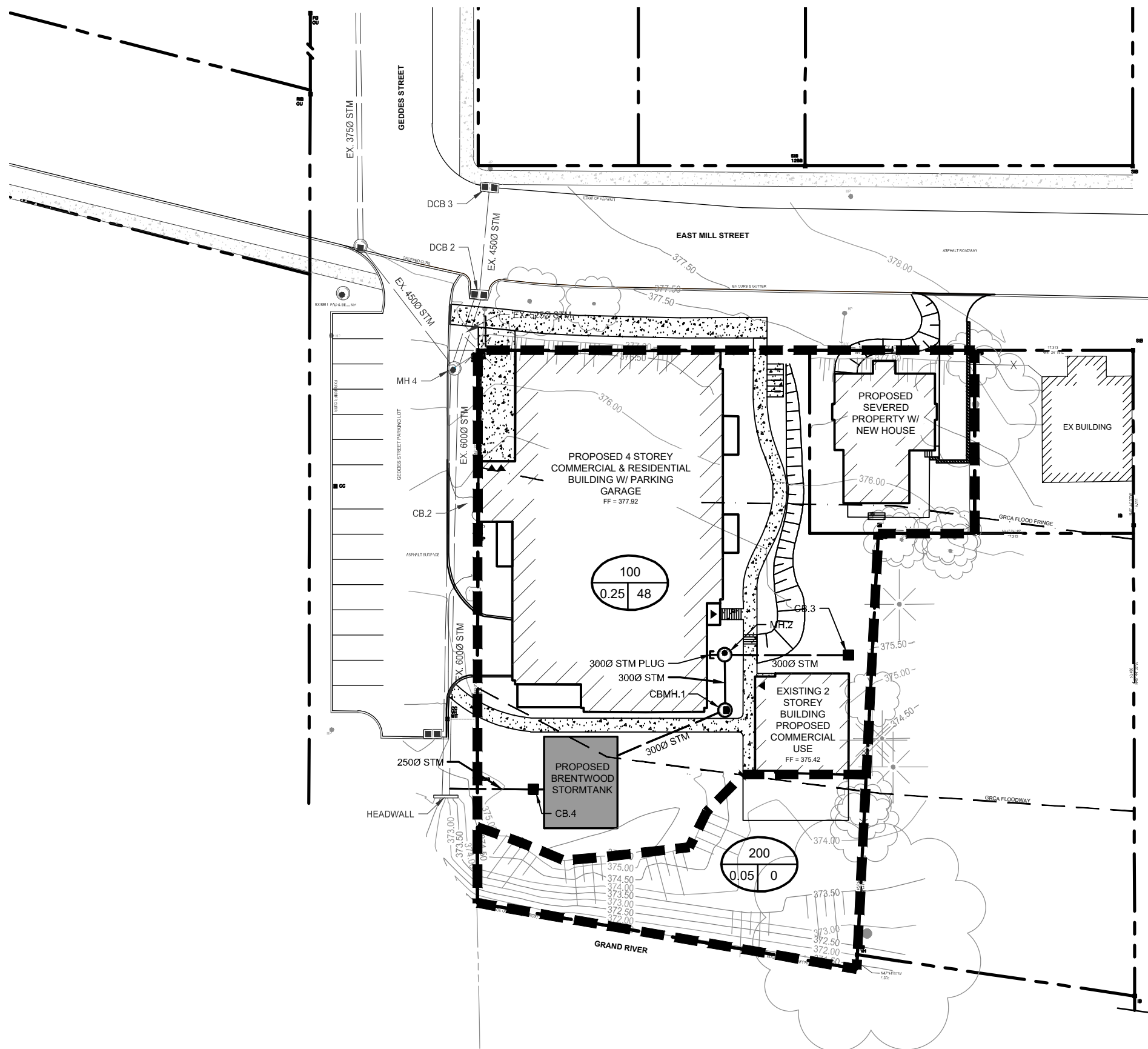


POST DEVELOPMENT
DRAINAGE AREA PLAN

Figure No. 2



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AUGUST 2022
Scale: 1:500 | NAD 1983 UTM Zone 17N



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APPENDIX A:
Fire Flow Demand Analysis



Project No: 42133
 Designed By: PW
 Checked By: SP

FIRE UNDERWRITERS SURVEY CALCULATIONS

Date: 3/2/2023

**19 East Mill Street,
 Township of Centre Wellington (Elora)**

Parameters from Water Supply for Public Fire Protection, Fire Underwriters Survey (1999)

Type of Construction

Wood	1.5
Ordinary	1.0
Non-Combustible	0.8
Fire-Resistive	0.6

Fire Hazard

Non-Combustible	-0.25
Limited Combustibility	-0.15
Combustible	0
Free Burning	0.15
Rapid Burning	0.25


Sprinklers

No	0
System	-30%
Standard Water Supply	-40%
Fully Supervised	-50%


Proximity to closest structure (m)

0 to 3	25%
3 to 10	20%
10 to 20	15%
20 to 30	10%
30 to 40	5%
None	0%
Fire Wall	10%

Building	Floor Area (m ²)	# Floors	Gross Floor Area (m ²)	Construction Coefficient	NFF 220°C*(A) **0.5	Rounded NFF (to nearest 1000L/min)	Occupancy Factor	NFF adjusted for occupancy	Sprinkler Adjustment	Sprinkler Credit	Exposure Coefficient					Exposure Flow Debit	RFF	Rounded RFF (to nearest 1000L/min)	Required Fire Flow (L/s)
											N	S	E	W	Total (max 0.75)				
Commercial & Residential Building	859	4	3436	1	12896	13000	-0.15	11050	-0.4	-4420	0	0	0.2	0	0.2	2210	8840	9000	150
Existing Commercial Building	112	2	224	1	3293	3000	0	3000	0	0	0.15	0	0	0.2	0.35	1050	4050	4000	67
Detached Residential Building	137	2	274	1.5	5462	5000	-0.15	4250	0	0	0	0.15	0.15	0.2	0.5	2125	6375	6000	100



APPENDIX B:
Storm Sewer and
Sanitary Sewer Design Sheets



STORM SEWER DESIGN

5-Year Design Storm

Township of Centre Wellington (Elora)

Chicago Storm Parameters

Intensity = $A / (t + B)^C$
5-Year

A = 1459.1

B = 13.69

C = 0.85

		Area (ha)	Runoff Coefficient	A x C	Cumulative A x C	TC (min.)	Intensity (mm/hr)	Flow (m ³ /s)	Proposed Sewer						
From	To						5-Year		Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m ³ /s)	Full Flow Velocity (m/s)	Time of Flow (min.)
Stub	CBMH.2	0.09	0.9	0.08	0.08	10.00	99.01	0.022	1.2	300	0.013	0.83	0.09	1.25	0.02
CBMH.2	MH.4	0.05	0.4	0.02	0.10	10.02	98.96	0.028	20.7	300	0.013	0.50	0.07	0.97	0.36
Trench Drain	MH.4	0.02	0.9	0.02	0.02	10.00	99.01	0.005	4.2	300	0.013	1.00	0.10	1.37	0.05
MH.4	Tank Inlet	0.00	0	0.00	0.12	10.37	97.71	0.032	12.7	300	0.013	0.50	0.07	0.97	0.22
CB.4/Tank	STM	0.00	0	0.00	0.08	10.00	99.01	0.022	9.1	250	0.013	0.44	0.04	0.80	0.19
Cumulative A x C for CB.4 to STM has been adjusted to calculate the 5-year controlled outflow resulting from the stormwater management tank of 0.022 m ³ /s.						Date:	March 3, 2023		Project: 19 East Mill Street						
						Designed By:	PW		Township of Centre Wellington (Elora)						
						Checked By:	SJP		File: 421133						

PROJECT: 19 East Mill Street
Township of Centre Wellington (Elora)
DATE: September 2, 2022
DESIGNED BY: PW
CHECKED BY: SJP

SANITARY SEWER DESIGN

Township of Centre Wellington

Average Daily Flow
Residential: 350 L/c/d
Commercial: 0.6 L/s/ha

$Q(i) = \text{Cum. Area (ha)} * \text{Infiltration Rate} / 1000$
Infiltration Rate: 0.15 L/s/ha

Manning Equation: $\text{Full Cap.} = (D/2/1000)^2 * \pi * (D/4/1000)^{0.667} * (1/n) * (S/100)^{0.5}$
D = Diameter (mm)
S = Slope (%)
n = 0.013 (PVC & Concrete), 01016 (Vitrified Clay)

n = 0.013

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

P = Population/1000

Minimum Full Velocity = 0.80 m/s

From	To	RESIDENTIAL AREA AND POPULATION							Commercial		Industrial		Institutional		C+I+I	Infiltration Q(i) = (L/s)	Total Flow (L/s)	Pipe					
		Area (ha)	No. of Units	Population	Cumulative		Peak Factor	Peak Flow (L/s)	Area (ha)	Cum. Area (ha)	Area (ha)	Cum. Area (ha)	Area (ha)	Cum. Area (ha)	Peak Flow (L/s)			Distance (m)	Diameter (mm)	Slope (%)	Capacity (Full) (m ³ /s)	Velocity	
					Area (ha)	Population																Full (m/s)	Actual (m/s)
Ex. Commercial Building	Commercial & Residential Building								0.03	0.03					0.045	0.0045	0.0495	5.50	150	0.50	0.0108	0.611	0.141
Commercial & Residential Building	SAN	0.21	18	45	0.21	45	4.324	0.7882	0.02	0.05					0.075	0.0390	0.9022	16.50	200	0.50	0.0232	0.738	0.362
Detached Residential Building	SAN	0.04	1	4	0.04	4	4.446	0.0720							0.000	0.0060	0.0780	15.20	100	0.50	0.0037	0.471	0.155



APPENDIX C:
Stormwater Management Analysis



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"          MIDUSS created                Sunday, February 07, 2010"
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"          Company                       gmbp"
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" 31          TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32          STORM Chicago storm"
"          1  Chicago storm"
"          695.047  Coefficient A"
"          6.387  Constant B"
"          0.793  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity              93.292  mm/hr"
"          Total depth                    33.014  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33          CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000  % Impervious"
"          0.300  Total Area"
"          45.000  Flow length"
"          10.000  Overland Slope"
"          0.201  Pervious Area"
"          45.000  Pervious length"
"          10.000  Pervious slope"
"          0.099  Impervious Area"
"          45.000  Impervious length"
"          10.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"

```

	0.020	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	21.942	1.795	3.041	minutes"
"	Time to Centroid	91.588	86.112	86.451	minutes"
"	Rainfall depth	33.014	33.014	33.014	mm"
"	Rainfall volume	66.36	32.68	99.04	c.m"
"	Rainfall losses	32.004	1.935	22.081	mm"
"	Runoff depth	1.010	31.079	10.933	mm"
"	Runoff volume	2.03	30.77	32.80	c.m"
"	Runoff coefficient	0.031	0.941	0.331	"
"	Maximum flow	0.002	0.020	0.020	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.020	0.020	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          W:\Kitchener\421-2021\
"              421133 - 19 Mill St E Elora\Design Data\Modelling Files"
"          Output filename:                     421133 - Ex_5yr.out"
"          Licensee name:                       gmbp"
"          Company                             gmbp"
"          Date & Time last used:               9/2/2022 at 12:23:13 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1459.072  Coefficient A"
"          13.690  Constant B"
"          0.850  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    113.586  mm/hr"
"          Total depth                          49.792  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000  % Impervious"
"          0.300  Total Area"
"          45.000  Flow length"
"          10.000  Overland Slope"
"          0.201  Pervious Area"
"          45.000  Pervious length"
"          10.000  Pervious slope"
"          0.099  Impervious Area"
"          45.000  Impervious length"
"          10.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"

```

	0.031	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	11.827	1.659	4.861	minutes"
"	Time to Centroid	89.158	85.059	86.350	minutes"
"	Rainfall depth	49.792	49.792	49.792	mm"
"	Rainfall volume	100.08	49.29	149.38	c.m"
"	Rainfall losses	39.012	2.180	26.857	mm"
"	Runoff depth	10.780	47.612	22.935	mm"
"	Runoff volume	21.67	47.14	68.80	c.m"
"	Runoff coefficient	0.217	0.956	0.461	"
"	Maximum flow	0.016	0.026	0.031	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.031	0.031	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
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"              421133 - 19 Mill St E Elora\Design Data\Modelling Files"
"          Output filename:                    421133 - Ex_10yr.out"
"          Licensee name:                      gmbp"
"          Company                             gmbp"
"          Date & Time last used:              9/2/2022 at 12:24:26 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          2327.596 Coefficient A"
"          19.500  Constant B"
"          0.894  Exponent C"
"          0.380  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    126.171  mm/hr"
"          Total depth                          61.359  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000 % Impervious"
"          0.300  Total Area"
"          45.000 Flow length"
"          10.000 Overland Slope"
"          0.201 Pervious Area"
"          45.000 Pervious length"
"          10.000 Pervious slope"
"          0.099 Impervious Area"
"          45.000 Impervious length"
"          10.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          75.000 Pervious Max.infiltration"
"          12.500 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"

```

	0.048	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	10.575	1.591	5.216	minutes"
"	Time to Centroid	89.162	84.627	86.457	minutes"
"	Rainfall depth	61.359	61.359	61.359	mm"
"	Rainfall volume	123.33	60.75	184.08	c.m"
"	Rainfall losses	41.696	2.333	28.706	mm"
"	Runoff depth	19.663	59.026	32.653	mm"
"	Runoff volume	39.52	58.44	97.96	c.m"
"	Runoff coefficient	0.320	0.962	0.532	"
"	Maximum flow	0.028	0.030	0.048	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.048	0.048	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				


```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          W:\Kitchener\421-2021\
"              421133 - 19 Mill St E Elora\Design Data\Modelling Files"
"          Output filename:                    421133 - Ex_25yr.out"
"          Licensee name:                      gmbp"
"          Company                             gmbp"
"          Date & Time last used:              9/2/2022 at 12:25:22 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          3701.648 Coefficient A"
"          25.500  Constant B"
"          0.937  Exponent C"
"          0.380  Fraction R"
"          180.000 Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    143.371  mm/hr"
"          Total depth                          75.581  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000 % Impervious"
"          0.300  Total Area"
"          45.000 Flow length"
"          10.000 Overland Slope"
"          0.201 Pervious Area"
"          45.000 Pervious length"
"          10.000 Pervious slope"
"          0.099 Impervious Area"
"          45.000 Impervious length"
"          10.000 Impervious slope"
"          0.250 Pervious Manning 'n'"
"          75.000 Pervious Max.infiltration"
"          12.500 Pervious Min.infiltration"
"          0.250 Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015 Impervious Manning 'n'"
"          0.000 Impervious Max.infiltration"
"          0.000 Impervious Min.infiltration"
"          0.050 Impervious Lag constant (hours)"
"          1.500 Impervious Depression storage"

```

	0.067	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	9.001	1.512	4.997	minutes"
"	Time to Centroid	89.198	84.255	86.555	minutes"
"	Rainfall depth	75.581	75.581	75.581	mm"
"	Rainfall volume	151.92	74.83	226.74	c.m"
"	Rainfall losses	44.275	2.559	30.509	mm"
"	Runoff depth	31.305	73.021	45.072	mm"
"	Runoff volume	62.92	72.29	135.22	c.m"
"	Runoff coefficient	0.414	0.966	0.596	"
"	Maximum flow	0.044	0.035	0.067	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.067	0.067	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          W:\Kitchener\421-2021\
"              421133 - 19 Mill St E Elora\Design Data\Modelling Files"
"          Output filename:                     421133 - Ex_50yr.out"
"          Licensee name:                       gmbp"
"          Company                             gmbp"
"          Date & Time last used:               9/2/2022 at 12:26:12 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          5089.418  Coefficient A"
"          30.000  Constant B"
"          0.967  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    156.350  mm/hr"
"          Total depth                          86.737  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000  % Impervious"
"          0.300  Total Area"
"          45.000  Flow length"
"          10.000  Overland Slope"
"          0.201  Pervious Area"
"          45.000  Pervious length"
"          10.000  Pervious slope"
"          0.099  Impervious Area"
"          45.000  Impervious length"
"          10.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"

```

	0.082	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	8.405	1.460	4.915	minutes"
"	Time to Centroid	89.539	84.074	86.793	minutes"
"	Rainfall depth	86.737	86.737	86.737	mm"
"	Rainfall volume	174.34	85.87	260.21	c.m"
"	Rainfall losses	45.784	2.751	31.583	mm"
"	Runoff depth	40.953	83.986	55.154	mm"
"	Runoff volume	82.32	83.15	165.46	c.m"
"	Runoff coefficient	0.472	0.968	0.636	"
"	Maximum flow	0.055	0.038	0.082	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.082	0.082	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          W:\Kitchener\421-2021\
"          421133 - 19 Mill St E Elora\Design Data\Modelling Files"
"          Output filename:                     421133 - Ex_100yr.out"
"          Licensee name:                       gmbp"
"          Company                              gmbp"
"          Date & Time last used:               9/2/2022 at 12:27:14 PM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          6933.019  Coefficient A"
"          34.669  Constant B"
"          0.998  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    168.900  mm/hr"
"          Total depth                          97.935  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 10"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          10  Catchment 10"
"          33.000  % Impervious"
"          0.300  Total Area"
"          45.000  Flow length"
"          10.000  Overland Slope"
"          0.201  Pervious Area"
"          45.000  Pervious length"
"          10.000  Pervious slope"
"          0.099  Impervious Area"
"          45.000  Impervious length"
"          10.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"

```

	0.102	0.000	0.000	0.000	c.m/sec"
"	Catchment 10	Pervious	Impervious	Total Area	"
"	Surface Area	0.201	0.099	0.300	hectare"
"	Time of concentration	8.075	1.416	4.884	minutes"
"	Time to Centroid	89.683	83.931	86.927	minutes"
"	Rainfall depth	97.935	97.935	97.935	mm"
"	Rainfall volume	196.85	96.96	293.80	c.m"
"	Rainfall losses	47.099	2.954	32.531	mm"
"	Runoff depth	50.836	94.981	65.404	mm"
"	Runoff volume	102.18	94.03	196.21	c.m"
"	Runoff coefficient	0.519	0.970	0.668	"
"	Maximum flow	0.066	0.042	0.102	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"	0.102	0.102	0.000	0.000"	
" 38	START/RE-START TOTALS 10"				
"	3	Runoff Totals on EXIT"			
"	Total Catchment area			0.300	hectare"
"	Total Impervious area			0.099	hectare"
"	Total % impervious			33.000"	
" 19	EXIT"				

**19 EAST MILL STREET
TOWNSHIP OF CENTRE WELLINGTON (ELORA)
Our File: 421133
March 2, 2023**

Catchment 100: Proposed Stormwater Management Tank

ELEV	INC. DEPTH	PONDING AREA	INCREASE ACTIVE VOLUME	ACCUM STORAGE VOL	
(m)	(m)	(m ²)	(m ³)	(m ³)	
373.15	0.00	163.32	0.00	0.00	Bottom of Tank
373.25	0.10	163.32	16.33	16.33	
373.35	0.20	163.32	16.33	32.66	
373.45	0.30	163.32	16.33	49.00	Top of Tank
373.60	0.45	0.36	0.05	49.05	
373.75	0.60	0.36	0.05	49.10	
373.90	0.75	0.36	0.05	49.15	
374.05	0.90	0.36	0.05	49.21	T/G
374.10	0.95	85.84	2.16	51.36	
374.15	1.00	323.76	10.24	61.60	Weir
374.20	1.05	340.00	16.59	78.20	Overflow

MINOR CONTROL
 Invert = 373.11 m
 Q = 0.081 m³/s
 Cd = 0.6
 H = 0.94 m
 2g = 19.62
 A = 0.031 m²
 D = 0.200 m

OVERFLOW WEIR
 Q = 0.046 cu m/s
 d1 = 1.050 m
 h = 1.000 m
 H = 0.050 m
 2g = 19.620
 L = 3.000 m

Stormwater Management Tank (continued)

ELEVATION	STAGE (m)	STORAGE (cu m)	MINOR CONTROL (cu m/s)	WEIR DISCHARGE (cu m/s)	TOTAL DISCHARGE (cu m/s)	
373.15	0.000	0.00	0.000	0.000	0.000	Bottom of Tank
373.25	0.100	16.33	0.017	0.000	0.017	
373.35	0.200	32.66	0.031	0.000	0.031	
373.45	0.300	49.00	0.041	0.000	0.041	Top of Tank
373.60	0.450	49.05	0.052	0.000	0.052	
373.75	0.600	49.10	0.061	0.000	0.061	
373.90	0.750	49.15	0.069	0.000	0.069	
374.05	0.900	49.21	0.077	0.000	0.077	T/G
374.10	0.950	51.36	0.079	0.000	0.079	
374.15	1.000	61.60	0.081	0.000	0.081	Weir
374.20	1.050	78.20	0.083	0.046	0.129	Overflow

```

"          MIDUSS Output ----->"
"          MIDUSS version                Version 2.25  rev. 473"
"          MIDUSS created                Sunday, February 07, 2010"
"          10  Units used:                ie METRIC"
"          Job folder:                   C:\MIDUSS\421133"
"          Output filename:              421133 - Post__2yr_R3.out"
"          Licensee name:                gmbp"
"          Company                       "
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" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          695.047  Coefficient A"
"          6.387  Constant B"
"          0.793  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                93.292  mm/hr"
"          Total depth                    33.014  mm"
"          6  002hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.025  0.000  0.000  0.000 c.m/sec"

```


	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	16.607	1.358	1.921	minutes"
"	Time to Centroid	87.776	85.601	85.681	minutes"
"	Rainfall depth	33.014	33.014	33.014	mm"
"	Rainfall volume	46.35	39.48	85.84	c.m"
"	Rainfall losses	32.006	2.110	18.254	mm"
"	Runoff depth	1.008	30.904	14.760	mm"
"	Runoff volume	1.42	36.96	38.38	c.m"
"	Runoff coefficient	0.031	0.936	0.447	"
"	Maximum flow	0.001	0.025	0.025	c.m/sec"

" 40 HYDROGRAPH Add Runoff "

"	4	Add Runoff "			
"		0.025	0.025	0.000	0.000"

" 54 POND DESIGN"

"	0.025	Current peak flow	c.m/sec"
"	0.016	Target outflow	c.m/sec"
"	38.4	Hydrograph volume	c.m"
"	11.	Number of stages"	
"	373.150	Minimum water level	metre"
"	375.000	Maximum water level	metre"
"	373.150	Starting water level	metre"
"	0	Keep Design Data: 1 = True; 0 = False"	
"		Level Discharge	Volume"
"	373.150	0.000	0.000"
"	373.250	0.01700	16.330"
"	373.350	0.03100	32.660"
"	373.450	0.04100	49.000"
"	373.600	0.05200	49.050"
"	373.750	0.06100	49.100"
"	373.900	0.06900	49.150"
"	374.050	0.07700	49.210"
"	374.100	0.07900	51.360"
"	374.150	0.08100	61.600"
"	374.200	0.1290	78.200"

"		Peak outflow	0.013	c.m/sec"
"		Maximum level	373.225	metre"
"		Maximum storage	12.290	c.m"
"		Centroidal lag	1.695	hours"
"	0.025	0.025	0.013	0.000 c.m/sec"

" 40 HYDROGRAPH Next link "

"	5	Next link "			
"		0.025	0.013	0.013	0.000"

" 33 CATCHMENT 200"

"	1	Triangular SCS"
"	1	Equal length"
"	2	Horton equation"
"	200	Catchment 200"
"	0.000	% Impervious"
"	0.040	Total Area"

```

"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.000    0.013    0.013    0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040    0.000    0.040    hectare"
"      Time of concentration  11.944    0.977    11.944    minutes"
"      Time to Centroid      84.280    84.889    84.280    minutes"
"      Rainfall depth      33.014    33.014    33.014    mm"
"      Rainfall volume      13.21    0.00    13.21    c.m"
"      Rainfall losses      32.003    2.614    32.003    mm"
"      Runoff depth        1.011    30.400    1.011    mm"
"      Runoff volume        0.40    0.00    0.40    c.m"
"      Runoff coefficient    0.031    0.000    0.031    "
"      Maximum flow        0.000    0.000    0.000    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.000    0.013    0.013    0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      0.300    hectare"
"      Total Impervious area      0.120    hectare"
"      Total % impervious      39.867"
" 19  EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                Version 2.25  rev. 473"
"          MIDUSS created                Sunday, February 07, 2010"
"          10  Units used:                ie METRIC"
"          Job folder:                   C:\MIDUSS\421133"
"          Output filename:              421133 - Post__5yr_R3.out"
"          Licensee name:                gmbp"
"          Company                       "
"          Date & Time last used:        3/2/2023 at 10:30:14 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          1459.072  Coefficient A"
"          13.690  Constant B"
"          0.850  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                113.586  mm/hr"
"          Total depth                    49.792  mm"
"          6  005hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.035  0.000  0.000  0.000 c.m/sec"

```

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	8.951	1.256	2.880	minutes"
"	Time to Centroid	86.290	84.538	84.908	minutes"
"	Rainfall depth	49.792	49.792	49.792	mm"
"	Rainfall volume	69.91	59.55	129.46	c.m"
"	Rainfall losses	39.014	2.522	22.228	mm"
"	Runoff depth	10.778	47.269	27.564	mm"
"	Runoff volume	15.13	56.53	71.67	c.m"
"	Runoff coefficient	0.216	0.949	0.554	"
"	Maximum flow	0.013	0.032	0.035	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.035	0.035	0.000	0.000"
" 54	POND DESIGN"				
"	0.035	Current peak flow	c.m/sec"		
"	0.016	Target outflow	c.m/sec"		
"	71.7	Hydrograph volume	c.m"		
"	11.	Number of stages"			
"	373.150	Minimum water level	metre"		
"	375.000	Maximum water level	metre"		
"	373.150	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	373.150	0.000	0.000"		
"	373.250	0.01700	16.330"		
"	373.350	0.03100	32.660"		
"	373.450	0.04100	49.000"		
"	373.600	0.05200	49.050"		
"	373.750	0.06100	49.100"		
"	373.900	0.06900	49.150"		
"	374.050	0.07700	49.210"		
"	374.100	0.07900	51.360"		
"	374.150	0.08100	61.600"		
"	374.200	0.1290	78.200"		
"		Peak outflow	0.022	c.m/sec"	
"		Maximum level	373.288	metre"	
"		Maximum storage	22.520	c.m"	
"		Centroidal lag	1.686	hours"	
"	0.035	0.035	0.022	0.000	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"		0.035	0.022	0.022	0.000"
" 33	CATCHMENT 200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	200	Catchment 200"			
"	0.000	% Impervious"			
"	0.040	Total Area"			

```

"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.005    0.022    0.022    0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040    0.000    0.040    hectare"
"      Time of concentration  6.438    0.903    6.438    minutes"
"      Time to Centroid      83.859    84.128    83.859    minutes"
"      Rainfall depth      49.792    49.792    49.792    mm"
"      Rainfall volume      19.92    0.00    19.92    c.m"
"      Rainfall losses      39.088    3.385    39.088    mm"
"      Runoff depth      10.704    46.407    10.704    mm"
"      Runoff volume      4.28    0.00    4.28    c.m"
"      Runoff coefficient    0.215    0.000    0.215    "
"      Maximum flow      0.005    0.000    0.005    c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.005    0.026    0.022    0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      0.300    hectare"
"      Total Impervious area      0.120    hectare"
"      Total % impervious      39.867"
" 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:\MIDUSS\421133"
"          Output filename:              421133 - Post__10yr_R3.out"
"          Licensee name:                gmbp"
"          Company                       "
"          Date & Time last used:        3/2/2023 at 10:29:15 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          2327.596  Coefficient A"
"          19.500  Constant B"
"          0.894  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity              126.171  mm/hr"
"          Total depth                    61.359  mm"
"          6  010hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.047  0.000  0.000  0.000 c.m/sec"

```

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	8.003	1.204	3.127	minutes"
"	Time to Centroid	86.733	84.120	84.859	minutes"
"	Rainfall depth	61.359	61.359	61.359	mm"
"	Rainfall volume	86.15	73.39	159.53	c.m"
"	Rainfall losses	41.699	2.842	23.825	mm"
"	Runoff depth	19.660	58.517	37.534	mm"
"	Runoff volume	27.60	69.99	97.59	c.m"
"	Runoff coefficient	0.320	0.954	0.612	"
"	Maximum flow	0.024	0.037	0.047	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.047	0.047	0.000	0.000"
" 54	POND DESIGN"				
"	0.047	Current peak flow	c.m/sec"		
"	0.016	Target outflow	c.m/sec"		
"	97.6	Hydrograph volume	c.m"		
"	11.	Number of stages"			
"	373.150	Minimum water level	metre"		
"	375.000	Maximum water level	metre"		
"	373.150	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	373.150	0.000	0.000"		
"	373.250	0.01700	16.330"		
"	373.350	0.03100	32.660"		
"	373.450	0.04100	49.000"		
"	373.600	0.05200	49.050"		
"	373.750	0.06100	49.100"		
"	373.900	0.06900	49.150"		
"	374.050	0.07700	49.210"		
"	374.100	0.07900	51.360"		
"	374.150	0.08100	61.600"		
"	374.200	0.1290	78.200"		
"		Peak outflow	0.030	c.m/sec"	
"		Maximum level	373.342	metre"	
"		Maximum storage	31.350	c.m"	
"		Centroidal lag	1.692	hours"	
"	0.047	0.047	0.030	0.000	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"		0.047	0.030	0.030	0.000"
" 33	CATCHMENT 200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	200	Catchment 200"			
"	0.000	% Impervious"			
"	0.040	Total Area"			

```

"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.007  0.030  0.030  0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040      0.000      0.040      hectare"
"      Time of concentration  5.756      0.866      5.756      minutes"
"      Time to Centroid      84.551      83.844      84.551      minutes"
"      Rainfall depth      61.359      61.359      61.359      mm"
"      Rainfall volume      24.54      0.00      24.54      c.m"
"      Rainfall losses      41.797      4.030      41.797      mm"
"      Runoff depth      19.562      57.329      19.562      mm"
"      Runoff volume      7.82      0.00      7.82      c.m"
"      Runoff coefficient      0.319      0.000      0.319      "
"      Maximum flow      0.007      0.000      0.007      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.007  0.034  0.030  0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      0.300  hectare"
"      Total Impervious area      0.120  hectare"
"      Total % impervious      39.867"
" 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:\MIDUSS\421133"
"          Output filename:              421133 - Post__25yr_R3.out"
"          Licensee name:                gmbp"
"          Company                       "
"          Date & Time last used:        3/2/2023 at 10:27:44 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          3701.648  Coefficient A"
"          25.500  Constant B"
"          0.937  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity              143.371  mm/hr"
"          Total depth                    75.581  mm"
"          6  025hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.067  0.000  0.000  0.000 c.m/sec"

```

	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	6.812	1.144	3.044	minutes"
"	Time to Centroid	87.133	83.780	84.904	minutes"
"	Rainfall depth	75.581	75.581	75.581	mm"
"	Rainfall volume	106.12	90.39	196.51	c.m"
"	Rainfall losses	44.545	3.300	25.572	mm"
"	Runoff depth	31.036	72.281	50.009	mm"
"	Runoff volume	43.57	86.45	130.02	c.m"
"	Runoff coefficient	0.411	0.956	0.662	"
"	Maximum flow	0.034	0.042	0.067	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.067	0.067	0.000	0.000"
" 54	POND DESIGN"				
"	0.067	Current peak flow	c.m/sec"		
"	0.016	Target outflow	c.m/sec"		
"	130.0	Hydrograph volume	c.m"		
"	11.	Number of stages"			
"	373.150	Minimum water level	metre"		
"	375.000	Maximum water level	metre"		
"	373.150	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	373.150	0.000	0.000"		
"	373.250	0.01700	16.330"		
"	373.350	0.03100	32.660"		
"	373.450	0.04100	49.000"		
"	373.600	0.05200	49.050"		
"	373.750	0.06100	49.100"		
"	373.900	0.06900	49.150"		
"	374.050	0.07700	49.210"		
"	374.100	0.07900	51.360"		
"	374.150	0.08100	61.600"		
"	374.200	0.1290	78.200"		
"		Peak outflow	0.037	c.m/sec"	
"		Maximum level	373.410	metre"	
"		Maximum storage	42.445	c.m"	
"		Centroidal lag	1.704	hours"	
"	0.067	0.067	0.037	0.000	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"		0.067	0.037	0.037	0.000"
" 33	CATCHMENT 200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	200	Catchment 200"			
"	0.000	% Impervious"			
"	0.040	Total Area"			

```

"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.010  0.037  0.037  0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040      0.000      0.040      hectare"
"      Time of concentration  4.900      0.823      4.899      minutes"
"      Time to Centroid      85.123      83.624      85.123      minutes"
"      Rainfall depth      75.581      75.581      75.581      mm"
"      Rainfall volume      30.23      0.00      30.23      c.m"
"      Rainfall losses      44.251      5.042      44.251      mm"
"      Runoff depth      31.330      70.539      31.330      mm"
"      Runoff volume      12.53      0.00      12.53      c.m"
"      Runoff coefficient      0.415      0.000      0.415      "
"      Maximum flow      0.010      0.000      0.010      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.010  0.043  0.037  0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"          Total Catchment area      0.300  hectare"
"          Total Impervious area      0.120  hectare"
"          Total % impervious      39.867"
" 19  EXIT"

```

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"          MIDUSS Output ----->"
"          MIDUSS version                Version 2.25  rev. 473"
"          MIDUSS created                Sunday, February 07, 2010"
"          10  Units used:                ie METRIC"
"          Job folder:                   C:\MIDUSS\421133"
"          Output filename:              421133 - Post__50yr_R3.out"
"          Licensee name:                gmbp"
"          Company                       "
"          Date & Time last used:        3/2/2023 at 10:22:20 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          5089.418  Coefficient A"
"          30.000  Constant B"
"          0.967  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity              156.350  mm/hr"
"          Total depth                    86.737  mm"
"          6  050hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.080  0.000  0.000  0.000 c.m/sec"

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	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	6.361	1.105	3.019	minutes"
"	Time to Centroid	87.501	83.641	85.047	minutes"
"	Rainfall depth	86.737	86.737	86.737	mm"
"	Rainfall volume	121.78	103.74	225.52	c.m"
"	Rainfall losses	46.249	3.723	26.687	mm"
"	Runoff depth	40.488	83.014	60.050	mm"
"	Runoff volume	56.84	99.28	156.13	c.m"
"	Runoff coefficient	0.467	0.957	0.692	"
"	Maximum flow	0.040	0.046	0.080	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.080	0.080	0.000	0.000"
" 54	POND DESIGN"				
"	0.080	Current peak flow	c.m/sec"		
"	0.016	Target outflow	c.m/sec"		
"	156.1	Hydrograph volume	c.m"		
"	11.	Number of stages"			
"	373.150	Minimum water level	metre"		
"	375.000	Maximum water level	metre"		
"	373.150	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	373.150	0.000	0.000"		
"	373.250	0.01700	16.330"		
"	373.350	0.03100	32.660"		
"	373.450	0.04100	49.000"		
"	373.600	0.05200	49.050"		
"	373.750	0.06100	49.100"		
"	373.900	0.06900	49.150"		
"	374.050	0.07700	49.210"		
"	374.100	0.07900	51.360"		
"	374.150	0.08100	61.600"		
"	374.200	0.1290	78.200"		
"		Peak outflow	0.067	c.m/sec"	
"		Maximum level	373.863	metre"	
"		Maximum storage	49.138	c.m"	
"		Centroidal lag	1.700	hours"	
"	0.080	0.080	0.067	0.000	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"		0.080	0.067	0.067	0.000"
" 33	CATCHMENT 200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	200	Catchment 200"			
"	0.000	% Impervious"			
"	0.040	Total Area"			

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"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.012  0.067  0.067  0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040      0.000      0.040      hectare"
"      Time of concentration  4.575      0.795      4.575      minutes"
"      Time to Centroid      85.545      83.517      85.545      minutes"
"      Rainfall depth      86.737      86.737      86.737      mm"
"      Rainfall volume      34.69      0.00      34.69      c.m"
"      Rainfall losses      45.996      5.926      45.996      mm"
"      Runoff depth      40.741      80.811      40.741      mm"
"      Runoff volume      16.30      0.00      16.30      c.m"
"      Runoff coefficient    0.470      0.000      0.470      "
"      Maximum flow      0.012      0.000      0.012      c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.012  0.074  0.067  0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      0.300  hectare"
"      Total Impervious area      0.120  hectare"
"      Total % impervious      39.867"
" 19  EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version                      Version 2.25  rev. 473"
"          MIDUSS created                      Sunday, February 07, 2010"
"          10  Units used:                      ie METRIC"
"          Job folder:                          C:\MIDUSS\421133"
"          Output filename:                     421133 - Post_100yr_R3.out"
"          Licensee name:                       gmbp"
"          Company                              "
"          Date & Time last used:               3/2/2023 at 10:26:09 AM"
" 31      TIME PARAMETERS"
"          5.000  Time Step"
"          180.000  Max. Storm length"
"          1500.000  Max. Hydrograph"
" 32      STORM Chicago storm"
"          1  Chicago storm"
"          6933.019  Coefficient A"
"          34.669  Constant B"
"          0.998  Exponent C"
"          0.380  Fraction R"
"          180.000  Duration"
"          1.000  Time step multiplier"
"          Maximum intensity                    168.900  mm/hr"
"          Total depth                          97.935  mm"
"          6  100hyd  Hydrograph extension used in this file"
" 33      CATCHMENT 100"
"          1  Triangular SCS"
"          1  Equal length"
"          2  Horton equation"
"          100  Catchment 100"
"          46.000  % Impervious"
"          0.260  Total Area"
"          20.000  Flow length"
"          5.000  Overland Slope"
"          0.140  Pervious Area"
"          20.000  Pervious length"
"          5.000  Pervious slope"
"          0.120  Impervious Area"
"          20.000  Impervious length"
"          5.000  Impervious slope"
"          0.250  Pervious Manning 'n'"
"          75.000  Pervious Max.infiltration"
"          12.500  Pervious Min.infiltration"
"          0.250  Pervious Lag constant (hours)"
"          5.000  Pervious Depression storage"
"          0.015  Impervious Manning 'n'"
"          0.000  Impervious Max.infiltration"
"          0.000  Impervious Min.infiltration"
"          0.050  Impervious Lag constant (hours)"
"          1.500  Impervious Depression storage"
"          0.092  0.000  0.000  0.000 c.m/sec"

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	Catchment 100	Pervious	Impervious	Total Area	
"	Surface Area	0.140	0.120	0.260	hectare"
"	Time of concentration	6.112	1.071	3.022	minutes"
"	Time to Centroid	87.638	83.532	85.121	minutes"
"	Rainfall depth	97.935	97.935	97.935	mm"
"	Rainfall volume	137.50	117.13	254.63	c.m"
"	Rainfall losses	47.495	4.176	27.568	mm"
"	Runoff depth	50.440	93.759	70.367	mm"
"	Runoff volume	70.82	112.14	182.95	c.m"
"	Runoff coefficient	0.515	0.957	0.719	"
"	Maximum flow	0.046	0.050	0.092	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4	Add Runoff "			
"		0.092	0.092	0.000	0.000"
" 54	POND DESIGN"				
"	0.092	Current peak flow	c.m/sec"		
"	0.016	Target outflow	c.m/sec"		
"	183.0	Hydrograph volume	c.m"		
"	11.	Number of stages"			
"	373.150	Minimum water level	metre"		
"	375.000	Maximum water level	metre"		
"	373.150	Starting water level	metre"		
"	0	Keep Design Data: 1 = True; 0 = False"			
"		Level Discharge	Volume"		
"	373.150	0.000	0.000"		
"	373.250	0.01700	16.330"		
"	373.350	0.03100	32.660"		
"	373.450	0.04100	49.000"		
"	373.600	0.05200	49.050"		
"	373.750	0.06100	49.100"		
"	373.900	0.06900	49.150"		
"	374.050	0.07700	49.210"		
"	374.100	0.07900	51.360"		
"	374.150	0.08100	61.600"		
"	374.200	0.1290	78.200"		
"		Peak outflow	0.078	c.m/sec"	
"		Maximum level	374.079	metre"	
"		Maximum storage	50.478	c.m"	
"		Centroidal lag	1.690	hours"	
"	0.092	0.092	0.078	0.000	c.m/sec"
" 40	HYDROGRAPH Next link "				
"	5	Next link "			
"		0.092	0.078	0.078	0.000"
" 33	CATCHMENT 200"				
"	1	Triangular SCS"			
"	1	Equal length"			
"	2	Horton equation"			
"	200	Catchment 200"			
"	0.000	% Impervious"			
"	0.040	Total Area"			


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"      20.000  Flow length"
"      15.000  Overland Slope"
"      0.040  Pervious Area"
"      20.000  Pervious length"
"      15.000  Pervious slope"
"      0.000  Impervious Area"
"      20.000  Impervious length"
"      15.000  Impervious slope"
"      0.250  Pervious Manning 'n'"
"      75.000  Pervious Max.infiltration"
"      12.500  Pervious Min.infiltration"
"      0.250  Pervious Lag constant (hours)"
"      5.000  Pervious Depression storage"
"      0.015  Impervious Manning 'n'"
"      0.000  Impervious Max.infiltration"
"      0.000  Impervious Min.infiltration"
"      0.050  Impervious Lag constant (hours)"
"      1.500  Impervious Depression storage"
"          0.015    0.078    0.078    0.000 c.m/sec"
"      Catchment 200      Pervious  Impervious Total Area  "
"      Surface Area      0.040    0.000    0.040    hectare"
"      Time of concentration  4.396    0.771    4.396    minutes"
"      Time to Centroid      85.841    83.430    85.841    minutes"
"      Rainfall depth      97.935    97.935    97.935    mm"
"      Rainfall volume      39.17     0.00     39.17     c.m"
"      Rainfall losses      47.475    6.911    47.475    mm"
"      Runoff depth         50.460    91.024    50.460    mm"
"      Runoff volume        20.18     0.00     20.18     c.m"
"      Runoff coefficient    0.515     0.000    0.515     "
"      Maximum flow         0.015     0.000    0.015     c.m/sec"
" 40  HYDROGRAPH Add Runoff "
"      4  Add Runoff "
"          0.015    0.090    0.078    0.000"
" 38  START/RE-START TOTALS 200"
"      3  Runoff Totals on EXIT"
"      Total Catchment area      0.300    hectare"
"      Total Impervious area      0.120    hectare"
"      Total % impervious      39.867"
" 19  EXIT"

```