

GEI Consultants

Functional Servicing and Stormwater Management Report

51-55 Hawkesville Road

Township of Woolwich (St. Jacobs), Ontario

Submitted by:
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Standard Limitations and Disclaimer

This report was prepared exclusively for the use of Polocorp Inc. The findings and conclusions, if any provided by GEI Consultants Canada Ltd. (GEI) in this report, are based solely on the information reported to GEI as of the date of this report. Future investigations or additional information not provided to GEI at the time of this report may result in modification of this report. GEI's scope of work did not include verifying the completeness or accuracy of information provided by others. Accordingly, GEI shall not be liable for any damages, costs, or other consequences resulting from reliance on such information if it is later determined to be inaccurate or incomplete. GEI's professional services for this project have been performed in a manner consistent with that degree of skill and care ordinarily exercised by members of the same profession currently practicing in the same locality, performing similar services under similar conditions. GEI makes no other representations and no warranties, express or implied.

Certification

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Record of Revisions

Identification	Date	Description of Issued and/or Revision
0	December 2024	Draft for Project Team and Coordination
1	January 2025	Issued for OPA, ZBA and Draft Plan of Condominium Submission
2	December 2025	Revision 2: Issued for OPA, ZBA and Draft Plan of Subdivision Submission
3.	March 2026	Revision 3: Issued for Draft Plan of Subdivision Submission
4.	June 2026	Revision 4: Re-Issued for OPA, ZBA and Draft Plan of Subdivision Submission

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1. Introduction

1.1. Introduction

In support of the Zoning Bylaw Amendment, Official Plan Amendment and Draft Plan of Subdivision applications, GEI Consultants Canada Ltd. (GEI) have prepared this revised Functional Servicing and Stormwater Management Report to document the proposed site grading, servicing and stormwater management design for the development of 51-55 Hawkesville Road (the site) and to address comments received from the Township of Woolwich, Region of Waterloo, and Grand River Conservation Authority (GRCA) to date.

The revised site layout was prepared by Polocorp Inc., (dated May 19, 2026). A topographic survey of the site was completed by GEI on October 20, 2023.

The Regulatory Flood Limit for the Conestogo River was provided by GRCA. The Floodplain Limit is shown on the Preliminary Grading Plans prepared by GEI.

1.2. Site Information

The 6.85 ha development (site) is located in St. Jacobs in the Township of Woolwich. The site's legal description is Part of Lot 37, German Company Tract in the Township of Woolwich. The boundaries of the development include Hawkesville Road to the north, the Waterloo Central Railway Line to the west, the Conestogo River to the south, and existing residential lots to the east of the site.

The site is currently zoned agricultural. There are two existing storage buildings on the site, along with a barn, silo and gravel driveways and parking areas. The remainder of the site is currently cultivated agricultural lands and natural areas.

Enclosed within the site, towards the northwest corner, is an Enbridge Gas Valving Station.

A Site Location Map is included as Figure No. 1. Figures are located after the main body of the report.

1.3. Site Development History

1.3.1. Pre-Consultation

A Pre-Application Consultation application was submitted to the Township of Woolwich (the Township) on June 30, 2023. The application package included a Development Concept Plan, Preliminary Hydrogeological Assessment and Preliminary Servicing Summary. The application package was submitted to the Township following two meetings with various Township representatives, on May 31, 2023, and June 15, 2023, which included extensive discussions regarding the Township's preferred approach to the development and servicing of the site. Pre-Consultation comments summarizing the Township's comments and submission requirements were received from the Township on August 23, 2023.

1.3.2. Groundwater Level Monitoring Scope of Work

On September 24, 2024, the applicant provided the Township with a scope of work for groundwater level monitoring. On November 26, 2024, the applicant also submitted a letter to the Township regarding Duration of Groundwater Monitoring for Proposed Draft Plan of Condominium, prepared by GEI. The letter included all data from the initial groundwater investigation, including borehole logs and groundwater hydrographs.

Groundwater level monitoring results from May 2024 to June 2026 are presented in the Hydrogeological Study by GEI Consultants Canada Ltd..

2. Existing Conditions

2.1. Topography

Existing ground elevations across the site range from approximately 347.50 metres at the northerly portion of the site to approximately 324.00 metres at the southerly end of the site near the Conestogo River.

Runoff from the site is generally directed in a southerly direction towards the Conestogo River, located along the south boundary of the site.

A slope is located on the southern portion of the site. The existing/long-term stable top of slope was identified by GEI as part of a Slope Stability Study. Stable top of slope was identified between 337.99 m and 339.40 m.

The existing site features are shown on the Existing Conditions Plan prepared by GEI.

2.2. Soil Characteristics

GEI completed a geotechnical investigation at the site in April 2024, to support the design of the proposed development. A copy of the Geotechnical Report, dated January 23, 2025, is provided in Appendix A. Please note that this geotechnical report was completed prior to the current iteration of the draft plan of subdivision and reference to a previous draft plan is made in the report. A memorandum indicating that the conclusions of the geotechnical report remain unchanged and that the site remains developable based on the updated draft plan. The memorandum has been provided in Appendix A.

As part the geotechnical investigation, GEI drilled a total of six (6) boreholes. The thickness of the topsoil on site was found to range from 305 mm to 455 mm.

Below the topsoil layer, fill (reworked native soil) was encountered in Borehole 24-01 (southwest portion of the site) with a thickness of 8.7 m, extending to 9.1 m below existing ground elevation. The existing fill material consists of sand to silt, gravel, cobble and scattered organic inclusions in the upper zone. The existing fill material had a variable density from very loose to very dense and was found to be typically moist, although some samples were wet. The existing fill material (reworked native soil) will need to be removed from the proposed building lots and municipal right-of-way during the area grading stage, prior to the construction of the proposed dwellings and municipal servicing. The existing fill material can be replaced and compacted as engineered fill under the direction and supervision of the geotechnical engineer, however, any organic or excessively wet material should not be reused.

Deposits of silty sand and silty clay were found in boreholes 24-02, 24-03 and 24-05. These deposits were found to be between 0.4 m and 2.0 m thick.

Below the topsoil, fill and sandy silt and silty clay deposits, a layer of sandy silt to silty sand glacial till was encountered. The glacial till extended to the termination of all boreholes at depths ranging from 5.2 to 12.8 m below ground surface. The glacial till was typically compact to very dense.

For additional information please refer to the Geotechnical Report included in Appendix A.

2.3. Groundwater

As part of the geotechnical investigation, monitoring wells were installed in six (6) of the boreholes on site for the purpose of measuring the seasonal high groundwater levels. The Hydrogeological Study is submitted under separate cover. GEI visited the site on May 3, May 13, September 3, and December 17, 2024, May 23, 2025, and December 9, 2025, to collect groundwater measurements from the six (6) monitoring wells and a shallow piezometer. During the May 2024 visits, GEI staff installed water dataloggers in the monitoring wells and shallow piezometer. The dataloggers recorded groundwater level measurements from May 2024 to December 2025. The following table outlines the observed seasonal high groundwater levels.

Table 2-1: Monitoring Well/Shallow Piezometer Details and Water Level Observations

Well ID	Ground El	MAX GWL	Min GWL	Max GWL	Date of Max
	(masl)	(masl)	(masl)	(mbgs)	(YYYY-MM-DD)
MW-24-01	338.22	335.191	331.641	3.029	4/7/2025
MW-24-02	339.17	336.084	332.393	3.086	4/5/2025
MW-24-03	340.13	339.881	337.076	0.249	4/3/2025
MW-24-04	346.38	345.680	343.395	0.700	6/10/2025
MW-24-05	338.62	338.713	337.674	-0.093	4/3/2025
MW-24-06	345.06	345.053	340.661	0.007	3/5/2025
PZ-01	338.600	338.565	337.942	0.035	4/3/2025

Based on the GEI groundwater level measurements, the high groundwater levels range from existing ground elevation at MW24-05 to approximately 3.086 m below existing ground level at 24-02.

Per recommendations of the Hydrogeological Study prepared by GEI, all subsurface linear infrastructure, including storm sewers, sanitary sewers and watermain, will be constructed with cut off collars/trench plugs, to minimize potential for development of groundwater flow pathways and minimize induced groundwater drainage.

For additional information regarding groundwater levels please refer to the Geotechnical Report prepared by GEI (dated January 23rd , 2025) and Geotechnical Memorandum prepared by GEI (dated December 19th , 2025) provided in Appendix A, and the Hydrogeological Study prepared by GEI and previously submitted under separate cover.

Two additional boreholes are to be advanced within the proposed stormwater management facility location as part of additional hydrogeological studies. Any new groundwater information will be considered as part of the stormwater management facility design as needed.

2.4. Slope Stability

A slope is located on the southern portion of the site, approximately 200 m south of Hawkesville Road, and extending from approximately 50 m east of the railway line to the east property line. The slope is located within the GRCA regulation limit. GEI completed a Slope Stability Study in June 2024 to identify

the erosion hazard limit and the development setback from top of slope. Per the study, all new building lots should be setback a minimum of six metres from the existing top of slope. This setback will allow for access to the valley for maintenance or emergency purposes per GRCA requirements. The Slope Stability Study establishes that the proposed building loads will have a negligible impact on slope stability.

For additional information regarding slope stability, please refer to the Slope Stability Study, prepared by GEI and previously submitted under separate cover.

3. Proposed Development

The proposed draft plan of subdivision generally consists of 17 single-family residential lots, 44-58 street fronting townhomes, 50-65 stacked townhomes, a park block, and a stormwater management facility. Figure No. 2 illustrates the Draft Plan of Subdivision prepared by Polocorp Inc.

Access to the development will be provided by Hawkesville Road.

3.1. Site Grading

The preliminary site grading for the development is shown on the Preliminary Grading Plans (GEI Consultants Canada Ltd., Drawing No. 6, 7, 11 and 12).

The grade and elevation of the internal road network is controlled by the elevation of Hawkesville Road, the adjacent properties and the major overland flow route to the stormwater management facility. The preliminary grading of the stormwater management facility has been completed to provide an outlet for the minor and major storm events to the Conestogo River.

The proposed development will generally match into the existing property line elevations. The internal roadways are proposed to be graded with slopes ranging from 0.5% to 5%, while lots are generally proposed to be graded with slopes ranging from 2% to 6% per the Township of Woolwich Engineering Development and Infrastructure Manual (March 2022). Where required, 3:1 transition slopes are proposed to accommodate the grade relief across the site and retaining walls are proposed in areas where transition slopes into existing ground elevations would exceed the maximum allowable slope of 3:1.

Per recommendations of the Hydrogeological Study prepared by GEI and as required per the Township of Woolwich Engineering Development and Infrastructure Manual, where feasible, basements will be constructed to meet the required clearance between seasonal high groundwater levels and underside of footing, which is 0.8 m for walk-out basements and 0.6 m for other basements. In area where this distance cannot be achieved, a third pipe system will be incorporated approximately 0.60m to 0.80m below the proposed foundations to provide clearance to provide an outlet for groundwater within the minimum distances of the proposed foundations. Details of the proposed third pipe system and services will be determined at the detailed design stage..

3.2. Roads

The internal roadways will be constructed as an urban cross-section complete with semi-mountable concrete curb and standard gutter (OPSD 600.040). Concrete sidewalks will be provided. A typical road cross-section has been included on the Notes and Details Plan (GEI Consultants Canada Ltd., Drawing No. 15).

4. Site Servicing

4.1. Water Supply

While the Region of Waterloo's *2025 Water and Wastewater Monitoring Report* (June 2025) reported that the Integrated Urban Water System (IUWS)—including St. Jacobs—had remaining capacity of 42,009 m³/day (approximately 130,000 people), based on projected maximum day flows and development commitments to the end of 2024, it is now understood that there are capacity concerns within the IUWS area. We also understand that the Region of Waterloo is looking at short-, medium-, and long-term solutions to address this issue. Therefore, it is our understanding that, subject to the Townships approval, the Region may institute a condition of draft plan approval.

There is an existing 150mm diameter watermain along Hawkesville Road which currently terminates east of the site, along the frontage of 47 Hawkesville Road. As per the Township of Woolwich Development Services Staff Report (dated January 20, 2026), the existing 150mm watermain will be removed and replaced with an upgraded (minimum 200mm diameter) watermain, and extended along Hawkesville Road to provide service to the proposed development. Water supply will be provided via connection to the extended and upgraded watermain at Street A and Street B.

A 200 mm diameter watermain will be extended throughout the site to service the proposed development. Individual 25 mm water service laterals will be installed per the Ontario Building Code (OBC, 2012) and Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (DGSSMS, February 2024). Fire hydrants are proposed to be placed at a minimum distance of 150 m to provide fire protection, in accordance with the OBC and DGSSMS. The preliminary watermain layout for the proposed development is shown on the Preliminary Servicing Plans (GEI Consultants Canada Ltd., Drawing No. 2, 3, 9 and 10). Anticipated domestic water demands for the site are presented in the table below. The table also includes estimated water demands for the entire site except for the medium-density block, to compare water demands for a potential first construction phase.

Table 4-1: Anticipated Water Demands from Site

	Anticipated Water Demand	Anticipated Water Demand- Phase 1 (Singles and Towns ONLY)
Average Day Demand [1](225 L/c/day @ 396 ppl) 17 Single and Semi Detached (3.25 ppu) 58 Townhouses (2.44 ppu) 65 Unspecified Unit Types (3.05 ppu)	1.03 L/s	0.51 L/s
Minimum Hour [2]Factor=0.4	0.41 L/s	0.20 L/s
Maximum Day [2]Factor=2.75	2.83 L/s	1.40 L/s
Peak Hour [2]Factor= 4.13	4.25 L/s	2.11 L/s
Fire Flow Demand	133 L/s	133 L/s
Total Demand Flow: Max Day + Fire Flow	135.83 L/s	134.40 L/s

1. Obtained from Region of Waterloo DGSSMS (2026)
2. Obtained from MECP Design guidelines for Drinking Water Systems

The Fire Underwriters Survey (FUS) approach was used to calculate fire flow demand, and calculations are included in Appendix F. Per the FUS calculations, the required fire flow at the site would be 133 L/s with firewalls every two townhouse units. The total maximum day plus fire flow demand is therefore 135.83 L/s. The total maximum day plus fire flow demand for the first construction phase is slightly lower at 134.40 L/s.

Hydrant test results and fire flow calculations are provided in Appendix F.

A hydrant test was completed on June 12th, 2025, for the nearby existing fire hydrant on Hawkesville Road, showing a result of 49.6 L/s at 20 psi. Based on correspondence with the Region of Waterloo (dated May 8, 2026; included in Appendix F), the pipe upgrade for the watermain along Hawkesville Road to 200mm diameter pipe is anticipated to result in available fire flows of 150 L/s at the Hawkesville Road connection to the servicing for the proposed development. While the existing available fire flows at Hawkesville Road are not sufficient to supply fire flow demands to the site, the proposed upgrades can provide this capacity. A 200mm watermain pipe is required to maintain the available fire flows at 150 L/s throughout the proposed development without exceeding a maximum velocity of 5 m/s.

To assess available fire flows throughout the proposed subdivision, water modelling will be completed, based on the water modelling boundary conditions to be provided by the Region of Waterloo.

4.2. Sanitary Servicing

4.2.1. St. Jacobs WWTP Capacity

The Region of Waterloo's 2025 Water and Wastewater Monitoring Report indicates that the St. Jacob's Wastewater Treatment Plant (WWTP) has a remaining capacity of 457 m^3/day or 1,100 people. This is

based on projected flows plus development commitments as of the end of 2024. It is noted that at 0.4119 m^3/d/c the average flows per capita for the St. Jacob's WWTP catchment area are the highest in the Region, and per the Water and Wastewater Monitoring Report (June 2025) infiltration and inflow (I&I) continue to be a problem in several areas in St. Jacob's. As the Region and Township undertake works to reduce the I&I and consequently average flow per capita, remaining capacity will increase. In addition, Appendix B of the Water and Wastewater Monitoring Report (June 2025) indicates that the system capacity for the St. Jacob's WWTP will increase from 1450 m^3/day to 1530 m^3/day in 2029, which will also result in an increase in remaining capacity. The St. Jacob's Wastewater Treatment Plant Expansion Class Environmental Assessment commenced in December 2024, per recommendation of the Region's 2018 Wastewater Treatment Master Plan, which determined that St. Jacob's Wastewater Treatment Plant expansion should be targeted for the end of 2029. As additional information becomes available regarding the preferred alternative for plant upgrades in order to increase rated capacity, this report will be updated accordingly.

4.2.2. Sanitary Servicing Options – Previous Discussions

An existing 200 mm diameter sanitary sewer is located within Hawkesville Road. It is currently terminated at the easterly limit of the proposed development. Based on review of the existing sanitary sewer invert elevation and the site topography, it is noted that there are significant cover constraints and limited ability to service the subject lands via a gravity connection to the existing sanitary sewer on Hawkesville Road. As a result, other servicing strategies were considered.

Discussions with the Township staff between October 2023 and had yielded several sanitary servicing options, resulting in the two alternatives presented below:

Chris Court Option (Formerly Option 3): Installation of a new deep sanitary main from the site to Chris Court. Flows from the site would be serviced via gravity connection.

Pumping Station Option (Formerly Option 1): Installation of a new sanitary main on Hawkesville Road. Flows from the site would require a pumping station to discharge to the sanitary main.

The possibility of installing a new deep sanitary main on Northside Drive for flows to be serviced via gravity connection was considered as the ***Deep Sanitary Sewer Option (Formerly Option 2***). This alternative resulted in the deepest sanitary sewers, and was therefore identified as the most costly and most disruptive to the neighbourhood due to the required restorations. Additionally, according to Section 7.3 of the Township's Engineering Development and Infrastructure Manual (2022), the maximum pipe depth over sanitary sewers is 8.0m, otherwise additional structural reviews are required. As part of this report, the ***Deep Sanitary Sewer Option*** has not been explored.

Township Council has since recommended a preferred servicing strategy for the north and south sides of Hawkesville Road, with the preferred strategy for 47 and 51-55 Hawkesville Road being via a connection to the existing 200mm diameter sewer on Chris Court.

4.2.1. Chris Court Option

This option consists of the installation of a deep sanitary sewer from the eastern limits of 51-55 Hawkesville Road (Polocorp lands) to Chris Court and would result in estimated sewer depths of approximately 2.8m to 5.5m below proposed ground surface. The proposed 200mm diameter sanitary sewer pipe is to be extended from the from the existing 200mm diameter sanitary sewer on Chris Court. A 9.0m sanitary sewer easement, will be provided at 8 and 9 Chris Court, 3.0m of which is an existing servicing easement at the northerly sideyard of 8 Chris Court in favour of the Township of Woolwich.

Proposed sanitary sewer design calculations have been provided in Appendix B. The proposed sanitary sewer layout is shown on the Preliminary Servicing Plans (GEI Consultants Canada Ltd., Drawing No. 2 and 3) and Figure No. 5A.

We acknowledge that the recommendation of Township Council from January 27, 2026, is for developers north of Hawkesville Road to connect to an extended sanitary sewer on Hawkesville Road to service their properties. Should it be determined by Township staff that a connection to Hawkesville Road is not feasible for any of 52, 56 and 60 Hawkesville Road, we are prepared to extend the proposed sanitary sewer from the Polocorp lands to service these properties. As shown on the engineering drawings for 51-55 Hawkesville Road (GEI Consultants Canada Ltd., Drawing No. 2 and 3), the proposed sanitary sewer from Chris Court, through 51-55 Hawkesville Road can be extended to 60 Hawkesville Road while providing 2.8m to the proposed invert. An additional sanitary sewer design sheet has been provided should 56, 60 and a portion of 52 Hawkesville Road require sanitary servicing via Chris Court. This additional analysis has also been provided in Appendix B. As shown on this design sheet, should a 56, 60 and a portion of 52 Hawkesville Road required servicing via Chris Court, the existing 200mm diameter sewer will be approximately 72.2% full during peak flow conditions.

4.2.2. Pumping Station Option

This option consists of the reconstruction and installation of new sanitary main on Hawkesville Road (with estimated depths of 1.5m to 5.5m below existing ground surface) and would require a sanitary sewage pumping station (SPS) to service the development. The SPS wet well will be sized to allow for holding of flows during peak hours for release to the forcemain during off-peak hours.

A 200 mm diameter sanitary sewer within the proposed development will convey sanitary flows via gravity to the SPS. Discharge from the SPS will then be conveyed via a forcemain to the sanitary sewer on Hawkesville Road. Preliminary sanitary sewer design calculations of select runs of pipe have been provided in Appendix B. The proposed sanitary sewer layout is shown on the Preliminary Servicing Plans (GEI Consultants Canada Ltd., Drawing No. 9 and 10) and Figure No. 5B.

4.3. Storm Sewer

The storm sewer system for the proposed development will be sized to convey the 5-year design storm event to the proposed stormwater management facility. Preliminary storm sewer sizing has been completed to size the inlet pipe into the stormwater management facility in support of determining the

preliminary internal road elevations for the development. Preliminary storm sewer calculations of select runs of pipe have been provided in Appendix C.

Major storm events will be conveyed overland along the internal roadways to the stormwater management facility. Outflow from the stormwater management facility will be discharged to the Conestogo River.

Rear lot swales and catchbasins will be used to convey runoff from the rear yards to the storm sewer system. Drainage swales will be designed with capacity for the 100-year design storm. Foundation drainage will be provided via sump pumps discharging to grade.

4.4. Third Pipe System

A secondary storm sewer system has been proposed as an outlet for a perforated pipe system within the private properties to the northeast and easterly portions of the site where higher groundwater is present. This system will serve as a groundwater outlet for groundwater within 0.60 to 0.80m of the proposed foundations.

5. Stormwater Management Design

The stormwater management criteria for the proposed development is as follows:

1. Post-development flows for the site are to be attenuated to pre-development levels for the 2 to 100-year design storm events.
2. Provide enhanced level quality control, 80% Total Suspended Solids (TSS) removal prior to discharge of runoff from the site.
3. Major storm flows are to be routed overland to an appropriate outlet.
4. Control the recharge to meet pre-development conditions on the property **OR** control the runoff from the 90th percentile storm event.

The methodology used to evaluate and design the stormwater management system is described in this section.

A three-hour duration rainfall event was used to generate the mass rainfall data required to model the 2, 5,10, 25, 50 and 100-year design events. The City of Kitchener Intensity Duration Frequency (IDF) data was used to calculate the Chicago Storm parameters. The 3-hour Chicago Storm parameters and the total depth of rainfall for each storm are shown below in Table 5-1.

Table 5-1: City of Kitchener – Chicago Storm Parameters

	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
A =	509.00	743.00	1,593.00	2,221.00	3,158.00	3,886.00	4,688.00
B =	6.00	6.00	11.00	12.00	15.00	16.00	17.00
C =	0.7989	0.7989	0.8789	0.9080	0.9355	0.9495	0.9624
Td =	240	180	180	180	180	180	180
Rainfall depth (mm)	25.415	34.276	47.265	56.290	68.266	77.647	87.079

The Regional Storm (Hurricane Hazel) and a 4-hour 25 mm Chicago Storm were modelled in addition to the 2 to 100-year design events.

The SCS (Soil Conservation Service) infiltration method was used in the runoff calculations.

The Ontario Soil Survey, Report No. 44, Waterloo County, describes the soils in the vicinity of the site as St Clements Silt Loam (well drained), Tavistock Loam (imperfectly drained), Freeport Sandy Loam (well drained), and Martin Sand and Gravel (variable drainage). As a conservative approach, SCS infiltration parameters for a hydrologic type C soil have been used in the analysis of the stormwater management system. The Curve Numbers (CN) are prorated based on type of land use and soil type for each catchment area. The calculated Curve Numbers applied in the hydrologic model are provided in Appendices D (pre-development) and E (post-development) and summarized in Table 5-2.

Table 5-2: Curve Numbers

Pre-Development Catchment	**Area (ha)**	**SCS Curve No.**
100	3.53	81
200	2.09	78
300	0.60	87
400	1.23	81
Post-Development Catchments for the *Chris Court Option*	**Area (ha)**	**SCS Curve No.**
1000	2.39	79*
2000	0.89	79*
3000	0.22	79*
4000	0.39	79*
5000	2.89	75
6000	0.60	82
7000	0.07	79
Post-Development Catchments for the *Pumping Station Option*	**Area (ha)**	**SCS Curve No.**
1000	2.65	79*
2000	1.16	79*
3000	0.36	79*
4000	2.68	78
5000	0.60	82

*Represents only pervious area curve number for use with StandHyd hydrologic object.

The hydrologic model Visual OTTHYMO was used to create the runoff hydrographs and to route the flows through the storage structure.

5.1. Pre-Development Conditions

For the pre-development condition analysis, the site and external areas have been modelled as four (4) drainage catchments. The pre-development condition drainage catchments are shown on Figure No. 3 and described below. The pre-development condition modelling files are enclosed in Appendix D. Imperviousness calculations for Catchment 100 are also shown in Appendix D.

Catchment 100 (3.53 hectares, 12% impervious) represents the majority of the site including existing agricultural buildings, driveway, and agricultural lands. Under pre-development conditions, runoff generated from Catchment 100 sheetflows overland and discharges to the Conestogo River.

Catchment 200 (2.09 hectares, 0% impervious) represents the southern part of the site including wooded area and the floodplain area of the Conestogo River. Under pre-development conditions, runoff generated from Catchment 200 sheetflows overland and discharges to the Conestogo River.

Catchment 300 (0.60 hectares, 15% impervious) represents external lands to the northeast of the Site, and includes an existing residence, paved driveway and gravel area, along with landscaped areas. Under pre-development conditions, runoff generated from Catchment 300 sheetflows overland to Catchment 100, ultimately discharging to the Conestogo River.

Catchment 400 (1.23 hectares, 20% impervious) represents a western portion of the site that drains to the rail corridor. Catchment 400 includes landscaped area, some existing structures on site, and a portion of the gravel parking lot area and driveway. Under pre-development conditions, runoff generated from Catchment 400 sheetflows overland to the existing channel that crosses through 55 Hawkesville Road at the northwest corner of the site and crosses through the rail corridor. Flows are conveyed via the channel and existing storm sewer pipes and culverts, prior to discharging to the existing swale southwest of the site, and ultimately to the Conestogo River.

Table 5-3 lists the flow rates and volumes discharging from each catchment under pre-development conditions.

Table 5-3: Pre-Development Condition Flow Rates and Volumes

	25mm	**2 Year**	**5 Year**	**10 Year**	**25 Year**	**50 Year**	**100 Year**	**Regional Storm**
Catchment 100 Flow Rate (m^3/s)	0.046	0.098	0.192	0.271	0.391	0.460	0.555	0.489
Catchment 100 Runoff Volume (m^3)	189.91	355.12	636.35	856.77	1224.52	1424.57	1706.19	8170.57
Catchment 200 Flow Rate (m^3/s)	0.035	0.072	0.138	0.195	0.279	0.328	0.396	0.288
Catchment 200 Runoff Volume (m^3)	107.03	196.90	351.10	473.01	678.12	790.44	949.32	4675.85
Catchment 300 Flow Rate (m^3/s)	0.019	0.036	0.064	0.088	0.119	0.138	0.163	0.086
Catchment 300 Runoff Volume (m^3)	50.59	87.08	145.53	189.53	260.81	298.80	351.59	1483.46
Catchment 400 Flow Rate (m^3/s)	0.022	0.035	0.067	0.103	0.160	0.193	0.241	0.170
Catchment 400 Runoff Volume (m^3)	87.55	150.28	253.91	333.86	465.92	537.33	637.50	2907.67
Total Flow Rate (m^3/s)	**0.101**	**0.217**	**0.437**	**0.624**	**0.902**	**1.063**	**1.286**	**1.033**
Total Runoff Volume (m^3)	435.08	789.33	1386.89	1853.19	2629.40	3051.15	3644.61	17237.59

5.2. Post-Development Conditions

5.2.1. Chris Court Option

For the post-development condition analysis, the site and external areas have been modelled as seven (7) drainage catchments. The post-development drainage catchments are shown on Figure No. 4 and described below. The post-development condition modelling files are enclosed in Appendix E.

Catchment 1000 (2.39 hectares, 75% impervious) represents a portion of the northern and eastern areas of the proposed site which includes single-detached and street townhouse units, driveways and internal roads, and landscaped areas. Under post-development conditions, runoff generated from Catchment 1000 will be conveyed to the proposed stormwater management facility via the proposed storm sewer system, prior to discharging to the Conestogo River.

Catchment 2000 (0.89 hectares,75% impervious) represents the north-western portion of the site with four townhouse blocks and parking in the centre of the catchment. Under post-development conditions, runoff generated from Catchment 2000 will be conveyed to the proposed stormwater management facility via the proposed storm sewer system, prior to discharging to the Conestogo River.

Catchment 3000 (0.22 hectares, 20% impervious) represents the proposed park block at the western portion of the site. Under post-development conditions, runoff generated from Catchment 3000 will be conveyed to the proposed stormwater management facility via the proposed storm sewer system, prior to discharging to the Conestogo River.

Catchment 4000 (0.39 hectares, 20% impervious) represents the proposed stormwater management facility, complete with maintenance access road and sediment drying area. Under post-development conditions, runoff generated from Catchment 4000 is controlled by the proposed stormwater management facility and ultimately discharges to the Conestogo River.

Catchment 5000 (2.89 hectares, 0% impervious) represents the rear portion of single-family homes in the southerly portion of the development, wooded land on steep slope, and the floodplain of the Conestogo River. Under post-development conditions, runoff generated from Catchment 5000 will sheetflow uncontrolled in a southerly direction, prior to discharging to the Conestogo River.

Catchment 6000 (0.60 hectares, 15% impervious) represents external lands to the northeast of the Site, and includes an existing residence, paved driveway and gravel area, along with landscaped areas. Under post-development conditions, runoff generated from Catchment 6000 will continue to sheetflow overland to Catchment 1000, and be conveyed to the proposed stormwater management facility via the proposed storm sewer system, and ultimately the Conestogo River.

Catchment 7000 (0.07 hectares, 0% impervious) represents landscaped area at the northwest corner of the site and west of the proposed stormwater management facility. Runoff generated from Catchment 7000 is proposed to sheetflow overland to the re-aligned channel within the rail corridor, prior to discharging to the existing swale southwest of the site, and ultimately to the Conestogo River.

5.2.1. Pumping Station Option

For the post-development condition analysis, the site and external areas have been modelled as five (5) drainage catchments. The post-development drainage catchments are shown on Figure No. 4 and described below. The post-development condition modelling files are enclosed in Appendix E.

Catchment 1000 (2.65 hectares, 80% impervious) represents a portion of the northern and eastern areas of the proposed site which includes single-detached and street townhouse units, driveways and internal roads, and landscaped areas. Under post-development conditions, runoff generated from Catchment 1000 will be conveyed to the proposed stormwater management facility via the proposed storm sewer system, prior to discharging to the Conestogo River.

Catchment 2000 (1.16 hectares, 60% impervious) represents the north-western portion of the site with four townhouse blocks and parking in the centre of the catchment. Under post-development conditions, runoff generated from Catchment 2000 will be conveyed to the proposed stormwater management facility via the proposed storm sewer system, prior to discharging to the Conestogo River.

Catchment 3000 (0.36 hectares, 20% impervious) represents the proposed stormwater management facility, complete with maintenance access road. Under post-development conditions, runoff generated from Catchment 3000 is controlled by the proposed stormwater management facility and ultimately discharges to the Conestogo River.

Catchment 4000 (2.68 hectares, 0% impervious) represents the rear portion of single-family homes in the southerly portion of the development, wooded land on steep slope, and the floodplain of the Conestogo River. Under post-development conditions, runoff generated from Catchment 4000 will sheetflow uncontrolled in a southerly direction, prior to discharging to the Conestogo River.

Catchment 5000 (0.60 hectares, 15% impervious) represents external lands to the northeast of the Site, and includes an existing residence, paved driveway and gravel area, along with landscaped areas. Under post-development conditions, runoff generated from Catchment 5000 will continue to sheetflow overland to Catchment 1000, and be conveyed to the proposed stormwater management facility via the proposed storm sewer system, and ultimately the Conestogo River.

Tables 5-4 and 5-7 show the post-development uncontrolled flows and volumes based on the above catchments.

Table 5-4: Post-Development Uncontrolled Flows (Chris Court Option)

	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	Regional Storm
Catchment 1000 Flow Rate (m^3/s)	0.117	0.187	0.277	0.366	0.476	0.553	0.668	0.337
Catchment 2000 Flow Rate (m^3/s)	0.088	0.13	0.172	0.228	0.258	0.3	0.129	0.088
Catchment 3000 Flow Rate (m^3/s)	0.002	0.005	0.012	0.019	0.029	0.036	0.044	0.030
Catchment 4000 Flow Rate (m^3/s)	0.013	0.02	0.028	0.035	0.045	0.052	0.062	0.052
Catchment 5000 Flow Rate (m^3/s)	0.011	0.024	0.045	0.064	0.091	0.106	0.127	0.084
Catchment 6000 Flow Rate (m^3/s)	0.037	0.081	0.159	0.228	0.332	0.394	0.48	0.391
Catchment 7000 Flow Rate (m^3/s)	0.002	0.005	0.008	0.011	0.016	0.018	0.022	0.006
Total Flow Rate (m^3/s)	**0.205**	**0.349**	**0.571**	**0.804**	**1.135**	**1.337**	**1.617**	**1.03**

Table 5-5: Post-Development Uncontrolled Volumes (Chris Court Option)

	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	Regional Storm
Catchment 1000 Runoff Volume (m^3)	362.922	549.987	828.159	1028.345	1343.108	1507.588	1733.539	6402.595
Catchment 2000 Runoff Volume (m^3)	135.120	204.789	308.367	382.923	500.127	561.376	645.526	2384.194
Catchment 3000 Runoff Volume (m^3)	13.039	24.059	42.486	56.793	80.476	93.300	111.294	518.588
Catchment 4000 Runoff Volume (m^3)	32.752	53.340	86.635	112.078	153.914	176.487	208.127	925.271
Catchment 5000 Runoff Volume (m^3)	22.877	42.019	74.248	99.329	140.954	163.511	195.199	911.200
Catchment 6000 Runoff Volume (m^3)	16.591	31.418	57.431	78.324	113.911	133.571	161.554	839.885
Catchment 7000 Runoff Volume (m^3)	38.197	67.798	91.104	130.163	151.492	181.611	529.230	38.197
Total Runoff Volume (m^3)	**705.7385**	**1136.4975**	**1817.651**	**2329.6895**	**3161.929**	**3607.29**	**4228.5455**	**17951.222**

Table 5-6: Post-Development Uncontrolled Flows (Pumping Station Option)

	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	Regional Storm
Catchment 1000 Flow Rate (m^3/s)	0.212	0.328	0.457	0.579	0.721	0.841	0.974	0.377
Catchment 2000 Flow Rate (m^3/s)	0.064	0.1	0.147	0.166	0.257	0.277	0.331	0.166
Catchment 3000 Flow Rate (m^3/s)	0.013	0.021	0.030	0.040	0.054	0.065	0.081	0.050
Catchment 4000 Flow Rate (m^3/s)	0.046	0.096	0.183	0.258	0.369	0.434	0.524	0.369
Catchment 5000 Flow Rate (m^3/s)	0.012	0.026	0.049	0.068	0.097	0.113	0.136	0.084
Total Flow Rate (m^3/s)	0.317	0.511	0.765	1.009	1.332	1.562	1.865	1.046

Table 5-7: Post-Development Uncontrolled Volumes (Pumping Station Option)

	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	Regional Storm
Catchment 1000 Runoff Volume (m^3)	443.120	646.031	942.8385	1154.688	1486.206	1658.963	1895.911	6769.015
Catchment 2000 Runoff Volume (m^3)	155.718	237.591	362.071	453.15	598.15	674.575	780.146	2702.092
Catchment 3000 Runoff Volume (m^3)	38.031	60.8034	97.2846	125.013	170.457	194.9178	229.1688	1091.383
Catchment 4000 Runoff Volume (m^3)	142.3638	261.9038	467.0122	629.1696	901.9988	1051.396	1262.7316	6225.393
Catchment 5000 Runoff Volume (m^3)	35.196	64.644	114.228	152.814	216.846	251.556	300.306	1397.634
Total Runoff Volume (m^3)	798.044	1231.634	1902.954	2401.284	3204.394	3631.652	4225.491	17212.93

5.3. Stormwater Management Overview

The stormwater management approach for the proposed development includes a “treatment train” to remove sediments and any absorbed contaminants prior to the discharge of runoff from the development to the receiving outlets. The “treatment train” approach will include a combination of lot-level, conveyance and end-of-pipe best management practices and is designed to filter and remove sediments from stormwater runoff prior to discharging to the proposed stormwater management facility, and ultimately the Conestogo River.

5.4. Lot Level Control

Stormwater management practices recommended for providing lot level controls on this site are as follows:

5.4.1. Roof Drainage to Ground Surface

Roof runoff will be directed to grassed surfaces to promote infiltration and reduce peak runoff rates prior to flowing to the internal roads and entering the proposed storm sewer system.

5.4.2. Rear Yard Swales

The grading of the lots will be to current Township of Woolwich Development Standards. Where practical, the length of the rear lot swales between catch basins will be increased to extend the contact time with the grassed surfaces.

To promote more infiltration on the lots and in the swales, it is recommended that the average depth of graded topsoil be 300 mm.

5.4.3. Foundation Drainage

Foundation drainage will be via sump pumps discharging to grade.

5.4.4. Infiltration Galleries

Infiltration galleries are proposed along rear lots of majority of the street townhouse units and at the private medium density block (Block 21) to meet pre-development recharge rates. These infiltration galleries have been proposed at locations where the gallery can be placed at least 1.0 metre above the seasonal high groundwater level, and 1.2 metre below the proposed ground surface.

5.5. Conveyance Control

Conveyance controls will be achieved through maintenance of the storm sewer system. The regular inspection and cleanout of the manholes, catchbasin sumps and the oil/grit separator (OGS) will remove the heavier sediments deposited from the runoff during storm events.

5.6. End of Pipe Facilities

The end-of-pipe component consists of the proposed stormwater management facility located along the southwesterly portion of the site. The proposed stormwater management facility will discharge to the existing swale located at the southwest corner of the site, and ultimately to the Conestogo River. The proposed stormwater management facility has been designed as a wetland type facility complete with a 1.0 m forebay and a 0.3 m deep permanent pool to provide the required water quality controls. The outlet structure is designed to provide extended detention of the required water quality storage volumes per the Ministry of Environment (MOE) Stormwater Management Planning and Design Manual (2003).

5.7. Stormwater Management Facility – Chris Court Option

The following sections discuss the stormwater management facility proposed for the Draft Plan of Subdivision that aligns with the Chris Court servicing option.

Further to the decision of Township council on January 27, 2026, we acknowledge that additional stormwater flows may be directed to the Polocorp lands should a stormwater servicing option be unavailable for the lands to the north of Hawkesville Road. We are willing to work with the Township and any other property owners to accommodate additional flows being directed to the Polocorp lands from north of Hawkesville Road. In order to minimize impacts to the proposed stormwater management facility on the Polocorp lands, we request that flows discharging from any external lands be attenuated to existing condition levels and receive proper quality control prior to discharging to the proposed stormwater management facility on the Polocorp lands.

5.7.1. Water Quality

Enhanced quality controls for the development will be provided by a treatment train approach. Initial quality treatment will be provided by one oil/grit separator prior to outletting to the proposed stormwater management facility. The oil/grit separator, a Stormceptor EFO10 or approved equivalent, will provide 53% total suspended solid removal of the ETV particle size distribution. This will be followed by additional quality treatment in the stormwater management facility. A copy of the oil/grit separator sizing report is provided in Appendix E.

The on-site stormwater management facility has been designed as a wetland-type pond with a total storage volume of 2,353.4 m^3, of which 349.8 m^3 represents the permanent pool and forebay volume. The forebay sizing sheet is provided in Appendix E.

To reach 80% Enhanced level water quality treatment, the stormwater management facility will be sized to achieve Basic level protection by removing 60% of suspended solids.

Using Table 3.2 of the MOE Stormwater Management Planning and Design Manual (2003), an 80% enhanced level total suspended solids (TSS) removal target has been applied. For enhanced level TSS removal target, a wetland-type pond requires 111 m^3/ha of storage volume for a contributing drainage area with 60% imperviousness. 40 m^3/ha of the required storage volume is to be extended detention volume, while the remaining 70 m^3/ha is to be permanent pool. Based on a contributing drainage area of 4.49 hectares (Catchments 1000, 2000, 3000, 4000, and 6000) and a requirement of 70 m^3/ha of permanent pool, the required volume of permanent pool storage is 314.3 m^3.

The proposed stormwater management facility has been designed with a 1-metre-deep forebay and a 0.3-metre-deep permanent pool which provide a total volume of 349.8m³. A flow splitter manhole upstream of the pond is provided to direct runoff from the 2-year design storm event runoff event and lower to the forebay, with flows exceed the 5-year design storm peak flows bypassing the forebay and discharging into the main wet pond cell. The forebay inlet pipe has been sized with a 525mm diameter pipe to convey flows produced from the 2-year design storm, and the second 450mm inlet pipe has been sized to convey the remaining minor system inflows for the 5-year design storm (i.e. 5-year flows minus 2-year flows).

Therefore, the proposed stormwater management facility volume and forebay will effectively meet the necessary enhanced water quality protection criteria. The proposed oil/grit separator provides additional protection for the wetland and reduces clean out frequency.

5.7.2. Extended Detention

Extended detention volume is calculated based on the runoff volume generated by the 4-hour 25 mm Chicago design storm event. The outlet structure, consisting of a 75mm diameter reverse sloped pipe and a 525mm diameter outlet pipe, will provide a 34-hour detention of the required extended detention volume, meeting the recommended 24-hour detention time as per the MOE Stormwater Management Planning and Design Manual (2003).

Table 3.2 of the MOE Stormwater Management Planning and Design Manual (2003) requires 40 m³/ha of the extended detention volume to achieve the 80% Enhanced level TSS removal target for a contributing drainage area with 80% imperviousness. This is equivalent to 179.6 m^3 for the 4.49 ha contributing area. The 25 mm event occupies a volume of 535.3 m^3 within the active storage portion of the stormwater management facility.

The extended detention volume also provides control of post-development flows generated from the 4-hour 25 mm Chicago design storm event to pre-development levels. This level of water quantity control also achieves the water balance stormwater management criteria outlined in the Township of Woolwich CLI-ECA (issued October 27, 2022). For development scenarios where additional assessment studies with water balance assessments have not been completed, the criterion is to control the runoff from the 90th percentile storm event.

5.7.3. Pond Routing

Table 5-8 compares the routing results through the stormwater management facility with the available stage/storage/ discharge capacities.

In addition to the 75mm reverse sloped pipe, a ditch-inlet catchbasin (DICB) control grate and 525mm outlet pipe is provided. A 2-m wide emergency overflow weir will be constructed at an elevation of 338.70 m, which will convey any emergency overflow to the natural area that slopes towards the Conestogo River.

Table 5-8: Stormwater Management Facility - Stage/Storage/Discharge Comparison (Chris Court Option)

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	Drawdown Time (hrs)
Top of Permanent Pool/ Orifice 1 (75 mm)	0.000	0.000	337.80	---	---	---	---
DICB Lip	0.008	523.60	338.25	---	---	---	---
25mm Storm	---	---	---	0.012	535.3	338.26	34
2 Year Storm	---	---	---	0.063	620.5	338.32	37
5 Year Storm	---	---	---	0.202	740.9	338.40	41
10 Year Storm	---	---	---	0.368	807.1	338.45	43
25 Year Storm	---	---	---	0.592	906.4	338.51	46
Regional Storm	---	---	---	0.610	923.0	338.52	47
50 Year Storm	---	---	---	0.669	977.2	338.55	48
100 Year Storm	---	---	---	0.756	1,100.6	338.63	51
Weir	0.773	1,222.1	338.70	---	---	---	---
Top of Pond	1.608	2003.7	339.10	---	---	---	---

Per the Township Engineering Development and Infrastructure Manual (2022), the maximum depth of water is less than 2.1 m above the bottom of pond (338.63m vs 337.50m), permanent pool depth is at the maximum of 0.3m, the maximum depth of the extended detention zone is less than one metre above permanent pool elevation, and the maximum peak flow attenuation zone is less than 1.8 metre above permanent pool elevation.

The erosion control criterion of a minimum 24-hour drawdown period for the 25mm storm is also met.

5.7.4. Stormwater Facility Lining

Per the Geotechnical Report prepared by GEI, a liner is required for the stormwater management facility. The liner should be placed along the entire pond bottom and extend a minimum of 1.0 m above the permanent pond elevation. The design of the liner will be determined at the detailed design stage.

5.7.5. Sediment Forebay Design

The stormwater management facility has been designed with one sediment forebay located at the pond inlet. The forebay is one metre deep, approximately 20 m long, and has a top width of approximately 10 m. This provides a length to width ratio of 2:1, which meets the minimum required ratio of 2:1, per the MOE Stormwater Management Planning and Design Manual (2003).

As the forebay will be lined, a layer of gravel material 300 mm thick will be placed above the liner to ensure that it is protected during sediment removal.

Sediment forebay sizing information has been included in Appendix E. Table 5-9 summarizes the required and provided parameters within the sediment forebay design.

Table 5-9: Sediment Forebay Design Details (Chris Court Option)

Required	**Dispersion Length (m)**	7.4
	Settling Length (m)	8.9
	Flow Velocity (m/s)	0.15
	Min. Length to Width Ratio	2:1
	Settling Velocity (m/s)	0.0003
Provided	**Dispersion Length (m)**	20.0
	Settling Length (m)	20.0
	Flow Velocity (m/s)	0.05
	Length to Width Ratio	2:1
	Settling Velocity (m/s)	0.0001

5.7.6. Sediment Loading and Cleanout Frequency

Table 5-10 illustrates sediment loading to the sediment forebay as well as the subsequent cleanout frequency required to maintain this system.

Table 5-10: Sediment Loading and Cleanout Frequency Calculations (Chris Court Option)

Treatment Train Component	Catchment Area	Imp.	Annual Sediment Loading	TSS Removal	Annual TSS Reduction	Storage Volume	Cleanout Frequency
OGS (Stormceptor EFO10)	4.10 ha (Catchments 1000, 2000,300, 6000)	65%	11.31 m^3 (based on 2.50 m^3/ha)[1]	54%	6.11 m^3 (5.20 m^3 remaining)	17.79 m^3	~1.6 Years
Forebay		65%	5.20 m^3 remaining from OGS treatment	80%	4.16 m^3 (1.04 m^3 remaining)	29.75 m^3 (1/3 of forebay)	~4.2 years
			Total Annual TSS Reduction:		**=10.27 m^3 out of 11.31 m^3 =91%**		

1. Annual sediment loading obtained from Table 6.3 of the MOE Stormwater Management Planning and Design Manual, 2003 and interpolated based on the contributing area percent imperviousness.

Therefore, it is estimated that the sediment forebay will require cleaning approximately every 4.2 years. The oil/grit separator will need to be cleaned out at least every 1.6 years.

Per the Township Engineering Development and Infrastructure Manual (2022), a sediment drying area will be provided adjacent to the maintenance access road, with a maximum slope of 4% draining towards the stormwater management facility.

A sediment drying area of approximately 98 m^2 has been provided under the Chris Court option. Within this area, at a slope of 4H:1V, and a height of 1.0m, a volume of 32.7 m^3 can be provided, which is

greater than the volume required at cleanout of 29.75 m^3. Calculations for the sediment drying area and clean-out frequency have been included in Appendix E.

5.8. Stormwater Management Facility – Pumping Station Option

The following sections discuss the stormwater management facility proposed for the Draft Plan of Subdivision that aligns with the Pumping Station Option of the two sanitary servicing options.

5.8.1. Water Quality

Enhanced quality controls for the development will be provided by a treatment train approach. Initial quality treatment will be provided by one oil/grit separator prior to outletting to the proposed stormwater management facility. The oil/grit separator, a Stormceptor EFO8 or approved equivalent, will provide 50% total suspended solid removal of the ETV particle size distribution. This will be followed by additional quality treatment in the stormwater management facility. A copy of the oil/grit separator sizing report is provided in Appendix E.

The on-site stormwater management facility has been designed as a wetland-type pond with a total storage volume of 1,833.61 m^3, of which 164.93 m^3 represents the permanent pool volume. A forebay is also proposed.

The oil/grit separator achieves a minimum of 50% total suspended solid (TSS) removal for a drainage area of 3.25ha (Catchments 1000 and 5000)/ To reach 80% Enhanced level water quality treatment, the stormwater management facility will be sized to achieve Normal level protection by removing 70% of suspended solids.

Using Table 3.2 of the MOE Stormwater Management Planning and Design Manual (2003), a 70% normal suspended solid removal target has been applied. For basic suspended solids removal target, a wetland-type pond requires 75 m^3/ha of storage volume for a contributing drainage area with 62% imperviousness. 40 m^3/ha of the required storage volume is to be extended detention volume, while the remaining 35 m^3/ha is to be permanent pool. Based on a contributing drainage area of 4.77 hectares (Catchments 1000, 2000, 3000 and 5000) and a requirement of 35 m^3/ha of permanent pool, the required volume of permanent pool storage is 167.0 m^3.

The proposed stormwater management facility has been designed with a forebay volume of 81.58 m^3 and a 0.3-metre-deep permanent pool which provides 164.93 m^3 of permanent pool volume, with a total of 246.51 m^3 of storage volume under the permanent pool elevation.

Therefore the proposed stormwater management facility, in conjunction with the oil/grit separator, will effectively meet the necessary enhanced water quality protection criteria.

5.8.2. Extended Detention

Extended detention volume is calculated based on the runoff volume generated by the 4-hour 25 mm Chicago design storm event. The outlet structure with a 75 mm diameter orifice at top of permanent pool has been designed to provide a 29-hour detention of the required extended detention volume, which exceeds the recommended 24-hour detention time as per the MOE Stormwater Management Planning and Design Manual (2003).

Table 3.2 of the MOE Stormwater Management Planning and Design Manual (2003) requires 40 m³/ha of the extended detention volume to achieve the 70% basic suspended solid removal target for a contributing drainage area with 62% imperviousness. This is equivalent to 190.8 m^3 for the 4.77 ha contributing area. The 25 mm event occupies a volume of 510 m^3 within the active storage portion of the stormwater management facility.

The extended detention volume also provides control of post-development flows generated from the 4-hour 25 mm Chicago design storm event to pre-development levels. This level of water quantity control also achieves the water balance stormwater management criteria outlined in the Township of Woolwich CLI-ECA (issued October 27, 2022). For development scenarios where additional assessment studies with water balance assessments have not been completed, the criteria is to control the runoff from the 90th percentile storm event.

5.8.3. Pond Routing

Table 5-11 compares the routing results through the stormwater management facility with the available stage/storage/ discharge capacities.

In addition to the 75 mm diameter orifice at top of permanent pool to provide adequate extended detention, a 350 mm diameter orifice is provided at an elevation of 337.30, and a 320 mm diameter orifice plate will be installed on the outlet pipe. A 4 m wide overflow weir will be constructed at an elevation of 337.80 m to convey flows from the 50-year, 100-year and regional event to the natural area that slopes towards the Conestogo River.

Table 5-11: Stormwater Management Facility - Stage/Storage/Discharge Comparison (Pumping Station Option)

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	Drawdown Time (hrs)
Top of Permanent Pool/ Orifice 1 (75 mm)	0.000	0.000	336.80	---	---	---	---
25mm Storm	---	---	---	0.007	610.2	337.29	29
Orifice 2 (350 mm)	0.008	619.9	337.30	---	---	---	---
2 Year Storm	---	---	---	0.034	802.2	337.42	37
5 Year Storm	---	---	---	0.100	1,079.9	337.59	44
Catchbasin Lip/Orifice 3 (320 mm)	0.106	1.097.8	337.60	---	---	---	---
10 Year Storm	---	---	---	0.261	1,174.5	337.64	47
25 Year Storm	---	---	---	0.446	1,265.8	337.70	51
Weir	0.493	1,453.8	337.80	---	---	---	---
50 Year Storm	---	---	---	0.508	1,531.1	337.84	55
Regional Storm	---	---	---	0.639	1,564.9	337.86	56
100 Year Storm	---	---	---	0.688	1,602.4	337.88	58
Top of Pond	1.159	1,833.6	338.00	---	---	---	---

Per the Township Engineering Development and Infrastructure Manual (2022), the maximum depth of water is less than 2.1m above the bottom of pond (permanent pool), permanent pool depth is at the maximum of 0.3m, the maximum depth of the extended detention zone is less than 1.0m above permanent pool elevation, and the maximum peak flow attenuation zone is less than 1.8m above permanent pool elevation.

5.8.4. Stormwater Facility Lining

Per the Geotechnical Report prepared by GEI, a liner is required for the stormwater management facility. The liner should be placed along the entire pond bottom and extend a minimum of 1.0m above the permanent pond elevation.

5.8.5. Sediment Forebay Design

The stormwater management facility has been designed with one sediment forebay located at the pond inlet. The forebay is one metre deep, approximately 22 m long, and has a top width of approximately 7 m. This provides a length to width ratio of 3.1:1, which meets the minimum required ratio of 3:1, per the MOE Stormwater Management Planning and Design Manual (2003).

As the forebay will be lined, a layer of gravel material 300 mm thick will be placed above the liner to ensure that it is protected during sediment removal.

Sediment forebay sizing information has been included in Appendix E. Table 5-12 summarizes the required and provided parameters within the sediment forebay design.

Table 5-12: Sediment Forebay Design Details (Pumping Station Option)

Required	**Dispersion Length (m)**	8.9
	Settling Length (m)	10.1
	Flow Velocity (m/s)	0.15
	Length to Width Ratio	2:1
	Settling Velocity (m/s)	0.0003
Provided	**Dispersion Length (m)**	21.0
	Settling Length (m)	21.0
	Flow Velocity (m/s)	0.10
	Length to Width Ratio	3:1
	Settling Velocity (m/s)	0.0001

5.8.6. Sediment Loading and Cleanout Frequency

Table 5-13 illustrates sediment loading to the sediment forebay as well as the subsequent cleanout frequency required to maintain this system.

Table 5-13: Sediment Loading and Cleanout Frequency Calculations (Pumping Station Option)

Treatment Train Component	Catchment Area	Imp.	Annual Sediment Loading	TSS Removal	Annual TSS Reduction	Storage Volume	Cleanout Frequency
OGS (Stormceptor EFO8)	3.25 ha (Catchments 1000, 5000)	68%	8.71 m^3 (based on 2.68 m^3/ha)[1]	50%	4.36 m^3 (4.36 m^3 remaining)	8.78 m^3	~1 year
Forebay	1.52 ha (Catchments 2000, 3000)	51%	2.49 m^3 (based on 1.64 m^3/ha)[1] + 4.36 m^3 remaining from OGS treatment =6.85 m^3	70%	4.79 m^3 (2.06 m^3 remaining)	40.79 m^3 (1/2 of forebay)	~6 years
			Total Annual TSS Reduction:		**=9.14 m^3 out of 11.20 m^3 =82%**		

1. Annual sediment loading obtained from Table 6.3 of the MOE Stormwater Management Planning and Design Manual, 2003 and interpolated based on the contributing area percent imperviousness.

Therefore, it is estimated that the sediment forebay will require cleaning every six (6) years. The oil/grit separator will need to be cleaned out at least every year.

Per the Township Engineering Development and Infrastructure Manual (2022), a sediment drying area will be provided adjacent to the maintenance access road, with a maximum slope of 4% draining towards the stormwater management facility.

5.9. Comparison of Pre-and Post-Development Flows and Volumes

Table 5-14 compares the pre- and post-development peak flows from the site to the Conestogo River.

Table 5-14: Comparison of Pre- and Post-Development Flow Rates

	25 mm	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional Storm
Pre-Development Flow Rates (m^3/s)	0.110	0.230	0.444	0.625	0.894	1.050	1.267	1.035
Post-Development Flow Rates (m^3/s) – Chris Court Option Scenario	0.043	0.088	0.279	0.536	0.891	1.030	1.230	1.005
Post-Development Flow Rates (m^3/s) – Pumping Station Option	0.050	0.101	0.190	0.371	0.744	0.862	1.088	1.004

Therefore, for both servicing options, the post-development peak flow rates discharging from the site during the 25 mm event and the 2 to 100-year design storm events have been attenuated to less than the pre-development flow rates from the site.

Table 5-15 compares the pre- and post-development runoff volumes from the site to the Conestogo River.

Table 5-15: Comparison of Pre- and Post-Development Runoff Volumes from the Site

	25 mm	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	Regional Storm
Pre-Development Runoff Volumes (m^3)	553.54	949.13	1596.54	2093.45	2909.23	3348.78	3964.15	17771.23
Post-Development Controlled Runoff Volumes (m^3)- Chris Court Option Scenario	631.69	1052.46	1901.46	2279.85	3133.84	3589.63	4223.93	18306.89
Post-Development Controlled Runoff Volumes (m^3) - Pumping Station Scenario	785.16	1218.00	1888.50	1715.88	3189.35	3616.60	4210.37	17206.00

In summary, there is an increase in post-development runoff volumes discharging from the site when compared to the pre-development runoff volumes. However, the stormwater management design has attenuated the post-development peak flow rates from the site (up to and including the 100-year design storm event) to be less than the pre-development flow rates.

6. Drainage Works within Rail Corridor

The proposed site plan includes a re-alignment of the existing swale to fall completely within the Regional rail corridor to the west of the subject site. Discussion of the existing and proposed changes to the swale within the Region's rail corridor is provided below, to acknowledge comments by the Region of Waterloo and CN Rail Staff from the Second Submission comments dated March 9, 2026.

6.1. Pre-Development Conditions - Drainage

Under pre-development conditions, an existing swale extends from just southeast of the rail crossing at Hawkesville Road, through 51-55 Hawkesville Road, returns to the Region rail corridor, discharging flows to the Conestogo River via an outlet near the southwest end of the site. Flows reach the existing swale via a 450mm culvert under Hawkesville Road, a 375mm diameter storm sewer from Hawkesville Road, and a 525mm culvert below the rail tracks (receiving flows from another 450mm Hawkesville Road cross culvert). During a site inspection completed by GEI Consultants Canada Ltd., Dougan Ecology, and Polocorp Inc. on May 21, 2026, it was noted that the existing swale within the Regional rail corridor and the 51-55 Hawkesville Road property conveys flows from the Region storm sewers and culverts, flow is not constants, and flows are not directed to the existing unevaluated wetland.

Flows from the existing swale discharge to a 525mm culvert, and 450mm storm sewer pipes and ultimately the Conestogo River. The existing 450mm storm sewer pipe collects flows from 51-55 Hawkesville Road via two inline drains. The existing storm sewer pipe capacity calculations are provided in Appendix G.

An assessment of the total drainage area to the railway corridor was also completed. The drainage area was delineated using the DTM and drawings provided by the Township of Woolwich. Peak flows from the 2-year to 100-year design storms were modelled using Visual OTTHYMO. Modelling results have been included in Appendix G. It was assumed that the flows reaching the existing ditch from the drainage area north of Hawkesville Road and east of the railway are controlled by the two cross culverts (450mm Hawkesville Road cross culvert, and 525mm railway cross culvert). Based on this assumption the combined maximum flows reaching the ditch from the drainage area north of Hawkesville Road would be 1.03 m^3/s. A 375mm culvert on Hawkesville Road also conveys flows from the Hawkesville Road ROW drainage area to the rail corridor, which was also assumed to control flows to its maximum capacity of 0.354 m^3/s. The estimated flow rates reaching the ditch are summarized in Table 6-1.

Table 6-1: Estimated Flows reaching Rail Corridor

	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Flows from Hawkesville Road ROW reaching 375mm culvert (m^3/s)	0.055	0.080	0.103	0.154	0.190	0.244
Flows from remaining drainage area reaching 450mm and 525mm cross culverts (m^3/s)	0.336	0.634	0.874	1.03	1.03	1.03
Total Flows (m^3/s)	0.366	0.692	0.952	1.184	1.220	1.274

6.1. Post Development Conditions - Drainage

Under post-development conditions, the Region's drainage swale is proposed to be relocated such that it is fully within the Region's rail corridor. As the existing swale conveys flows from the Region storm sewers on Hawkesville Road, along with two Regional culverts, relocation of the drainage swale to the Region's property is appropriate. The proposed swale design is included in the engineering drawings for 51-55 Hawkesville Road (GEI Consultants Canada Ltd., Drawing No. 6 and 7).

The proposed swale and storm sewer pipe capacity calculations are provided in Appendix G. Swale capacities were estimated by inputting the designed cross-section into Visual OTTHMO to obtain depth/flow/travel time tables.

Maximum flow capacity for the drainage features from the top of the swale (at the 525mm culvert) to Inlet 13 are summarized in Table 6-1. Flows reaching Inlet Tee 13 can be conveyed via the combined storm sewer and ditch that has a maximum capacity of 7.07 m^3/s.

Table 6-2: Conveyance Capacity of Proposed Features at Rail Corridor

Location	Post-development Conveyance Feature	Conveyance Capacity	Conveyance Capacity – Design Storm Event
Downstream of 525mm CN rail cross culvert to Proposed storm sewer	57.3m swale @ 0.6%	2.1 m^3/s	100-year design storm (1.274 m^3/s)
	65.6m swale @ 3.1%	4.8 m^3/s	100-year design storm (1.274 m^3/s)
Proposed storm sewer	450mm storm sewer @ 5.76%	0.711 m^3/s	5-year design storm (0.699 m^3/s)
Existing Inlet Tee 13 to Outlet	450mm storm sewer pipes and ditch	7.070 m^3/s	100-year design storm (1.274 m^3/s)

As shown in Table 6-2, the proposed swale can convey flows up to the 100-year design storm. The proposed storm sewer (extension of the 450mm diameter storm sewer pipe) can convey flows up to the 5-year design storm, and its size is limited by the existing downstream 450mm storm sewer pipes.

The re-alignment of the swale away from the private property and onto to the Region's rail corridor allows for long-term access and maintenance while reducing any potential conflicts with private property owners.

6.1.1. Rail Corridor Flows - Outlet

Under post-development conditions, the proposed outlet for flows from the re-aligned swale within the Region's rail corridor is to remain the same as under existing conditions, with the exception of the proposed rip-rap to reduce erosive impacts of flows discharging to the Conestogo River. The proposed outlet for the site (i.e. from the proposed SWM facility) is downstream of the rail corridor outlet. Flows are not expected to back into either outlet structure as the floodplain limit is located at an elevation lower than both outlet locations, and a steep slope near the outlets (ranging from 6% to 30%) can ensure drainage of the flows discharging from the outlets.

6.2. Flows from Site - Comparison

Based on the comments received by the Region, the existing drainage swale was not designed to accept additional flows. The catchment area draining to the rail corridor has decreased significantly under post-development conditions, from 1.23 ha with 20% imperviousness to 0.07ha with 0% imperviousness. For a comparison of pre-and post-development flow rates and volumes to the Regional rail corridor, please see Table 6-3 below. Peak flows and volumes below were obtained from the modelling completed for the site.

Table 6-3: Rail Corridor Flows- Pre-Development and Post-Development Flows Comparison

To Rail Corridor:	25mm	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	Regional Storm
Pre-Development Peak Flow (m^3/s) (Catchment 400)	0.022	0.035	0.067	0.103	0.160	0.193	0.241	0.170
Pre-Development Runoff Volume (m^3/s) (Catchment 400)	87.55	150.28	253.91	333.86	465.92	537.33	637.50	2907.67
Post-Development Peak Flow (m^3/s) (Catchment 7000)	0.002	0.005	0.008	0.011	0.016	0.018	0.022	0.006
Post-Development Runoff Volume (m^3) (Catchment 7000)	38.197	67.798	91.104	130.163	151.492	181.611	529.230	38.197

As shown above, peak flow rates and runoff volume to the rail corridor have been reduced under post-development conditions.

Based on the analysis of the rail corridor drainage system capacity and comparison of flows from site, the development will not present negative impacts to the railway right-of-way.

7. Water Budget

The average annual precipitation for the area in which the site is located is estimated to be about 870.8 mm, per the Elora 1991-2020 Climate Normals station data. The Geotechnical Investigation completed by GEI identifies that the soils on site include silty sand and silty clay overlaying sandy silt to silty sand glacial till. All boreholes were terminated in the glacial till at depths ranging from 5.2 m to 12.8 m below ground surface.

A Thornthwaite Mather Monthly Water Budget analysis was completed for the pre-development and post-development site conditions, with silt loam and shallow rooted vegetation site characteristics.

Under existing conditions, the average annual groundwater recharge volume and runoff volume for the 7.45-hectare drainage area was estimated to be 19,702 m^3/year and 24,080 m^3/year, respectively. Under post development conditions, the average annual natural groundwater recharge volume and runoff volume for the 7.45-hectare drainage area was estimated to be 15,348 m^3/year and 35,812 m^3/year.

Infiltration galleries are proposed on Block 21, and street townhouse Blocks 20, 19, and 18 to infiltrate rear-yard and rooftop area runoff. An estimated A percolation rate of 8.4 mm/hr was used as the design infiltration rate based on the measured hydraulic conductivity rates presented in the Hydrogeological Study undertaken by GEI, ranging from 1.01E-07 m/s to 2.6E-09 m/s. The design percolation was approximated based on the protocol presented in the Low Impact Development Stormwater Management Planning and Design Guide (Appendix C, Credit Valley Conservation and Toronto and Region Conservation Authority, 2010).

The proposed infiltration galleries provide a total storage volume of 75.57 m^3 and treat an area of approximately 0.70ha. The additional recharge volume provided by infiltration galleries is 5,684 m^3/year, contributing to a total post-development recharge volume of 21,032 m^3/year. Therefore, post-development recharge rates are 1,330m^3 above the existing condition levels. The Township of Woolwich CLI-ECA water balance criteria to control runoff from the 90th percentile storm event has been met, and the water budget analysis shows that recharge rates have also been controlled to pre-development conditions on the property, providing improved conditions on site.

The summary of the yearly post-development recharge and runoff volumes as well as comparison to existing conditions recharge and runoff volumes are summarized in Table 6-1 below.

Table 7-1: Summary of Recharge and Runoff Volume

Column Title	Total Estimated Recharge	Total Estimated Runoff
Existing Conditions	19,702 m^3	24,080m^3
Post-Development Conditions	21,032 m^3	35,812 m^3
Change from Existing Conditions	6.8%	+48.7%

The water budget is summarized further in Appendix E.

8. Sediment and Erosion Control Plan

Primary sediment control will be achieved with the installation of Heavy Duty Sediment Fence (OPS 219.130) around the property boundary. The silt fence will eliminate the opportunity for waterborne sediments to be transported from the site.

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

The proposed stormwater management facility will be rough-graded and used as a temporary sediment pond during servicing and construction.

Once catch basins have been installed, the grates will be wrapped in filter cloth. This will be maintained until all building and landscaping are completed.

Temporary straw bale check dams will be installed in swales after initial grading has been completed to slow the flow rates and promote the settlement of waterborne sediments before they reach the silt fence.

Mud-tracking mat(s) will be installed at all construction access points.

Inspection and maintenance of all silt fencing and the sediment pond will start after installation is complete. These features will be inspected on a weekly basis or after a rainfall event of 13 mm or greater. Maintenance will be carried out, within 48 hours, on any part of the sediment and erosion controls found to need repair.

Once construction has been substantially completed, the silt fence will be removed, any accumulated sediment will be removed from the temporary sediment pond, and the final grading and landscaping of the stormwater management facility will be completed.

Further information regarding sediment and erosion control during construction is provided on the Sediment and Erosion Control Plan provided by GEI.

After construction of the development, erosion and sediment transportation will be minimal.

9. Maintenance Plan

A two-phase maintenance plan is recommended. Phase I will address the short-term more intensive maintenance necessary during and immediately after construction. Once all landscaping has been completed, maintenance will shift to Phase II.

As outlined in the section on Sediment and Erosion Control, Phase I will include weekly inspection of all sediment and erosion control devices plus “as needed” inspection after significant rainfall, with the repair of any damaged works and collection of captured sediment.

Phase II will be the maintenance carried out by the Township of Woolwich after assumption. This work will involve a yearly visual inspection of the existing stormwater management pond and catch basins to determine the amount of sediment accumulation. Sediment should be removed as required and the recommended vegetation replanted.

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 stormwater management facility structures (i.e. Outlet structures, overflow weirs)? If yes, complete any necessary repairs and/or installation of replacement structures.
2. Is there any noticeable damage to the asphalt and grassed swales (i.e. erosion, blockages)? If yes, complete any necessary repairs.
3. Is there any indication of a spill (i.e. Frothy water, oily sheen on the water)? If yes, investigate, inform the appropriate agencies and complete the necessary clean-up and restoration.
4. Inspect all ditch inlets, catchbasins, and manholes. Remove and dispose of any accumulated sediment, trash/litter, debris (i.e. sediment, garbage, leaves, etc.).
5. Inspect the bottom of the stormwater management facility for accumulated sediment, trash/litter and debris. Remove and dispose of any accumulated sediment, trash/litter and debris found in or around the stormwater management facility.
6. Inspect all swales and 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.

10. Sanitary Servicing Strategy Recommendation

We acknowledge the decision of Township council on January 27, 2026, recommending that 51-55 Hawkesville Road (Polocorp lands) and any future development at 47 Hawkesville Road be serviced via a connection to the existing sanitary sewer on Chris Court via a reduced easement through 8 and 9 Chris Court. We also acknowledge that if it is determined that any of 52, 56 and 60 Hawkesville Road cannot be serviced via a connection to Hawkesville Road, we are prepared to extend the proposed sanitary sewer within the Polocorp lands to service the lands to the north of Hawkesville Road, subject to a cost sharing agreement.

11. Conclusions

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

1. Water service will be provided by a connection to an upgraded (minimum 200mm diameter) watermain along Hawkesville Road, which currently terminates east of the site, and will need to be extended west along Hawkesville Road to service the development. The proposed 200 mm diameter watermain will be connected to the development at Street A and Street B, and will provide domestic and fire flows.
2. Two sanitary service options have been assessed in this report for the 51 Hawkesville Road Subdivision.
    a. The Chris Court Option, which is the preferred servicing strategy for the site, is via the extension of a 200mm diameter sanitary sewer from the existing sewer on Chris Court. Should it be required, 56, 60 and a portion of 52 Hawkesville Road can feasibly be serviced via Chris Court.
    b. The Pumping Station Option requires an extension of the sanitary sewer on Hawkesville Road to the development, along with a sanitary pumping station to pump flows from the proposed development to the extended sewer on Hawkesville Road.
3. The applicant is actively pursuing the Chris Court Option as the preferred servicing strategy as it was approved by Council and these conclusions align with Council's decision.
4. Storm sewers will be designed to convey the 5-year design storm event to the proposed stormwater management facility, while overland flows from the site will be conveyed via the internal roads to the proposed stormwater management facility.
5. A third pipe system is proposed at the northeast and easterly areas of the development to lower groundwater levels below the undersides of footing.
6. A treatment train approach with initial pre-treatment by an oil/grit separator followed by further treatment in the stormwater management facility forebay will provide an Enhanced level of quality control (80% total suspended solid removal) for the development.
7. Under both design scenarios, the post-development flow rates discharging from the site during the 25 mm event and 2 to 100-year design storm events have been attenuated to less than the pre-development flow rates from the site.
8. The stormwater management systems meet current Provincial and Municipal guidelines. The principles of "Stormwater Management Practices", the Ministry of Environment Stormwater Management Planning and Design Manual 2003, and guidelines from the Township of Woolwich Engineering Development and Infrastructure Manual have been used in the design of the stormwater management system.
9. The proposed re-aligned channel and storm sewer pipe within the Region rail corridor has capacity to convey estimated 5-year flows. Post-development flow rates and runoff volumes from the site are well below the pre-development flows.

10. Based on the above works, the following public assets will be gained by the Township of Woolwich and/or Region of Waterloo, beyond the normal assets delivered through a subdivision:
    a. 200mm water line upgrade on Hawkesville Road.
    b. Urbanization of the South side of Hawkesville Road from 47 Hawkesville Road to the rail crossing.
    c. The flexibility of integrating all of the lands that were included in ROPA6 via one servicing strategy.
    d. An improved drainage channel within the Region rail corridor..
    e. A 9m easement (up from 3m) in favour of the Township for any required future maintenance to the proposed sanitary sewer between 8 and 9 Chris Court.

Based on the above works, we trust that this is the information required to support the Draft Plan of Subdivision applications.

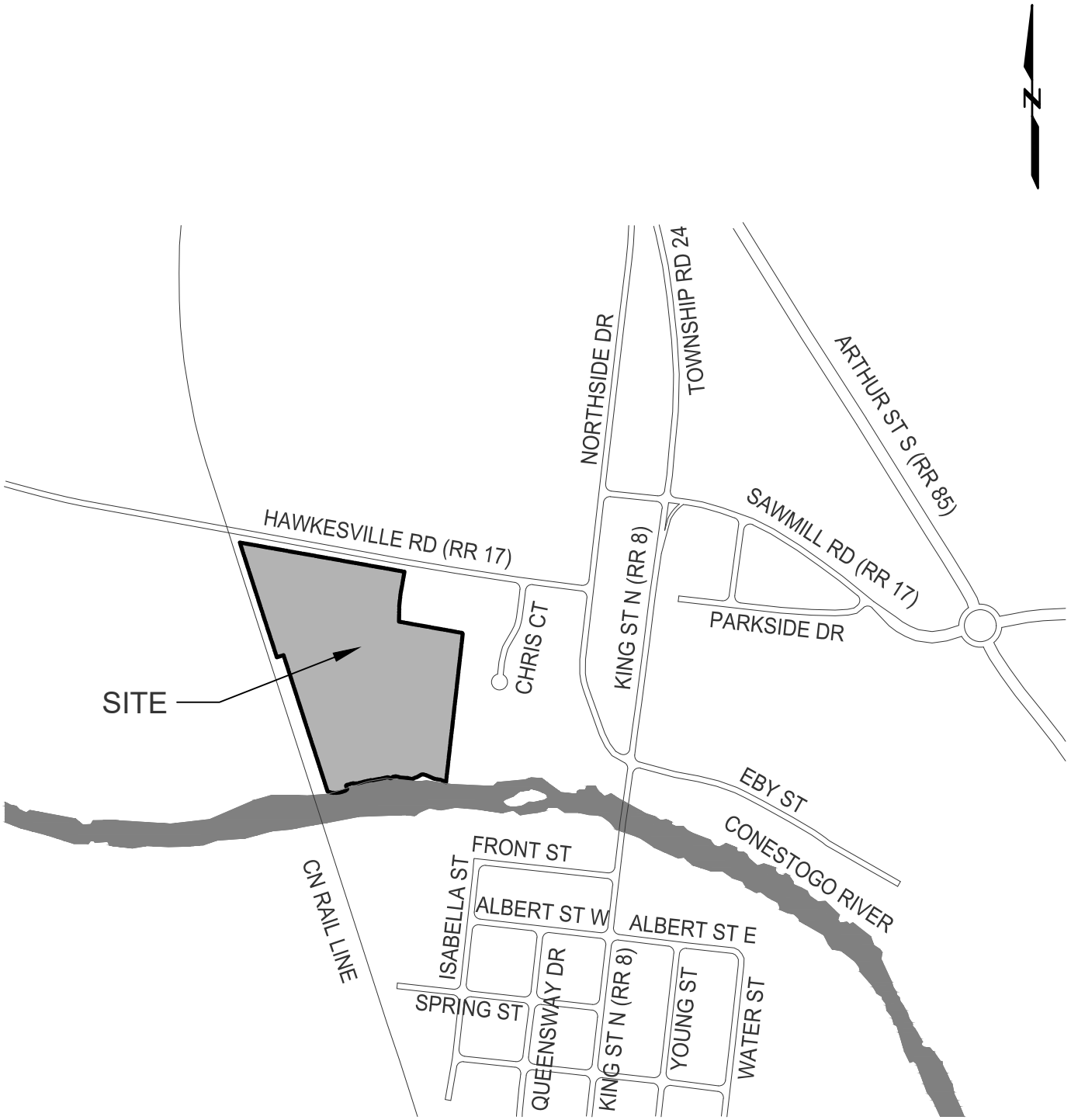
Figures

Figure No. 1. Site Location Map

Figure No. 2. Draft Plan of Subdivision

Figure No. 3. Pre-Development Stormwater Management Area Plan

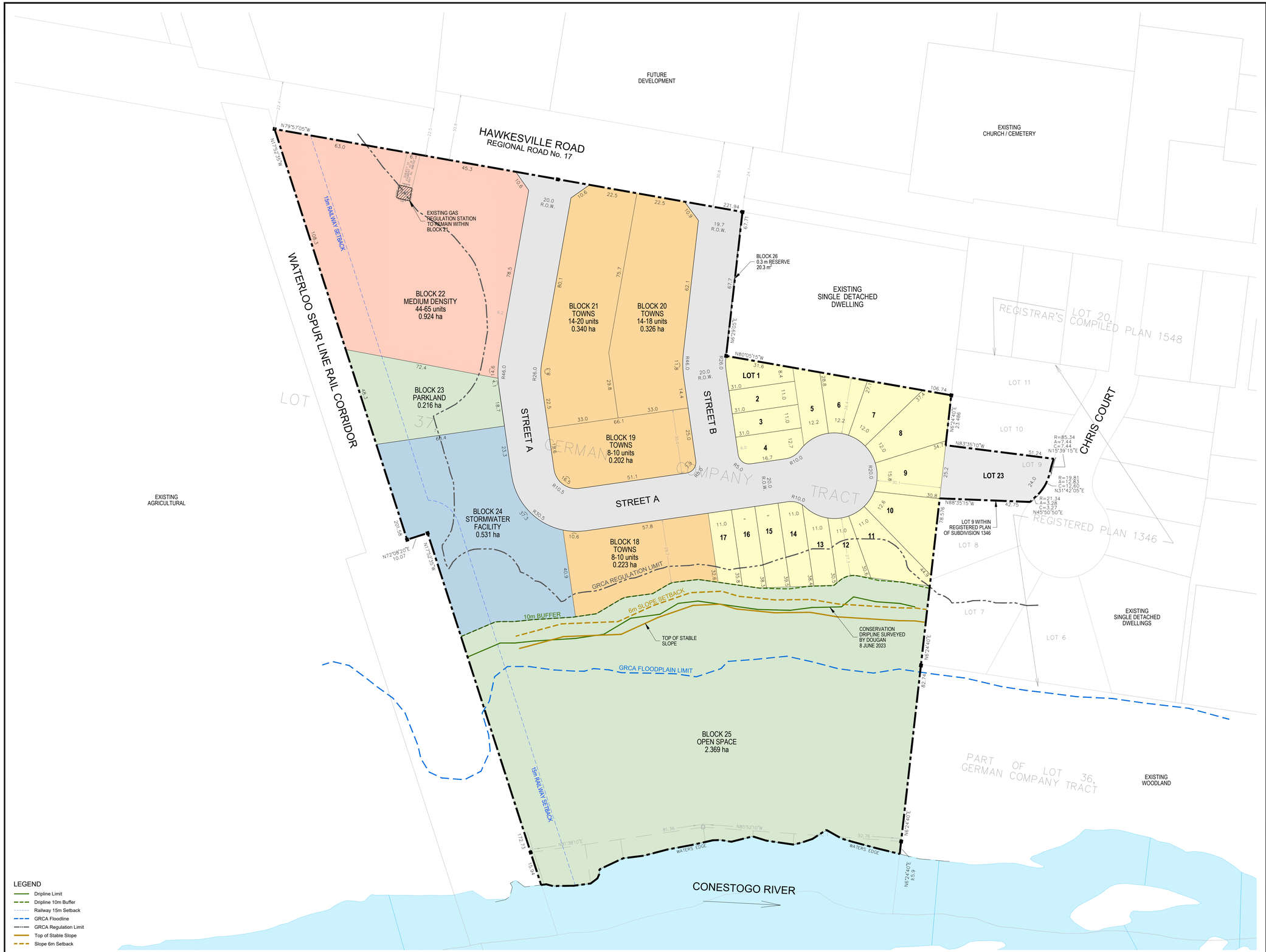
Figure No. 4. Post-Development Stormwater Management Area Plan



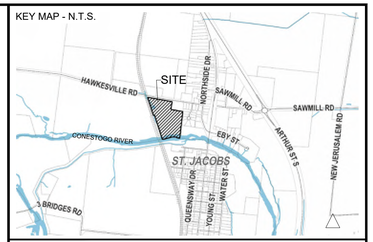
51 HAWKESVILLE ROAD ST. JACOBS, ONTARIO	GEI Consultants	LOCATION PLAN
POLOCORP INC.	2401775	SEPTEMBER 2025 FIG No. 1

---- B:\Working\POLOCORP INC\2401775 - 421067 St Jacobs - 51-55 Hawkesville Road\Drawings\Figures\421067 - SWM Figures-OpA.dwg - 6/4/2026

Figure No.2



KEY MAP - N.T.S.



DRAFT PLAN OF SUBDIVISION

PART OF LOT 37, GERMAN COMPANT TRACT,
TOWNSHIP OF WOOLWICH
REGIONAL MUNICIPALITY OF WATERLOO

51–55 HAWKESVILLE ROAD, ST. JACOBS

20 0 20 40 60
SCALE = 1:800 (metric)

LAND USE SCHEDULE

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Single Detached	1-17	17	0.793
Street Townhouses	18-21	44-58	1.092
Medium Density	22	50-65	0.924
Existing Residential	23	1	0.110
Parkland	23	-	0.216
Stormwater Facility	24	-	0.531
Open Space	25	-	2.369
0.3 m Reserve	26	-	0.002
Public Roads	-	-	0.921
TOTAL		112-141	6.958

DENSITY	GROSS	NET
Area (ha)	6.958	4.589
Density (upha)	16.1 - 20.3	24.4 - 30.7
People & Jobs per ha. (P&J/ha)	62.7 - 78.1	41.4 - 51.5

NOTES:
1. Lot 9 within Registered Plan of Subdivision 1346 (municipally known as 9 Christ Court) forms part of the subject lands solely for the purpose of securing consent for the proposed easement through the current subdivision application. No changes are proposed to Lot 9, which is identified as proposed Lot 23, and so it will not form part of the Registered Plan of Subdivision following draft approval.
2. The limit of development is defined by a 10.0 metre conservation buffer measured from the surveyed dripline.

INFORMATION REQUIRED

UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,f.1,g, j AND I ARE AS SHOWN ON THE DRAFT PLAN.
(h) Municipal Water Supply
(i) Silty Sands
(k) Municipal Sanitary and Storm Sewers

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

JASON ELLIOTT, O.L.S.
J.D. Barnes Limited

March 12, 2026
DATE

OWNER'S CERTIFICATE

I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM

MIKE PUOPOLO
Polocorp Inc.

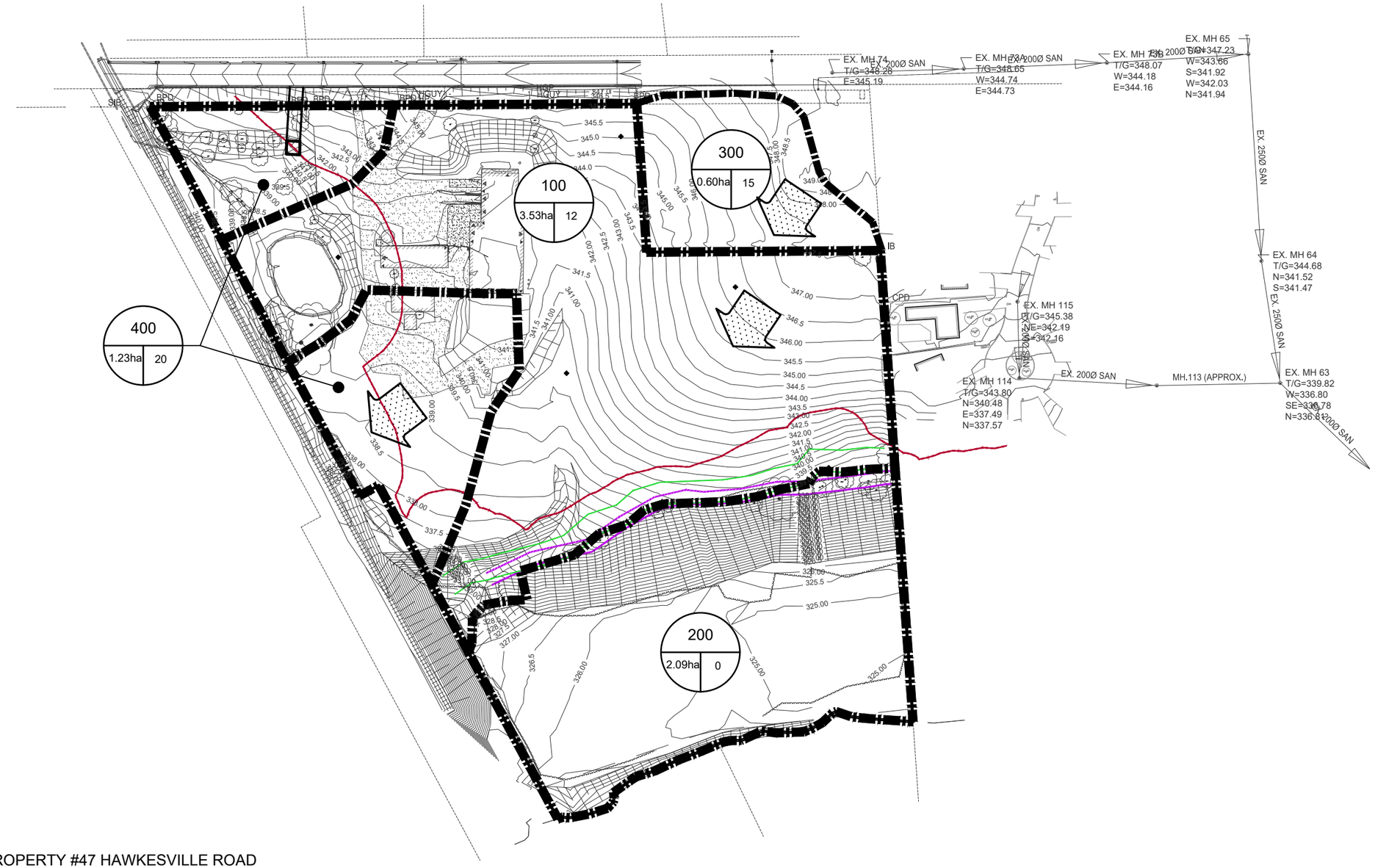
March 12, 2026
DATE

APPROVALS

REVISIONS		
DATE	BY	DESCRIPTION
2026.03.20	GFE	ISSUED FOR DPS (SUB. 1) & OPA / ZBA (SUB. 3)
2026.05.19	ND	ISSUED FOR DPS (SUB. 2) & OPA / ZBA (SUB. 4)

POLOCORP
379 Queen Street South
Kitchener, ON N2T 1W6
polocorpinc.com
519-745-3249

DATE: 2026.03.20 SCALE 1:800 (metric)
PROJECT: 1010 (Hawkesville) DRAWN BY: GFE
FILE: dps1010-2026.05.19 - ND.dwg



NOTE:
EXTERNAL EXISTING CONTOURS AT PROPERTY #47 HAWKESVILLE ROAD
(CATCHMENT 300) FROM GRCA ONLINE WEB MAP, RETRIEVED 2024-12-03.

LEGEND

PROPERTY LINE

EXISTING STORM DRAINAGE AREA

EXISTING OVERLAND FLOW DIRECTION

A1POST
0.25ha 50

DRAINAGE AREA IN HECTARES

STORM DRAINAGE AREA NUMBER

PERCENT IMPERVIOUS

30 0 20 40 80
1:2000 (m)

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

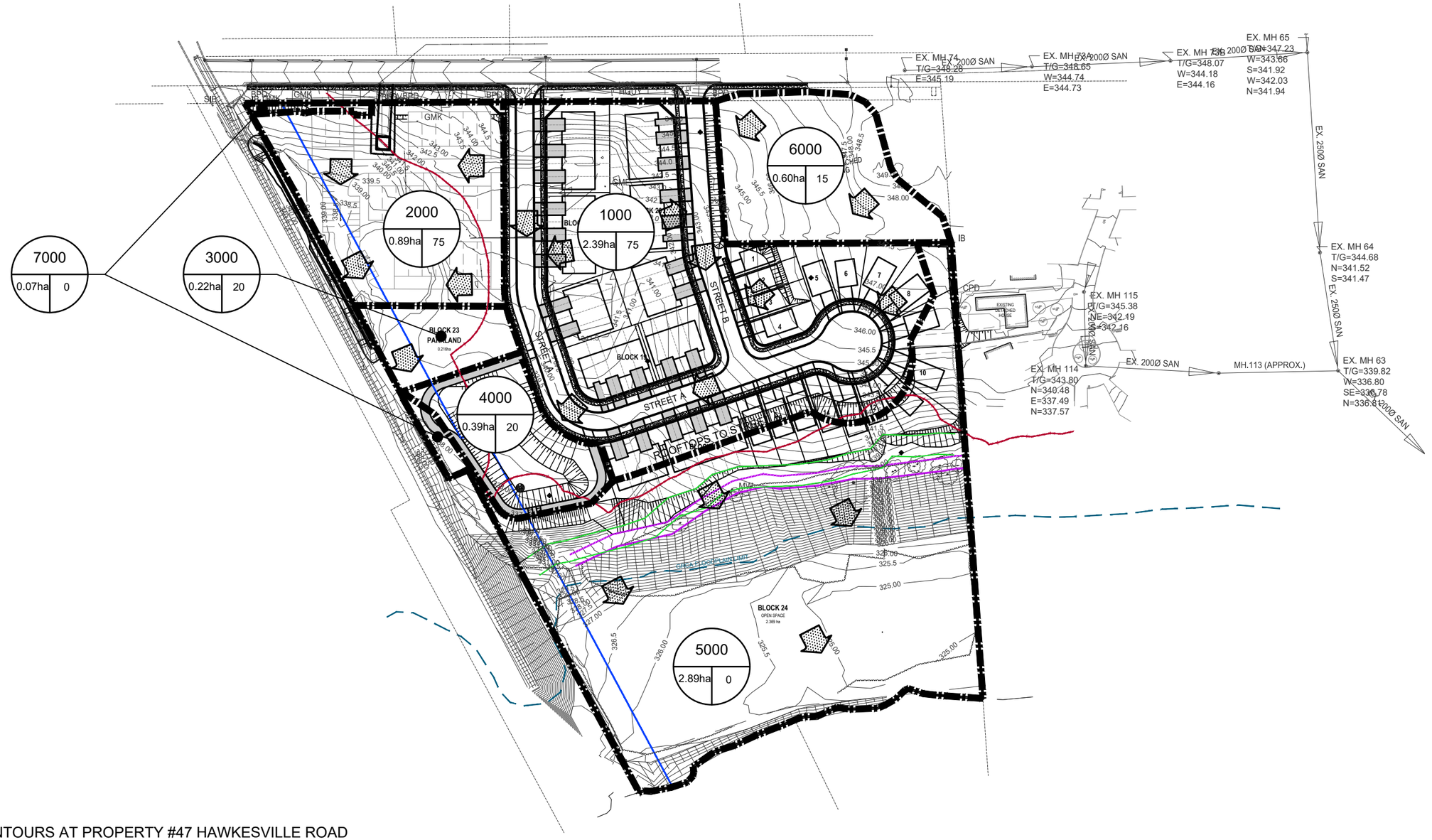
POLOCORP INC.

GEI Consultants

2401775

PRE-DEVELOPMENT STORMWATER MANAGEMENT FIGURE

SEPTEMBER 2025 FIG No. 3



NOTE:
EXTERNAL EXISTING CONTOURS AT PROPERTY #47 HAWKESVILLE ROAD (CATCHMENT 6000) FROM GRCA ONLINE WEB MAP, RETRIEVED 2024-12-03.

30 0 20 40 80
1:2000 (m)

LEGEND

PROPERTY LINE

PROPOSED STORM DRAINAGE AREA

PROPOSED OVERLAND FLOW DIRECTION

A1POST
0.25ha 50

STORM DRAINAGE AREA NUMBER

DRAINAGE AREA IN HECTARES

PERCENT IMPERVIOUS

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

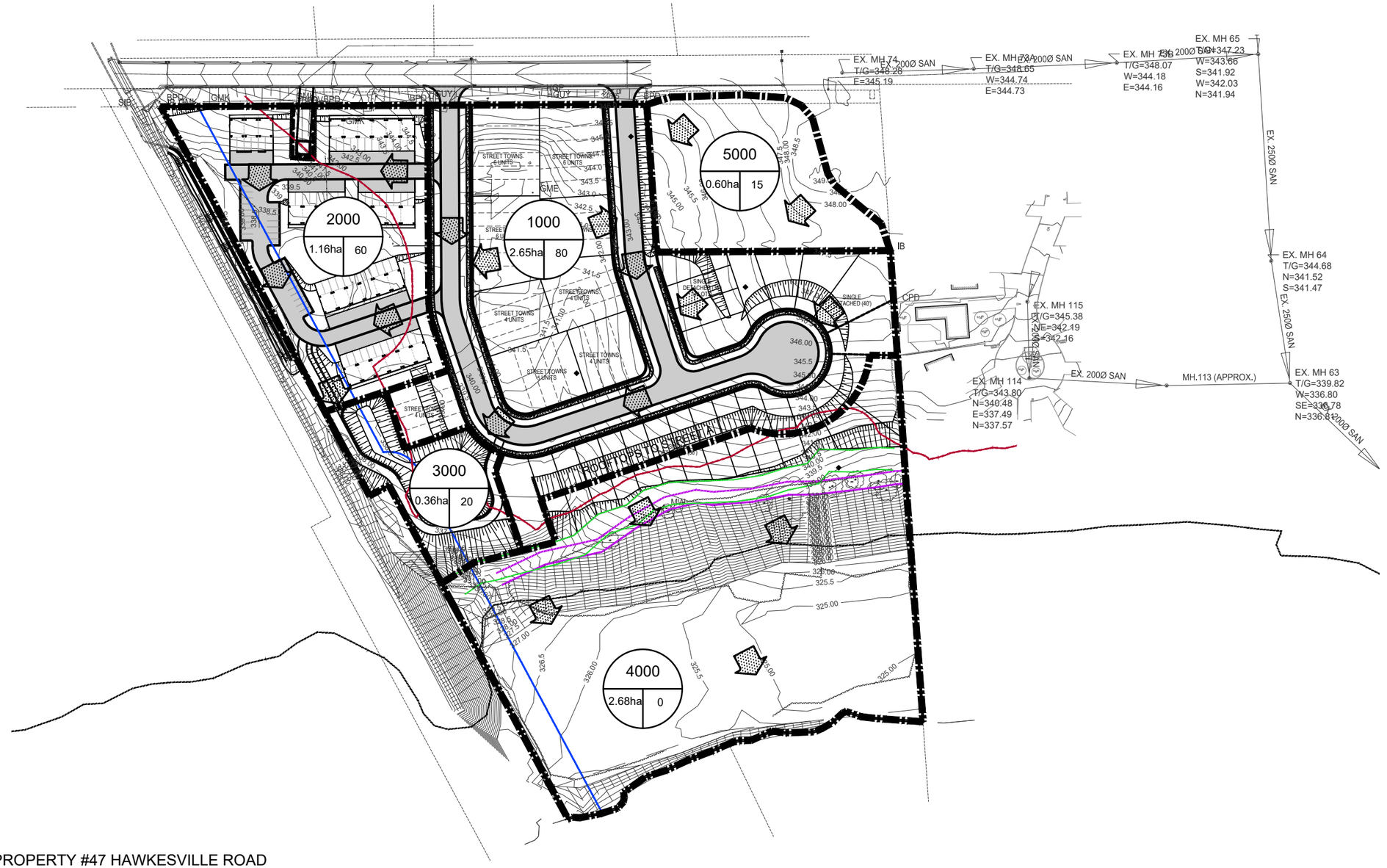
POLOCORP INC.

GEI Consultants

2401775

POST-DEVELOPMENT STORMWATER MANAGEMENT FIGURE CHRIS COURT OPTION (FORMERLY OPTION 3)

MARCH 2026 FIG No. 4A



NOTE:
EXTERNAL EXISTING CONTOURS AT PROPERTY #47 HAWKESVILLE ROAD
(CATCHMENT 6000) FROM GRCA ONLINE WEB MAP, RETRIEVED 2024-12-03.

30 0 20 40 80
1:2000 (m)

LEGEND

PROPERTY LINE

PROPOSED STORM DRAINAGE AREA

PROPOSED OVERLAND FLOW DIRECTION

A1POST
0.25ha 50

DRAINAGE AREA IN HECTARES

STORM DRAINAGE AREA NUMBER

PERCENT IMPERVIOUS

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

2401775

POST-DEVELOPMENT STORMWATER MANAGEMENT FIGURE
PUMPING STATION OPTION
(FORMERLY OPTION 1)

MARCH 2026 FIG No. 4B

Appendix A Geotechnical Report and Memo

Geotechnical Report (GEI Consultants Canada Ltd., January 23rd , 2025)

Geotechnical Memo (GEI Consultants Canada Ltd., December 19th , 2025)

GEI Consultants

Consulting Engineers and Scientists

Geotechnical Report
Proposed Residential Development

51-55 Hawkesville Road, St. Jacobs, Ontario

Submitted to:
Polocorp Inc.
379 Queen Street South
Kitchener, ON
N2G 1W6

Submitted by:
GEI Consultants Canada Ltd.
650 Woodlawn Road West, Block C, Unit 2
Guelph, ON N1K 1B8
https://canada.geiconsultants.com/

January 23, 2025
Project No. 2403070

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1. Introduction

GEI Consultants Canada Ltd. (GEI) was retained by Polocorp Inc. (Client) to complete a geotechnical investigation and report for the proposed residential development at 51-55 Hawkesville Road, St. Jacobs, Ontario (site).

The site is bounded by Hawkesville Road to the north, existing residential properties to the east, Conestogo River to the south, and a Waterloo-Spur Line rail corridor to the west. There are currently three (3) buildings at the site and an existing pond near the northwest corner of the site which is mapped as a wetland. The southern portion of the site includes a forested area and steep slope and is located within the floodplain of the Conestogo River. Portions of the site are located within an area regulated by the Grand River Conservation Authority (GRCA) under O.Reg. 150/06. Photographs of the site are provided in Appendix D. An aerial photograph of the site is provided Figure 2A.

Based on the site plan dated December 11, 2024, the proposed development will consist of 151 residential dwelling units comprising 17 single detached dwelling units and 134 townhouse type dwelling units. The proposed development will also feature amenity areas, a stormwater management facility, and a sewage pumping station. Internal roadways, watermains and sewers will be private as the proposed development will be a condominium development. The site plan is included in Appendix E for reference.

The purpose of the geotechnical investigation is to assess the subsurface soil conditions at the site, and based on this information, provide borehole logs, a borehole location plan, a written description of the subsurface conditions, and geotechnical engineering recommendations to support the design of the proposed development. This report only addresses the geotechnical design of the proposed development. Hydrogeological recommendations are provided under separate cover. A stability assessment of the slope near the south side of the property is also provided separately.

If there are any changes to the proposed development, GEI should be contacted to review that the recommendations provided in this report are still valid.

2. Procedures and Methodology

It is noted that all elevations in this report are metric/geodetic and expressed in metres (m). All measurements are also in metric and expressed in millimetres (mm), metres (m) or kilometres (km).

Prior to the commencement of drilling activities, the borehole locations were staked in the field by GEI. Ground surface elevations of the boreholes and horizontal coordinates (referencing NAD 83 geodetic datum) were surveyed by GEI. The boreholes were cleared of underground utilities prior to drilling.

The fieldwork for the drilling program was carried out on April 23, 2024, at which time six (6) boreholes were drilled at the site. The boreholes were advanced to a depth of 5.2 m below existing grade except for Boreholes 24-01 and 24-02, which were advanced to 9.8 m and 12.8 m depth, respectively. Borehole logs are provided in Appendix A and the borehole locations are shown on the Borehole Locations Plans in Figures 2A and 2B. Additionally, Polocorp provided GEI with a borehole log for a borehole previously at the site by Chung Vander Doelen (CVD) in 2021. The CVD borehole log is included in Appendix B.

The boreholes were advanced by a drilling subcontractor retained and supervised by GEI using a track-mounted drill rig, hollow stem augers, and standard soil sampling equipment. Sampling was conducted using a 51 mm O.D. Split Spoon (SS) sampler. Standard Penetration Test (SPT) "N" Values (N values) were recorded for the sampled intervals as the number of blows required to drive an SS sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, in accordance with ASTM D1586. In each borehole soil sampling was conducted at 0.75 m intervals for the upper 3.0 m and at 1.5 m intervals thereafter.

Six (6) monitoring wells were installed (i.e. one in each borehole) to permit long-term groundwater monitoring and hydrogeological testing. Each monitoring well consisted of a 50 mm diameter PVC pipe with a 3.0 m long screen. The screen was surrounded with a sand filter pack and the annulus surrounding the pipe was backfilled to surface with bentonite pellets. Monitoring well construction is shown on the borehole logs in Appendix A.

The GEI field staff examined, and classified characteristics of the soils encountered in the boreholes, including the presence of fill materials, groundwater observations during and upon completion of the drilling, recorded observations of borehole construction, and processed the recovered samples. All recovered soil samples were logged in the field, carefully packaged, and transported to GEI's laboratory for more detailed examination and classification.

In GEI's laboratory, the samples were classified based on their visual and textural characteristics. Five (5) soil samples were selected from the boreholes and submitted to our laboratory for grain size analysis. Two (2) soil samples were subjected to Atterberg Limits

testing to assess plasticity. The grain size and Atterberg limits testing results are provided in Appendix A.

Three (3) samples were also submitted to an external laboratory for corrosivity parameters.

3. Subsurface Conditions

3.1 General Overview

Borehole logs and the geotechnical laboratory results from the GEI investigation are provided in Appendix A. The borehole locations are shown on Figures 2A and 2B. The borehole log from the CVD investigation is included in Appendix B.

It should be noted that the conditions indicated on the borehole logs are for specific locations only and can vary between and beyond the locations. It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones and should not be interpreted as exact planes of geological change.

In addition, the descriptions provided in the borehole logs are inferred from a variety of factors, including visual observations of the soil samples retrieved, laboratory testing, measurements prior to and after drilling, and the drilling process itself (speed of drilling, shaking/grinding of the augers, etc.). The passage of time also may result in changes in conditions interpreted to exist at locations where sampling was conducted.

3.2 Stratigraphy

The following sections provide a description of the stratigraphy encountered in boreholes completed as part of the GEI investigation.

3.2.1 Topsoil

Topsoil was encountered at the ground surface in all boreholes. The thickness of the topsoil ranged from 305 to 455 mm. Topsoil thicknesses measured at the borehole locations may not be representative of the topsoil depth across the site.

3.2.2 Fill

Fill was encountered in Borehole 24-01 underlying the topsoil. The fill was generally comprised of sand with varying amounts of silt and gravel and cobbles. Some trace organics and/or rootlets were noted in the upper portion of the fill.

In Borehole 24-01, the fill was 8.7 m thick and extended to a depth of 9.1 m below existing ground surface (Elev. 329.1). The fill was typically moist however some recovered samples of the fill were wet. Measured moisture contents ranged from 10% to 27%. SPT "N" values in the fill ranged from 3 to 50+ blows per 0.3 m of penetration, indicating a variable relative density (very loose to very dense).

3.2.3 Silty Sand to Sand and Silt

A deposit of silty sand was encountered in Borehole 24-02. The silty sand generally contained trace amounts of clay and gravel. This layer was 1.9 m thick and extended to a depth of 2.3 m below existing ground surface (Elev. 336.9). Moisture contents ranged from 13% to 17%. SPT "N" values were 5 to 6 blows per 0.3 m of penetration, indicating a loose condition.

3.2.4 Silty Clay

A layer of silty clay was encountered in Boreholes 24-03 and 24-05. The silty clay contained some sand and trace gravel. In Borehole 24-03, the silty clay was 2.0 m thick and extended to a depth of 2.3 (Elev. 337.8). In Borehole 24-05, the silty clay was 0.4 m thick and extended to 0.7 m depth (Elev. 337.8). The silty clay was moist to dry in Borehole 23-03 and wet in Borehole 24-05. Measured moisture contents ranged from 9% to 34%. SPT "N" values measured in the silty clay ranged from 3 to 14 blows per 0.3 m of penetration, indicating a soft to stiff consistency.

One (1) sample of the silty clay was submitted for grain size analysis and the results are included in Figure A1 in Appendix A. One (1) sample of the silty clay was submitted for Atterberg testing and the results are provided in Figure A3 in Appendix A. The results of the Atterberg limits testing indicate the silty clay to have high plasticity (CH).

3.2.5 Glacial Till

A deposit of sandy silt to silty sand glacial till was encountered underlying the fill in Borehole 24-01, underlying the silty sand in Borehole 24-02, below the silty clay in Borehole 24-03 and Borehole 24-05, and below the topsoil in Boreholes 24-04 and 24-06. The glacial till generally contained trace to some gravel and trace amounts of clay, although some plastic zones were encountered locally within the till. Glacial till inherently contains cobbles and boulders.

All of the boreholes were terminated in the glacial till at depths ranging from 5.2 m to 12.8 m below ground surface (Elev. 341.2 to 326.4). Moisture contents ranged from 7% to 20% and SPT "N" values ranged from 2 to greater than 50 blows per 0.3 m of penetration. However, the glacial till was typically compact to very dense.

Four (4) samples of the glacial till were collected and submitted for grain size analysis. The results of the testing are presented in Figure A2 in Appendix A. Two (2) samples of the glacial

till exhibiting plasticity were submitted for Atterberg testing and the results are provided in Figure A4 in Appendix A. The results of the Atterberg limits testing indicate the plastic zones within the glacial till to have slight to low plasticity (ML to CL-ML).

3.3 Groundwater Levels

Unstabilized groundwater level measurements were taken upon the completion of drilling and six (6) boreholes were outfitted with a monitoring well to permit measurement of stabilized groundwater level. The monitoring wells consisted of 50 mm diameter PVC standpipes and 3.0 m long screens. Monitoring well configuration and groundwater observations are noted on the borehole logs in Appendix A. A summary of the groundwater level measurements is provided in the following table.

Borehole	Ground Surface Elevation (m)	Depth of Cave (m)	Un-Stabilized Groundwater Level in Open Borehole	Stabilized Groundwater Level in Monitoring Well on May 3, 2024	Stabilized Groundwater Level in Monitoring Well on May 13, 2024
			Depth / Elevation (m)		
24-01	338.2	Open	Dry	3.6 / 334.6	4.3 / 333.9
24-02	339.2	Open	8.5 / 330.7	4.2 / 335.0	4.2 / 335.0
24-03	340.1	Open	Dry	0.9 / 339.2	1.1 / 339.0
24-04	346.4	Open	Dry	4.0 / 342.4	3.6 / 342.8
24-05	338.6	Open	Dry	0.2 / 338.4	0.3 / 338.3
24-06	345.1	Open	Dry	3.2 / 341.9	2.3 / 342.7

The stabilized groundwater levels measured to date in the monitoring wells were 0.2 to 4.3 m below existing ground surface (Elev. 342.8 to 333.9). It should be noted that GEI is currently carrying out a long-term groundwater monitoring program at the site as part of the hydrogeological investigation.

Groundwater levels are expected to show seasonal fluctuations and vary in response to prevailing climate conditions.

3.4 Corrosivity

Select soil samples from Boreholes 24-02, 24-03, and 24-04 were submitted for analytical testing of corrosivity parameters and sulphate. The laboratory certificates of analysis are provided in Appendix A and summarized below.

Parameter	Units	Test Results		
		24-04, SS2 Depth = 0.8 to 1.4 m	**24-02, SS2 Depth = 0.8 to 1.4 m**	**24-03, SS2 Depth = 0.8 to 1.4 m**
		Glacial Till	**Silty Sand**	**Silty Clay**
Sulphate	%	<0.01	<0.01	<0.01
Electrical Conductivity	mS/cm	0.12	0.14	0.13
pH	-	7.96	7.93	8.02
Resistivity	ohm-cm	8333	7143	7692
Chloride	%	0.003	<0.002	<0.002

The American Water Works Association (AWWA) has developed a scoring system in their C-105 Standard to determine the potential for soil to corrode cast iron alloys. Based on the AWWA scoring system, all samples subjected to corrosivity testing scored less than 10 points which indicates a low potential for the soil corrosivity to affect cast iron alloys and corrosion protection measures are therefore not recommended for the site.

It should be noted that this ranking system provides a general indication of soil corrosivity potential only. Other external factors may increase corrosivity potential, such as stray electrical currents or the application of de-icing salts in the winter that can leach into the ground.

The samples were also tested for water-soluble sulphate content and compared to *Table 3: Additional Requirements for Concrete Subjected to Sulphate Attack* as found in CSA A23.1 *Concrete Materials and Methods of Construction*. Table 3 is used to determine the cementing materials required in concrete based on degree of exposure to sulphate attack. The testing shows the samples have less than 0.1% water-soluble sulphate, and therefore there will have negligible exposure to sulphate attack, as such no additives are required.

4. Engineering Design Parameters & Analysis

Based on the site plan (Appendix E), it is understood that the existing buildings at the site will be demolished, the pond will be filled in, and a total of 151 residential dwelling units comprising 17 single detached dwelling units and 134 townhouse type dwelling units will be constructed. A private pumping station and stormwater management (SWM) facility will also be constructed near the southwest corner of the site.

If there are any changes to the proposed development, GEI should be contacted to review that the recommendations provided in this report are still valid.

4.1 Site Grading

Detailed grading plans were not available for review at the time of this report. However, based on the Sanitary Sewer Servicing Strategy letter prepared by GM BluePlan, dated February 5, 2024, it is envisaged that the grades at the site will likely be raised as part of the proposed development. When final grading is established, GEI should review the drawings for geotechnical requirements.

The existing topsoil, fill, loose silty sand, and soft to firm silty clay are not suitable to support the foundations. These materials should be removed and replaced with engineered fill. Footings could then be placed at nominal depth and be founded on engineered fill or native soil at depth and the floor slab could be supported by engineered fill. It is envisioned that the engineered fill/earthworks take place first then excavation for building addition footings would occur.

4.1.1 Engineered Fill

GEI defines “engineered fill” as material that will support foundations, and which is placed and compacted in a specified and controlled manner under full-time supervision of geotechnical engineering staff.

In any location where engineered fill will be placed to raise grades or replace poor/weak soil, any topsoil, fill, vegetation, wet/saturated/weathered soil must be fully removed down to competent native soil. The exposed subgrade soil must be proof-rolled and inspected by the geotechnical engineer to ensure all unsuitable material (e.g., organics, weak or loose/soft soil, weathered / disturbed soil, deleterious materials) is removed from the engineered fill footprint. Particular attention should be given to existing pond area where the soils may be particularly soft/wet when the removal of sediment is taking place after pond draining. Also, the existing fill associated with the building foundations must also be removed both vertically and laterally when the buildings are demolished. Any unsuitable areas must be further sub-excavated and replaced with approved material and compacted to a targeted 100% Standard Proctor

maximum dry density (SPMDD) in building areas and 95% SPMDD in pavement and servicing areas.

Once the subgrade is approved, engineered fill can be placed. Engineered fill must be placed under the full-time supervision of a geotechnical engineer as required in the Ontario Building Code. The engineered fill may consist of excavated on-site cohesionless soils provided they have been moisture conditioned to a moisture content within 2% of optimum moisture content (OMC) and do not contain organics, topsoil or deleterious material. It should be noted that it may be impractical to reuse existing native soils excavated from below the groundwater table as they may be too wet to achieve compaction. Moisture can be reduced by tilling or spreading out the soil to dry or blending it with drier material however if compaction cannot be achieved it will need to be replaced with approved imported soil. It is recommended that any imported soil consist of Granular B (OPSS.MUNI 1010) and be first used in building areas, with suitable on-site soil used in landscaped or road areas. Engineered fill must be placed in loose lifts of 200 mm or less and compacted as noted above.

The engineered fill must extend a minimum of 1 m out from all sides of the foundations and extend at a 1 horizontal to 1 vertical slope (1H:1V) down to the exposed subgrade. A typical detail for engineered fill pad dimensioning is included in Appendix C.

4.2 Existing Fill

Borehole 24-01, advanced near the southwest corner of the site, encountered a thick layer of sand fill containing varying amounts of silt and gravel, cobbles, and organics. The fill extended to a depth of 9.1 m (Elev. 329.1) in the borehole and was loose to very dense. It is envisaged that the fill was placed as part of previous grading activities at the site. The thickness and composition of the fill will vary across the site.

A SWM facility, pumping station, and townhouse buildings are currently proposed to be constructed within the area of existing fill. It must be noted that no structures, ponds, etc. may be founded in the existing fill given that this fill was placed in an uncontrolled manner and structures founded within the fill would be at risk of settlement and/or instability. Consequently, this fill will need to be removed entirely and replaced with engineered fill prior to construction of any structures or ponds within this area. Additional geotechnical investigation is recommended in the area of the existing fill.

4.3 Foundations

4.3.1 Footings on Native Soil

Foundations at this site can constructed as conventional shallow spread and strip footing foundations that bear on the undisturbed native compact to very dense sandy silt to silty sand

glacial till. Foundations should not be supported on the topsoil, fill, loose silty sand, and soft to firm silty clay.

The depth and elevation where compact to dense glacial till was encountered in the boreholes is provided in the table below. Footings founded on undisturbed compact to dense glacial till may be designed using a geotechnical reaction at Serviceability Limit State (SLS) of 150 kPa for 25 mm of settlement and a factored geotechnical resistance at Ultimate Limit State (ULS) of 225 kPa.

Borehole	Level of *Compact to Dense* Glacial Till in Borehole	
	Depth (m)	Elevation (m)
24-01	N/A	N/A
24-02	2.3	336.9
24-03	2.3	337.8
24-04	0.5	345.9
24-05	2.3	336.6
24-06	1.5	343.6

Final footing elevations must be reviewed by geotechnical personnel from GEI to confirm bearing capacity values. The final site configuration must also be reviewed by GEI to assess the potential for footings to be founded on different soil subgrades, and to assess the potential for differential settlement.

4.3.2 Footings on Engineered Fill

As an alternative to foundations made on undisturbed native glacial till, spread and strip footings can be supported on engineered fill supported on the undisturbed native compact to very dense sandy silt to silty sand glacial till.

Engineered fill must be placed and compacted in accordance with Section 4.1. Foundations supported on engineered fill may designed using a geotechnical reaction at SLS of 100 kPa for 25 mm of settlement and a factored geotechnical resistance at ULS of 150 kPa. The engineered fill must extend a minimum of 1 m out from all sides of the foundations and extended at a 1H:1V slope down to the exposed subgrade. A typical detail for engineered fill pad dimensioning is included in Appendix C.

It is recommended that nominal reinforcing steel for stiffening of the foundation walls made on engineered fill be provided to help mitigate minor cracking due to minor differential settlement. The reinforcing steel in the poured concrete foundation walls may consist of 2-15M

bars continuous at the top of the foundation wall, and 2-15M bars continuous at the bottom of the foundation walls. Typically, these bars are placed 100 to 200 mm from the top or bottom of the foundation wall, respectively. The reinforcing steel should extend a minimum of 3 m past any transition zones between engineered fill and native soil. A typical reinforcing steel detail for foundation walls placed on engineered fill is provided within Appendix C. The recommended nominal reinforcing steel should not be considered a structural design. The need for different or additional reinforcement should be reviewed by a structural engineer to ensure the original structural design intent of the structure is maintained.

4.3.3 Pumping Station

The site plan indicates that a pumping station is proposed near the southwest corner of the site. Few details were available for the proposed pumping station at the time of this report preparation. However, based on Figure 6 included in the Sanitary Sewer Servicing Strategy letter prepared by GM BluePlan, dated February 5, 2024, it is understood that the proposed grade at the pumping station will be at Elevation 341.48 m and that the invert at the pumping station will be at Elevation 338.36 (i.e. pumping station will be founded approximately 3.1 m below final grade).

The location of the pumping station coincides with a thick layer of fill. It must be noted that no structures may be founded in the existing fill given that this fill was placed in an uncontrolled manner and structures founded within the fill would be at risk of settlement and/or instability. Consequently, this fill will need to be removed entirely and replaced with engineered fill prior to construction of the pumping station within this area.

Once the existing fill is removed and replaced with engineered fill then the pumping station may be supported on conventional spread footings founded within the engineered fill. Additional geotechnical investigation should be carried out to support design of the pumping station once the final location of the pumping station is known.

4.3.4 General Foundation Considerations

The recommended geotechnical resistances provided in Sections 4.3.1 and 4.3.2 are for vertical, concentric loading. Where eccentric or inclined loads are applied, the effects of load inclination and eccentricity must be considered.

The minimum strip and spread footing widths to be used shall be dictated as per the Ontario Building Code, regardless of loading considerations. Footings stepped from one level to another must be at a slope not exceeding 7 vertical to 10 horizontal. This concept should also be applied to excavations for new foundations in relation to existing footings or underground services unless rigid shoring is provided. All footings exposed to ambient air temperature throughout the year must be provided with a minimum of 1.2 metres of earth cover or equivalent insulation for frost protection. A 25 mm thick polystyrene insulation board is equivalent to 300 mm of soil cover.

The foundation design parameters provided above are predicated on the assumption that the foundation subgrade surface is undisturbed, and that all deleterious, softened, disturbed, organic, and caved material is removed. The foundation excavation must be done in such a way that groundwater is controlled to prevent any disturbance to the foundation base. Temporary groundwater control during construction is discussed in Section 5.2.

The foundation subgrade must be inspected and approved by a geotechnical engineer prior to the placement of any fill or concrete to verify the foundation design parameters provided are applicable, and to provide remedial recommendations if necessary. If foundation excavations will be open for a prolonged period of time, the foundation subgrade should be protected with a skim coat of lean mix concrete (after inspection and approval by the geotechnical engineer), to ensure that no deterioration will occur due to weather effects.

Should construction extend to the winter season, particular attention should be given to prevent freezing of the exposed subgrade and ensure frozen material is not used as backfill. The building foundations must not be placed on frozen ground.

4.4 Basement Wall Earth Pressure Design Parameters

Backfill to the structure walls may consist of the on-site glacial till provided it its free of organics and deleterious materials. Oversize particles (cobbles and boulders) larger than 100 mm should be removed and discarded from the backfill. Alternatively, imported granular material (e.g. Granular 'B' Type I) may be used to backfill the basement walls.

Basement walls must be designed to resist unbalanced lateral earth pressures imparted from the weight of adjacent soils. For a fully drained condition, lateral earth pressures are calculated using the following equation:

$$\boldsymbol{P = K[\gamma h + q]}$$

where, **P** = the horizontal pressure at depth, **h** (m)
K = the earth pressure coefficient (dimensionless)
h = depth below surface in metres
γ = the bulk unit weight of soil, (kN/m^3)
q = surcharge loading (kPa)

The above equation assumes that a drainage system is present which prevents the build up of any hydrostatic pressure behind the structure subjected to the unbalanced lateral earth pressures. If this is not the case, the equation must be revised to also incorporate the submerged unit weight of the soil multiplied by the earth pressure coefficient, in addition to the water pressure itself.

The values for use in the design of basements subjected to unbalanced lateral earth pressures are as follows:

Soil Type	γ – Bulk Unit Weight (kN/m^3)	φ – Friction Angle (degrees)	Earth Pressure Coefficient (dimensionless)		
			K_a – Active	K_o – At-Rest	K_p – Passive
Granular 'B' (OPSS.MUNI 1010)	21.0	32	0.31	0.47	3.25
Compacted Glacial Till	21.0	30	0.33	0.50	3.00

The calculation of the earth pressure coefficients is based on Rankine theory, which provides a conservative estimate as no friction between the soil and the structure is accounted for. The earth pressure coefficients provided above are only applicable for flat ground surfaces beyond the structure and will change for sloping ground surfaces.

The earth pressure coefficients referenced within the above table are a function of the friction angle of the adjacent soil, and both the degree and direction of movement of the structure subjected to unbalanced lateral earth pressures. For structures that are restrained at the top (such as basement walls), the at-rest earth pressure coefficient will apply.

4.5 Slab-on-Grade Design

Inorganic native soils and engineered fill are suitable to support floor slabs. Topsoil, vegetation, organics, peat, organic sands, in-situ earth fill and other soil containing organics, excessive moisture, or deleterious materials are not suitable to support floor slabs.

The exposed subgrade must be proof-rolled and inspected by the geotechnical engineer. If any soft or weak subgrade areas are identified, or if there are areas containing excessive amounts of deleterious/organic material, they must be locally sub-excavated and backfilled with approved clean earth fill or imported granular material and compacted to a minimum of 98% SPMDD within 2% of OMC.

All building floor slabs must be provided with a capillary moisture barrier and drainage layer. This is made by placing the concrete slab on a minimum 200 mm layer of 19 mm clear stone (OPSS.MUNI 1004) compacted by vibration to a dense state. The upper 50 mm of clear stone can be replaced with 19 mm crusher run limestone for a working surface. Granular A compacted to 100% SPMDD can also be utilized.

For new structures that will be slab-on-grade with no basement levels, perimeter and under-slab drainage at the foundation level is not required, provided that the underside of concrete slab is at least 200 mm above the prevailing grade of the site and the surrounding surfaces slope away from the building at a gradient of at least 2% to promote surface water run-off and to reduce groundwater infiltration adjacent to foundations. To minimize infiltration of surface water, the upper 150 mm of backfill could consist of less permeable, compacted clayey soil.

4.6 Basement Drainage

Where basements are constructed, all basement foundation walls must be provided with damp-proofing provisions in conformance to the Ontario Building Code. Backfill to the basement walls must consist of Granular 'B' Type I (OPSS.MUNI 1010) for a minimum lateral distance of 600 mm out from the foundation wall. Alternatively, if a filtered cellular drainage media is provided adjacent to the foundation wall, the backfill may consist of common earth fill.

For buildings with basements, a perimeter drainage system must be installed that will remove any water that infiltrates into the building backfill, to ensure that any water does not infiltrate into the basement. The perimeter drains must consist of minimum 100 mm diameter perforated pipes wrapped in filter socks, sufficiently covered on all sides by 19 mm clear stone. Perimeter drains should be directed to the sump underneath the basement floor in solid pipes so as not to surcharge the underfloor drainage layer with water. Two runs of perforated subfloor drainage pipe, surrounded by 19 mm clear stone, surrounded by a geotextile such as Terrafix 270R (or approved equivalent) to prevent the migration of fines, and trenched into the subgrade should also be installed beneath the slab-on-grade of each building along the long axis of the building. A typical basement drainage detail is included in Appendix C.

It is recommended that basements be established a minimum of 0.6 m above the seasonal high groundwater table. If the basement level is set near or within the prevailing groundwater level, it is possible that perimeter drainage issues may occur in the future (e.g. sump pump failure, blockage of drainage pipes, etc.), which may lead to basement flooding.

Once basement floor elevations are known for the townhouses, they should be compared to seasonal high groundwater levels across the site.

4.7 Site Servicing

4.7.1 Subgrade and Bedding

Following subexcavation to the piping subgrade level, any topsoil/organics, loose/soft or wet, and disturbed materials should be subexcavated and replaced These materials should be removed and replaced with engineered fill. The entire base of the excavation should be inspected and approved by a geotechnical engineer. Should construction extend to the winter season, particular attention should be given to prevent freezing of the exposed subgrade and ensure frozen material is not used as backfill.

The pipes must be placed on a uniformly competent subgrade. Any water within the excavation must be removed prior to pipe placement. Pipe bedding materials, compaction and cover should follow OPSD 802.010 or 802.013 for flexible pipes, and OPSD 802.030 to 802.033 for rigid pipes. Oversize particles (cobbles and boulders) larger than 100 mm should be removed and discarded.

Where disturbance of the trench base has occurred from ground water seepage, construction traffic, etc., the disturbed soils should be sub excavated and replaced with suitably compacted granular material.

Regardless of whether flexible or rigid pipes are implemented, granular bedding and cover material should consist of a well graded, free draining material, such as Granular "A" (OPSS.MUNI 1010). All granular bedding must be compacted to a minimum of 95% SPMDD.

4.7.2 Backfill

Trench backfill materials should be placed and compacted as per OPSS.MUNI 401. Excavated soil is considered geotechnically suitable for use as backfill in trenches provided it is unfrozen, free of organics (topsoil, roots, peat, etc.) and deleterious materials. Backfill must be compacted to the following limits:

- Utility trenches located beneath a roadway: 98% SPMDD
- Utility trenches not located beneath a roadway: 95% SPMDD

All trench backfill must be placed in maximum 200 mm lifts and within 2% of optimum moisture content. The maximum cobble or boulder size should not exceed half of the loose lift thickness (i.e. all particles with a diameter greater than 100 mm should be removed). In confined areas the layer thickness will have to be reduced to utilize smaller compaction equipment efficiently or by using granular material or unshrinkable fill.

Moisture conditioning of the excavated soils may be required to achieve adequate compaction. Moisture can be increased by adding water and mixing the soil prior to re-use, blending the soil with wetter material, or by importing soil to the site that is at optimum and can be readily compacted. Moisture can be reduced by tilling or spreading out the soil to dry or blending it with drier material. In-situ moisture contents can change based on the season and local groundwater levels and can also change for stockpiled material due to precipitation.

Where trenches are located within the traveled portions of a roadway/pavement areas, backfill within the frost penetration depth of 1.2 metres should consist of on-site, non-organic, excavated material consistent with the soils surrounding the trench. If this technique is not undertaken, then frequently problems arise with yearly differential frost heave movements between the trench backfill and the adjacent native soil. This would occur, for example, if imported granular fill was used to backfill the trenches which is less susceptible to frost compared to most of the existing soils at the site with higher silt content.

4.8 Pavement Design

The site plan shows that five roads will be constructed as part of the new development (i.e. Condo Road A to E).

The pavement subgrade must be inspected and approved by the geotechnical engineer at the time of construction. The exposed pavement subgrade should be compacted to a minimum 98% SPMDD. If any soft or weak subgrade areas are identified, or if there are areas containing excessive amounts of moisture or deleterious/organic material, they must be locally sub-excavated and backfilled with approved clean earth fill or imported granular material and compacted to a minimum of 98% SPMDD.

The long-term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures must be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as possible when fill is placed, and the subgrade is not disturbed or weakened after it is exposed.

Control of surface water is an important factor in achieving a good pavement life. The need for adequate subgrade drainage cannot be over-emphasized. The subgrade must be free of depressions and sloped (at a minimum grade of 2 percent) to provide effective drainage toward subgrade drains. Grading adjacent to pavement areas should be designed to ensure that water is not allowed to pond adjacent to the outside edges of the pavement.

Continuous pavement subdrains should be provided along the edges of the pavement and drained into respective catchbasins to facilitate drainage of the subgrade and the granular materials. The subdrain invert should be maintained at least 0.3 m below subgrade level. To minimize the problems of differential movement between the pavement and catchbasins/manhole due to frost action, the backfill around the structures should consist of free-draining OPSS Granular B. Typical pavement drainage details are provided in Appendix C.

The industry pavement design methods are based on a design life of 15 to 20 years for typical weather conditions depending on actual traffic volumes. For preliminary design the following pavement design is recommended. The pavement design will need to be reviewed once the grading/subgrade has been established.

Pavement Layer	Compaction Requirements	Thickness
Surface Course Asphaltic Concrete: HL3 (OPSS 1150) with PG 58-28 Asphalt Cement (OPSS.MUNI 1101)	OPSS 310	40 mm
Binder Course Asphaltic Concrete: HL8 (OPSS 1150) with PG 58-28 Asphalt Cement (OPSS.MUNI 1101)	OPSS 310	50 mm

Pavement Layer	Compaction Requirements	Thickness
Base Course: Granular A (OPSS.MUNI 1010)	100% SPMDD (ASTM-D698)	150 mm
Subbase Course: Granular B Type I (OPSS.MUNI 1010)	100% SPMDD (ASTM-D698)	300 mm

The granular materials should be placed in lifts 200 mm thick or less and be compacted to a minimum of 100% SPMDD for both granular base and subbase. Asphalt materials should be rolled and compacted as per OPSS 310. The granular and asphalt pavement materials and their placement should conform to OPSS 310, 501, 1010 and 1150.

If the pavement construction occurs in wet, winter or inclement weather, it may be necessary to provide additional subgrade support for heavy construction traffic by increasing the thickness of the granular subbase, base or both. Further, traffic areas for construction equipment may experience unstable subgrade conditions. These areas may be stabilized utilizing additional thickness of granular materials or the use of geogrid.

It should be noted that in addition to adherence to the above pavement design recommendations, a close control on the pavement construction process will also be required in order to obtain the desired pavement life. Therefore, it is recommended that regular inspection and testing should be conducted during the pavement construction to confirm material quality, thickness, and to ensure adequate compaction.

Frost tapers of 10H:1V should be implemented between areas of differing pavement thickness and tie-in areas to existing pavement.

Smooth transitions are required in all areas where the new pavement meets the existing asphalt surface. Asphalt joints shall follow OPSS.MUNI 310. Longitudinal asphalt joints should be milled into the existing asphalt a minimum 0.5 m for each lift. Transverse joints shall be milled into the existing asphalt a minimum 0.5 m for each lift. Successive joints should be staggered.

5. Constructability Considerations

5.1 Excavations

Excavations are generally expected to extend through surficial topsoil and fill/sand layers and into compact to very dense cohesionless glacial till. Where engineered fill has been

constructed, excavation will be carried out through the engineered fill material prior to contacting the native soil. Glacial till inherently contains cobbles and boulders. The Contractor should anticipate slow digging in the glacial till. Provision should be made for handling and removal or cobbles/boulders during excavation.

Excavations must be carried out in accordance with the Occupational Health and Safety Act, Ontario Regulation 213/91 (as amended), Construction Projects, Part III - Excavations, Section 222 through 242. Where workers must enter a trench or excavation, the soil must be suitably sloped and/or braced in accordance with the OHSA. These regulations designate four (4) broad classifications of soils to stipulate appropriate measures for excavation safety. If more than one soil type is encountered in an excavation, the most conservative soil type must be followed for sloping the sidewalls of the excavation. Excavations for the site should be completed as follows:

- Type 3 Soil above the water table: 1 Horizontal to 1 Vertical from base of the excavation.
- Type 4 Soil below the water table: 3 Horizontal to 1 Vertical from base of the excavation.

Excavation sidewalls will need to be continuously reviewed for evidence of instability and ground water seepage, particularly following periods of heavy rain or thawing. When required, remedial action must be taken to ensure the continued stability of excavation slopes and the safety of the workers.

Minimum support system requirements for steeper excavations are stipulated in Sections 235 through 238 and 241 of the OHSA and include provisions for timbering, shoring and moveable trench boxes. To reduce the potential for instability of the trench excavations, materials excavated from the service trenches and/or other fill materials or heavy equipment should not be placed near the crest of the trench excavations.

5.2 Temporary Construction Groundwater Control

The water levels measured during the site visits in May 2024 indicated groundwater levels within 0.23 to 4.29 m below ground surface. Consideration should be given to raising the grades at the site to minimize the depth of excavation below the groundwater table and amount of dewatering required.

The exact scenario where certain groundwater control techniques will work are directly correlated to how coarse/fine the native soils are in an excavation, and both the lateral and vertical extent of the wet cohesionless deposits. If the groundwater table is not controlled during construction, the base of the excavations will be unstable, leading to difficulties in excavating and placement of pipes, footings or engineered fill, and providing safety for the workers. Further recommendations regarding dewatering are provided in GEI's Hydrogeological Study Report.

It is recommended to carry out the work during the dry time of the year when the groundwater table is lowest, to mitigate groundwater control measures. Also reducing the size of the excavation that is open at any one time will aid in reducing groundwater control requirements.

5.3 Stormwater Management Pond

A SWM facility is currently proposed near the southwest corner of the site. The SWM facility coincides with a thick fill layer. This fill layer will need to be removed prior to SWM facility construction.

Preliminary recommendations are provided below. These recommendations will need to be revisited once further details are available including grading plans and pond design drawings.

5.3.1 General Construction Considerations

The steepest recommended pond slope inclination is 5H:1V (inside the pond) and should follow the design guidelines of the local municipality. It is recommended that any piping or trenching in the area of the pond should be provided with seepage cut-off collars (clay plugs, concrete plugs, or other barriers) to protect against water seepage through the pipe bedding and backfill. Reference should be made to OPSD 802.095. Pond berms above grade will have to be constructed as engineered fill, constructed as described earlier in the report.

5.3.2 Pond Slope Surface Treatment

The final slope surface and all bare or exposed areas (where applicable) should be provided with suitable vegetation cover or erosion protection. The sloped surface should be provided with a layer of topsoil (minimum 100 mm thick) and should be hydro-seeded with a grass mixture and mulch. If seeded, during the first 2 to 3 years, the surface cover of topsoil and seeding may require periodic maintenance until the vegetation becomes well established. It is recommended that erosion netting/erosion control blankets be staked on the slope surface for erosion protection (including the inside slope above the water level).

5.3.3 Liner Considerations

A liner will be required if a permanent pool is proposed. The liner should be placed along the entire pond bottom and extend a minimum of 1.0 m above the permanent pool elevation. The liner may consist of a natural soil material (such as clay), a synthetic membrane liner (such as a High-Density Polyethylene, Geo-synthetic Clay Liner, or PVC), a concrete liner, or a combination thereof. Details can be provided when the design has progressed.

The liner system must be designed to withstand uplift pressure due to hydrostatic head at the base of the liner for the worse-case condition when the pond is emptied for cleaning and maintenance activities. Uplift pressure can be assessed and reviewed when design details are

established. A gravel/rip rap protection layer should also be considered for the liner when the pond is cleaned out in the future.

5.4 Compaction Specifications

Standard Proctor Maximum Dry Density the specification to indicate the degree to which soil or aggregate is compacted. To achieve the specified SPMDD as indicated in this report, all soils or aggregates must be placed in lift thicknesses no greater than 200 mm. If this is not the case, only the upper portion of the lift will be adequately compacted, and the lower portion of the lift has a high probability of not meeting compaction specifications. In addition, industry standard equipment used to determine the degree of compaction consists of nuclear densometers. These devices have an inherent limitation in that they cannot test beyond 300 mm in depth, and so the degree of compaction beyond this depth cannot be quantitatively determined.

Along with lift thickness, ensuring that the soil or aggregate is within 2% of its OMC ensures that the specified compaction can be reached. If the soil or aggregate is too dry/wet, it is either very difficult or impossible to reach the specified compaction. This is especially true for when higher compaction specifications such as 98% and 100% SPMDD are required.

Moisture can be increased by adding water and mixing the soil prior to re-use, blending the soil with wetter material, or by importing soil to the site that is at optimum and can be readily compacted.

Moisture can be reduced by tilling or spreading out the soil to dry or blending it with drier material. In-situ moisture contents can change based on the season and local groundwater levels and can also change for stockpiled material due to precipitation. Zones of the fine-grained soil with very high moisture contents may find moisture conditioning to be difficult to accomplish.

In addition to the above compaction specifications, in any areas where compacted fill will be placed over the exposed native soil subgrade, any loose, soft, wet, organic or unstable areas should be sub-excavated, and backfilled with clean earth fill or Granular 'B' (OPSS.MUNI 1010) compacted to a minimum of 95% SPMDD. This recommendation applies to site servicing and pavement subgrades. Where structures/buildings require upfilling beneath the structure the fill should be compacted to 100% SPMDD.

5.5 Quality Verification Services

On-site quality verification services are an integral part of the geotechnical design function, and for foundations, engineered fill and retaining walls, are required under the Ontario Building Code. Quality verification services are used to confirm that construction is being conducted in general conformance with the requirements as outlined in the drawings, reports and specifications prepared for the proposed development.

GEI Consultants can provide all the on-site quality verification services outlined below:

- The subgrade for shallow foundations for the proposed buildings will need to be field reviewed by the geotechnical engineer.
- Installation of retaining structures over 1.0 m high and related backfilling operations must be field reviewed on a continuous basis by the geotechnical engineer as required in the OBC.
- Full-time monitoring, testing and inspection of engineered fill placement is required by the geotechnical engineer per the OBC.
- Part-time monitoring of the subgrade support capabilities, material quality, lift thickness, moisture content, degree of compaction, etc. is recommended for the following areas to ensure the recommendations within this report are followed and they perform adequately in the long-term;
    - Slab-on-grades;
    - Pavement structure (granular and asphalt); and
    - Bedding/backfilling of site servicing.
- Testing of the concrete (compressive strength, slump, air content, etc.) and testing of the asphalt (asphalt content and gradation) are recommended to ensure that the quality of the materials being brought to site meet the requirements of the project.

6. Limitations and Conclusions

6.1 Limitations

The recommendations and comments provided are necessarily on-going as new information of underground conditions becomes available. More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during excavation operations. Consequently, conditions not observed during this investigation may become apparent. Should this occur, GEI should be contacted to assess the situation and additional testing and reporting may be required.

GEI should be retained for a general review of the final design drawings and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, GEI will assume no responsibility for interpretation of the recommendations in the report.

The comments given in this report are intended only for the guidance of the design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc. could be greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

This report was authorized by, and prepared by GEI for Polocorp Inc. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. GEI accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

6.2 Conclusion

It is recognized that municipal/regional governing bodies, in their capacity as the planning and building authority under Provincial statues, will make use of and rely upon this report, cognizant of the limitations thereof, both as are expressed and implied.

We trust this report is complete within our terms of reference, and the information presented is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to contact our office.

Yours Truly,

GEI Consultants

Reviewed By:

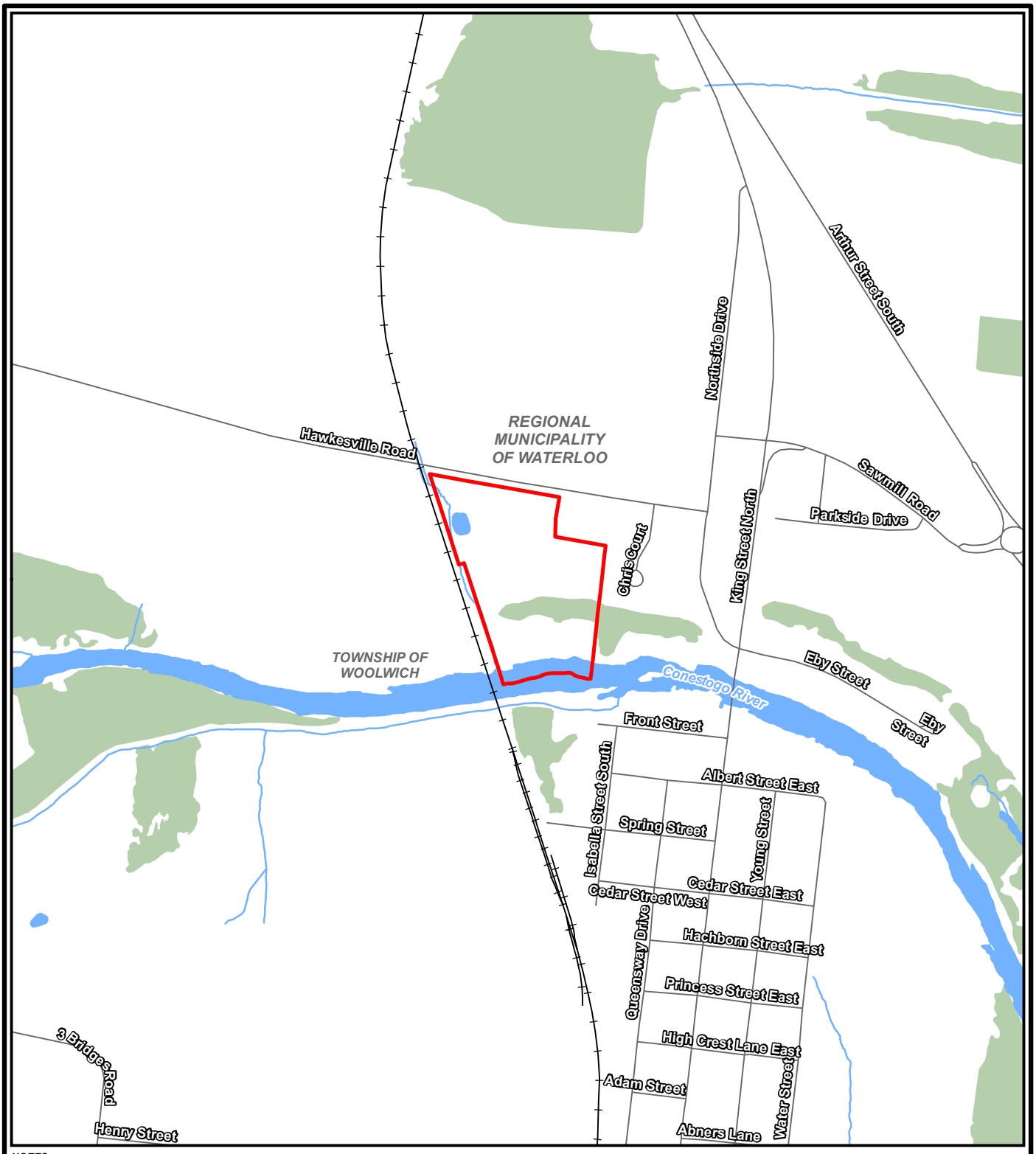


Isaac Asonya, P.Eng.
Senior Geotechnical Engineer

Figures

Site Location Plan

Borehole Location Plans



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.

Legend

- Subject Lands
- Road
- Railway
- Watercourse
- Waterbody
- Wooded Area

N

0 100 200 m

1:10,000

51-55 Hawkesville Road,
St. Jacobs, ON

Polocorp Inc.

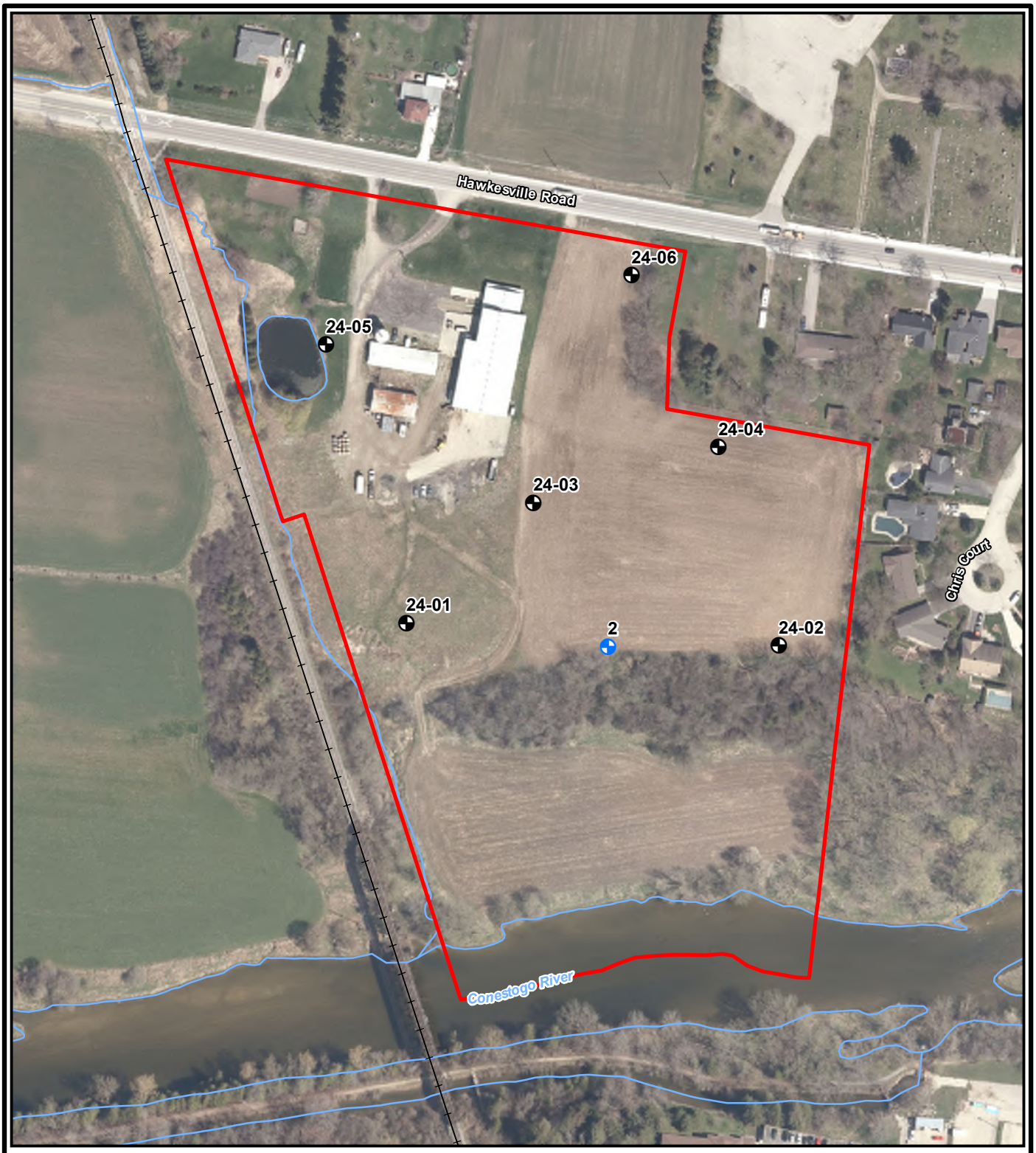
GEI Consultants

Project 2403070

SITE LOCATION PLAN

June 2024 Fig. 1

Path: \\bos-pzcc-1\Data_Storage\Working\POLOCORP INC\2403070 51_55 Hawkesville Rd St Jacobs\05_GIS\figures\report_figures\2024-05_geotech\2403070_rpt_fig01_site_location_plan.mxd Date Saved: Wednesday, May 8, 2024 Last Modified by: PatWor3101



NOTES:
1. Coordinate System: NAD 1983 UTM Zone 17N.
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
3. Orthoimagery © First Base Solutions, 2024. Imagery taken in 2022.

Legend

- Subject Lands
- GEI Borehole (2024)
- CVD Borehole (2024)
- Railway
- Watercourse
- Waterbody

N

0 25 50 m

1:2,500

51-55 Hawkesville Road,
St. Jacobs, ON

Polocorp Inc.

GEI Consultants

BOREHOLE LOCATION PLAN
(AERIAL)

Project 2403070 | June 2024 | Fig. 2A

Path: \\bos-pzcc-1\Data_Storage\Working\POLOCORP INC\2403070 51_55 Hawkesville Rd St Jacobs\05_GIS\figures\report_figures\2024-05_geotech\2403070_rpt_fig02a_bh_location_plan_aerial.mxd Date Saved: Wednesday, May 8, 2024 Last Modified by: PatWor3101

Appendix A

Borehole Logs and Geotechnical Laboratory Data - GEI

RECORD OF BOREHOLE No. 24-01

Project Number: **2403070**
Project Client: **Polocorp**
Project Name:
Project Location: **51-55 Hawkesville Road, St. Jacobs, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Hollow Stem Augers** Drilling Machine: **Track Mount**
Logged By: **MM** Northing: **4821191** Date Started: **Apr 23/24**
Reviewed By: **GL** Easting: **535655** Date Completed: **Apr 23/24**

Geodetic	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING (Shear Strength Testing (kPa); Penetration Testing SPT/DCPT)	LAB TESTING (Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); Atterberg Limits; Water Content (%))	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
0.0 / 338.2											GR / SA / SI / CL
0.4 / 337.8	TOPSOIL: 380 mm	SS	1	50	13	0	338	13	10		
	FILL: Sand, some silt, some rootlets, trace gravel, compact, dark brown, moist	SS	2	75	16			16	11		
		SS	3	75	12			12	14		
	- - - Gravel and sand, very dense, grey - - -	SS	4	10	50+	2	336	50+	23		Auger grinding from 2.4 - 2.7 m
	- - - Cobbles - - - - - - Trace clay - - - - - - Wet - - -	SS	5	10	50+			50+	21		
	- - Silty sand, some clay, very loose - -	SS	6	35	3	4	334	3	17		
	- - - Dense - - -	SS	7	100	32	6	332	32	27		
	- - - Loose - - -	SS	8	100	8	8	330	8	18		
9.1 / 329.1											
9.8 / 329.0	SANDY SILT GLACIAL TILL: Some clay, trace gravel, inferred cobbles and boulders, very dense, grey, wet	SS	9	75	50+			50+	9		7 / 33 / 45 / 15
	Borehole Terminated at 9.8 m										

Groundwater depth encountered on completion of drilling: Dry
Groundwater depth observed on: May 03/24 at depth of: 3.6 m.
Cave depth after auger removal: Open
Groundwater Elevation: 334.6 m

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Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale **1 :100**

RECORD OF BOREHOLE No. 24-02

GEI Consultants

Project Number:	**2403070**				
Project Client:	**Polocorp**				
Project Name:		Drilling Method:	**Hollow Stem Augers**	Drilling Machine:	**Track Mount**
Project Location:	**51-55 Hawkesville Road, St. Jacobs, ON**	Logged By:	**MM**	Northing: **4821181**	Date Started: **Apr 23/24**
Drilling Location:	**See Borehole Location Plan**	Reviewed By:	**GL**	Easting: **535822**	Date Completed: **Apr 23/24**
Local Benchmark:					

LITHOLOGY PROFILE | SOIL SAMPLING | FIELD TESTING | LAB TESTING | COMMENTS & GRAIN SIZE DISTRIBUTION (%)

Field Testing – Shear Strength Testing (kPa): × Other Test; + Pocket Penetrometer; ▲ Field Vane (Intact); △ Field Vane (Remolded) (40, 80, 120, 160). Penetration Testing: ○ SPT; ● DCPT (10, 20, 30, 40)

Lab Testing: △ Combustible Organic Vapour (ppm); ▲ Combustible Organic Vapour (%LEL); ◇ Total Organic Vapour (ppm) (100, 200, 300, 400); Atterberg Limits PL ├──┤ LL; ○ Water Content (%) (10, 20, 30, 40)

Geodetic Depth (m)	Elevation (m)	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	Water Content (%)	GR	SA	SI	CL	Comments
0.0	339.2											
0.4	338.8	TOPSOIL: 405 mm	SS	1	75	6	17					
		SILTY SAND: Trace clay, trace gravel, loose, brown, moist to wet	SS	2	50	5	12					
2.3	336.9		SS	3	50	6	13					
		SANDY SILT TO SILTY SAND GLACIAL TILL: Some gravel, trace clay, inferred cobbles and boulders, compact to very dense, light brown to brown, moist	SS	4	65	13	8	11	42	39	8	Auger grinding from 2.4 - 2.7 m
			SS	5	25	50+	8					Auger grinding from 3.7 - 4.0 m
			SS	6	75	50+	7					
			SS	7	50	50+	9					
			SS	8	50	50+	10					
			SS	9	65	50+	8					Auger grinding from 9.0 - 9.1 m
		- - - Some clay, wet - - -	SS	10	60	50+	12	14	30	42	14	
12.8	326.4	- - - Some cobbles - - -	SS	11	100	50+	9					
		Borehole Terminated at 12.8 m										

Groundwater depth encountered on completion of drilling: 8.5 m. Cave depth after auger removal: Open

Groundwater depth observed on: May 03/24 at depth of: 4.2 m. Groundwater Elevation: 335.0 m

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Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale **1 :100**

RECORD OF BOREHOLE No. 24-03

Project Number: **2403070**
Project Client: **Polocorp**
Project Name:
Project Location: **51-55 Hawkesville Road, St. Jacobs, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Hollow Stem Augers** Drilling Machine: **Track Mount**
Logged By: **MM** Northing: **4821245** Date Started: **Apr 23/24**
Reviewed By: **GL** Easting: **535712** Date Completed: **Apr 23/24**

Lithology Plot	DESCRIPTION	Geodetic	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING	LAB TESTING	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%)
		0.0 / 340.1					0	340	Shear Strength Testing (kPa): Other Test; Pocket Penetrometer; Field Vane (Intact); Field Vane (Remolded); 40 80 120 160. Penetration Testing: SPT ○ DCPT ● 10 20 30 40	Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); 100 200 300 400. Atterberg Limits: PL LL; Water Content (%): ○ 10 20 30 40		GR SA SI CL
	0.3 / 339.8 TOPSOIL: 305 mm											
	SILTY CLAY: Some sand, trace gravel, firm to stiff, brown, moist to dry		SS	1	75	7			7	9		
			SS	2	75	7			7	26		3 10 26 60
			SS	3	75	14			14	16		
	2.3 / 337.8						2	338				
	SANDY SILT TO SILTY SAND GLACIAL TILL: Trace clay, trace gravel, inferred cobbles and boulders, loose to dense, light brown to grey, moist to wet		SS	4	50	29			29	8		
			SS	5	50	32			32	8		Auger grinding from 3.7 - 4.0 m
							4	336				
	5.2 / 334.9		SS	6	50	48			48	13		First Water Strike SS6
	Borehole Terminated at 5.2 m											

Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: May 03/24 at depth of: 0.9 m.
Groundwater Elevation: 339.2 m

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Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale **1 :100**

RECORD OF BOREHOLE No. 24-04

Project Number: **2403070**
Project Client: **Polocorp**
Project Name:
Project Location: **51-55 Hawkesville Road, St. Jacobs, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Hollow Stem Augers** Drilling Machine: **Track Mount**
Logged By: **MM** Northing: **4821270** Date Started: **Apr 23/24**
Reviewed By: **GL** Easting: **535795** Date Completed: **Apr 23/24**

Geodetic	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	FIELD TESTING (Shear Strength Testing (kPa); Penetration Testing: SPT, DCPT)	LAB TESTING (Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); Atterberg Limits; Water Content (%))	Instrumentation Installation	COMMENTS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	TOPSOIL: 455 mm					0	346				
0.5		SS	1	100	4			4	18		
345.9	SANDY SILT TO SILTY SAND GLACIAL TILL: Trace clay, trace gravel, inferred cobbles and boulders, compact to dense, brown, moist	SS	2	75	15			15	20		
		SS	3	100	21	2	344	21	13		
		SS	4	100	31			31	16		
		SS	5	100	31			31	12		
						4	342				
5.2		SS	6	100	45			45	10		
341.2	Borehole Terminated at 5.2 m										

Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: May 03/24 at depth of: 4.0 m.
Groundwater Elevation: 342.4 m

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www.geiconsultants.com

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Scale **1 :100**

RECORD OF BOREHOLE No. 24-05

Project Number: **2403070**
Project Client: **Polocorp**
Project Name:
Project Location: **51-55 Hawkesville Road, St. Jacobs, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Hollow Stem Augers** Drilling Machine: **Track Mount**
Logged By: **MM** Northing: **4821316** Date Started: **Apr 23/24**
Reviewed By: **GL** Easting: **535619** Date Completed: **Apr 23/24**

Geodetic	Description	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)	GR	SA	SI	CL
0.0 / 338.6	TOPSOIL: 355 mm										
0.2 / 338.5	SILTY CLAY: Some sand, some organics, trace gravel, soft, brown to grey, wet	SS	1	35	3	0	338				
0.8 / 337.9	SANDY SILT TO SILTY SAND GLACIAL TILL: Trace to some clay, trace gravel, inferred cobbles and boulders, very loose to compact, grey, moist to wet	SS	2	75	2			4	41	46	9
		SS	3	75	4	2	336				
	- - - Dense to very dense - - -	SS	4	65	11						
		SS	5	75	39	4	334				
5.2 / 333.5		SS	6	20	50+						
	Borehole Terminated at 5.2 m										

FIELD TESTING: Shear Strength Testing (kPa); Other Test; Pocket Penetrometer; Field Vane (Intact); Field Vane (Remolded); 40 80 120 160; Penetration Testing; SPT; DCPT; 10 20 30 40

LAB TESTING: Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); 100 200 300 400; Atterberg Limits; PL; LL; Water Content (%); 10 20 30 40

Instrumentation installation

COMMENTS & GRAIN SIZE DISTRIBUTION (%)

Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: May 03/24 at depth of: 0.2 m.
Groundwater Elevation: 338.4 m

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Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale **1 :100**

RECORD OF BOREHOLE No. 24-06

Project Number: **2403070**
Project Client: **Polocorp**
Project Name:
Project Location: **51-55 Hawkesville Road, St. Jacobs, ON**
Drilling Location: **See Borehole Location Plan**
Local Benchmark:

Drilling Method: **Hollow Stem Augers** Drilling Machine: **Track Mount**
Logged By: **MM** Northing: **4821347** Date Started: **Apr 23/24**
Reviewed By: **GL** Easting: **535756** Date Completed: **Apr 23/24**

Geodetic	DESCRIPTION	Sample Type	Sample Number	Recovery (%)	SPT "N" Value	DEPTH (m)	ELEVATION (m)
0.0 / 345.1							
0.3 / 344.7	TOPSOIL: 305 mm	SS	1	75	4	0	344
	SANDY SILT TO SILTY SAND GLACIAL TILL: Trace clay, trace gravel, inferred cobbles and boulders, loose to compact, brown, moist	SS	2	100	8	2	342
		SS	3	100	19	4	340
		SS	4	100	21		
		SS	5	100	25		
	- - - Dense - - -	SS	6	100	34		
5.2 / 339.9	Borehole Terminated at 5.2 m						

FIELD TESTING: Shear Strength Testing (kPa) — Other Test; Pocket Penetrometer; Field Vane (Intact); Field Vane (Remolded); 40 80 120 160. Penetration Testing — SPT; DCPT; 10 20 30 40. Values: 4, 8, 19, 21, 25, 34.

LAB TESTING: Combustible Organic Vapour (ppm); Combustible Organic Vapour (%LEL); Total Organic Vapour (ppm); 100 200 300 400. Atterberg Limits — PL; LL; Water Content (%); 10 20 30 40. Values: 16, 12, 18, 13, 8, 9.

Instrumentation Installation

COMMENTS & GRAIN SIZE DISTRIBUTION (%): GR | SA | SI | CL

Groundwater depth encountered on completion of drilling: Dry
Cave depth after auger removal: Open
Groundwater depth observed on: May 03/24 at depth of: 3.2 m.
Groundwater Elevation: 341.9 m

GEI CONSULTANTS
Canada Ltd.
www.geiconsultants.com

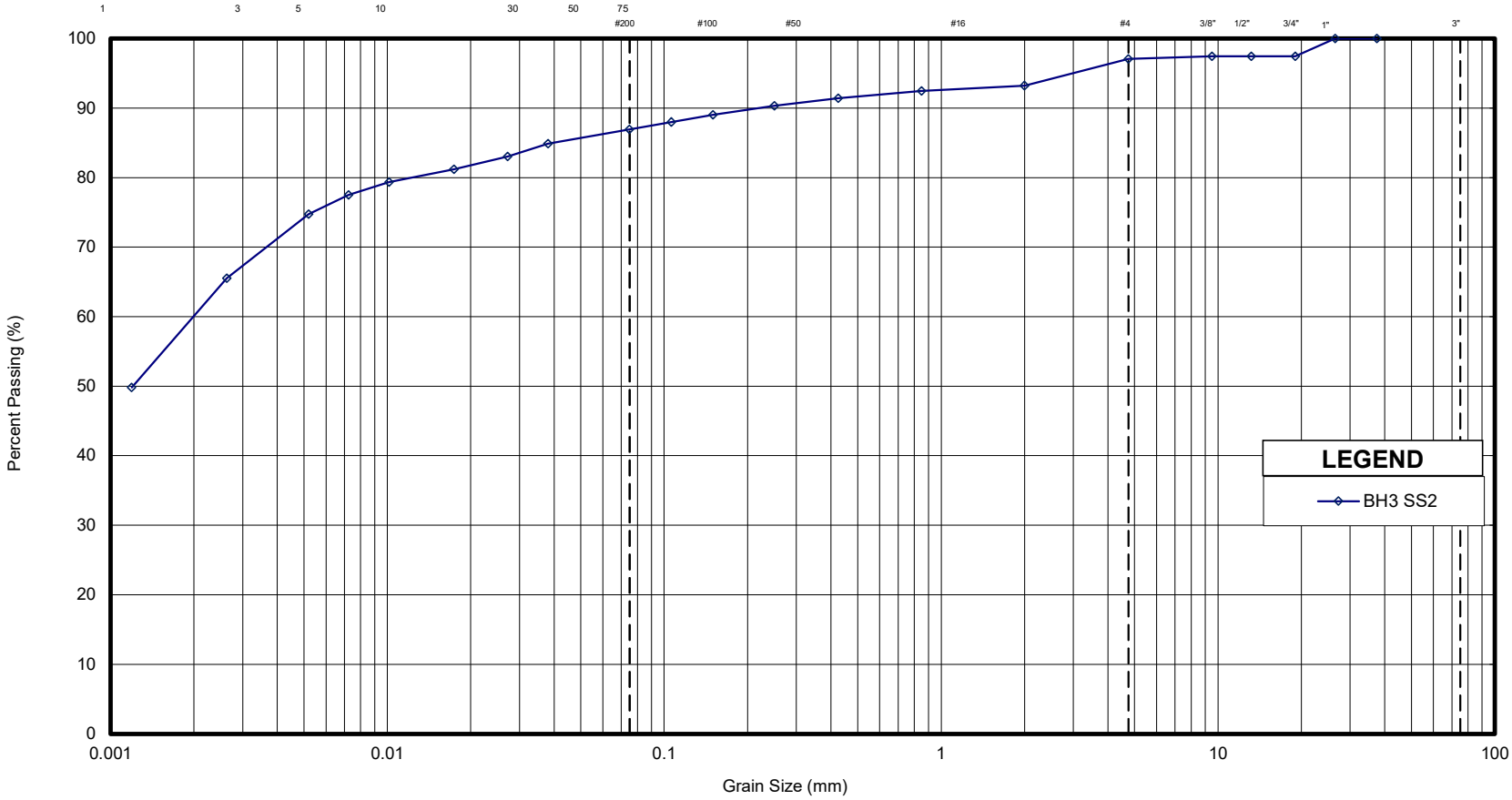
Borehole details presented do not constitute a thorough understanding of all potential conditions present and require interpretative assistance from a qualified geotechnical engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying 'Explanation of Boring Log'.

Scale **1 :100**

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse

GRAIN SIZE IN MICROMETERS — SIEVE DESIGNATION (IMPERIAL)



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH24-03 SS2	SILTY CLAY, Some Sand, Trace Gravel	3	10	27	60	-	-	0.002	-	-

GEI Consultants

GRAIN SIZE DISTRIBUTION - 51-55 Hawkesille Rd, St. Jacobs

SILTY CLAY

FIGURE No. A1

REF. No. 2403070

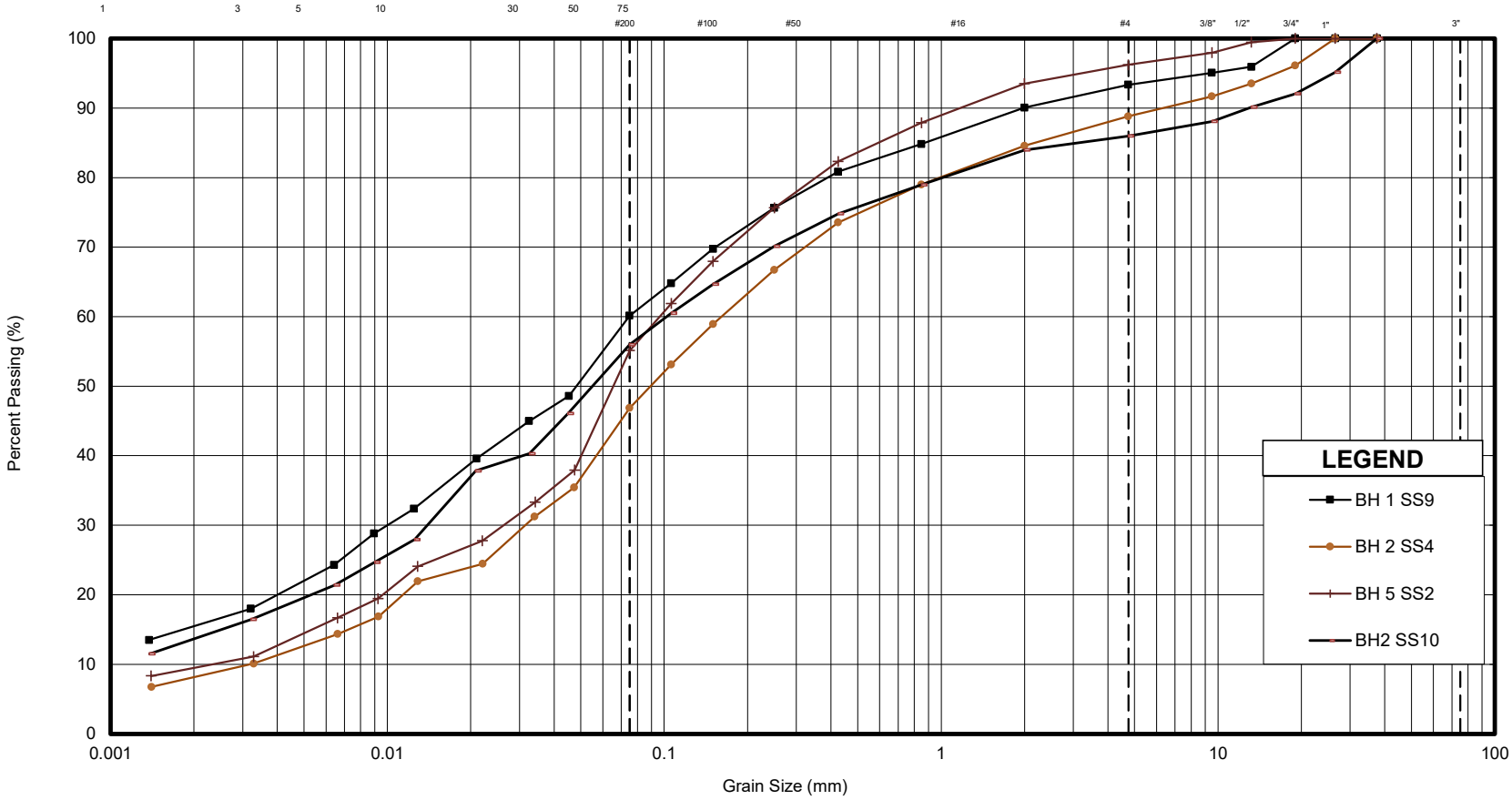
DATE June 2024

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY AND SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse

GRAIN SIZE IN MICROMETERS

SIEVE DESIGNATION (IMPERIAL)



Sample	Description	Gr.	Sa.	Si.	Cl.	D_{10}	D_{30}	D_{60}	C_u	C_c
BH24-01 SS9	SANDY SILT, Some Clay, Trace Gravel	7	33	45	15	-	0.010	0.075	-	-
BH24-02 SS4	SILT AND SAND, Some Gravel, Trace Clay	11	42	39	8	0.003	0.031	0.161	50.4	1.9
BH24-05 SS2	SILT AND SAND, Trace Clay, Trace Gravel	4	41	46	9	0.002	0.026	0.096	41.1	3.1
BH24-02 SS10	SANDY SILT, Some Clay, Some Gravel	14	30	42	14	-	0.014	0.102	-	-

GEI Consultants

GRAIN SIZE DISTRIBUTION - 51-55 Hawkesille Rd, St. Jacobs

GLACIAL TILL

FIGURE No. A2

REF. No. 2403070

DATE June 2024

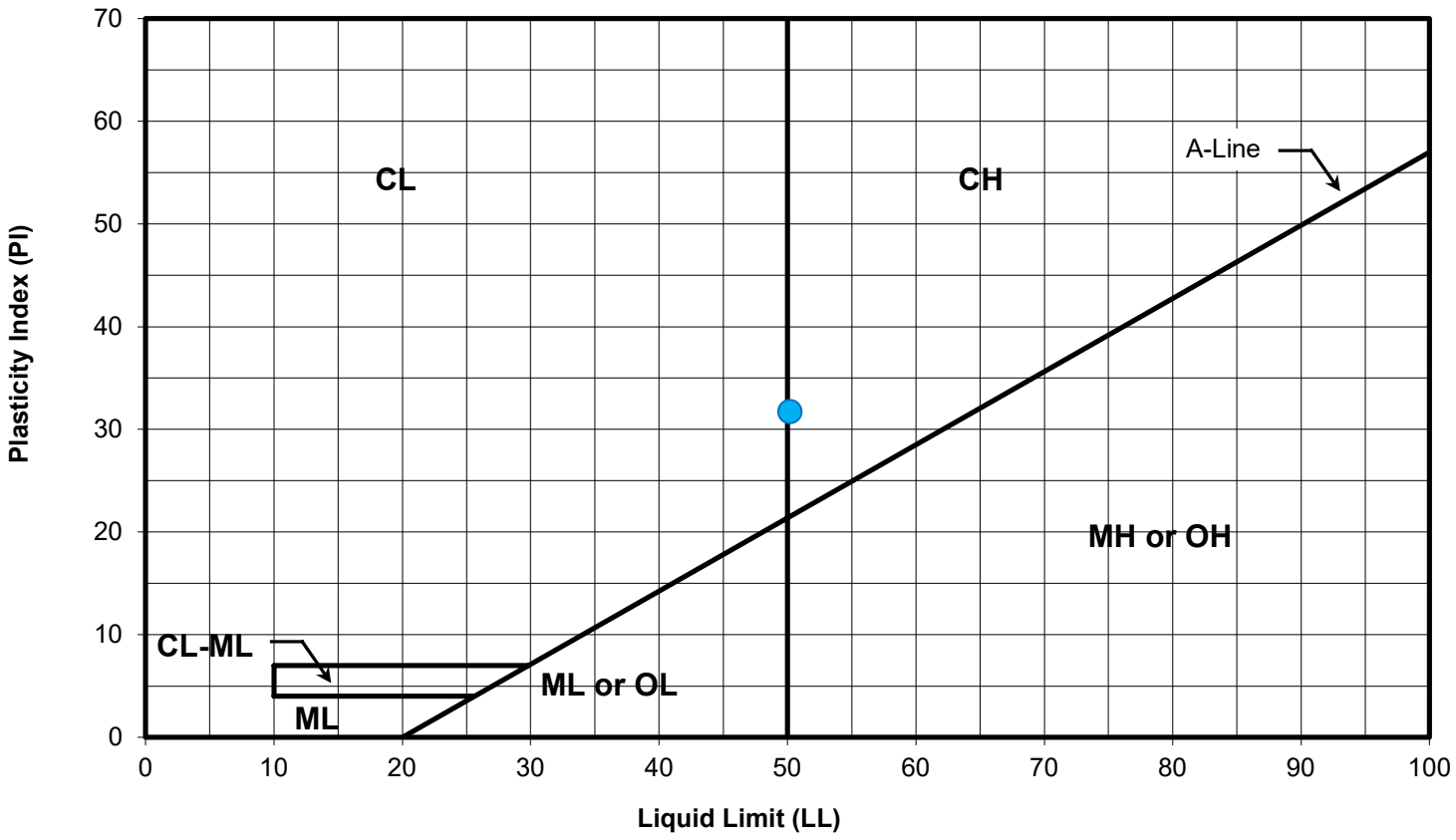
Atterberg Limits Report

Project Name: 51-55 Hawkesville Rd, St. Jacobs
Project No.: 2403070
Client: Polocorp

Figure No.: A3
Date Tested: June 3, 2024
Date Sampled: April 23, 2024

SAMPLE INFORMATION								
SAMPLE ID	BH24-03 SS3	LIQUID LIMIT (LL):	50.2	PLASTIC LIMIT (PL)	18.5	PLASTIC INDEX (PI)	31.7	●

Plasticity Chart - Silty Clay



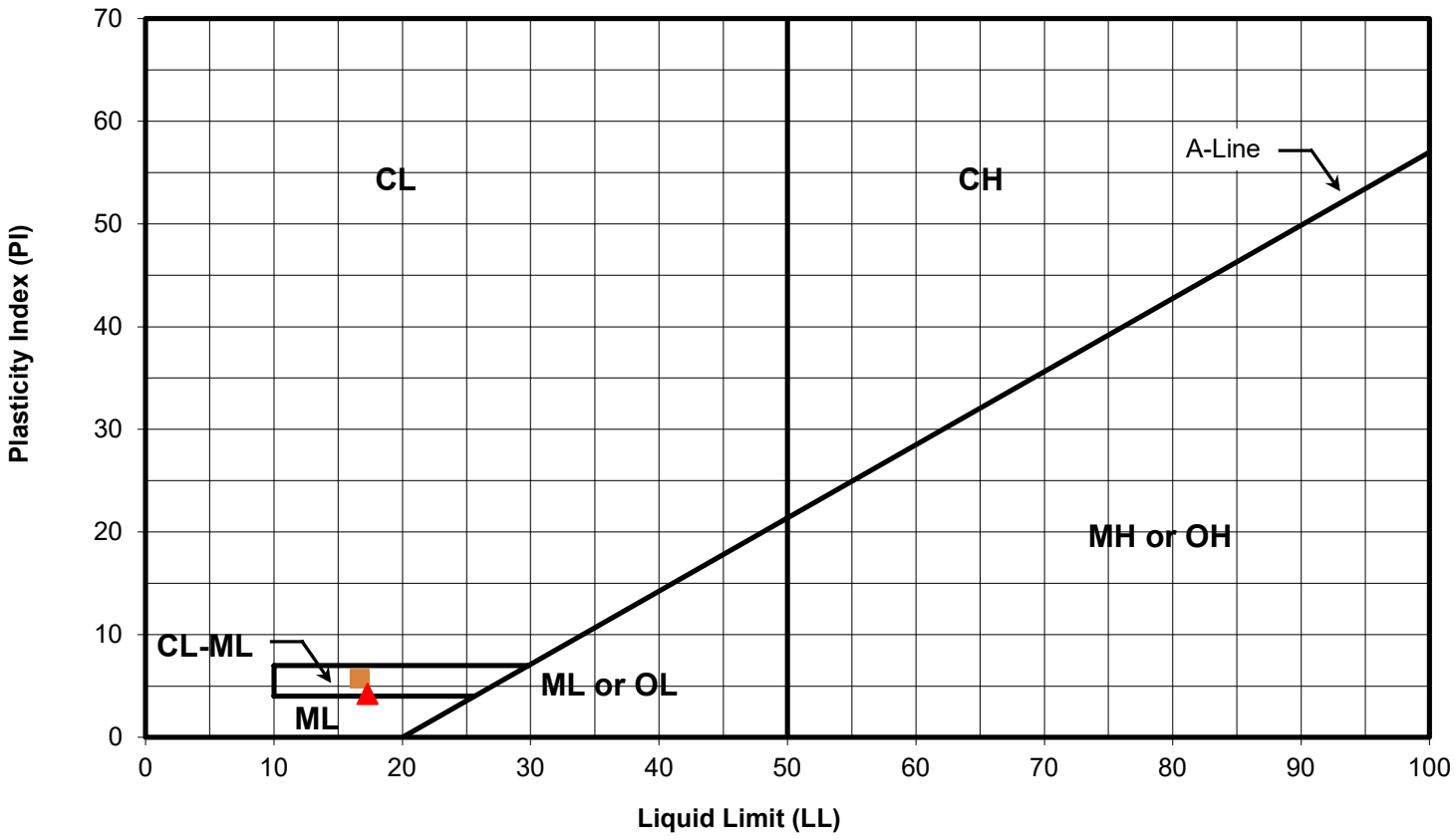
Atterberg Limits Report

Project Name: 51-55 Hawkesville Rd, St. Jacobs
Project No.: 2403070
Client: Polocorp

Figure No.: A4
Date Tested: May 2, 2024
Date Sampled: April 23, 2024

SAMPLE INFORMATION								
SAMPLE ID	BH2 SS10	LIQUID LIMIT (LL):	16.7	PLASTIC LIMIT (PL)	11.0	PLASTIC INDEX (PI)	5.7	■
SAMPLE ID	BH5 SS2	LIQUID LIMIT (LL):	17.3	PLASTIC LIMIT (PL)	13.1	PLASTIC INDEX (PI)	4.2	▲

Plasticity Chart - Glacial Till



Certificate of Analysis

Environment Testing

Client: GEI Consultants Inc.
647 Welham Rd Unit 14
Barrie, ON
L4N 0B7
Attention: Mr. Geoff Lay
Invoice to: GEI Consultants Inc.
PO#:

Report Number: 3007005
Date Submitted: 2024-04-29
Date Reported: 2024-05-03
Project: 2403070 - 51
Hawkesville Rd, St. Jacobs
COC #: 914399
Temperature (C): 16
Custody Seal:

Dear Geoff Lay:

Please find attached the analytical results for your samples. If you have any questions regarding this report, please do not hesitate to call (613-727-5692).

Report Comments:

Emma-Dawn Ferguson, Chemist

All analysis is completed at Eurofins Environment Testing Canada Inc. (Ottawa, Ontario) unless otherwise stated
.
Eurofins Environment Testing Canada Inc. is accredited by CALA, Canadian Association for Laboratory Accreditation to ISO/IEC 17025 for tests which appear on the scope of accreditation. The scope is available at https://directory.cala.ca/

Please note: Field data, where presented on the report, has been provided by the client and is presented for informational purposes only. Guideline or regulatory limits listed on this report are provided for ease of use (informational purposes) only. Eurofins recommends consulting the official guideline or regulation as required. Unless otherwise stated, measurement uncertainty is not taken into account when determining guideline or regulatory exceedances.

Certificate of Analysis

Client: GEI Consultants Inc.
647 Welham Rd Unit 14
Barrie, ON
L4N 0B7
Attention: Mr. Geoff Lay
PO#:
Invoice to: GEI Consultants Inc.

Report Number: 3007005
Date Submitted: 2024-04-29
Date Reported: 2024-05-03
Project: 2403070 - 51
Hawkesville Rd, St. Jacobs
COC #: 914399

Exceedence Summary

Sample I.D.	Analyte	Result	Units	Criteria

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: GEI Consultants Inc.
647 Welham Rd Unit 14
Barrie, ON
L4N 0B7
Attention: Mr. Geoff Lay
PO#:
Invoice to: GEI Consultants Inc.

Report Number: 3007005
Date Submitted: 2024-04-29
Date Reported: 2024-05-03
Project: 2403070 - 51
Hawkesville Rd, St. Jacobs
COC #: 914399

Guideline = O.Reg 153-T1-All Other Soils - Res/Par/Ins/Ind/Com/Prop

Inorganics

Analyte	Batch No	MRL	Units	Guideline	Lab I.D. 1725583 Sample Matrix Soil Sample Type Sample Date 2024-04-23 Sampling Time Sample I.D. BH 4 SS 2	Lab I.D. 1725584 Sample Matrix Soil Sample Type Sample Date 2024-04-23 Sampling Time Sample I.D. BH 2 SS 2	Lab I.D. 1725585 Sample Matrix Soil Sample Type Sample Date 2024-04-23 Sampling Time Sample I.D. BH 3 SS 2
Chloride	459431	0.002	%		0.003	<0.002	<0.002
Electrical Conductivity	459372	0.05	mS/cm	STD 0.57	0.12	0.14	0.13
pH	459372	2.00			7.96	7.93	8.02
Resistivity	459372	1	ohm-cm		8333	7143	7692
SO4	459338	0.01	%		<0.01	<0.01	<0.01

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: GEI Consultants Inc.
647 Welham Rd Unit 14
Barrie, ON
L4N 0B7
Attention: Mr. Geoff Lay
PO#:
Invoice to: GEI Consultants Inc.

Report Number: 3007005
Date Submitted: 2024-04-29
Date Reported: 2024-05-03
Project: 2403070 - 51
Hawkesville Rd, St. Jacobs
COC #: 914399

Quality Assurance Summary

Batch No	Analyte	Blank	QC % Rec	QC Limits	Spike % Rec	Spike Limits	Dup % RPD	Duplicate Limits
459338	SO4		100	70-130	102		0	-50-50
459372	Electrical Conductivity	<0.05	92	90-110			0	0-10
459372	pH	6.21	99	90-110			0	0-1
459372	Resistivity							
459431	Chloride	<0.002 %	97	90-110			0	

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

Certificate of Analysis

Client: GEI Consultants Inc.
647 Welham Rd Unit 14
Barrie, ON
L4N 0B7
Attention: Mr. Geoff Lay
PO#:
Invoice to: GEI Consultants Inc.

Report Number: 3007005
Date Submitted: 2024-04-29
Date Reported: 2024-05-03
Project: 2403070 - 51
Hawkesville Rd, St. Jacobs
COC #: 914399

Test Summary

Batch No	Analyte	Instrument	Prep aration Date	Analysis Date	Analyst	Method
459338	SO4	Manual	2024-05-01	2024-05-02	M_B	AG SOIL
459372	Electrical Conductivity	Electrical Conductivity Mete	2024-05-02	2024-05-02	IP	Cond-Soil
459372	pH	pH Meter	2024-05-02	2024-05-02	IP	AG Soil
459372	Resistivity	Calculation	2024-05-02	2024-05-02	IP	Resistivity - soil
459431	Chloride	Manual	2024-05-02	2024-05-03	AsA	C CSA A23.2-4B

Results relate only to the parameters tested on the samples submitted.
Methods references and/or additional QA/QC information available on request.

MRL = Method Reporting Limit, AO = Aesthetic Objective, OG = Operational Guideline, MAC = Maximum Acceptable Concentration, IMAC = Interim Maximum Acceptable Concentration, STD = Standard, PWQO = Provincial Water Quality Guideline, IPWQO = Interim Provincial Water Quality Objective, TDR = Typical Desired Range

eurofins 91459

STANDARD CHAIN-OF-CUSTODY

146 Colonnade Road, Unit #8, Ottawa, ON, K2E 7Y1 - Phone: 613-727-5692, Fax: 613-727-5222

Eurofins Workorder #: 2007025

CLIENT INFORMATION

Company:	GEI Consultants		
Contact:	Geoff Lay		
Address:	650 Woodlawn Road West, Block C, Unit 2, Guelph, ON N1K 1B8		
Telephone:	519 824 8150	Cell:	416 303 8668
Email: #1:	GLay@geiconsultants.com		
Email: #2:	mmeskar@geiconsultants.com		
Project:	2403070- 51 Hawkesville Rd, St. Jacobs	Quote #:	192092

INVOICE INFORMATION (SAME AS CLIENT INFORMATION: YES ☐ NO ☐)

Company:	Fax:
Contact:	Email: #1:
Address:	Email: #2:
Telephone:	PO #:

TURN-AROUND TIME (Business Days)

☐ 1 Day* (100%) ☐ 2 Day** (50%) ☐ 3-5 Days (25%) ☑ 5-7 Days (Standard)

Please contact Lab in advance to determine rush availability.

*For results reported after rush due date, surcharges will apply: before 12:00 - 100%, after 12:00 - 50%.

**For results reported after rush due date, surcharges will apply: before 12:00 - 50%, after 12:00 - 25%.

REGULATION/GUIDELINE REQUIRED

☐ Sanitary Sewer, City:

☐ Storm Sewer, City:

☐ DDWSOG (Use DW CoC if analyzing drinking water)

☐ PWQO

☐ O.Reg 347

☑ Other:

☐ O. Reg 153

The sample results from this submission will form part of a formal Record of Site Condition (RSC) under O.Reg. 153/04. Analysis of full parameter list only Yes ☐ No ☑

Table # 1 (Coarse) Fine, Surface / subsurface

Type: Com-Ind (Res-Park) / Agri / GW / All Other / Sediment

☐ O. Reg 406 Excess Soils

Table # _____ Full depth/Strat/Ceiling/mSPLP Leachate

Type: Com-Ind /Res-Park /Agri/All Other

Category: Surface /Subsurface

The optimal temperature conditions during transport should be less than 10°C. Sample(s) cannot be frozen, unless otherwise indicated or agreed upon with the Laboratory. Note that this COC is not to be used for drinking water samples. The COC must be complete upon submission of the samples, there will be a $25 surcharge if required information is missing (required fields are shaded in grey).

Sample Details

Sample ID	Date/Time Collected	Sample Matrix	# of Containers	O.Reg.153 parameters: PHC F1 - F4	BTEX	VOCs	PAHs	PCBs	Metals + Inorganics	Metals only	Corrosivity	RN# (Lab Use Only)
BH 4 SS 2	24/04/23	soil	1								✔	1725583
BH 2 SS 2	24/04/23	soil	1								✔	84
BH 3 SS 2	24/04/23	soil	1								✔	85

	PRINT	SIGN	DATE/TIME	TEMP (°C)
Sampled By:	Miad M		24/04/25	
Relinquished By:	Miad M		2024/04/29 @ 10:16	
Received By:				

COMMENTS:

CUSTODY SEAL: ☐ YES ☐ NO

Appendix B

Borehole Log - CVD

FILE No: G21262

BOREHOLE No. 2

Client: **Polocorp Inc.**

Project: **Slope Stability and Fill Investigation**

Location: **51 Hawkesville Road, St. Jacobs, Ontario**

EQUIPMENT DATA

Machine: **Diedrich D50T**
Method: **Hollow Stem Auger**
Size: **108 mm I.D.**
Date: **Jul 27 - 21** TO **Jul 27 - 21**

Ground Elevation: **339.11 m**

ELEV./ DEPTH (m)	DESCRIPTION	DEPTH (m)	SAMPLE ID	TYPE	N-VALUE	REMARKS
	compact, dark brown FILL, sandy silt trace gravel, trace organics moist	0.5	1	SS	10	steel monument casing set in concrete
		1.0	2	SS	11	50 mm I.D. PVC riser with bentonite seal
337.76 1.35	compact, mottled brown SAND AND SILT trace gravel, moist	1.5	3	SS	20	
336.96 2.15	compact to very dense brown SAND AND SILT TILL trace to some gravel occ. clay lenses moist	2.5	4	SS	26	
		3.0	5	SS	29	
		4.5	6	SS	74	
		6.0	7	SS	50/ 130mm	
	---------- clay seam/layer	7.5	8	SS	50/ 100mm	water level in monitoring well measured to 7.55 m bgs on July 27, 2021
	---------- trace clay	9.0	9	SS	50/ 130mm	6.10 m long, 50 mm I.D. PVC slotted screen with sandpack

SHEAR STRENGTH (kPa)
FIELD VANE: Peak ⊗ Rem. ×
LAB TEST: Unc. ■ P.P. □
50 100 150 200
PENETRATION RESISTANCE
STANDARD ● DYN. CONE ○
20 40 60 80

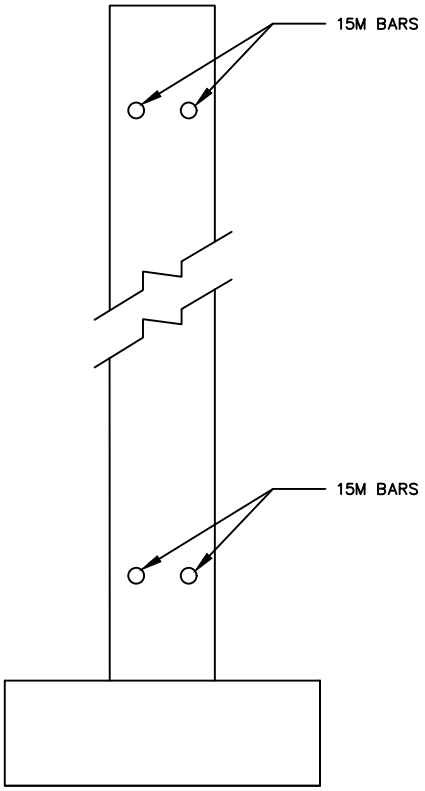
WATER CONTENT (%)
W_P W W_L
10 20 30

PROJECT MANAGER: **EYC**

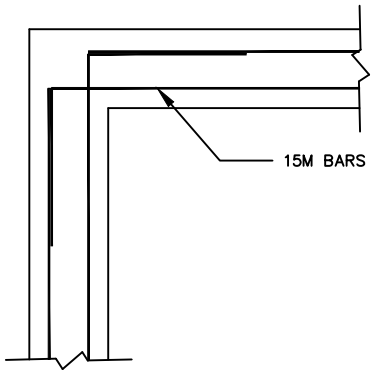
CHUNG & VANDER DOELEN ENGINEERING LTD.
311 Victoria Street North
Kitchener, Ontario N2H 5E1
ph. (519) 742-8979, fx. (519) 742-7739

Appendix C

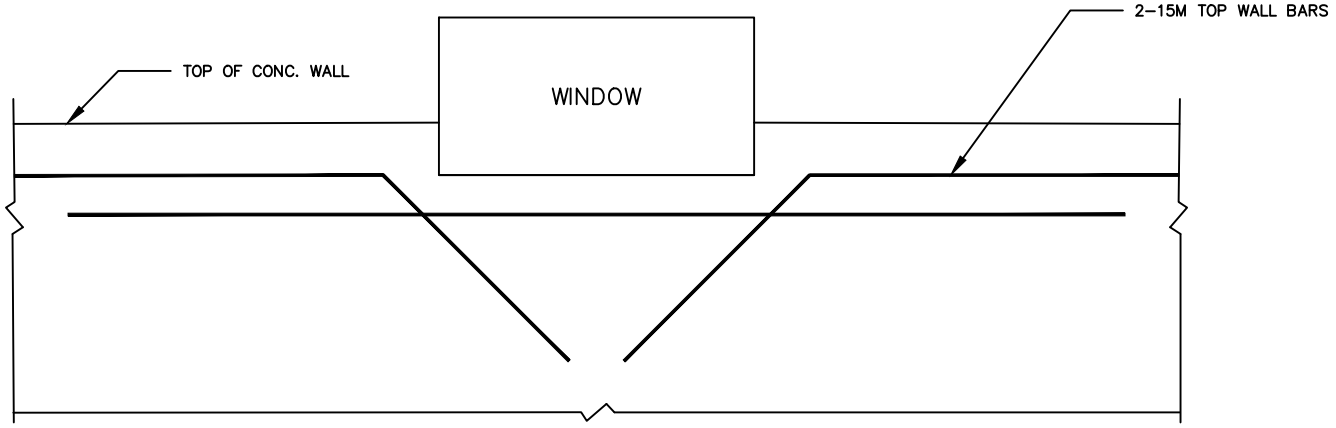
Typical Details



TYPICAL REINFORCED WALL



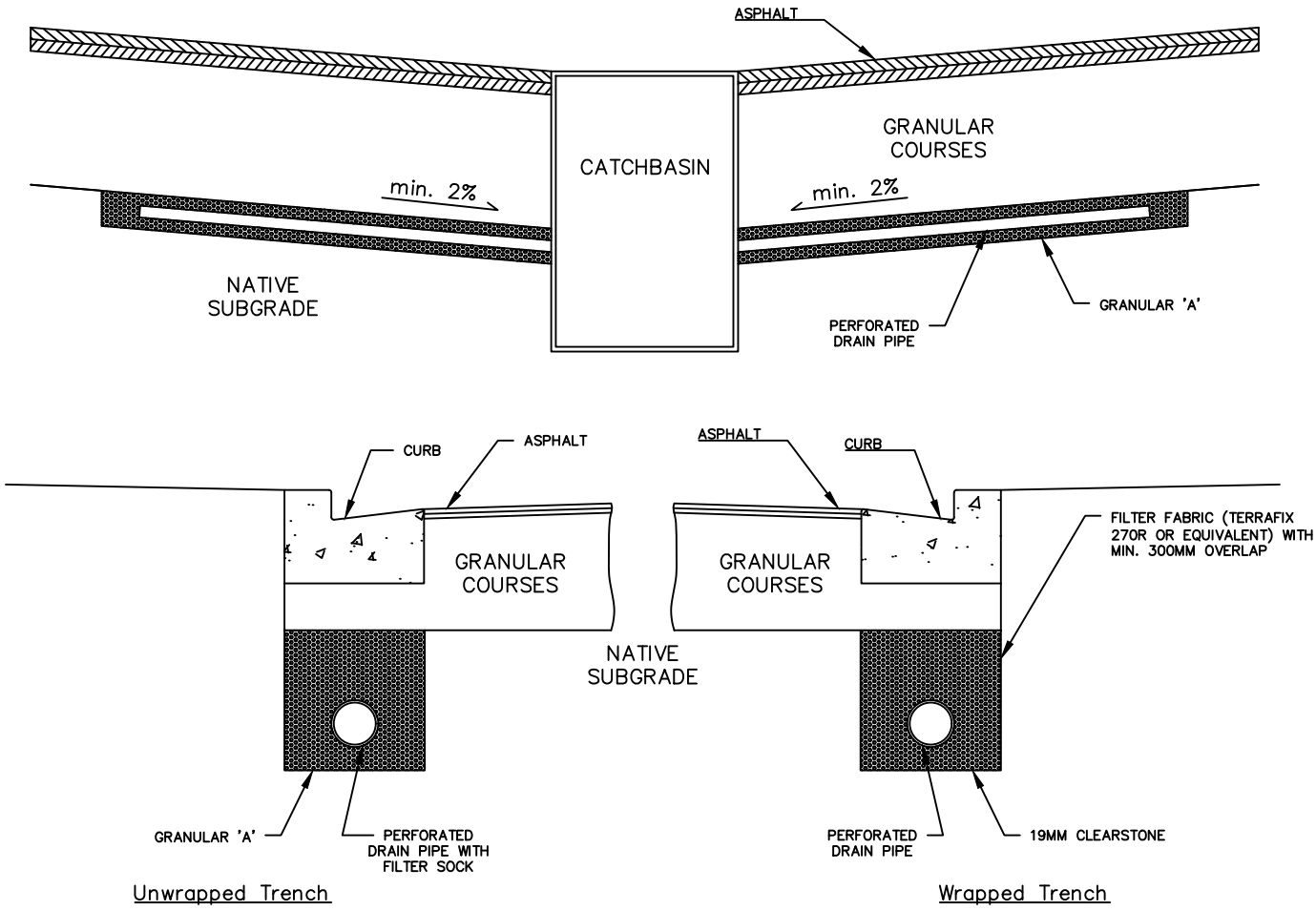
TYPICAL SPLICING AT CORNERS



TYPICAL WINDOW REINFORCING

GEI Consultants
647 Welham Rd, Unit 14, Barrie, ON, L4N 0B7

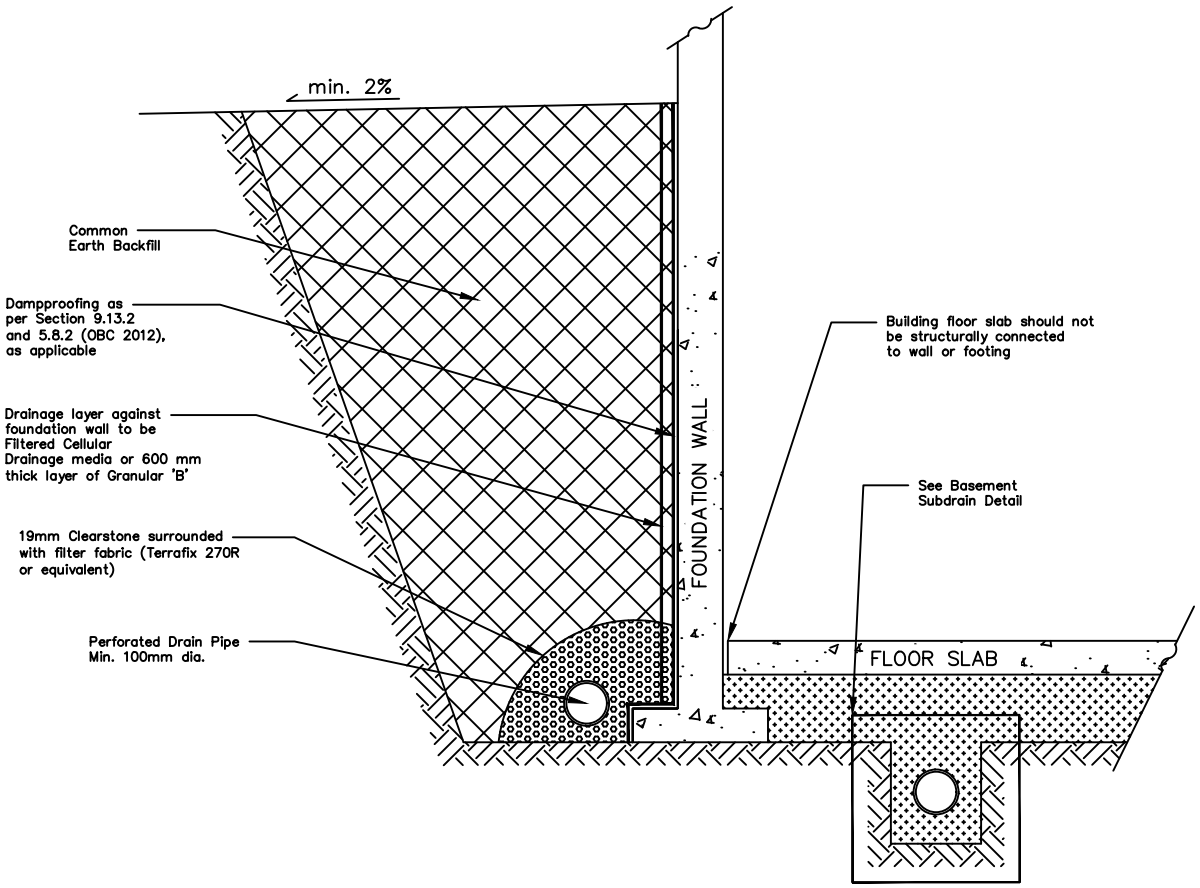
FOUNDATION WALL REINFORCING ON ENGINEERED FILL TYPICAL DETAIL

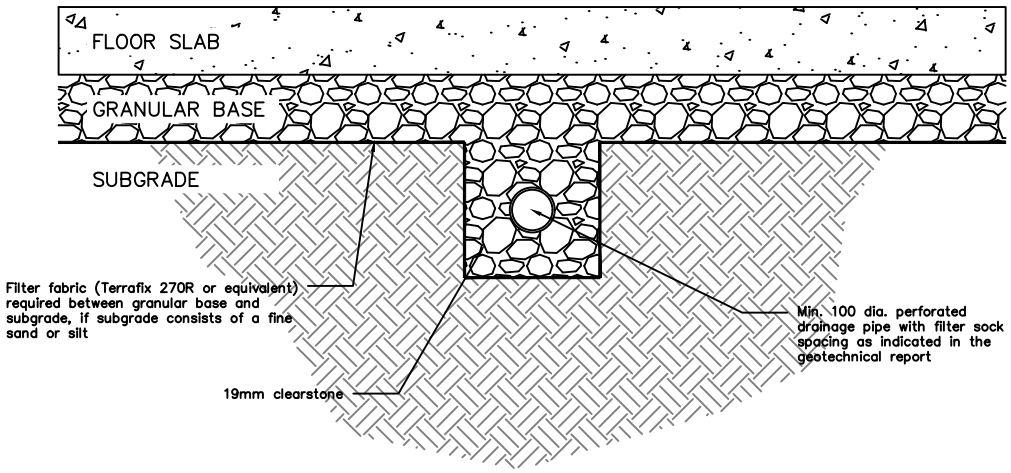


Urban Cross Sections

GEI Consultants
647 Welham Rd, Unit 14, Barrie, ON, L4N 0B7

PAVEMENT DRAINAGE ALTERNATIVES TYPICAL DETAILS





GEI Consultants
647 Welham Rd, Unit 14, Barrie, ON, L4N 0B7

BASEMENT FOUNDATION WALL & SUBFLOOR DRAINAGE TYPICAL DETAIL

Appendix D

Site Photographs



PHOTOGRAPH 1

GEI (2024)

Description:
View of buildings present at the site.



PHOTOGRAPH 2

GEI (2024)

Description:
View of pond near northwest corner of the site.



PHOTOGRAPH 3

GEI (2024)

Description:
View of field east of existing buildings. Photograph captured close to Hawkesville Road.



PHOTOGRAPH 4

GEI (2024)

Description:
View of existing buildings.



PHOTOGRAPH 5

GEI (2024)

Description:
View of railway to west of site.



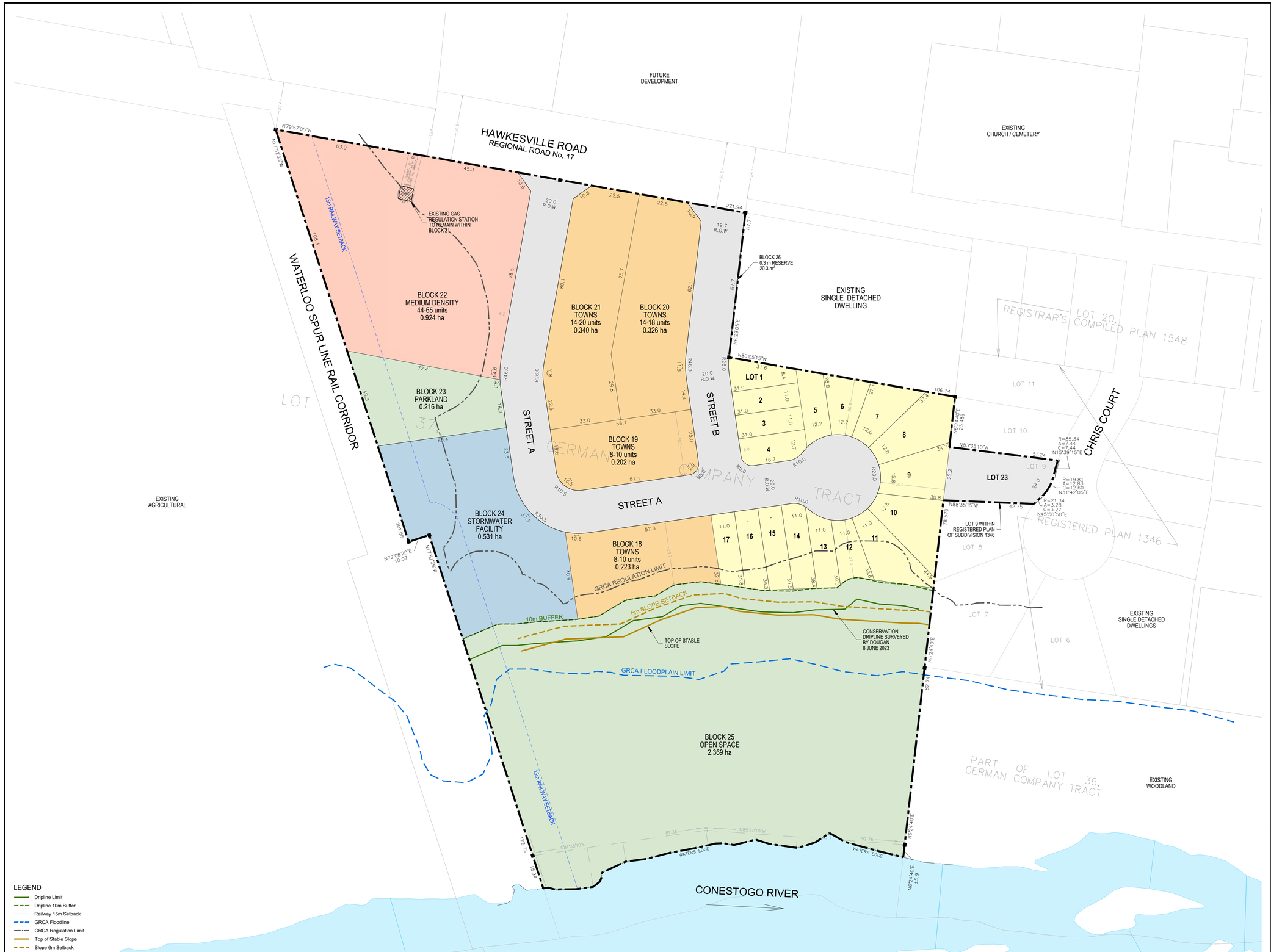
PHOTOGRAPH 6

GEI (2024)

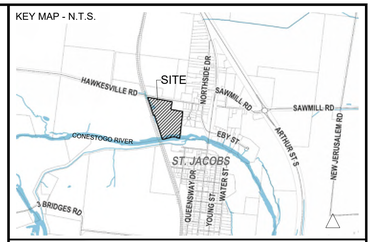
Description:
Side view of existing fill located near southwest corner of site.

Appendix E

Site Plan



KEY MAP - N.T.S.



DRAFT PLAN OF SUBDIVISION

PART OF LOT 37, GERMAN COMPANT TRACT,
TOWNSHIP OF WOOLWICH
REGIONAL MUNICIPALITY OF WATERLOO

51–55 HAWKESVILLE ROAD, ST. JACOBS

20 0 20 40 60
SCALE = 1:800 (metric)

LAND USE SCHEDULE

DESCRIPTION	LOTS/BLKS.	UNITS	AREA (ha.)
Single Detached	1-17	17	0.793
Street Townhouses	18-21	44-58	1.092
Medium Density	22	50-65	0.924
Existing Residential	23	1	0.110
Parkland	23	-	0.216
Stormwater Facility	24	-	0.531
Open Space	25	-	2.369
0.3 m Reserve	26	-	0.002
Public Roads	-	-	0.921
TOTAL		112-141	6.958

DENSITY	GROSS	NET
Area (ha)	6.958	4.589
Density (upha)	16.1 - 20.3	24.4 - 30.7
People & Jobs per ha. (P&J/ha)	62.7 - 78.1	41.4 - 51.5

NOTES:
1. Lot 9 within Registered Plan of Subdivision 1346 (municipally known as 9 Christ Court) forms part of the subject lands solely for the purpose of securing consent for the proposed easement through the current subdivision application. No changes are proposed to Lot 9, which is identified as proposed Lot 23, and so it will not form part of the Registered Plan of Subdivision following draft approval.
2. The limit of development is defined by a 10.0 metre conservation buffer measured from the surveyed dripline.

INFORMATION REQUIRED

UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O. 1990, c.P.13 AS AMENDED
INFORMATION REQUIRED BY CLAUSES a,b,c,d,e,f,f.1,g, j AND I ARE AS SHOWN ON THE DRAFT PLAN.

(h) Municipal Water Supply
(i) Silty Sands
(k) Municipal Sanitary and Storm Sewers

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

JASON ELLIOTT, O.L.S.
J.D. Barnes Limited

March 12, 2026
DATE

OWNER'S CERTIFICATE

I HEREBY CONSENT TO THE FILING OF THIS PLAN BY POLOCORP INC., IN DRAFT FORM

MIKE PUOPOLO
Polocorp Inc.

March 12, 2026
DATE

APPROVALS

REVISIONS		
DATE	BY	DESCRIPTION
2026.03.20	GFE	ISSUED FOR DPS (SUB. 1) & OPA / ZBA (SUB. 3)
2026.05.19	ND	ISSUED FOR DPS (SUB. 2) & OPA / ZBA (SUB. 4)

POLOCORP
379 Queen Street South
Kitchener, ON N2T 1W6
polocorpinc.com
519-745-3249

DATE: 2026.03.20 SCALE 1:800 (metric)
PROJECT: 1010 (Hawkesville) DRAWN BY: GFE
FILE: dps1010-2026.05.19 - ND.dwg

December 19, 2025
Project No. 2403070

VIA EMAIL: mike@polocorpinc.com

Attention: Mike Puopolo, CO-CEO
Polocorp Inc.
379 Queen Street South
Kitchener, ON N2G 1W6

Re: Geotechnical Review of Reports and New Drawing
Proposed Residential Development at 51-55 Hawkesville Road
St. Jacobs, Ontario

GEI Consultants Canada Ltd. (GEI) was retained by Polocorp Inc. (client) to review the existing geotechnical and slope stability reports for the site, compared to the latest site plans, and provide an overall conclusion that the site is developable from a geotechnical perspective.

The following reports were previously prepared by GEI:

- "Geotechnical Report, Proposed Residential Development, 51-55 Hawkesville Road, St. Jacobs, Ontario," File No. 2403070, dated January 23, 2025.
- "Slope Stability Report, Proposed Residential Development, 51-55 Hawkesville Road, St. Jacobs, Ontario," File No. 2403070, dated January 23, 2025.

GEI was provided with the following most recent site plan for review:

- "Draft Plan of Subdivision, Part of Lot 37, German Compant Tract, Township of Woolwich, Regional Municipality of Waterloo, 51 Hawkesville Road, St. Jacobs," dated 2025-12-10, by Polocorp.

Based on the subsurface conditions encountered, the results of the geotechnical investigation and slope stability analyses, and subject to the implementation of the recommendations and mitigation measures outlined in these reports, the site at 51–55 Hawkesville Road is considered readily developable for the proposed development from a geotechnical engineering perspective.

The identified soil and groundwater conditions are typical of the area and do not present constraints that would preclude development, provided that the recommended earthworks, foundation design, drainage controls, and slope stability measures are incorporated into the detailed design and construction phases.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, or if we can be of any further assistance, please do not hesitate to contact the undersigned.

Sincerely,

GEI Consultants Canada Ltd.





Russell Wiginton, P.Eng.
Senior Geotechnical Engineer

Isaac Asonya, P.Eng.
Senior Geotechnical Engineer

Appendix B Preliminary Sanitary Design Calculations

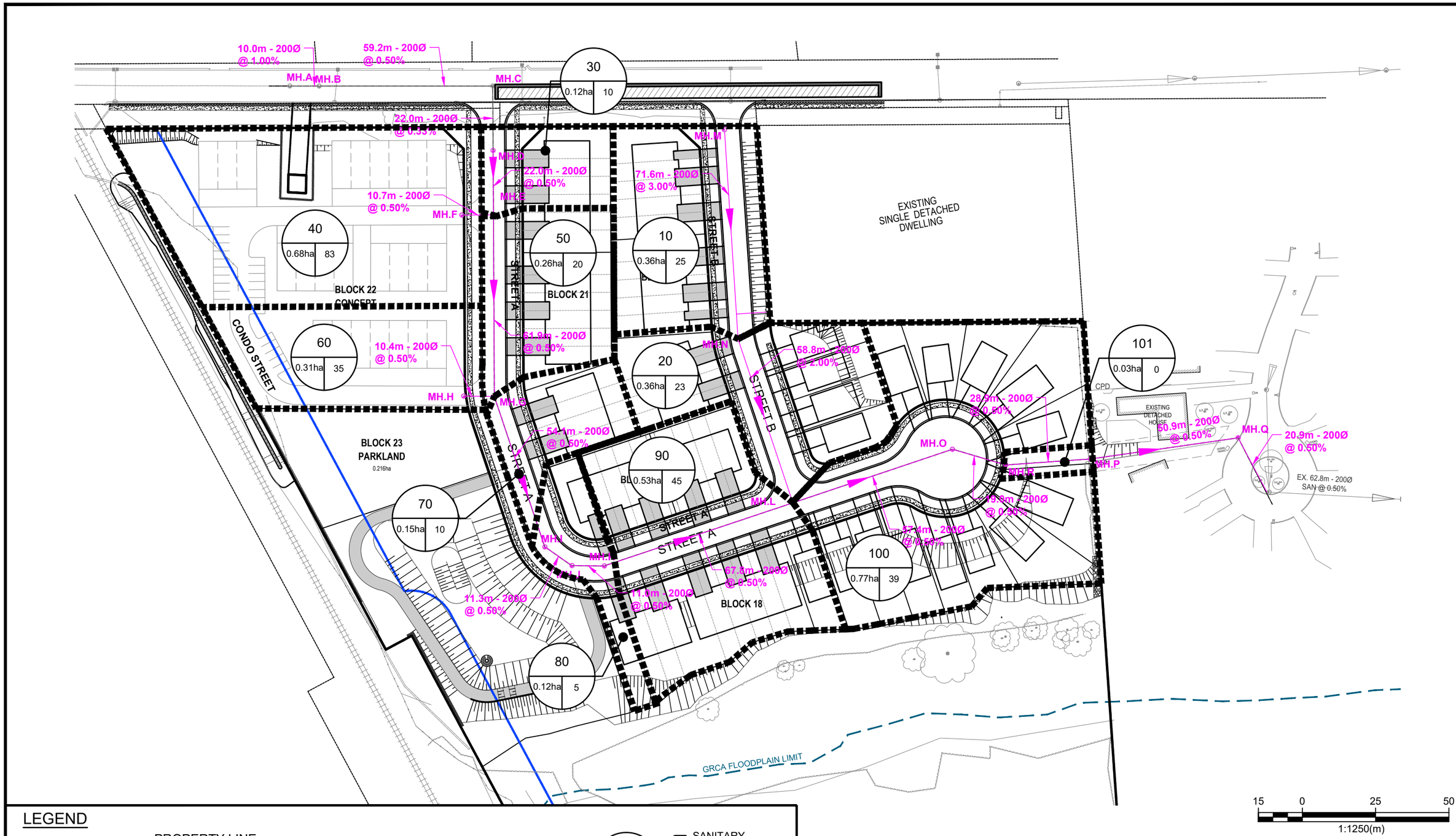
Item 1: Preliminary Sanitary Sewer Catchment Areas (Chris Court Option)

Item 2: Preliminary Sanitary Design Sheet (Chris Court Option)

Item 3: Preliminary Sanitary Sewer Design – Assessment of Flows to Chris Court

Item 4: Preliminary Sanitary Sewer Catchment Areas (Pumping Station Option)

Item 5: Preliminary Sanitary Design Sheet (Pumping Station Option)



LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER DRAINAGE AREA
- PROPOSED SANIATRY SEWER

10 — SANITARY DRAINAGE AREA NUMBER
0.25ha — DRAINAGE AREA IN HECTARES
50 — POPULATION

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

PRELIMINARY SANITARY SEWER CATCHMENT FIGURE
CHRIS COURT OPTION
(FORMERLY OPTION 3)

2401775 | MARCH 2026 | FIG No. 5A

PROJECT: **51 Hawkesville Road**

PRELIMINARY SANITARY SEWER DESIGN

51 Hawkesville Road

Township of Woolwich (St Jacobs)

Chris Court Option

DATE: 6/8/2026
DESIGNED BY: SJ
CHECKED BY: PG

Average Daily Flow

Residential:	305	L/c/d
Commercial:	0.5	L/s/ha
Industrial:	0.4	L/s/ha
Inst./School	0.25	L/s/ha

Industrial and Commercial Peaking Factor = 3.9

Q(i) = Cum. Area (ha) * Infiltration Rate / 1000
Infiltration Rate: 0.25 L/s/ha
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)

n = 0.013

Singles/Semis 3.25
Row Housing 2.44

Catchment	From M.H.	To M.H.	RESIDENTIAL AREA AND POPULATION								Commercial		Industustrial		Institutional		C+I+I	Total Cum. Area	Infiltration	Total Flow	Pipe					
			Area	Resident Type		Population	Cumulative		Peak Factor	Peak Flow	Area	Cum. Area	Area	Cum. Area	Area	Cum. Area	Peak Flow				Distance	Diameter	Slope	Capacity (Full)	Velocity	% of Full
			(ha)	Single/ Semis	Townhouses		Area (ha)	Population		(m^3/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(m^3/s)	(ha)	Q(i) = (m^3/s)	(m^3/s)	(m)	(mm)	(%)	(m^3/s)	Full (m/s)	
10	MH.M	MH.N	0.36		10	25	0.36	25	4.37	0.0004	-	-	-	-	-	-	0.00000	0.36	0.00009	0.00048	71.60	200	3.00	0.0568	1.808	0.84%
20	MH.N	MH.L	0.36	4	4	23	0.72	48	4.32	0.0007	-	-	-	-	-	-	0.00000	0.72	0.00018	0.00091	58.80	200	2.00	0.0464	1.477	1.96%
										-																
30	MH.D	MH.E	0.12		4	10	0.12	10	4.41	0.0002	-	-	-	-	-	-	0.00000	0.12	0.00003	0.00019	29.30	200	0.50	0.0232	0.738	0.80%
40	MH.F	MH.E	0.68		34	83	0.68	83	4.26	0.0012	-	-	-	-	-	-	0.00000	0.68	0.00017	0.00142	10.70	200	0.50	0.0232	0.738	6.12%
50	MH.E	MH.G	0.26		8	20	1.06	113	4.23	0.0017	-	-	-	-	-	-	0.00000	1.06	0.00027	0.00195	61.90	200	0.50	0.0232	0.738	8.41%
60	MH.H	MH.G	0.31		14	35	0.31	35	4.34	0.0005	-	-	-	-	-	-	0.00000	0.31	0.00008	0.00061	10.40	200	0.50	0.0232	0.738	2.65%
70	MH.G	MH.I	0.15		4	10	1.52	158	4.18	0.0023	-	-	-	-	-	-	0.00000	1.52	0.00038	0.00271	54.10	200	0.50	0.0232	0.738	11.70%
-	MH.I	MH.J	-		-	-	1.52	158	4.18	0.0023	-	-	-	-	-	-	0.00000	1.52	0.00038	0.00271	11.30	200	0.50	0.0232	0.738	11.70%
80	MH.J	MH.K	0.12		2	5	1.64	163	4.18	0.0024	-	-	-	-	-	-	0.00000	1.64	0.00041	0.00281	11.00	200	0.50	0.0232	0.738	12.13%
90	MH.K	MH.L	0.53	1	17	45	2.17	208	4.14	0.0030	-	-	-	-	-	-	0.00000	2.17	0.00054	0.00358	67.80	200	0.50	0.0232	0.738	15.45%
100	MH.L	MH.O	0.77	12		39	3.66	295	4.08	0.0043	-	-	-	-	-	-	0.00000	3.66	0.00092	0.00517	57.40	200	0.50	0.0232	0.738	22.26%
-	MH.O	MH.R	-		-	-	3.66	295	4.08	0.0043	-	-	-	-	-	-	0.00000	3.66	0.00092	0.00517	19.00	200	0.50	0.0232	0.738	22.26%
101	MH.R	MH.P	0.03		-	-	3.69	295	4.08	0.0043	-	-	-	-	-	-	0.00000	3.69	0.00092	0.00517	28.90	200	0.50	0.0232	0.738	22.30%
-	MH.P	MH.Q	-		-	-	3.69	295	4.08	0.0043	-	-	-	-	-	-	0.00000	3.69	0.00092	0.00517	50.90	200	0.50	0.0232	0.738	22.30%
-	MH.Q	EX. SAN	-		-	-	3.69	295	4.08	0.0043	-	-	-	-	-	-	0.00000	3.69	0.00092	0.00517	20.90	200	0.50	0.0232	0.738	22.30%

Notes: Population Density

Singles/semis:	3.25	person/unit
Row Townhouse:	2.44	person/unit
Apartment:	1.77	person/unit

PROJECT: **51-55 Hawkesville Road**

PRELIMINARY SANITARY SEWER DESIGN

Assessment of Flows to Chris Court (Option #3)

Township of Woolwich (St. Jacobs)

DATE: January 30, 2026
DESIGNED BY: SJ
CHECKED BY: PG

Average Daily Flow

Residential:	305	L/c/d
Commercial:	0.5	L/s/ha
Industrial:	0.4	L/s/ha
Inst./School	0.25	L/s/ha
Institutional Peaking Factor =	2.0	

Population Density

Singles/Semis	3.25	ppl/unit
Row Housing	2.44	ppl/unit
Apartment/Condominium	1.77	ppl/unit

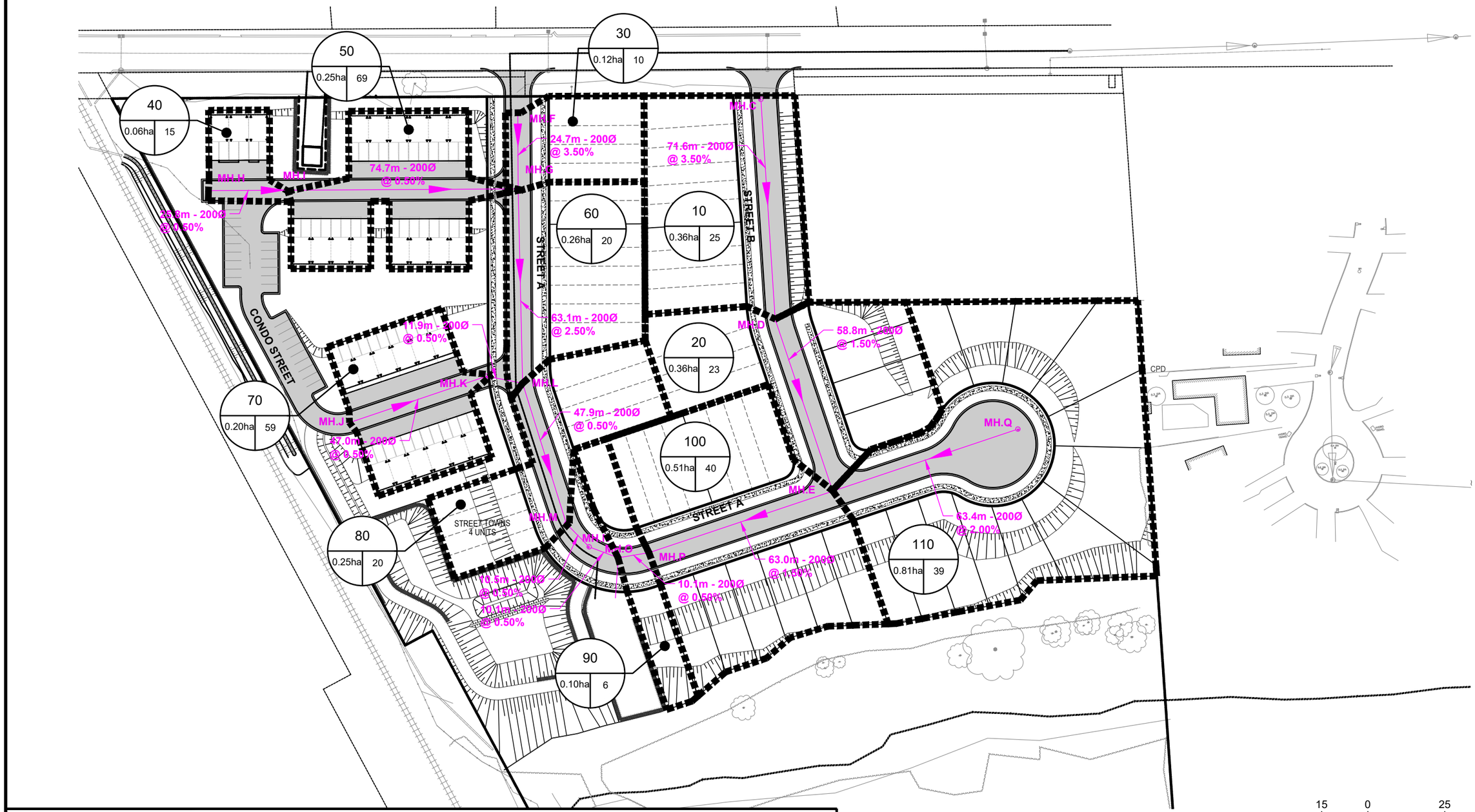
Q(i) = Cum. Area (ha) * Infiltration Rate / 1000
0.25 L/s/ha
Peaking Factor : F = 1 + (14/(4+P^0.5))
P = Population/1000

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)

n = 0.013

Catchment	From M.H.	To M.H.	RESIDENTIAL AREA AND POPULATION								Commercial		Industustrial		Institutional		C+I+I	Total Cum. Area	Infiltration	Total Flow	Pipe					
			Area	Resident Type		Population	Cumulative		Peak Factor	Peak Flow	Area	Cum. Area	Area	Cum. Area	Area	Cum. Area	Peak Flow				Distance	Diameter	Slope	Capacity (Full)	Velocity	% of Full
			(ha)	Single/ Semis	Townhouses		Area (ha)	Population		(m^3/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(m^3/s)	(ha)	Q(i) = (m^3/s)	(m^3/s)	(m)	(mm)	(%)	(m^3/s)	Full (m/s)	
52 Hawkesville Road			11.05			583	11.05	583	3.94	0.0081								11.05	0.00301	0.01112						
47 Hawkesville Road			0.22			12	0.22	12	4.41	0.0002						-	-	0.22	0.00031	0.00049						
56 Hawkesville Road			0.13			7	0.13	7	4.43	0.0001						-	-	0.13	0.00028	0.00039						
60 Hawkesville Road			0.25			13	0.25	13	4.40	0.0002						-	-	0.25	0.00031	0.00051						
51-55 Hawkesville Road	MH.T	EX. SAN	4.48	16	123	309	16.13	924	3.82	0.0125	-	-	-	-	-	-	-	16.13	0.00428	0.01675						
Chris Court	EX.SAN	Downstream	1.82	11		36	17.95	960	3.81	0.0129						-	-	17.95	0.00474	0.01765	62.79	200	0.50	0.0232	0.738	72.19%

Property	Density (ppl/ha)
47 Hawkesville Road	51.0
51-55 Hawkesville Road	68.97
52 Hawkesville Road	52.73
56 Hawkesville Road	51.0
58 Hawkesville Road	51.0



15 0 25 50

1:1250(m)

LEGEND

- PROPERTY LINE
- PROPOSED SANITARY SEWER DRAINAGE AREA
- PROPOSED SANIATRY SEWER

10 — SANITARY DRAINAGE AREA NUMBER
0.25ha — DRAINAGE AREA IN HECTARES
50 — POPULATION

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

PRELIMINARY SANITARY SEWER CATCHMENT FIGURE
PUMPING STATION OPTION
(FORMERLY OPTION 1)

2401775 | MARCH 2026 | FIG No. 5B

PROJECT: **51 Hawkesville Road**

PRELIMINARY SANITARY SEWER DESIGN

51 Hawkesville Road

Township of Woolwich (St Jacobs)

Pumping Station Option

DATE: 10/17/2025
DESIGNED BY: SJ
CHECKED BY: PG

Residential:	305 L/c/d
Commercial:	0.5 L/s/ha
Industrial:	0.4 L/s/ha
Inst./School	0.25 L/s/ha
Industrial and Commercial Peaking Factor =	3.9

Q(i) = Cum. Area (ha) * Infiltration Rate / 1000
Infiltration Rate: 0.25 L/s/ha
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)

n = 0.013

Singles/Semis	3.25
Row Housing	2.44

Catchment	From M.H.	To M.H.	RESIDENTIAL AREA AND POPULATION							Commercial		Industustrial		Institutional		C+I+I	Total Cum. Area	Infiltration	Total Flow	Pipe					
			Area	Resident Type		Population	Cumulative		Peak Factor	Peak Flow	Area	Cum. Area	Area	Cum. Area	Area	Cum. Area	Peak Flow				Distance	Diameter	Slope	Capacity (Full)	Velocity	% of Full
			(ha)	Single/ Semis	Townhouses		Area (ha)	Population		(m^3/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(m^3/s)	(ha)	Q(i) = (m^3/s)	(m^3/s)	(m)	(mm)	(%)	(m^3/s)	Full (m/s)	
10	MH.C	MH.D	0.36		10	25	0.36	25	4.37	0.0004	-	-	-	-	-	-	0.00000	0.36	0.00034	0.00073	71.60	200	3.50	0.0614	1.954	1.18%
20	MH.D	MH.E	0.36	4	4	23	0.72	48	4.32	0.0007	-	-	-	-	-	-	0.00000	0.72	0.00043	0.00116	58.80	200	1.50	0.0402	1.280	2.89%
110	MH.Q	MH.E	0.81	12		39	0.81	39	4.34	0.0006	-	-	-	-	-	-	0.00000	0.81	0.00045	0.00105	63.40	200	2.00	0.0464	1.477	2.26%
100	MH.E	MH.P	0.51	6	8	40	2.04	127	4.21	0.0019	-	-	-	-	-	-	0.00000	2.04	0.00076	0.00265	63.00	200	1.50	0.0402	1.280	6.59%
90	MH.P	MH.O	0.10	1	1	6	2.14	133	4.21	0.0020	-	-	-	-	-	-	0.00000	2.14	0.00079	0.00276	10.10	200	0.50	0.0232	0.738	11.90%
30	MH.F	MH.G	0.12		4	10	0.12	10	4.41	0.0002	-	-	-	-	-	-	0.00000	0.12	0.00028	0.00044	24.70	200	3.50	0.0614	1.954	0.71%
40	MH.H	MH.I	0.06		6	15	0.06	15	4.40	0.0002	-	-	-	-	-	-	0.00000	0.06	0.00027	0.00050	25.80	200	0.50	0.0232	0.738	2.15%
50	MH.I	MH.G	0.25		28	69	0.31	84	4.26	0.0013	-	-	-	-	-	-	0.00000	0.31	0.00033	0.00159	74.70	200	0.50	0.0232	0.738	6.86%
60	MH.G	MH.L	0.26		8	20	0.69	114	4.23	0.0017	-	-	-	-	-	-	0.00000	0.69	0.00042	0.00212	63.10	200	2.50	0.0519	1.652	4.09%
70	MH.J	MH.K	0.20		24	59	0.20	59	4.30	0.0009	-	-	-	-	-	-	0.00000	0.20	0.00030	0.00120	47.00	200	0.50	0.0232	0.738	5.15%
-	MH.K	MH.L	-		-	-	0.20	59	4.30	0.0009	-	-	-	-	-	-	0.00000	0.20	0.00030	0.00120	11.90	200	0.50	0.0232	0.738	5.15%
80	MH.L	MH.M	0.25		8	20	1.14	193	4.15	0.0028	-	-	-	-	-	-	0.00000	1.14	0.00054	0.00336	47.90	200	0.50	0.0232	0.738	14.50%
-	MH.M	MH.N	0.04		-	-	1.18	193	4.15	0.0028	-	-	-	-	-	-	0.00000	1.18	0.00055	0.00338	10.50	200	0.50	0.0232	0.738	14.55%
-	MH.N	MH.O	0.02		-	-	1.20	193	4.15	0.0028	-	-	-	-	-	-	0.00000	1.20	0.00055	0.00338	10.10	200	0.50	0.0232	0.738	14.57%
-	MH.O	Private SPS				-	3.34	326	4.06	0.0047	-	-	-	-	-	-	0.00000	3.34	0.00109	0.00576	13.10	200	2.00	0.0464	1.477	12.42%

Notes: Population Density

Singles/semis:	3.25	person/unit
Row Townhouse:	2.44	person/unit
Apartment:	1.77	person/unit

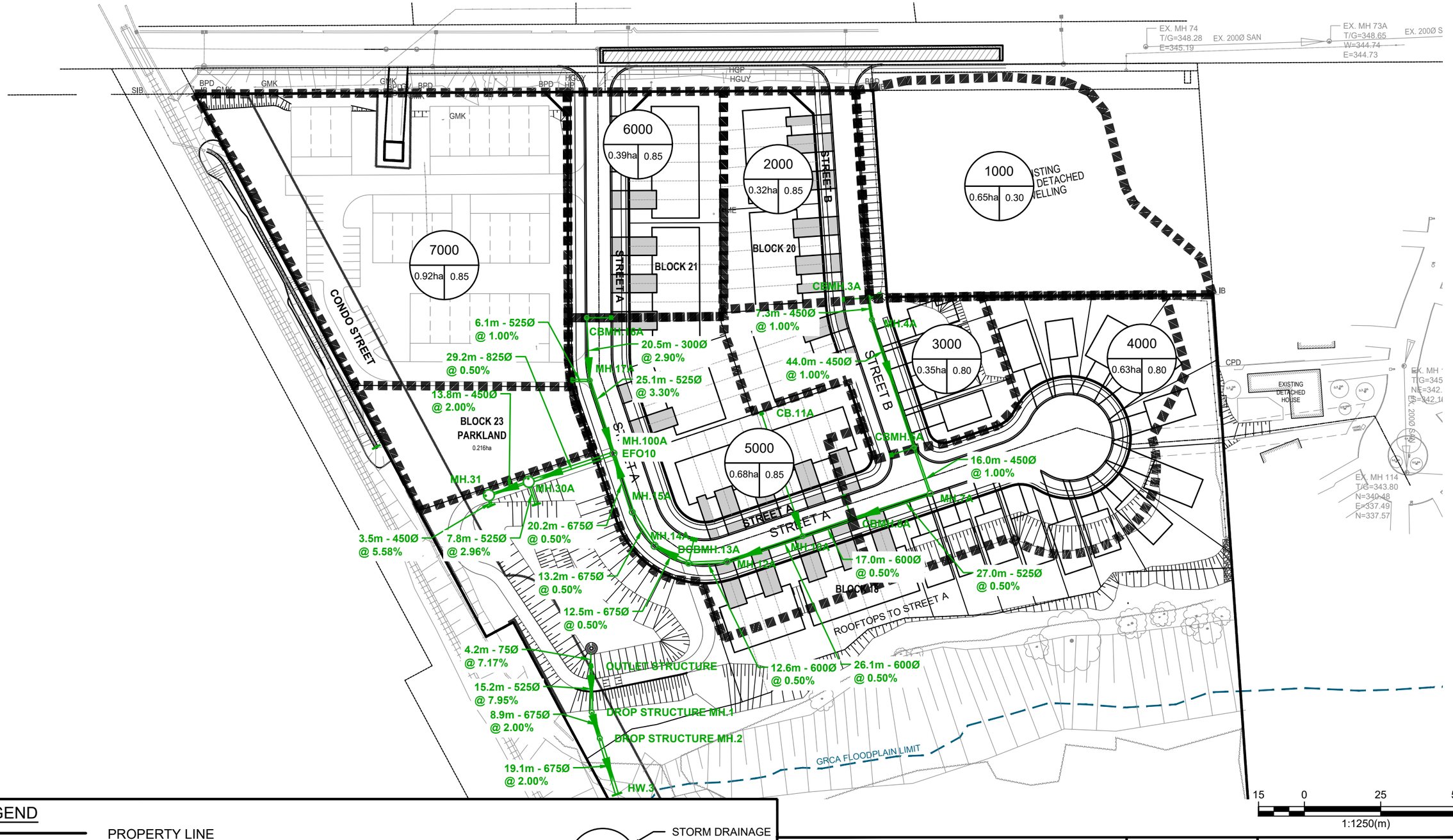
Appendix C Preliminary Storm Sewer Design Calculations

Item 1: Preliminary Storm Sewer Catchment Areas (Chris Court Option)

Item 2: Preliminary Storm Design Sheet (Chris Court Option)

Item 3: Preliminary Storm Sewer Catchment Areas (Pumping Station Option)

Item 4: Preliminary Storm Design Sheet (Pumping Station Option)



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER DRAINAGE AREA
- PROPOSED STORM SEWER

A1POST
0.25ha 0.50

- STORM DRAINAGE AREA NUMBER
- RUNOFF COEFFICIENT
- DRAINAGE AREA IN HECTARES

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

PRELIMINARY STORM SEWER CATCHMENT FIGURE
CHRIS COURT OPTION
(FORMERLY OPTION 3)

2401775 | MARCH 2026 | FIG No. 6A

City of Kitchener Design Storm Event:

5 yr		2 yr	
A =	1593	A =	743
B =	11	B =	6
C =	0.8789	C =	0.7989

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

PRELIMINARY STORM SEWER DESIGN

51-55 Hawkesville Road

Township of Woolwich (St Jacobs)

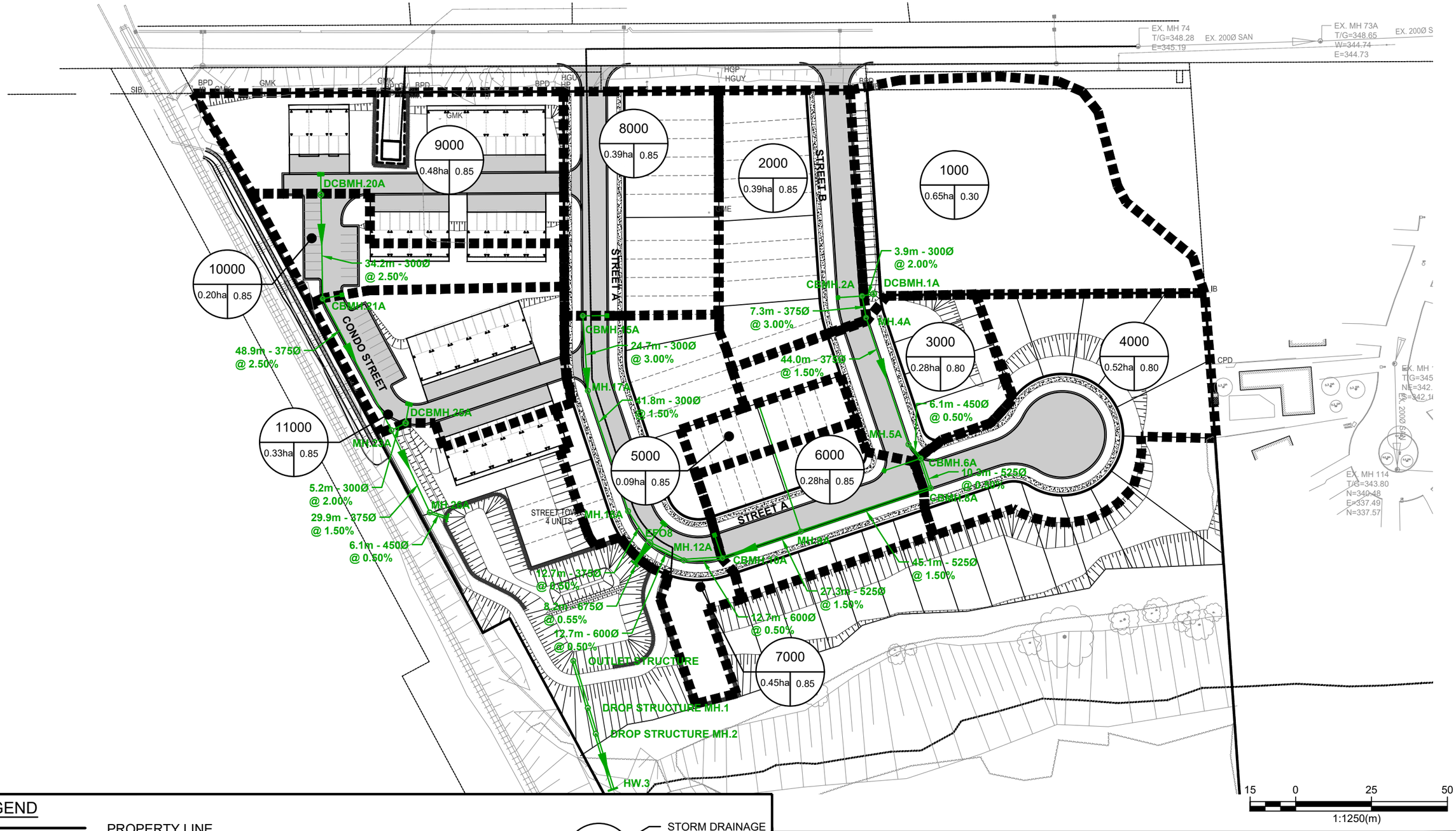
Chris Court Option

Date: 6/8/2026

Designed By: SJ
Checked By PG
File: 2401775-421067

CATCHMENT ID	From	To	Area (ha)	Cumulative Area (ha)	Runoff Coefficient	A x C	Cumulative A x C	Time of Conc. (min.)	Intensity (mm/hr)	Flow (m^3/s)	Proposed Sewer							% of Full	Actual Velocity (m/s)
											Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Time of Flow (min.)		
1000	Overland Flow	CBMH.3A	0.65	0.65	0.30	0.20	0.20	10.00	109.68	**0.059**									
2000	CBMH.3A	MH.4A	0.32	0.97	0.85	0.27	0.47	10.00	109.68	**0.142**	7.3	450	0.013	1.00	0.296	1.86	0.07	48.02	1.83
--	MH.4A	CBMH.5A	-	0.97	0.85	0.00	0.47	11.83	101.93	**0.132**	44.0	450	0.013	1.00	0.296	1.86	0.39	44.63	1.81
3000	CBMH.5A	MH.7A	0.35	1.32	0.80	0.28	0.75	11.83	101.93	**0.212**	16.0	450	0.013	1.00	0.296	1.86	0.14	71.39	2.02
--	MH.7A	CBMH.8A	-	1.32	0.80	0.00	0.75	11.97	101.37	**0.210**	27.0	525	0.013	0.50	0.316	1.46	0.31	66.57	1.56
4000	CBMH.8A	MH.10A	0.63	1.95	0.80	0.50	1.25	12.28	100.19	**0.348**	17.0	600	0.013	0.50	0.451	1.60	0.18	77.17	1.77
---	MH.10A	MH.12A	-	1.95	0.80	0.00	1.25	12.45	99.52	**0.346**	26.1	600	0.013	0.50	0.451	1.60	0.27	76.66	1.77
---	MH.12A	DCBMH.13A	-	1.95	0.80	0.00	1.25	12.73	98.52	**0.342**	12.6	600	0.013	0.50	0.451	1.60	0.13	75.88	1.76
5000	DCBMH.13A	MH.14A	0.68	2.63	0.85	0.58	1.83	12.86	98.04	**0.498**	12.5	675	0.013	0.50	0.618	1.73	0.12	80.65	1.92
---	MH.14A	MH.15A	-	2.63	0.85	0.00	1.83	12.98	97.61	**0.496**	13.2	675	0.013	0.50	0.618	1.73	0.13	80.29	1.92
---	MH.15A	EFO10	-	2.63	0.85	0.00	1.83	13.11	97.15	**0.494**	20.2	675	0.013	0.50	0.618	1.73	0.20	79.91	1.92
6000	CBMH.16A	MH.17A	0.39	0.39	0.85	0.33	0.33	10.00	109.68	**0.101**	20.5	300	0.013	2.90	0.171	2.42	0.14	59.02	2.52
7000	Catchment 7000	MH17A	0.92	0.92	0.85	0.78	0.78	10.00	109.68	**0.238**	8.4	525	0.013	1.00	0.447	2.06	0.07	53.31	2.11
---	MH.17A	EFO10	-	1.31	0.85	0.00	1.11	10.14	109.03	**0.337**	25.1	525	0.013	3.30	0.812	3.75	0.11	41.54	3.56
---	EFO10	MH.30A	-	3.94	0.80	0.00	2.94	13.30	96.47	**0.788**	29.2	825	0.013	0.50	1.055	1.97	0.25	74.76	2.17
*2 YEAR STORM FLOWS	MH.30A	HW1	-	3.94	0.80	0.00	2.94	13.55	69.11	**0.565**	7.8	525	0.013	2.96	0.769	3.55	0.04	73.47	3.89
5 YEAR STORM FLOWS				3.94	0.80	0.00	2.94	13.55	95.61	**0.782**									
flows to MH19A	MH.30A	MH.31	-	3.94	0.80	0.00	2.94	13.59	95.49	**0.217**	13.8	450	0.013	2.00	0.419	2.63	0.09	51.71	2.66
	MH.31	HW2	-	3.94	0.80	0.00	2.94	13.67	95.19	**0.217**	3.5	450	0.013	5.58	0.700	4.40	0.01	30.96	3.92
---	POND OUTLET*	DROP STRUCTURE MH.1					2.48	10.00	109.68	**0.756**	16.1	525	0.013	7.50	1.224	5.65	0.05	61.74	5.94
---	DROP STRUCTURE MH.1	DROP STRUCTURE MH.2					2.48	10.05	109.46	**0.754**	8.9	675	0.013	2.00	1.235	3.45	0.04	61.04	3.62
---	DROP STRUCTURE MH.2	HW.3					2.48	10.09	109.26	**0.753**	19.1	675	0.013	2.00	1.24	3.45	0.09	60.93	3.62

*cumulative AxC for the POND OUTLET was adjusted to reflect the 100-year design flow discharge rate from the pond



LEGEND

- PROPERTY LINE
- PROPOSED STORM SEWER DRAINAGE AREA
- PROPOSED STORM SEWER

A1POST (0.25ha | 0.50)

- STORM DRAINAGE AREA NUMBER
- DRAINAGE AREA IN HECTARES
- RUNOFF COEFFICIENT

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

PRELIMINARY STORM SEWER CATCHMENT FIGURE
PUMPING STATION OPTION
(FORMERLY OPTION 1)

2401775 | MARCH 2026 | FIG No. 6B

City of Kitchener

5 -Year Design Storm Event
A = 1593
B = 11
C = 0.8789
Intensity = A / (t + B)^C

PRELIMINARY STORM SEWER DESIGN

51-55 Hawkesville Road

Township of Woolwich (St Jacobs)

Pumping Station Option

Date: 12/19/2025
Designed By: SJ
Checked By PG
File: 2401775-421067

CATCHMENT ID	From	To	Area (ha)	Cumulative Area (ha)	Runoff Coefficient	A x C	Cumulative A x C	Time of Conc. (min.)	Intensity (mm/hr)	Flow (m^3/s)	Proposed Sewer							% of Full	Actual Velocity (m/s)
											Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Time of Flow (min.)		
1000	DCBMH.1A	CBMH.2A	0.65	0.65	0.30	0.20	0.20	10.00	109.68	**0.059**	3.9	300	0.013	2.00	0.137	1.93	0.03	43.44	1.95
2000	CBMH.2A	MH.4A	0.39	1.04	0.60	0.23	0.43	10.03	109.52	**0.131**	7.3	375	0.013	3.00	0.304	2.75	0.04	42.98	2.78
---	MH.4A	MH.5A	-	1.04	0.60	0.00	0.43	10.08	109.32	**0.130**	44.0	375	0.013	1.50	0.215	1.94	0.38	60.67	2.13
---	MH.5A	CBMH.6A	-	1.04	0.60	0.00	0.43	10.46	107.63	**0.128**	6.1	450	0.013	0.50	0.202	1.27	0.08	63.62	1.41
3000	CBMH.6A	CBMH.8A	0.28	1.32	0.45	0.13	0.56	10.54	107.28	**0.165**	10.3	525	0.013	0.50	0.304	1.40	0.12	54.39	1.50
4000	CBMH.8A	MH.9A	0.52	1.84	0.45	0.23	0.79	10.66	106.75	**0.234**	45.1	525	0.013	1.50	0.527	2.43	0.31	44.42	2.48
5000	RYCB.4A	MH.9A	0.09	1.41	0.60	0.06	0.06	10.00	109.68	**0.017**	43.8	300	0.013	2.00	0.137	1.93	0.38	12.43	1.39
---	MH.9A	CBMH.10A	-	3.25	0.60	0.00	0.84	10.97	105.43	**0.247**	27.3	525	0.013	1.50	0.527	2.43	0.19	46.97	2.51
6000	CBMH.10A	MH.12A	0.28	3.53	0.45	0.13	0.97	11.15	104.64	**0.282**	12.7	600	0.013	0.50	0.434	1.54	0.14	64.99	1.69
---	MH.12A	EFO8	-	3.53	0.60	0.00	0.97	11.29	104.07	**0.281**	12.7	600	0.013	0.50	0.434	1.54	0.14	64.64	1.69
8000	CBMH.15A	MH.17A	0.39	0.39	0.60	0.23	0.23	10.00	109.68	**0.071**	24.7	300	0.013	3.00	0.167	2.37	0.17	42.56	2.39
---	MH.17A	MH.18A	-	0.39	0.60	0.00	0.23	10.17	108.89	**0.071**	41.8	300	0.013	1.50	0.118	1.68	0.42	59.76	1.83
---	MH.18A	EFO8	-	0.39	0.60	0.00	0.23	10.59	107.04	**0.070**	12.7	375	0.013	0.50	0.124	1.12	0.19	56.12	1.21
7000	EFO8	HW1	0.45	4.37	0.60	0.27	1.47	11.43	103.51	**0.424**	8.2	675	0.013	0.55	0.623	1.74	0.08	68.02	1.94
9000	DCBMH.20A	CBMH.21A	0.48	0.48	0.60	0.29	0.29	10.00	109.68	**0.088**	34.2	300	0.013	2.50	0.153	2.16	0.26	57.39	2.34
10000	CBMH.21A	MH.23A	0.20	0.68	0.60	0.12	0.41	10.26	108.48	**0.123**	48.9	375	0.013	2.50	0.277	2.51	0.32	44.35	2.56
11000	DCBMH.25A	MH.23A	0.33	0.33	0.60	0.20	0.20	10.00	109.68	**0.060**	5.2	300	0.013	2.00	0.137	1.93	0.04	44.11	1.97
---	MH.23A	MH.26A	-	1.01	0.60	0.00	0.61	10.59	107.05	**0.180**	29.9	375	0.013	2.00	0.248	2.25	0.22	72.67	2.53
---	MH.26A	HW2	-	1.01	0.60	0.00	0.61	10.81	106.09	**0.179**	6.1	450	0.013	1.50	0.349	2.20	0.05	51.14	2.31
---	POND OUTLET*	DROP STRUCTURE MH.1	-	1.01	0.60	0.00	1.94	10.00	109.68	**0.592**	16.2	600	0.013	4.10	1.243	4.40	0.06	47.61	4.53
---	DROP STRUCTURE MH.1	DROP STRUCTURE MH.2	-	1.01	0.60	0.00	1.94	10.06	109.40	**0.590**	8.9	600	0.013	2.00	0.868	3.07	0.05	68.00	3.42
---	DROP STRUCTURE MH.2	HW.3	-	1.01	0.60	0.00	1.94	10.11	109.18	**0.589**	19.1	600	0.013	2.00	0.868	3.07	0.10	67.86	3.42

*cumulative AxC for the POND OUTLET was adjusted to reflect the 100-year design flow discharge rate from the pond

Appendix D Pre-Development Conditions Stormwater Management Analysis

Item 1: Catchment 100 Impervious Area Calculation

Item 2: Pre-Development Catchment SCS Numbers

Item 3: Visual OTTHYMO Pre-Development Condition Output Files



NOTE:
EXTERNAL EXISTING CONTOURS AT PROPERTY #47 HAWKESVILLE ROAD
(CATCHMENT 300) FROM GRCA ONLINE WEB MAP, RETRIEVED 2024-12-03.

30 0 20 40 80
1:2000 (m)

LEGEND

- PROPERTY LINE
- EXISTING STORM DRAINAGE AREA
- EXISTING OVERLAND FLOW DIRECTION

A1POST (STORM DRAINAGE AREA NUMBER)
0.25ha (DRAINAGE AREA IN HECTARES) 50 (PERCENT IMPERVIOUS)

51 HAWKESVILLE ROAD
ST. JACOBS, ONTARIO

POLOCORP INC.

GEI Consultants

2401775

PRE-DEVELOPMENT
STORMWATER
MANAGEMENT FIGURE

SEPTEMBER 2025 FIG No. 3

Pre-Development Catchment SCS Numbers
51 Hawkesville Road
Project: 2401775
8-Jun-26

Curve Number

CATCHMENT	Area (ha.)	Soil Group	Landuse	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)
100	0.175	C	(1)	98	99
	0.319	C	(2)	89	94
	3.036	C	(3)	79	89
Total (100)	**3.530**	-	-	**81**	**90**
200	0.590	C	(4)	73	86
	1.500	C	(3)	79	89
Total (200)	**2.090**	-	-	**78**	**89**
300	0.250	C	(1)	98	99
	0.350	C	(3)	79	89
Total (300)	**0.600**	-	-	**87**	**94**
400	0.020	C	(1)	98	99
	0.180	C	(2)	89	94
	1.030	C	(3)	79	89
Total (400)	**1.230**	-	-	**81**	**90**
Total	**7.450**	-	-	-	-

SCS CURVE PARAMETERS	A	B	C	D
(1) Paved Parking Lots, roofs, driveway, etc	98	98	98	98
(2) Gravel (Including right-of-way)	76	85	89	91
(3) Open space (lawns, parks, golf course, cemeteries, etc.)	51	68	79	84
(4) Woods (fair)	36	60	73	79

Urban Hydrology for Small Watershed (TR-55) User Manual

Intial Abstraction

CATCHMENT	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)	S	IA (mm)
100	81	90	28.2	4.23
200	78	89	31.4	3.14
300	87	94	16.2	2.43
400	81	90	28.2	4.23

1.0mm ≤ IA ≤5.0mm

CN ≤ 70 IA = 0.075 X S

CN > 70 ≤ 80 IA = 0.10 X S

CN > 80 ≤ 90 IA = 0.15 X S

CN > 90 IA = 0.2 X S

S = (25400 / CN) - 254

Standhyd Catchments:

Pervious area depression storage=5mm

Impervious area depression storage =1mm

Time to Peak

CATCHMENT	L (m)	Sw (%)	C	Tc (min.)	TP (hr) of IUH
100	200	4.7	0.30	23	0.26
200	110	13	0.20	14	0.16
300	70	7.2	0.31	12	0.14
400	100	4	0.38	15	0.17

AIRPORT FORMULA (C < 0.4) $Tc = 3.26 X (1.1 - C) X L0.5 / SW^{0.33}$

Bransby Williams (C>0.4) $Tc = 0.057 X L / (SW^{0.2} X A^{0.1})$

Where:

Tc = Time of concentration

L= Watershed length, m

Sw = Watershed slope %

A=Watershed area, ha

C = Runoff Coefficient, C=0.2 x (1-I) + 0.9 x I

I= Impervious Ratio

Tp=Time to peak: (N-1)/NxTc

N = 3, Number of linear reservoirs

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 06/08/2026                          TIME: 03:55:03

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
-----------------------
  ********************************************
  ** SIMULATION : City of Kitchener - 25mm      **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 509.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.799
```

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.47	1.00	6.93	2.00	4.30	3.00	1.98
0.08	1.56	1.08	10.85	2.08	3.90	3.08	1.90
0.17	1.67	1.17	25.26	2.17	3.57	3.17	1.83
0.25	1.80	1.25	74.93	2.25	3.29	3.25	1.76
0.33	1.94	1.33	32.48	2.33	3.06	3.33	1.70
0.42	2.12	1.42	18.06	2.42	2.86	3.42	1.64
0.50	2.33	1.50	12.36	2.50	2.68	3.50	1.59
0.58	2.60	1.58	9.37	2.58	2.53	3.58	1.54
0.67	2.95	1.67	7.55	2.67	2.40	3.67	1.50
0.75	3.42	1.75	6.33	2.75	2.28	3.75	1.45
0.83	4.10	1.83	5.46	2.83	2.17	3.83	1.41
0.92	5.13	1.92	4.81	2.92	2.07	3.92	1.37

CALIB NASHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 2.09	Curve Number (CN)= 78.0
	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.16	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83

0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.035 (i)
TIME TO PEAK (hrs)= 1.550

RUNOFF VOLUME (mm)= 5.121
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.205

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0003)	Area (ha)=	0.60	Curve Number (CN)= 87.0
ID= 1 DT= 1.0 min	Ia (mm)=	2.43	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.14	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59

0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.019 (i)
TIME TO PEAK (hrs)= 1.500
RUNOFF VOLUME (mm)= 8.432
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.337

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)=	81.0
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.26		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45

0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.046 (i)
TIME TO PEAK (hrs)= 1.700
RUNOFF VOLUME (mm)= 5.380
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.215

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0006)
ID= 1 DT= 1.0 min

Area (ha)= 1.23
Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90

0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37

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               0.967    5.13 | 1.967    4.81 | 2.967    2.07 |  3.97    1.37
               0.983    5.13 | 1.983    4.81 | 2.983    2.07 |  3.98    1.37
               1.000    5.13 | 2.000    4.81 | 3.000    2.07 |  4.00    1.37

     Max.Eff.Inten.(mm/hr)=      74.93         6.34
               over (min)         5.00        32.00
     Storage Coeff.  (min)=       1.89 (ii)   31.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00        32.00
     Unit Hyd. peak  (cms)=       0.38         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.01          0.022 (iii)
     TIME TO PEAK    (hrs)=       1.37         1.98           1.37
     RUNOFF VOLUME    (mm)=      24.03         5.26           7.12
     TOTAL RAINFALL   (mm)=      25.03        25.03          25.03
     RUNOFF COEFFICIENT   =       0.96         0.21           0.28

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.046     1.70     5.38
      + ID2= 2 (  0002):     2.09   0.035     1.55     5.12
        ================================================
        ID = 3 (  0004):     5.62   0.076     1.63     5.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.076     1.63     5.28
      + ID2= 2 (  0003):     0.60   0.019     1.50     8.43
        ================================================
        ID = 1 (  0004):     6.22   0.093     1.60     5.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   0.093     1.60     5.59
      + ID2= 2 (  0006):     1.23   0.022     1.37     7.12
        ================================================
        ID = 3 (  0004):     7.45   0.101     1.60     5.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2d
ae3c72-89f8-44e7-87c7-f009548dbcb6\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2d
ae3c72-89f8-44e7-87c7-f009548dbcb6\s


DATE: 06/08/2026                          TIME: 03:55:03

USER:



COMMENTS: _____________________________________________________________
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  ***********************************************
  ** SIMULATION : City of Kitchener - 25yr      **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3258.000
| Ptotal= 70.23 mm |                          B=  15.000
--------------------                          C=   0.936
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.66 |  0.75   39.43 |  1.50   16.71 |  2.25    5.48
                0.08    4.18 |  0.83   90.02 |  1.58   14.03 |  2.33    5.04
                0.17    4.84 |  0.92  197.33 |  1.67   11.99 |  2.42    4.66
                0.25    5.72 |  1.00  112.57 |  1.75   10.40 |  2.50    4.33
                0.33    6.91 |  1.08   67.57 |  1.83    9.14 |  2.58    4.04
                0.42    8.61 |  1.17   45.68 |  1.92    8.12 |  2.67    3.78
                0.50   11.18 |  1.25   33.29 |  2.00    7.28 |  2.75    3.55
                0.58   15.34 |  1.33   25.55 |  2.08    6.58 |  2.83    3.34
                0.67   22.92 |  1.42   20.37 |  2.17    5.98 |  2.92    3.16


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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   2.09   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    3.66 | 0.767   39.43 | 1.517   16.71 |  2.27    5.48
               0.033    3.66 | 0.783   39.43 | 1.533   16.71 |  2.28    5.48
               0.050    3.66 | 0.800   39.43 | 1.550   16.71 |  2.30    5.48
               0.067    3.66 | 0.817   39.43 | 1.567   16.71 |  2.32    5.48
               0.083    3.66 | 0.833   39.43 | 1.583   16.71 |  2.33    5.48
               0.100    4.18 | 0.850   90.01 | 1.600   14.03 |  2.35    5.04
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0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.279 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 32.446
TOTAL RAINFALL (mm)= 70.233
RUNOFF COEFFICIENT = 0.462

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.60   Curve Number   (CN)= 87.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   2.43   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34

0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.119 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 43.468
TOTAL RAINFALL (mm)= 70.233
RUNOFF COEFFICIENT = 0.619

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)= 81.0
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.26	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33

0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.391 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 34.689
TOTAL RAINFALL (mm)= 70.233
RUNOFF COEFFICIENT = 0.494

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0006)
ID= 1 DT= 1.0 min

Area (ha)= 1.23
Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16

```
                0.733   22.92 | 1.483   20.37 | 2.233    5.98 |  2.98    3.16
                0.750   22.92 | 1.500   20.37 | 2.250    5.98 |  3.00    3.16

     Max.Eff.Inten.(mm/hr)=     197.33        84.33
               over (min)         5.00        12.00
     Storage Coeff.  (min)=       1.28 (ii)   11.92 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.44         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.14          0.160 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.23           1.22
     RUNOFF VOLUME    (mm)=      69.23        34.40          37.88
     TOTAL RAINFALL   (mm)=      70.23        70.23          70.23
     RUNOFF COEFFICIENT   =       0.99         0.49           0.54

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.391     1.35    34.69
      + ID2= 2 (  0002):     2.09   0.279     1.22    32.45
        ================================================
        ID = 3 (  0004):     5.62   0.642     1.28    33.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.642     1.28    33.85
      + ID2= 2 (  0003):     0.60   0.119     1.17    43.47
        ================================================
        ID = 1 (  0004):     6.22   0.745     1.27    34.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   0.745     1.27    34.78
      + ID2= 2 (  0006):     1.23   0.160     1.22    37.88
        ====================================================
        ID = 3 (  0004):     7.45   0.902     1.25    35.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\9f
0b22ab-cbfe-40bf-8506-f375f139cc4d\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\9f
0b22ab-cbfe-40bf-8506-f375f139cc4d\s


DATE: 06/08/2026                          TIME: 03:55:03

USER:



COMMENTS: _____________________________________________________________
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  ********************************************
  ** SIMULATION : City of Kitchener - 2yr       **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 743.000
| Ptotal= 34.25 mm |                          B=   6.000
--------------------                          C=   0.799
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.83 |  0.75   15.84 |  1.50    7.97 |  2.25    3.69
                0.08    3.09 |  0.83   36.87 |  1.58    7.02 |  2.33    3.50
                0.17    3.41 |  0.92  109.37 |  1.67    6.28 |  2.42    3.32
                0.25    3.80 |  1.00   47.42 |  1.75    5.69 |  2.50    3.17
                0.33    4.31 |  1.08   26.37 |  1.83    5.21 |  2.58    3.02
                0.42    5.00 |  1.17   18.04 |  1.92    4.80 |  2.67    2.90
                0.50    5.98 |  1.25   13.68 |  2.00    4.46 |  2.75    2.78
                0.58    7.49 |  1.33   11.02 |  2.08    4.17 |  2.83    2.67
                0.67   10.12 |  1.42    9.24 |  2.17    3.92 |  2.92    2.58


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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   2.09   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    2.83 | 0.767   15.84 | 1.517    7.97 |  2.27    3.69
               0.033    2.83 | 0.783   15.84 | 1.533    7.97 |  2.28    3.69
               0.050    2.83 | 0.800   15.84 | 1.550    7.97 |  2.30    3.69
               0.067    2.83 | 0.817   15.84 | 1.567    7.97 |  2.32    3.69
               0.083    2.83 | 0.833   15.84 | 1.583    7.97 |  2.33    3.69
               0.100    3.09 | 0.850   36.87 | 1.600    7.02 |  2.35    3.50
               0.117    3.09 | 0.867   36.87 | 1.617    7.02 |  2.37    3.50
```

0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.072 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 9.421
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.275

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.60   Curve Number   (CN)= 87.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   2.43   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

        NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67

0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.036 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 14.513
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.424

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)= 81.0
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.26	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17

0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.098 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 10.060
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.294

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0006)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58

```
                0.750   10.12 | 1.500    9.24 | 2.250    3.92 |  3.00    2.58

     Max.Eff.Inten.(mm/hr)=     109.37        16.45
               over (min)         5.00        23.00
     Storage Coeff.  (min)=       1.63 (ii)   22.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        23.00
     Unit Hyd. peak  (cms)=       0.41         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.02          0.035 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.45           1.03
     RUNOFF VOLUME    (mm)=      33.25         9.89          12.22
     TOTAL RAINFALL   (mm)=      34.25        34.25          34.25
     RUNOFF COEFFICIENT   =       0.97         0.29           0.36

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.098     1.35    10.06
      + ID2= 2 (  0002):     2.09   0.072     1.20     9.42
        ================================================
        ID = 3 (  0004):     5.62   0.162     1.28     9.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.162     1.28     9.82
      + ID2= 2 (  0003):     0.60   0.036     1.17    14.51
        ================================================
        ID = 1 (  0004):     6.22   0.193     1.25    10.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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```
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   0.193     1.25    10.27
      + ID2= 2 (  0006):     1.23   0.035     1.03    12.22
        ================================================
        ID = 3 (  0004):     7.45   0.217     1.27    10.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\4b
2483db-1c5b-4c7c-a072-f8afc7bf6b37\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\4b
2483db-1c5b-4c7c-a072-f8afc7bf6b37\s


DATE: 06/08/2026                          TIME: 03:55:03

USER:



COMMENTS: _____________________________________________________________
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  ***********************************************
  ** SIMULATION : City of Kitchener - 50yr      **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3886.000
| Ptotal= 77.43 mm |                          B=  16.000
--------------------                          C=   0.950
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.00    3.81 |  0.75   44.21 |  1.50   18.51 |  2.25    5.83
               0.08    4.38 |  0.83  100.30 |  1.58   15.47 |  2.33    5.34
               0.17    5.12 |  0.92  215.47 |  1.67   13.16 |  2.42    4.92
               0.25    6.10 |  1.00  125.05 |  1.75   11.37 |  2.50    4.56
               0.33    7.44 |  1.08   75.67 |  1.83    9.94 |  2.58    4.23
               0.42    9.35 |  1.17   51.24 |  1.92    8.79 |  2.67    3.95
               0.50   12.24 |  1.25   37.29 |  2.00    7.84 |  2.75    3.69
               0.58   16.96 |  1.33   28.54 |  2.08    7.06 |  2.83    3.47
               0.67   25.56 |  1.42   22.66 |  2.17    6.39 |  2.92    3.26


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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   2.09   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    3.81 | 0.767   44.21 | 1.517   18.51 |  2.27    5.83
              0.033    3.81 | 0.783   44.21 | 1.533   18.51 |  2.28    5.83
              0.050    3.81 | 0.800   44.21 | 1.550   18.51 |  2.30    5.83
              0.067    3.81 | 0.817   44.21 | 1.567   18.51 |  2.32    5.83
              0.083    3.81 | 0.833   44.21 | 1.583   18.51 |  2.33    5.83
              0.100    4.38 | 0.850  100.30 | 1.600   15.47 |  2.35    5.34
              0.117    4.38 | 0.867  100.30 | 1.617   15.47 |  2.37    5.34
              0.133    4.38 | 0.883  100.30 | 1.633   15.47 |  2.38    5.34
```

0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.328 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 37.820
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.488

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0003)	Area (ha)=	0.60	Curve Number (CN)=	87.0	
ID= 1 DT= 1.0 min	Ia (mm)=	2.43	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.14			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47

0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.138 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 49.800
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.643

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)= 81.0
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.26	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56

0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.460 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 40.356
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.521

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0006) ID= 1 DT= 1.0 min	Area (ha)= 1.23 Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

```
     Max.Eff.Inten.(mm/hr)=     215.47       102.95
               over (min)         5.00        12.00
     Storage Coeff.  (min)=       1.24 (ii)   11.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=       0.45         0.10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.17          0.193 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.23           1.20
     RUNOFF VOLUME    (mm)=      76.43        40.05          43.69
     TOTAL RAINFALL   (mm)=      77.43        77.43          77.43
     RUNOFF COEFFICIENT   =       0.99         0.52           0.56

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.460     1.35    40.36
      + ID2= 2 (  0002):     2.09   0.328     1.22    37.82
        ================================================
        ID = 3 (  0004):     5.62   0.756     1.28    39.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.756     1.28    39.41
      + ID2= 2 (  0003):     0.60   0.138     1.17    49.80
        ================================================
        ID = 1 (  0004):     6.22   0.875     1.27    40.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
```

```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   0.875     1.27    40.41
      + ID2= 2 (  0006):     1.23   0.193     1.20    43.69
        ================================================
        ID = 3 (  0004):     7.45   1.063     1.25    40.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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b17bc3-4d89-4502-8906-f16c13211851\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\84
b17bc3-4d89-4502-8906-f16c13211851\s


DATE: 06/08/2026                          TIME: 03:55:03

USER:
```

COMMENTS: _____

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  ***********************************************
  ** SIMULATION : City of Kitchener - 5yr       **
  ***********************************************
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CHICAGO STORM Ptotal= 47.23 mm	IDF curve parameters: A=1593.000 B= 11.000 C= 0.879 used in: INTENSITY = A / (t + B)^C Duration of storm = 3.00 hrs Storm time step = 5.00 min Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.03	0.75	24.58	1.50	11.05	2.25	4.23
0.08	3.38	0.83	57.37	1.58	9.45	2.33	3.94
0.17	3.82	0.92	139.25	1.67	8.23	2.42	3.70
0.25	4.38	1.00	72.71	1.75	7.28	2.50	3.48
0.33	5.14	1.08	42.10	1.83	6.51	2.58	3.28
0.42	6.19	1.17	28.36	1.92	5.89	2.67	3.11
0.50	7.74	1.25	20.87	2.00	5.37	2.75	2.95
0.58	10.23	1.33	16.27	2.08	4.93	2.83	2.81
0.67	14.72	1.42	13.21	2.17	4.55	2.92	2.68

CALIB NASHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 2.09 Curve Number (CN)= 78.0 Ia (mm)= 3.14 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.16

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23

0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.138 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 16.799
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.356

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 0.60	Curve Number (CN)= 87.0	Ia (mm)= 2.43	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.14

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95

0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.064 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 24.255
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.514

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)=	81.0	
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.26			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48

0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.192 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 18.027
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.382

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0006)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00

Length (m)=	100.00	100.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68

```
                0.700   14.72 | 1.450   13.21 | 2.200    4.55 |  2.95    2.68
                0.717   14.72 | 1.467   13.21 | 2.217    4.55 |  2.97    2.68
                0.733   14.72 | 1.483   13.21 | 2.233    4.55 |  2.98    2.68
                0.750   14.72 | 1.500   13.21 | 2.250    4.55 |  3.00    2.68

     Max.Eff.Inten.(mm/hr)=     139.25        37.62
               over (min)        5.00        17.00
     Storage Coeff.  (min)=      1.48 (ii)   16.16 (ii)
     Unit Hyd. Tpeak (min)=      5.00        17.00
     Unit Hyd. peak  (cms)=      0.42         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.04         0.06         0.067 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.33          1.30
     RUNOFF VOLUME    (mm)=     46.23        17.81         20.64
     TOTAL RAINFALL   (mm)=     47.23        47.23         47.23
     RUNOFF COEFFICIENT   =      0.98         0.38          0.44

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.192     1.35    18.03
      + ID2= 2 (  0002):     2.09   0.138     1.22    16.80
        ================================================
        ID = 3 (  0004):     5.62   0.315     1.28    17.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.315     1.28    17.57
      + ID2= 2 (  0003):     0.60   0.064     1.17    24.25
        ================================================
        ID = 1 (  0004):     6.22   0.371     1.27    18.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   0.371     1.27    18.21
      + ID2= 2 (  0006):     1.23   0.067     1.30    20.64
        ================================================
        ID = 3 (  0004):     7.45   0.437     1.27    18.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\90
16655e-8d82-4503-9035-89c504ae3967\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\90
16655e-8d82-4503-9035-89c504ae3967\s


DATE: 06/08/2026                          TIME: 03:55:02

USER:
```

COMMENTS: _____

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  ***********************************************
  ** SIMULATION : City of Kitchener 100-yr      **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=4688.000
| Ptotal= 87.25 mm |                          B=  17.000
--------------------                          C=   0.962
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.11 |  0.75   50.61 |  1.50   21.03 |  2.25    6.40
                0.08    4.76 |  0.83  113.86 |  1.58   17.51 |  2.33    5.85
                0.17    5.59 |  0.92  239.65 |  1.67   14.84 |  2.42    5.37
                0.25    6.71 |  1.00  141.46 |  1.75   12.77 |  2.50    4.95
                0.33    8.24 |  1.08   86.38 |  1.83   11.13 |  2.58    4.58
                0.42   10.44 |  1.17   58.67 |  1.92    9.80 |  2.67    4.26
                0.50   13.78 |  1.25   42.69 |  2.00    8.71 |  2.75    3.97
                0.58   19.23 |  1.33   32.61 |  2.08    7.81 |  2.83    3.72
                0.67   29.17 |  1.42   25.83 |  2.17    7.05 |  2.92    3.49


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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   2.09   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.017    4.11 | 0.767   50.61 | 1.517   21.03 |  2.27    6.40
                0.033    4.11 | 0.783   50.61 | 1.533   21.03 |  2.28    6.40
                0.050    4.11 | 0.800   50.61 | 1.550   21.03 |  2.30    6.40
                0.067    4.11 | 0.817   50.61 | 1.567   21.03 |  2.32    6.40
                0.083    4.11 | 0.833   50.61 | 1.583   21.03 |  2.33    6.40
```

0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.396 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 45.422
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.521

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   0.60   Curve Number   (CN)= 87.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   2.43   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72

0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.163 (i)
TIME TO PEAK (hrs)= 1.167
RUNOFF VOLUME (mm)= 58.599
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.672

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0001)	Area (ha)=	3.53	Curve Number (CN)=	81.0
ID= 1 DT= 1.0 min	Ia (mm)=	4.23	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.26		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95

0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.519

PEAK FLOW (cms)= 0.555 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 48.334
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.554

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0006)	Area (ha)= 1.23
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 10.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.25	0.98
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	4.00	4.00
Length	(m)=	100.00	100.00

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49

```
                0.717   29.17 | 1.467   25.83 | 2.217    7.05 |  2.97    3.49
                0.733   29.17 | 1.483   25.83 | 2.233    7.05 |  2.98    3.49
                0.750   29.17 | 1.500   25.83 | 2.250    7.05 |  3.00    3.49

     Max.Eff.Inten.(mm/hr)=     239.65       123.74
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       1.19 (ii)   10.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.45         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.21          0.241 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.22           1.18
     RUNOFF VOLUME    (mm)=      86.25        48.01          51.83
     TOTAL RAINFALL   (mm)=      87.25        87.25          87.25
     RUNOFF COEFFICIENT   =       0.99         0.55           0.59

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     3.53   0.555     1.35    48.33
      + ID2= 2 (  0002):     2.09   0.396     1.20    45.42
        ================================================
        ID = 3 (  0004):     5.62   0.914     1.28    47.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0004):     5.62   0.914     1.28    47.25
      + ID2= 2 (  0003):     0.60   0.163     1.17    58.60
        ================================================
        ID = 1 (  0004):     6.22   1.055     1.27    48.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0004):     6.22   1.055     1.27    48.35
      + ID2= 2 (  0006):     1.23   0.241     1.18    51.83
        ================================================
        ID = 3 (  0004):     7.45   1.286     1.25    48.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\4e
3dcb6e-28bd-4c20-9e94-ada92cf0dcd9\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\4e
3dcb6e-28bd-4c20-9e94-ada92cf0dcd9\s


DATE: 06/08/2026                          TIME: 03:55:13

USER:



COMMENTS: _____________________________________________________________
```

```
--------------------------------------------------------------------------------
----------------------
  ***********************************************
  ** SIMULATION : Hazel                        **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\sabjiv4671\AppD
|                  |              ata\Local\Temp\
|                  |              7e79fc62-f148-4744-96a6-bfb1c5d4ce69\130a20bd
| Ptotal=285.00 mm |    Comments: Hazel
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	12.08	2.03	24.17	2.03	36.25	6.00
0.08	2.03	12.17	2.03	24.25	2.03	36.33	6.00
0.17	2.03	12.25	2.03	24.33	2.03	36.42	6.00
0.25	2.03	12.33	2.03	24.42	2.03	36.50	6.00
0.33	2.03	12.42	2.03	24.50	2.03	36.58	6.00
0.42	2.03	12.50	2.03	24.58	2.03	36.67	6.00
0.50	2.03	12.58	2.03	24.67	2.03	36.75	6.00
0.58	2.03	12.67	2.03	24.75	2.03	36.83	6.00
0.67	2.03	12.75	2.03	24.83	2.03	36.92	6.00
0.75	2.03	12.83	2.03	24.92	2.03	37.00	6.00
0.83	2.03	12.92	2.03	25.00	2.03	37.08	4.00
0.92	2.03	13.00	2.03	25.08	2.03	37.17	4.00
1.00	2.03	13.08	2.03	25.17	2.03	37.25	4.00
1.08	2.03	13.17	2.03	25.25	2.03	37.33	4.00
1.17	2.03	13.25	2.03	25.33	2.03	37.42	4.00
1.25	2.03	13.33	2.03	25.42	2.03	37.50	4.00
1.33	2.03	13.42	2.03	25.50	2.03	37.58	4.00
1.42	2.03	13.50	2.03	25.58	2.03	37.67	4.00
1.50	2.03	13.58	2.03	25.67	2.03	37.75	4.00
1.58	2.03	13.67	2.03	25.75	2.03	37.83	4.00
1.67	2.03	13.75	2.03	25.83	2.03	37.92	4.00
1.75	2.03	13.83	2.03	25.92	2.03	38.00	4.00
1.83	2.03	13.92	2.03	26.00	2.03	38.08	6.00
1.92	2.03	14.00	2.03	26.08	2.03	38.17	6.00
2.00	2.03	14.08	2.03	26.17	2.03	38.25	6.00
2.08	2.03	14.17	2.03	26.25	2.03	38.33	6.00
2.17	2.03	14.25	2.03	26.33	2.03	38.42	6.00
2.25	2.03	14.33	2.03	26.42	2.03	38.50	6.00
2.33	2.03	14.42	2.03	26.50	2.03	38.58	6.00
2.42	2.03	14.50	2.03	26.58	2.03	38.67	6.00
2.50	2.03	14.58	2.03	26.67	2.03	38.75	6.00
2.58	2.03	14.67	2.03	26.75	2.03	38.83	6.00
2.67	2.03	14.75	2.03	26.83	2.03	38.92	6.00

2.75	2.03	14.83	2.03	26.92	2.03	39.00	6.00
2.83	2.03	14.92	2.03	27.00	2.03	39.08	13.00
2.92	2.03	15.00	2.03	27.08	2.03	39.17	13.00
3.00	2.03	15.08	2.03	27.17	2.03	39.25	13.00
3.08	2.03	15.17	2.03	27.25	2.03	39.33	13.00
3.17	2.03	15.25	2.03	27.33	2.03	39.42	13.00
3.25	2.03	15.33	2.03	27.42	2.03	39.50	13.00
3.33	2.03	15.42	2.03	27.50	2.03	39.58	13.00
3.42	2.03	15.50	2.03	27.58	2.03	39.67	13.00
3.50	2.03	15.58	2.03	27.67	2.03	39.75	13.00
3.58	2.03	15.67	2.03	27.75	2.03	39.83	13.00
3.67	2.03	15.75	2.03	27.83	2.03	39.92	13.00
3.75	2.03	15.83	2.03	27.92	2.03	40.00	13.00
3.83	2.03	15.92	2.03	28.00	2.03	40.08	17.00
3.92	2.03	16.00	2.03	28.08	2.03	40.17	17.00
4.00	2.03	16.08	2.03	28.17	2.03	40.25	17.00
4.08	2.03	16.17	2.03	28.25	2.03	40.33	17.00
4.17	2.03	16.25	2.03	28.33	2.03	40.42	17.00
4.25	2.03	16.33	2.03	28.42	2.03	40.50	17.00
4.33	2.03	16.42	2.03	28.50	2.03	40.58	17.00
4.42	2.03	16.50	2.03	28.58	2.03	40.67	17.00
4.50	2.03	16.58	2.03	28.67	2.03	40.75	17.00
4.58	2.03	16.67	2.03	28.75	2.03	40.83	17.00
4.67	2.03	16.75	2.03	28.83	2.03	40.92	17.00
4.75	2.03	16.83	2.03	28.92	2.03	41.00	17.00
4.83	2.03	16.92	2.03	29.00	2.03	41.08	13.00
4.92	2.03	17.00	2.03	29.08	2.03	41.17	13.00
5.00	2.03	17.08	2.03	29.17	2.03	41.25	13.00
5.08	2.03	17.17	2.03	29.25	2.03	41.33	13.00
5.17	2.03	17.25	2.03	29.33	2.03	41.42	13.00
5.25	2.03	17.33	2.03	29.42	2.03	41.50	13.00
5.33	2.03	17.42	2.03	29.50	2.03	41.58	13.00
5.42	2.03	17.50	2.03	29.58	2.03	41.67	13.00
5.50	2.03	17.58	2.03	29.67	2.03	41.75	13.00
5.58	2.03	17.67	2.03	29.75	2.03	41.83	13.00
5.67	2.03	17.75	2.03	29.83	2.03	41.92	13.00
5.75	2.03	17.83	2.03	29.92	2.03	42.00	13.00
5.83	2.03	17.92	2.03	30.00	2.03	42.08	23.00
5.92	2.03	18.00	2.03	30.08	2.03	42.17	23.00
6.00	2.03	18.08	2.03	30.17	2.03	42.25	23.00
6.08	2.03	18.17	2.03	30.25	2.03	42.33	23.00
6.17	2.03	18.25	2.03	30.33	2.03	42.42	23.00
6.25	2.03	18.33	2.03	30.42	2.03	42.50	23.00
6.33	2.03	18.42	2.03	30.50	2.03	42.58	23.00
6.42	2.03	18.50	2.03	30.58	2.03	42.67	23.00
6.50	2.03	18.58	2.03	30.67	2.03	42.75	23.00
6.58	2.03	18.67	2.03	30.75	2.03	42.83	23.00
6.67	2.03	18.75	2.03	30.83	2.03	42.92	23.00
6.75	2.03	18.83	2.03	30.92	2.03	43.00	23.00
6.83	2.03	18.92	2.03	31.00	2.03	43.08	13.00

6.92	2.03	19.00	2.03	31.08	2.03	43.17	13.00
7.00	2.03	19.08	2.03	31.17	2.03	43.25	13.00
7.08	2.03	19.17	2.03	31.25	2.03	43.33	13.00
7.17	2.03	19.25	2.03	31.33	2.03	43.42	13.00
7.25	2.03	19.33	2.03	31.42	2.03	43.50	13.00
7.33	2.03	19.42	2.03	31.50	2.03	43.58	13.00
7.42	2.03	19.50	2.03	31.58	2.03	43.67	13.00
7.50	2.03	19.58	2.03	31.67	2.03	43.75	13.00
7.58	2.03	19.67	2.03	31.75	2.03	43.83	13.00
7.67	2.03	19.75	2.03	31.83	2.03	43.92	13.00
7.75	2.03	19.83	2.03	31.92	2.03	44.00	13.00
7.83	2.03	19.92	2.03	32.00	2.03	44.08	13.00
7.92	2.03	20.00	2.03	32.08	2.03	44.17	13.00
8.00	2.03	20.08	2.03	32.17	2.03	44.25	13.00
8.08	2.03	20.17	2.03	32.25	2.03	44.33	13.00
8.17	2.03	20.25	2.03	32.33	2.03	44.42	13.00
8.25	2.03	20.33	2.03	32.42	2.03	44.50	13.00
8.33	2.03	20.42	2.03	32.50	2.03	44.58	13.00
8.42	2.03	20.50	2.03	32.58	2.03	44.67	13.00
8.50	2.03	20.58	2.03	32.67	2.03	44.75	13.00
8.58	2.03	20.67	2.03	32.75	2.03	44.83	13.00
8.67	2.03	20.75	2.03	32.83	2.03	44.92	13.00
8.75	2.03	20.83	2.03	32.92	2.03	45.00	13.00
8.83	2.03	20.92	2.03	33.00	2.03	45.08	53.00
8.92	2.03	21.00	2.03	33.08	2.03	45.17	53.00
9.00	2.03	21.08	2.03	33.17	2.03	45.25	53.00
9.08	2.03	21.17	2.03	33.25	2.03	45.33	53.00
9.17	2.03	21.25	2.03	33.33	2.03	45.42	53.00
9.25	2.03	21.33	2.03	33.42	2.03	45.50	53.00
9.33	2.03	21.42	2.03	33.50	2.03	45.58	53.00
9.42	2.03	21.50	2.03	33.58	2.03	45.67	53.00
9.50	2.03	21.58	2.03	33.67	2.03	45.75	53.00
9.58	2.03	21.67	2.03	33.75	2.03	45.83	53.00
9.67	2.03	21.75	2.03	33.83	2.03	45.92	53.00
9.75	2.03	21.83	2.03	33.92	2.03	46.00	53.00
9.83	2.03	21.92	2.03	34.00	2.03	46.08	38.00
9.92	2.03	22.00	2.03	34.08	2.03	46.17	38.00
10.00	2.03	22.08	2.03	34.17	2.03	46.25	38.00
10.08	2.03	22.17	2.03	34.25	2.03	46.33	38.00
10.17	2.03	22.25	2.03	34.33	2.03	46.42	38.00
10.25	2.03	22.33	2.03	34.42	2.03	46.50	38.00
10.33	2.03	22.42	2.03	34.50	2.03	46.58	38.00
10.42	2.03	22.50	2.03	34.58	2.03	46.67	38.00
10.50	2.03	22.58	2.03	34.67	2.03	46.75	38.00
10.58	2.03	22.67	2.03	34.75	2.03	46.83	38.00
10.67	2.03	22.75	2.03	34.83	2.03	46.92	38.00
10.75	2.03	22.83	2.03	34.92	2.03	47.00	38.00
10.83	2.03	22.92	2.03	35.00	2.03	47.08	13.00
10.92	2.03	23.00	2.03	35.08	2.03	47.17	13.00
11.00	2.03	23.08	2.03	35.17	2.03	47.25	13.00

11.08	2.03	23.17	2.03	35.25	2.03	47.33	13.00
11.17	2.03	23.25	2.03	35.33	2.03	47.42	13.00
11.25	2.03	23.33	2.03	35.42	2.03	47.50	13.00
11.33	2.03	23.42	2.03	35.50	2.03	47.58	13.00
11.42	2.03	23.50	2.03	35.58	2.03	47.67	13.00
11.50	2.03	23.58	2.03	35.67	2.03	47.75	13.00
11.58	2.03	23.67	2.03	35.75	2.03	47.83	13.00
11.67	2.03	23.75	2.03	35.83	2.03	47.92	13.00
11.75	2.03	23.83	2.03	35.92	2.03	48.00	13.00
11.83	2.03	23.92	2.03	36.00	2.03		
11.92	2.03	24.00	2.03	36.08	6.00		
12.00	2.03	24.08	2.03	36.17	6.00		

CALIB NASHYD (0002)	Area (ha)= 2.09	Curve Number (CN)= 78.0
ID= 1 DT= 5.0 min	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.16	

Unit Hyd Qpeak (cms)= 0.499

PEAK FLOW (cms)= 0.288 (i)
TIME TO PEAK (hrs)= 46.083
RUNOFF VOLUME (mm)= 223.725
TOTAL RAINFALL (mm)= 285.000
RUNOFF COEFFICIENT = 0.785

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0003)	Area (ha)= 0.60	Curve Number (CN)= 87.0
ID= 1 DT= 5.0 min	Ia (mm)= 2.43	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.14	

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.086 (i)
TIME TO PEAK (hrs)= 46.083
RUNOFF VOLUME (mm)= 247.243
TOTAL RAINFALL (mm)= 285.000
RUNOFF COEFFICIENT = 0.868

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   3.53   Curve Number   (CN)= 81.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   4.23   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.26

     Unit Hyd Qpeak  (cms)=   0.519

     PEAK FLOW       (cms)=   0.489 (i)
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 231.461
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.812

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  10.00
-------------------

                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.25         0.98
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         4.00
     Length            (m)=     100.00       100.00
     Mannings n            =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00        56.94
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.17 (ii)   14.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.31         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.15         0.170 (iii)
     TIME TO PEAK    (hrs)=      45.67        46.08         46.08
     RUNOFF VOLUME    (mm)=     284.00       231.11        236.40
     TOTAL RAINFALL   (mm)=     285.00       285.00        285.00
     RUNOFF COEFFICIENT   =       1.00         0.81          0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     3.53   0.489    46.08   231.46
     + ID2= 2 (  0002):     2.09   0.288    46.08   223.72
       ================================================
       ID = 3 (  0004):     5.62   0.777    46.08   228.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0004):     5.62   0.777    46.08   228.58
     + ID2= 2 (  0003):     0.60   0.086    46.08   247.24
       ================================================
       ID = 1 (  0004):     6.22   0.863    46.08   230.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0004)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0004):     6.22   0.863    46.08   230.38
     + ID2= 2 (  0006):     1.23   0.170    46.08   236.40
       ================================================
       ID = 3 (  0004):     7.45   1.033    46.08   231.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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Appendix E Post-Development Conditions Stormwater Management Analysis

Item 1: Post-Development Catchment SCS Numbers – Chris Court Option

Item 2: Stormwater Management Facility SSD Table, Drawdown Calculations, Facility Forebay Calculations – Chris Court Option

Item 3 Visual OTTHYMO Post-Development Controlled Condition Output Files – Chris Court Option

Item 4 Post-Development Catchment SCS Numbers – Pumping Station Option

Item 5: Stormwater Management Facility SSD Table, Drawdown Calculations, Facility Forebay Calculations – Pumping Station Option

Item 6: Visual OTTHYMO Post-Development Controlled Condition Output Files – Pumping Station Option

Item 7: Stormceptor Sizing

Item 8: Riprap Sizing

Item 9: Water Budget Analysis

Item 10: Sediment Drying Area Calculation

Post-Development Catchment SCS Numbers
51 Hawkesville Road - Chris Court Option
Project: 2401775
4-Jun-26

Curve Number

CATCHMENT	Area (ha.)	Soil Group	Landuse	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)
1000	0.598	C	(3)	79	89
	1.793	C	(5)	98	99
Total (1000)	**2.390**	-	-	**94**	**97**
2000	0.223	C	(3)	79	89
	0.668	C	(5)	98	99
Total (2000)	**0.890**	-	-	**94**	**97**
3000	0.044	C	(3)	79	89
	0.176	C	(5)	98	99
Total (3000)	**0.220**	-	-	**95**	**97**
4000	0.312	C	(3)	79	89
	0.078	C	(5)	98	99
Total (4000)	**0.390**	-	-	**83**	**91**
5000	2.194	C	(3)	79	89
	0.592	C	(4)	73	86
Total (5000)	**2.890**	-	-	**75**	**87**
6000	0.510	C	(3)	79	89
	0.090	C	(5)	98	99
Total (6000)	**0.600**	-	-	**82**	**91**
7000	0.070	C	(3)	79	89
Total (7000)	**0.070**	-	-	**79**	**89**
Total	**7.450**				

SCS CURVE PARAMETERS	A	B	C	D
(1) Residential districts (1/8 acre or less (stacked townhouses)	77	85	90	92
(2) Residential districts (1/4 acre or less)	61	75	83	87
(3) Open space (lawns, parks, golf course, cemeteries, etc.)	51	68	79	84
(4) Woods (fair)	36	60	73	79
(5) Paved Parking Lots, roofs, driveway, etc	98	98	98	98

Urban Hydrology for Small Watershed (TR-55) User Manual

Intial Abstraction

CATCHMENT	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)	S	IA (mm)
1000 (pervious area IA calculation)	79	89	31.4	3.14
2000 (pervious area IA calculation)	79	89	31.4	3.14
3000 (pervious area IA calculation)	79	89	31.4	3.14
4000 (pervious area IA calculation)	79	89	31.4	3.14
5000	75	87	38.0	3.80
6000	82	91	25.1	3.77
7000	79	89	31.4	3.14

1.0mm ≤ IA ≤5.0mm

CN ≤ 70 IA = 0.075 X S

CN > 70 ≤ 80 IA = 0.10 X S

CN > 80 ≤ 90 IA = 0.15 X S

CN > 90 IA = 0.2 X S

S = (25400 / CN) - 254

Standhyd Catchments:

Pervious area depression storage=5mm

Impervious area depression storage =1mm

Time to Peak

CATCHMENT	L (m)	Sw (%)	C	Tc (min.)	TP (hr) of IUH
1000	180	2	0.73	10	0.12
2000	80	2	0.73	10	0.12
3000	80	2	0.34	10	0.12
4000	135	2	0.34	10	0.12
5000	136	13	0.20	15	0.17
6000	85	6	0.31	14	0.16
7000	5	15	0.20	3	0.04

AIRPORT FORMULA (C < 0.4) $Tc = 3.26 \times (1.1 - C) \times L0.5 / SW^{0.33}$

Bransby Williams (C>0.4) $Tc = 0.057 \times L / (SW^{0.2} \times A^{0.1})$

Where:

Tc = Time of concentration

L= Watershed length, m

Sw = Watershed slope %

A=Watershed area, ha

C = Runoff Coefficient, C=0.2 x (1-I) + 0.9 x I

I= Impervious Ratio

Tp=Time to peak: (N-1)/NxTc

N = 3, Number of linear reseirvoirs

* If the Tc<10 min (inlet time), 10 min is applied for Tc

Chris Court Option - Post-Dev Modeling

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
June 4, 2026

Catchment 3000: Proposed Stormwater Management Facility - Chris Court Option

ELEV (m)	INC. DEPTH (m)	ACCUM. ACTIVE SURFACE AREA (m^2)	ACCUM. FOREBAY SURFACE AREA (m^2)	ACCUM. PERM.POOL SURFACE AREA (m^2)	ACCUM. PERM. POOL+ FOREBAY VOLUME (m^3)	ACCUM. ACTIVE STORAGE VOLUME (m^3)	pp and active storage
336.50	0.00	--	0.00	--	0.00	--	**Bottom of Forebay**
337.50	1.00	--	178.50	757.30	89.25	--	**Bottom of Permanent Pool**
337.60	1.10	--	--	830.30	168.63	--	
337.70	1.20	--	--	905.20	255.40	--	
337.80	1.30	982.00	--	982.00	349.77	0.00	**Top of Permanent Pool**
337.90	1.40	1060.70	--	--		102.14	
338.00	1.50	1141.30	--	--		212.24	
338.10	1.60	1223.90	--	--	--	330.50	
338.20	1.70	1308.3	--	--	--	457.11	
338.25	1.75	1351.5	--	--		523.60	**CB Grate**
338.30	1.80	1394.7	--	--	--	592.26	
338.40	1.90	1483	--	--	--	736.14	
338.50	2.00	1573.2	--	--	--	888.95	
338.60	2.10	1665.4	--	--	--	1050.88	
338.70	2.20	1759.5	--	--	--	1222.13	**Weir**
338.80	2.30	1855.4	--	--	--	1402.87	
338.90	2.40	1953.3	--	--	--	1593.31	
339.00	2.50	2053.2	--	--	--	1793.63	708.543
339.10	2.60	2147.1	--	--	--	2003.65	**Overflow**

Orifice Tube Outlet (Extended Detention)

INV	337.80	m
Q =	0.014	m^3/s
Cd =	0.630	
H =	1.263	m
2g =	19.620	
A =	0.004	m^2
D =	0.075	m

Flow Over Grate

OPSD 702.040 DICB - Type A

d1 =	0.80	m
h =	0.50	
H =	0.30	m
2g =	19.62	
L =	3.01	m
Q =	0.744	m^3/s

Weir Flow(CB Grate)

Head over Grate (m)	Length (m)	Q m^3/s	Elev:
0	1.20	0.000	338.25
0.05	1.52	0.024	338.30
0.15	2.15	0.181	338.40
0.25	3.01	0.563	338.50
≥0.3	3.66	0.906	≥338.55

Overflow Weir

d1 =	1.300	m
h =	0.900	
H =	0.400	m
2g =	19.620	
L =	2.0	m
Q =	0.826	m^3/s

Weir Flow (Overflow Weir)

Head over Weir (m)	Length (m)	Q m^3/s
0	2.0	0.000
0.1	3.0	0.088
0.2	4.0	0.254
0.3	5.0	0.476
0.4	6.0	0.746

Pipe Outflow

Diameter =	525	mm
Gradient =	7.5%	
Pipe Capacity =	1.224	m^3/s
Length =	16.10	m

$$\text{Weir Flow} = 0.433 \sqrt{2g(\tfrac{d}{d})}LH^{3/2}$$

L = Length of Weir

2g = 19.62
d = total depth of water
h = depth of water below weir
H = depth of water above weir

$$\text{Orifice Flow} = Cd\,A\,\sqrt{2gH}$$

Cd =	Discharge Coefficient
A =	Area of Orifice
2g =	19.62
H =	Depth of Water above orifice - half of orifice diameter

Stormwater Management Pond (continued)

ELEVATION	STAGE (m)	STORAGE (m^3)	75mm Pipe CONTROL (m^3/s)	DICB Grate (m^3/s)	525mm Outlet Pipe (Orifice) (m^3/s)	WEIR DISCHARGE (m^3/s)	TOTAL DISCHARGE (m^3/s)	
337.80	0.000	0.00	0.000	0.000	0.519	0.000	0.000	**Top of Permanent Pool**
337.90	0.100	102.14	0.003	0.000	0.553	0.000	0.003	
338.00	0.200	212.24	0.005	0.000	0.585	0.000	0.005	
338.10	0.300	330.50	0.006	0.000	0.615	0.000	0.006	
338.20	0.400	457.11	0.007	0.000	0.644	0.000	0.007	
338.25	0.450	523.60	0.008	0.000	0.658	0.000	0.008	**CB Grate**
338.30	0.500	592.26	0.008	0.024	0.672	0.000	0.032	
338.40	0.600	736.14	0.009	0.181	0.699	0.000	0.190	
338.50	0.700	888.95	0.010	0.563	0.724	0.000	0.573	
338.60	0.800	1050.88	0.011	0.906	0.749	0.000	0.749	
338.70	0.900	1222.13	0.011	0.906	0.773	0.000	0.773	**Weir**
338.80	1.000	1402.87	0.012	0.906	0.796	0.088	0.884	
338.90	1.100	1593.31	0.013	0.906	0.819	0.254	1.073	
339.00	1.200	1793.63	0.013	0.906	0.841	0.476	1.317	
339.10	1.300	2003.65	0.014	0.906	0.862	0.746	1.608	**Overflow**

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
June 4, 2026

Stormwater Management Facility

Forebay - Chris Court Option

Forebay Length =	20.0	m	(Dist)
Forebay Top Width =	10.0	m	
Active Forebay Depth =	1.0	m	(d)
Active Forebay Bottom Width =	0.0	m	
Approximate Forebay Volume =		m^3	
Length Width Ratio =	2.0	:1	(r)
25 mm Storm Peak Flowrate =	0.012	m^3/s	(Q25mm)
5 Year Storm Inflow Rate =	0.463	m^3/s	(Q5)
Desired Forebay Velocity =	0.500	m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003	m/s	(Vs)

Settling Length

Dist = ((r x Q25mm)/Vs)^.5 =	8.9	m	25mm

Forebay length (20 m) is less than the settling length.

Dispersion Length

Dist = (8 x Q5)/(d x Vf) =	7.4	m	5 Year

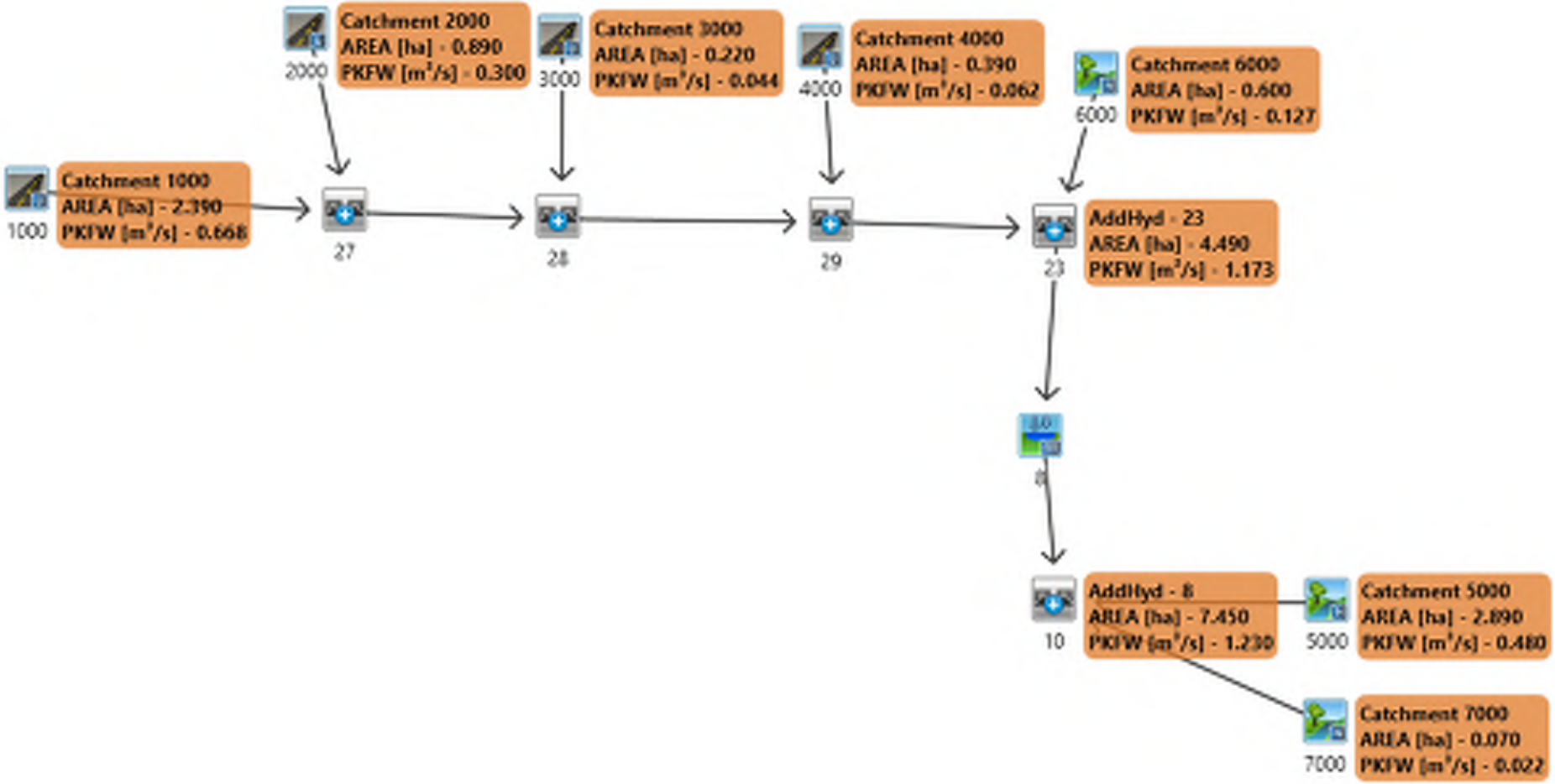
Forebay length (20 m) exceeds dispersion length (8.4 m).

Flow Velocity in Forebay

Cross-sectional Area =	5.000	m^2	
Cross-sectional Area (With Permanent Pool) =	8.450	m^2	A
Q5 =	0.463	m^3/s	
Velocity = Q5/A =	0.05	m/s	5 Year

The average flow velocity through the forebay meets the allowable velocity of 0.15 m/s.

Chris Court Option - VO Schematic



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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\7a
48c5ec-000a-4361-b2ea-46ac9972dd9a\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\7a
48c5ec-000a-4361-b2ea-46ac9972dd9a\s


DATE: 06/02/2026                          TIME: 08:46:54

USER:



COMMENTS: _____________________________________________________________


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  ********************************************
  ** SIMULATION : City of Kitchener - 25mm      **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 509.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.799
```

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.47	1.00	6.93	2.00	4.30	3.00	1.98
0.08	1.56	1.08	10.85	2.08	3.90	3.08	1.90
0.17	1.67	1.17	25.26	2.17	3.57	3.17	1.83
0.25	1.80	1.25	74.93	2.25	3.29	3.25	1.76
0.33	1.94	1.33	32.48	2.33	3.06	3.33	1.70
0.42	2.12	1.42	18.06	2.42	2.86	3.42	1.64
0.50	2.33	1.50	12.36	2.50	2.68	3.50	1.59
0.58	2.60	1.58	9.37	2.58	2.53	3.58	1.54
0.67	2.95	1.67	7.55	2.67	2.40	3.67	1.50
0.75	3.42	1.75	6.33	2.75	2.28	3.75	1.45
0.83	4.10	1.83	5.46	2.83	2.17	3.83	1.41
0.92	5.13	1.92	4.81	2.92	2.07	3.92	1.37

CALIB NASHYD (5000) ID= 1 DT= 1.0 min	Area (ha)= 2.89	Curve Number (CN)= 75.0
	Ia (mm)= 3.80	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.17	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83

0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.037 (i)
TIME TO PEAK (hrs)= 1.567

RUNOFF VOLUME (mm)= 4.254
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.170

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (6000)	Area (ha)=	0.60	Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.16	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59

0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.011 (i)
TIME TO PEAK (hrs)= 1.550
RUNOFF VOLUME (mm)= 5.866
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.234

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (4000)	Area (ha)= 0.39
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00

Length (m)=	100.00	100.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50

0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	3.76		
over (min)	5.00	48.00		
Storage Coeff. (min)=	2.33 (ii)	47.75 (ii)		
Unit Hyd. Tpeak (min)=	5.00	48.00		
Unit Hyd. peak (cms)=	0.35	0.02		
			TOTALS	
PEAK FLOW (cms)=	0.01	0.00	0.013 (iii)	
TIME TO PEAK (hrs)=	1.37	2.32	1.37	
RUNOFF VOLUME (mm)=	24.03	4.58	8.40	
TOTAL RAINFALL (mm)=	25.03	25.03	25.03	
RUNOFF COEFFICIENT =	0.96	0.18	0.34	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1000)	Area (ha)= 2.39
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.79	0.60
Dep. Storage	(mm)=	1.00	5.00

Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54

0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	41.32	
over (min)	5.00	29.00	
Storage Coeff. (min)=	3.31 (ii)	28.09 (ii)	
Unit Hyd. Tpeak (min)=	5.00	29.00	
Unit Hyd. peak (cms)=	0.29	0.04	
			TOTALS
PEAK FLOW (cms)=	0.11	0.04	0.117 (iii)
TIME TO PEAK (hrs)=	1.37	1.87	1.37
RUNOFF VOLUME (mm)=	24.03	11.41	15.18
TOTAL RAINFALL (mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT =	0.96	0.46	0.61

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (2000)	Area (ha)= 0.89
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00

Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50

0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	57.57		
over (min)	5.00	16.00		
Storage Coeff. (min)=	2.04 (ii)	15.38 (ii)		
Unit Hyd. Tpeak (min)=	5.00	16.00		
Unit Hyd. peak (cms)=	0.37	0.07		
			TOTALS	
PEAK FLOW (cms)=	0.05	0.02	0.052 (iii)	
TIME TO PEAK (hrs)=	1.37	1.62	1.37	
RUNOFF VOLUME (mm)=	24.03	11.41	15.18	
TOTAL RAINFALL (mm)=	25.03	25.03	25.03	
RUNOFF COEFFICIENT =	0.96	0.46	0.61	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0027)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (1000):	2.39	0.117	1.37	15.18
+ ID2= 2 (2000):	0.89	0.052	1.37	15.18
ID = 3 (0027):	3.28	0.170	1.37	15.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (3000) ID= 1 DT= 1.0 min	Area (ha)= 0.22 Total Imp(%)= 20.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.04	0.18
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64

0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	7.84	
over (min)	5.00	32.00	
Storage Coeff. (min)=	2.04 (ii)	31.66 (ii)	
Unit Hyd. Tpeak (min)=	5.00	32.00	
Unit Hyd. peak (cms)=	0.37	0.04	
			TOTALS
PEAK FLOW (cms)=	0.00	0.00	0.002 (iii)
TIME TO PEAK (hrs)=	1.37	1.98	1.97
RUNOFF VOLUME (mm)=	24.03	5.83	5.93
TOTAL RAINFALL (mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT =	0.96	0.23	0.24

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0028)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0027):	3.28	0.170	1.37	15.18
	+ ID2= 2 (3000):	0.22	0.002	1.97	5.93
	ID = 3 (0028):	3.50	0.170	1.37	14.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0029)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0028):	3.50	0.170	1.37	14.60
	+ ID2= 2 (4000):	0.39	0.013	1.37	8.40
	ID = 3 (0029):	3.89	0.183	1.37	13.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0023)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0029):	3.89	0.183	1.37	13.98
	+ ID2= 2 (6000):	0.60	0.011	1.55	5.87
	ID = 3 (0023):	4.49	0.188	1.37	12.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0008)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5730	0.0890
	0.0030	0.0100	0.7490	0.1050
	0.0050	0.0210	0.7730	0.1220
	0.0060	0.0330	0.8840	0.1400
	0.0070	0.0460	1.0730	0.1590
	0.0320	0.0590	1.3170	0.1790

0.1900 0.0740 | 1.6080 0.2000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0023)	4.490	0.188	1.37	12.90
OUTFLOW: ID= 1 (0008)	4.490	0.012	4.10	12.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.35
TIME SHIFT OF PEAK FLOW (min)=164.00
MAXIMUM STORAGE USED (ha.m.)= 0.0486

CALIB				
NASHYD (7000)	Area (ha)=	0.07	Curve Number (CN)=	79.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.14	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.04		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64

0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.067

PEAK FLOW (cms)= 0.002 (i)
TIME TO PEAK (hrs)= 1.350
RUNOFF VOLUME (mm)= 5.346
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.214

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.

```
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  5000):     2.89   0.037     1.57     4.25
      + ID2= 2 (  7000):     0.07   0.002     1.35     5.35
        ================================================
        ID = 3 (  0010):     2.96   0.038     1.57     4.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.038     1.57     4.28
      + ID2= 2 (  0008):     4.49   0.012     4.10    12.00
        ================================================
        ID = 1 (  0010):     7.45   0.043     1.58     8.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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  Summary filename:
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83cdcd-9d9c-4eb7-85b8-fae40fd2be9e\s
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DATE: 06/02/2026 TIME: 08:46:54

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener - 25yr **
****

CHICAGO STORM
Ptotal= 70.23 mm

IDF curve parameters: A=3258.000
B= 15.000
C= 0.936
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.66	0.75	39.43	1.50	16.71	2.25	5.48
0.08	4.18	0.83	90.02	1.58	14.03	2.33	5.04
0.17	4.84	0.92	197.33	1.67	11.99	2.42	4.66
0.25	5.72	1.00	112.57	1.75	10.40	2.50	4.33
0.33	6.91	1.08	67.57	1.83	9.14	2.58	4.04
0.42	8.61	1.17	45.68	1.92	8.12	2.67	3.78
0.50	11.18	1.25	33.29	2.00	7.28	2.75	3.55
0.58	15.34	1.33	25.55	2.08	6.58	2.83	3.34
0.67	22.92	1.42	20.37	2.17	5.98	2.92	3.16

CALIB NASHYD (5000) ID= 1 DT= 1.0 min

Area (ha)= 2.89 Curve Number (CN)= 75.0
Ia (mm)= 3.80 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.649

```
     PEAK FLOW       (cms)=   0.332 (i)
     TIME TO PEAK    (hrs)=   1.233
     RUNOFF VOLUME    (mm)=  29.208
     TOTAL RAINFALL   (mm)=  70.233
     RUNOFF COEFFICIENT   =   0.416

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (  6000)|   Area    (ha)=   0.60   Curve Number   (CN)= 82.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78

0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.091 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 36.142
TOTAL RAINFALL (mm)= 70.233
RUNOFF COEFFICIENT = 0.515

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (4000) ID= 1 DT= 1.0 min	Area (ha)= 0.39 Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48

0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Max.Eff.Inten.(mm/hr)=	197.33	61.84	
over (min)	5.00	17.00	
Storage Coeff. (min)=	1.58 (ii)	16.40 (ii)	
Unit Hyd. Tpeak (min)=	5.00	17.00	
Unit Hyd. peak (cms)=	0.41	0.07	
			TOTALS
PEAK FLOW (cms)=	0.04	0.03	0.045 (iii)
TIME TO PEAK (hrs)=	1.02	1.33	1.03

```
     RUNOFF VOLUME    (mm)=      69.23        32.05          39.47
     TOTAL RAINFALL   (mm)=      70.23        70.23          70.23
     RUNOFF COEFFICIENT   =       0.99         0.46           0.56

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  1000)|   Area    (ha)=   2.39
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  30.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.79         0.60
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     180.00       180.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                        ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.017    3.66 | 0.767   39.43 | 1.517   16.71 |  2.27    5.48
     0.033    3.66 | 0.783   39.43 | 1.533   16.71 |  2.28    5.48
     0.050    3.66 | 0.800   39.43 | 1.550   16.71 |  2.30    5.48
     0.067    3.66 | 0.817   39.43 | 1.567   16.71 |  2.32    5.48
     0.083    3.66 | 0.833   39.43 | 1.583   16.71 |  2.33    5.48
     0.100    4.18 | 0.850   90.01 | 1.600   14.03 |  2.35    5.04
     0.117    4.18 | 0.867   90.02 | 1.617   14.03 |  2.37    5.04
     0.133    4.18 | 0.883   90.02 | 1.633   14.03 |  2.38    5.04
     0.150    4.18 | 0.900   90.02 | 1.650   14.03 |  2.40    5.04
     0.167    4.18 | 0.917   90.02 | 1.667   14.03 |  2.42    5.04
     0.183    4.84 | 0.933  197.33 | 1.683   11.99 |  2.43    4.66
     0.200    4.84 | 0.950  197.33 | 1.700   11.99 |  2.45    4.66
     0.217    4.84 | 0.967  197.33 | 1.717   11.99 |  2.47    4.66
     0.233    4.84 | 0.983  197.33 | 1.733   11.99 |  2.48    4.66
     0.250    4.84 | 1.000  197.33 | 1.750   11.99 |  2.50    4.66
     0.267    5.72 | 1.017  112.57 | 1.767   10.40 |  2.52    4.33
     0.283    5.72 | 1.033  112.57 | 1.783   10.40 |  2.53    4.33
     0.300    5.72 | 1.050  112.57 | 1.800   10.40 |  2.55    4.33
```

0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Max.Eff.Inten.(mm/hr)=	197.33	322.47	
over (min)	5.00	14.00	
Storage Coeff. (min)=	2.25 (ii)	13.14 (ii)	
Unit Hyd. Tpeak (min)=	5.00	14.00	
Unit Hyd. peak (cms)=	0.35	0.08	
			TOTALS
PEAK FLOW (cms)=	0.34	0.31	0.476 (iii)
TIME TO PEAK (hrs)=	1.03	1.23	1.07
RUNOFF VOLUME (mm)=	69.23	50.61	56.20
TOTAL RAINFALL (mm)=	70.23	70.23	70.23
RUNOFF COEFFICIENT =	0.99	0.72	0.80

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

| STANDHYD (2000)| Area (ha)= 0.89
|ID= 1 DT= 1.0 min | Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55

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                0.583   11.18 | 1.333   33.29 | 2.083    7.28 |  2.83    3.55
                0.600   15.34 | 1.350   25.55 | 2.100    6.58 |  2.85    3.34
                0.617   15.34 | 1.367   25.55 | 2.117    6.58 |  2.87    3.34
                0.633   15.34 | 1.383   25.55 | 2.133    6.58 |  2.88    3.34
                0.650   15.34 | 1.400   25.55 | 2.150    6.58 |  2.90    3.34
                0.667   15.34 | 1.417   25.55 | 2.167    6.58 |  2.92    3.34
                0.683   22.92 | 1.433   20.37 | 2.183    5.98 |  2.93    3.16
                0.700   22.92 | 1.450   20.37 | 2.200    5.98 |  2.95    3.16
                0.717   22.92 | 1.467   20.37 | 2.217    5.98 |  2.97    3.16
                0.733   22.92 | 1.483   20.37 | 2.233    5.98 |  2.98    3.16
                0.750   22.92 | 1.500   20.37 | 2.250    5.98 |  3.00    3.16

     Max.Eff.Inten.(mm/hr)=     197.33       338.28
               over (min)        5.00         9.00
     Storage Coeff.  (min)=      1.38 (ii)    8.96 (ii)
     Unit Hyd. Tpeak (min)=      5.00         9.00
     Unit Hyd. peak  (cms)=      0.43         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.13         0.14          0.228 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.15           1.07
     RUNOFF VOLUME    (mm)=     69.23        50.61          56.19
     TOTAL RAINFALL   (mm)=     70.23        70.23          70.23
     RUNOFF COEFFICIENT   =      0.99         0.72           0.80


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0027)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     2.39   0.476     1.07    56.20
      + ID2= 2 (  2000):     0.89   0.228     1.07    56.19
        ================================================
        ID = 3 (  0027):     3.28   0.704     1.07    56.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  3000)|   Area    (ha)=   0.22
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=   1.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
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Surface Area	(ha)=	0.04	0.18
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34

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               0.650   15.34 | 1.400   25.55 | 2.150    6.58 |  2.90    3.34
               0.667   15.34 | 1.417   25.55 | 2.167    6.58 |  2.92    3.34
               0.683   22.92 | 1.433   20.37 | 2.183    5.98 |  2.93    3.16
               0.700   22.92 | 1.450   20.37 | 2.200    5.98 |  2.95    3.16
               0.717   22.92 | 1.467   20.37 | 2.217    5.98 |  2.97    3.16
               0.733   22.92 | 1.483   20.37 | 2.233    5.98 |  2.98    3.16
               0.750   22.92 | 1.500   20.37 | 2.250    5.98 |  3.00    3.16

     Max.Eff.Inten.(mm/hr)=     197.33        98.58
               over (min)        5.00        13.00
     Storage Coeff.  (min)=      1.38 (ii)   12.14 (ii)
     Unit Hyd. Tpeak (min)=      5.00        13.00
     Unit Hyd. peak  (cms)=      0.43         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.00         0.03          0.029 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.25           1.25
     RUNOFF VOLUME    (mm)=     69.23        36.28          36.58
     TOTAL RAINFALL   (mm)=     70.23        70.23          70.23
     RUNOFF COEFFICIENT   =      0.99         0.52           0.52

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0028)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0027):     3.28   0.704     1.07    56.20
      + ID2= 2 (  3000):     0.22   0.029     1.25    36.58
        ================================================
        ID = 3 (  0028):     3.50   0.719     1.07    54.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0029)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0028):     3.50   0.719     1.07    54.96
      + ID2= 2 (  4000):     0.39   0.045     1.03    39.47
        ================================================
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        ID = 3 (  0029):     3.89   0.763     1.07    53.41

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0029):     3.89   0.763     1.07    53.41
      + ID2= 2 (  6000):     0.60   0.091     1.20    36.14
        ================================================
        ID = 3 (  0023):     4.49   0.827     1.13    51.10

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      0.827      1.13      51.10
   OUTFLOW: ID= 1 (  0008)      4.490      0.586      1.37      50.19

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.88
                  TIME SHIFT OF PEAK FLOW         (min)= 14.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0902

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  7000)|   Area    (ha)=   0.07   Curve Number   (CN)= 79.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.067

PEAK FLOW (cms)= 0.016 (i)

```
     TIME TO PEAK    (hrs)=   1.017
     RUNOFF VOLUME    (mm)=  33.375
     TOTAL RAINFALL   (mm)=  70.233
     RUNOFF COEFFICIENT   =   0.475

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  5000):     2.89   0.332     1.23    29.21
      + ID2= 2 (  7000):     0.07   0.016     1.02    33.37
        ====================================================
        ID = 3 (  0010):     2.96   0.339     1.23    29.31

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.339     1.23    29.31
      + ID2= 2 (  0008):     4.49   0.586     1.37    50.19
        ====================================================
        ID = 1 (  0010):     7.45   0.891     1.32    41.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\909257ba-31e4-4d2c-9185-7b75c081da42\s
Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\909257ba-31e4-4d2c-9185-7b75c081da42\s

DATE: 06/02/2026 TIME: 08:46:54

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener - 2yr **
****

| CHICAGO STORM |
| Ptotal= 34.25 mm |

IDF curve parameters: A= 743.000
B= 6.000
C= 0.799
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	2.83	0.75	15.84	1.50	7.97	2.25	3.69
0.08	3.09	0.83	36.87	1.58	7.02	2.33	3.50
0.17	3.41	0.92	109.37	1.67	6.28	2.42	3.32
0.25	3.80	1.00	47.42	1.75	5.69	2.50	3.17
0.33	4.31	1.08	26.37	1.83	5.21	2.58	3.02

0.42	5.00	1.17	18.04	1.92	4.80	2.67	2.90
0.50	5.98	1.25	13.68	2.00	4.46	2.75	2.78
0.58	7.49	1.33	11.02	2.08	4.17	2.83	2.67
0.67	10.12	1.42	9.24	2.17	3.92	2.92	2.58

CALIB			
NASHYD (5000)	Area (ha)=	2.89	Curve Number (CN)= 75.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.80	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.17	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78

0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.081 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 8.056
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.235

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (6000) ID= 1 DT= 1.0 min	Area (ha)= 0.60	Curve Number (CN)= 82.0
	Ia (mm)= 3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.16	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32

0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.024 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 10.774
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.315

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (4000)	Area (ha)= 0.39
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67

0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	10.35	
over (min)	5.00	33.00	
Storage Coeff. (min)=	2.00 (ii)	32.30 (ii)	
Unit Hyd. Tpeak (min)=	5.00	33.00	
Unit Hyd. peak (cms)=	0.37	0.03	
			TOTALS
PEAK FLOW (cms)=	0.02	0.00	0.020 (iii)
TIME TO PEAK (hrs)=	1.03	1.65	1.03
RUNOFF VOLUME (mm)=	33.25	8.84	13.68
TOTAL RAINFALL (mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT =	0.97	0.26	0.40

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (1000)
ID= 1 DT= 1.0 min

Area (ha)= 2.39
Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.79	0.60
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	2.00	2.00
Length (m)=	180.00	180.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69

0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	86.70
over (min)	5.00	22.00
Storage Coeff. (min)=	2.85 (ii)	21.27 (ii)
Unit Hyd. Tpeak (min)=	5.00	22.00
Unit Hyd. peak (cms)=	0.32	0.05

				TOTALS
PEAK FLOW	(cms)=	0.17	0.08	0.187 (iii)
TIME TO PEAK	(hrs)=	1.03	1.38	1.03
RUNOFF VOLUME	(mm)=	33.25	18.63	23.01
TOTAL RAINFALL	(mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT	=	0.97	0.54	0.67

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (2000)
ID= 1 DT= 1.0 min

Area (ha)= 0.89
Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17

0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	123.75	
over (min)	5.00	12.00	
Storage Coeff. (min)=	1.75 (ii)	11.57 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	0.40	0.10	
			TOTALS
PEAK FLOW (cms)=	0.07	0.04	0.088 (iii)
TIME TO PEAK (hrs)=	1.02	1.18	1.03
RUNOFF VOLUME (mm)=	33.25	18.63	23.01
TOTAL RAINFALL (mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT =	0.97	0.54	0.67

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0027)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     2.39   0.187     1.03    23.01
      + ID2= 2 (  2000):     0.89   0.088     1.03    23.01
        ================================================
        ID = 3 (  0027):     3.28   0.274     1.03    23.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  3000)|   Area    (ha)=   0.22
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.04         0.18
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.017    2.83 | 0.767   15.84 | 1.517    7.97 |  2.27    3.69
 0.033    2.83 | 0.783   15.84 | 1.533    7.97 |  2.28    3.69
 0.050    2.83 | 0.800   15.84 | 1.550    7.97 |  2.30    3.69
 0.067    2.83 | 0.817   15.84 | 1.567    7.97 |  2.32    3.69
 0.083    2.83 | 0.833   15.84 | 1.583    7.97 |  2.33    3.69
 0.100    3.09 | 0.850   36.87 | 1.600    7.02 |  2.35    3.50
 0.117    3.09 | 0.867   36.87 | 1.617    7.02 |  2.37    3.50
 0.133    3.09 | 0.883   36.87 | 1.633    7.02 |  2.38    3.50
 0.150    3.09 | 0.900   36.87 | 1.650    7.02 |  2.40    3.50
 0.167    3.09 | 0.917   36.87 | 1.667    7.02 |  2.42    3.50
 0.183    3.41 | 0.933  109.37 | 1.683    6.28 |  2.43    3.32
 0.200    3.41 | 0.950  109.37 | 1.700    6.28 |  2.45    3.32
 0.217    3.41 | 0.967  109.37 | 1.717    6.28 |  2.47    3.32
 0.233    3.41 | 0.983  109.37 | 1.733    6.28 |  2.48    3.32
 0.250    3.41 | 1.000  109.37 | 1.750    6.28 |  2.50    3.32
 0.267    3.80 | 1.017   47.42 | 1.767    5.69 |  2.52    3.17
 0.283    3.80 | 1.033   47.42 | 1.783    5.69 |  2.53    3.17
 0.300    3.80 | 1.050   47.42 | 1.800    5.69 |  2.55    3.17
 0.317    3.80 | 1.067   47.42 | 1.817    5.69 |  2.57    3.17
 0.333    3.80 | 1.083   47.42 | 1.833    5.69 |  2.58    3.17
 0.350    4.31 | 1.100   26.37 | 1.850    5.21 |  2.60    3.02
```

0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	19.89	
over (min)	5.00	23.00	
Storage Coeff. (min)=	1.75 (ii)	22.16 (ii)	
Unit Hyd. Tpeak (min)=	5.00	23.00	
Unit Hyd. peak (cms)=	0.40	0.05	
			TOTALS
PEAK FLOW (cms)=	0.00	0.01	0.005 (iii)
TIME TO PEAK (hrs)=	1.02	1.45	1.43
RUNOFF VOLUME (mm)=	33.25	10.77	10.94
TOTAL RAINFALL (mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT =	0.97	0.31	0.32

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD (0028)|

```
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0027):     3.28   0.274     1.03    23.01
      + ID2= 2 (  3000):     0.22   0.005     1.43    10.94
        ================================================
        ID = 3 (  0028):     3.50   0.275     1.03    22.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0029)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0028):     3.50   0.275     1.03    22.25
      + ID2= 2 (  4000):     0.39   0.020     1.03    13.68
        ================================================
        ID = 3 (  0029):     3.89   0.296     1.03    21.39

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0029):     3.89   0.296     1.03    21.39
      + ID2= 2 (  6000):     0.60   0.024     1.20    10.77
        ================================================
        ID = 3 (  0023):     4.49   0.306     1.03    19.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      0.306      1.03      19.97
   OUTFLOW: ID= 1 (  0008)      4.490      0.063      2.17      19.06
```

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.47
TIME SHIFT OF PEAK FLOW (min)= 68.00
MAXIMUM STORAGE USED (ha.m.)= 0.0619

CALIB			
NASHYD (7000)	Area (ha)= 0.07	Curve Number (CN)= 79.0	
ID= 1 DT= 1.0 min	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.04		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78

0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.067

PEAK FLOW (cms)= 0.005 (i)
TIME TO PEAK (hrs)= 1.017
RUNOFF VOLUME (mm)= 9.794
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.286

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (5000):	2.89	0.081	1.23	8.06
+ ID2= 2 (7000):	0.07	0.005	1.02	9.79
ID = 3 (0010):	2.96	0.082	1.22	8.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	2.96	0.082	1.22	8.10
+ ID2= 2 (0008):	4.49	0.063	2.17	19.06
ID = 1 (0010):	7.45	0.088	1.23	14.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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e8e9b8-5b0e-41f3-898b-79c0d25247b2\s
  Summary filename:
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e8e9b8-5b0e-41f3-898b-79c0d25247b2\s


DATE: 06/02/2026                          TIME: 08:46:53

USER:



COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : City of Kitchener - 50yr      **
  ***********************************************


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| CHICAGO STORM    |    IDF curve parameters: A=3886.000
| Ptotal= 77.43 mm |                          B=  16.000
--------------------                          C=   0.950
                       used in:   INTENSITY =  A / (t + B)^C
```

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.81	0.75	44.21	1.50	18.51	2.25	5.83
0.08	4.38	0.83	100.30	1.58	15.47	2.33	5.34
0.17	5.12	0.92	215.47	1.67	13.16	2.42	4.92
0.25	6.10	1.00	125.05	1.75	11.37	2.50	4.56
0.33	7.44	1.08	75.67	1.83	9.94	2.58	4.23
0.42	9.35	1.17	51.24	1.92	8.79	2.67	3.95
0.50	12.24	1.25	37.29	2.00	7.84	2.75	3.69
0.58	16.96	1.33	28.54	2.08	7.06	2.83	3.47
0.67	25.56	1.42	22.66	2.17	6.39	2.92	3.26

CALIB			
NASHYD (5000)	Area (ha)=	2.89	Curve Number (CN)= 75.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.80	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.17	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56

0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.394 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 34.249
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.442

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (6000)	Area (ha)=	0.60	Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.16	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr

0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.106 (i)
TIME TO PEAK (hrs)= 1.200

RUNOFF VOLUME (mm)= 41.926
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.541

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (4000) ID= 1 DT= 1.0 min	Area (ha)= 0.39 Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23

0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	74.45		
over (min)	5.00	16.00		
Storage Coeff. (min)=	1.53 (ii)	15.29 (ii)		
Unit Hyd. Tpeak (min)=	5.00	16.00		
Unit Hyd. peak (cms)=	0.42	0.07		
			TOTALS	
PEAK FLOW (cms)=	0.04	0.04	0.052 (iii)	
TIME TO PEAK (hrs)=	1.02	1.32	1.03	
RUNOFF VOLUME (mm)=	76.43	37.49	45.25	
TOTAL RAINFALL (mm)=	77.43	77.43	77.43	
RUNOFF COEFFICIENT =	0.99	0.48	0.58	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB		
STANDHYD (1000)	Area (ha)=	2.39
ID= 1 DT= 1.0 min	Total Imp(%)=	75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.79	0.60

Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47

0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	365.02	
over (min)	5.00	13.00	
Storage Coeff. (min)=	2.17 (ii)	12.54 (ii)	
Unit Hyd. Tpeak (min)=	5.00	13.00	
Unit Hyd. peak (cms)=	0.36	0.09	
			TOTALS
PEAK FLOW (cms)=	0.37	0.37	0.553 (iii)
TIME TO PEAK (hrs)=	1.03	1.22	1.07
RUNOFF VOLUME (mm)=	76.43	57.36	63.08
TOTAL RAINFALL (mm)=	77.43	77.43	77.43
RUNOFF COEFFICIENT =	0.99	0.74	0.81

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (2000)	Area (ha)= 0.89
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83

0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	382.78	
over (min)	5.00	9.00	
Storage Coeff. (min)=	1.34 (ii)	8.65 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.44	0.13	
			TOTALS
PEAK FLOW (cms)=	0.15	0.16	0.258 (iii)
TIME TO PEAK (hrs)=	1.02	1.13	1.07
RUNOFF VOLUME (mm)=	76.43	57.36	63.08

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     TOTAL RAINFALL   (mm)=      77.43        77.43          77.43
     RUNOFF COEFFICIENT   =       0.99         0.74           0.81


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0027)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     2.39   0.553     1.07    63.08
      + ID2= 2 (  2000):     0.89   0.258     1.07    63.08
        ================================================
        ID = 3 (  0027):     3.28   0.812     1.07    63.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  3000)|   Area    (ha)=   0.22
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.04         0.18
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    3.81 | 0.767   44.21 | 1.517   18.51 |  2.27    5.83
              0.033    3.81 | 0.783   44.21 | 1.533   18.51 |  2.28    5.83
              0.050    3.81 | 0.800   44.21 | 1.550   18.51 |  2.30    5.83
              0.067    3.81 | 0.817   44.21 | 1.567   18.51 |  2.32    5.83
              0.083    3.81 | 0.833   44.21 | 1.583   18.51 |  2.33    5.83
              0.100    4.38 | 0.850  100.30 | 1.600   15.47 |  2.35    5.34
              0.117    4.38 | 0.867  100.30 | 1.617   15.47 |  2.37    5.34
              0.133    4.38 | 0.883  100.30 | 1.633   15.47 |  2.38    5.34
              0.150    4.38 | 0.900  100.30 | 1.650   15.47 |  2.40    5.34
```

0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	119.94	
over (min)	5.00	12.00	
Storage Coeff. (min)=	1.34 (ii)	11.28 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	0.44	0.10	
			TOTALS
PEAK FLOW (cms)=	0.00	0.04	0.036 (iii)
TIME TO PEAK (hrs)=	1.02	1.23	1.23
RUNOFF VOLUME (mm)=	76.43	42.10	42.41
TOTAL RAINFALL (mm)=	77.43	77.43	77.43
RUNOFF COEFFICIENT =	0.99	0.54	0.55

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%

YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0028)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0027):		3.28	0.812	1.07	63.08
+ ID2= 2 (3000):		0.22	0.036	1.23	42.41
ID = 3 (0028):		3.50	0.832	1.07	61.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0029)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0028):		3.50	0.832	1.07	61.78
+ ID2= 2 (4000):		0.39	0.052	1.03	45.25
ID = 3 (0029):		3.89	0.883	1.07	60.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0023)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0029):		3.89	0.883	1.07	60.12
+ ID2= 2 (6000):		0.60	0.106	1.20	41.93
ID = 3 (0023):		4.49	0.972	1.13	57.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0008)	IN= 2---> OUT= 1	DT= 1.0 min	OVERFLOW IS OFF			
			OUTFLOW	STORAGE	OUTFLOW	STORAGE
			(cms)	(ha.m.)	(cms)	(ha.m.)

0.0000	0.0000	0.5730	0.0890
0.0030	0.0100	0.7490	0.1050
0.0050	0.0210	0.7730	0.1220
0.0060	0.0330	0.8840	0.1400
0.0070	0.0460	1.0730	0.1590
0.0320	0.0590	1.3170	0.1790
0.1900	0.0740	1.6080	0.2000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0023)	4.490	0.972	1.13	57.69
OUTFLOW: ID= 1 (0008)	4.490	0.668	1.37	56.78

PEAK FLOW REDUCTION [Qout/Qin](%)= 68.71
TIME SHIFT OF PEAK FLOW (min)= 14.00
MAXIMUM STORAGE USED (ha.m.)= 0.0977

CALIB			
NASHYD (7000)	Area (ha)= 0.07	Curve Number (CN)= 79.0	
ID= 1 DT= 1.0 min	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.04		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56

0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.067

PEAK FLOW (cms)= 0.018 (i)
TIME TO PEAK (hrs)= 1.017
RUNOFF VOLUME (mm)= 38.844
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.502

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (5000):		2.89	0.394	1.23	34.25
+ ID2= 2 (7000):		0.07	0.018	1.02	38.84
		==========	==========	==========	==========
ID = 3 (0010):		2.96	0.402	1.22	34.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.402     1.22    34.36
      + ID2= 2 (  0008):     4.49   0.668     1.37    56.78
        ====================================================
        ID = 1 (  0010):     7.45   1.030     1.30    47.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2b
f4eadf-a944-45fe-a01a-8be7f3a5493d\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2b
f4eadf-a944-45fe-a01a-8be7f3a5493d\s


DATE: 06/02/2026                          TIME: 08:46:53

USER:



COMMENTS: _____________________________________________________________
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  ********************************************
  ** SIMULATION : City of Kitchener - 5yr       **
  ********************************************

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| CHICAGO STORM    |    IDF curve parameters: A=1593.000
| Ptotal= 47.23 mm |                          B=  11.000
--------------------                          C=   0.879
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.03	0.75	24.58	1.50	11.05	2.25	4.23
0.08	3.38	0.83	57.37	1.58	9.45	2.33	3.94
0.17	3.82	0.92	139.25	1.67	8.23	2.42	3.70
0.25	4.38	1.00	72.71	1.75	7.28	2.50	3.48
0.33	5.14	1.08	42.10	1.83	6.51	2.58	3.28
0.42	6.19	1.17	28.36	1.92	5.89	2.67	3.11
0.50	7.74	1.25	20.87	2.00	5.37	2.75	2.95
0.58	10.23	1.33	16.27	2.08	4.93	2.83	2.81
0.67	14.72	1.42	13.21	2.17	4.55	2.92	2.68

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--------------------
| CALIB            |
| NASHYD   (  5000)|   Area    (ha)=   2.89   Curve Number   (CN)= 75.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94

0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.159 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 14.726
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.312

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| NASHYD   (  6000)|   Area    (ha)=   0.60   Curve Number   (CN)= 82.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81

0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.045 (i)
TIME TO PEAK (hrs)= 1.217
RUNOFF VOLUME (mm)= 19.038
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.403

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (4000) ID= 1 DT= 1.0 min	Area (ha)= 0.39 Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70

0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Max.Eff.Inten.(mm/hr)=	139.25	24.87	
over (min)	5.00	24.00	
Storage Coeff. (min)=	1.82 (ii)	23.16 (ii)	
Unit Hyd. Tpeak (min)=	5.00	24.00	
Unit Hyd. peak (cms)=	0.39	0.05	
			TOTALS
PEAK FLOW (cms)=	0.03	0.01	0.028 (iii)
TIME TO PEAK (hrs)=	1.03	1.47	1.03
RUNOFF VOLUME (mm)=	46.23	16.25	22.21
TOTAL RAINFALL (mm)=	47.23	47.23	47.23
RUNOFF COEFFICIENT =	0.98	0.34	0.47

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1000)	Area (ha)= 2.39
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.79	0.60
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11

0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Max.Eff.Inten.(mm/hr)=	139.25	163.77		
over (min)	5.00	17.00		
Storage Coeff. (min)=	2.59 (ii)	16.87 (ii)		
Unit Hyd. Tpeak (min)=	5.00	17.00		
Unit Hyd. peak (cms)=	0.33	0.07		
			TOTALS	
PEAK FLOW (cms)=	0.23	0.15	0.277 (iii)	
TIME TO PEAK (hrs)=	1.03	1.30	1.05	
RUNOFF VOLUME (mm)=	46.23	29.69	34.65	
TOTAL RAINFALL (mm)=	47.23	47.23	47.23	
RUNOFF COEFFICIENT =	0.98	0.63	0.73	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (2000)	Area (ha)= 0.89
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68

```
              0.733   14.72 | 1.483   13.21 | 2.233    4.55 |  2.98    2.68
              0.750   14.72 | 1.500   13.21 | 2.250    4.55 |  3.00    2.68

     Max.Eff.Inten.(mm/hr)=     139.25       198.72
               over (min)        5.00        11.00
     Storage Coeff.  (min)=       1.59 (ii)   10.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00        11.00
     Unit Hyd. peak  (cms)=       0.41         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.08          0.130 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.18           1.05
     RUNOFF VOLUME    (mm)=      46.23        29.69          34.65
     TOTAL RAINFALL   (mm)=      47.23        47.23          47.23
     RUNOFF COEFFICIENT   =       0.98         0.63           0.73


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0027)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     2.39   0.277     1.05    34.65
      + ID2= 2 (  2000):     0.89   0.130     1.05    34.65
        ================================================
        ID = 3 (  0027):     3.28   0.407     1.05    34.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  3000)|   Area    (ha)=   0.22
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.04         0.18
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Max.Eff.Inten.(mm/hr)= 139.25 44.70

```
               over (min)        5.00        17.00
     Storage Coeff.  (min)=       1.59 (ii)   16.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=       0.41         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.01          0.012 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.33           1.33
     RUNOFF VOLUME    (mm)=      46.23        19.08          19.31
     TOTAL RAINFALL   (mm)=      47.23        47.23          47.23
     RUNOFF COEFFICIENT   =       0.98         0.40           0.41

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0028)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0027):     3.28   0.407     1.05    34.65
      + ID2= 2 (  3000):     0.22   0.012     1.33    19.31
        ====================================================
        ID = 3 (  0028):     3.50   0.411     1.05    33.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0029)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0028):     3.50   0.411     1.05    33.69
      + ID2= 2 (  4000):     0.39   0.028     1.03    22.21
        ====================================================
        ID = 3 (  0029):     3.89   0.438     1.05    32.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 1 (  0029):     3.89   0.438     1.05    32.54
      + ID2= 2 (  6000):     0.60   0.045     1.22    19.04
        ================================================
        ID = 3 (  0023):     4.49   0.463     1.05    30.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      0.463      1.05      30.73
   OUTFLOW: ID= 1 (  0008)      4.490      0.202      1.63      29.82

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.64
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0745

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  7000)|   Area    (ha)=   0.07   Curve Number   (CN)= 79.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    3.03 | 0.767   24.58 | 1.517   11.05 |  2.27    4.23
              0.033    3.03 | 0.783   24.58 | 1.533   11.05 |  2.28    4.23
              0.050    3.03 | 0.800   24.58 | 1.550   11.05 |  2.30    4.23
              0.067    3.03 | 0.817   24.58 | 1.567   11.05 |  2.32    4.23
              0.083    3.03 | 0.833   24.58 | 1.583   11.05 |  2.33    4.23
              0.100    3.38 | 0.850   57.37 | 1.600    9.45 |  2.35    3.94
              0.117    3.38 | 0.867   57.37 | 1.617    9.45 |  2.37    3.94
              0.133    3.38 | 0.883   57.37 | 1.633    9.45 |  2.38    3.94
```

0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.067

PEAK FLOW (cms)= 0.008 (i)
TIME TO PEAK (hrs)= 1.017
RUNOFF VOLUME (mm)= 17.384
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.368

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  5000):     2.89   0.159     1.23    14.73
      + ID2= 2 (  7000):     0.07   0.008     1.02    17.38
        ====================================================
        ID = 3 (  0010):     2.96   0.163     1.23    14.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.163     1.23    14.79
      + ID2= 2 (  0008):     4.49   0.202     1.63    29.82
        ====================================================
        ID = 1 (  0010):     7.45   0.279     1.58    23.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\be
3b943d-0a63-4673-8c2c-348300670cb1\s
  Summary filename:
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C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\be3b943d-0a63-4673-8c2c-348300670cb1\s

DATE: 06/02/2026 TIME: 08:46:54

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener 100-yr **
****

CHICAGO STORM
Ptotal= 87.25 mm

IDF curve parameters: A=4688.000
B= 17.000
C= 0.962
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.11	0.75	50.61	1.50	21.03	2.25	6.40
0.08	4.76	0.83	113.86	1.58	17.51	2.33	5.85
0.17	5.59	0.92	239.65	1.67	14.84	2.42	5.37
0.25	6.71	1.00	141.46	1.75	12.77	2.50	4.95
0.33	8.24	1.08	86.38	1.83	11.13	2.58	4.58
0.42	10.44	1.17	58.67	1.92	9.80	2.67	4.26
0.50	13.78	1.25	42.69	2.00	8.71	2.75	3.97
0.58	19.23	1.33	32.61	2.08	7.81	2.83	3.72
0.67	29.17	1.42	25.83	2.17	7.05	2.92	3.49

CALIB
NASHYD (5000)
ID= 1 DT= 1.0 min

Area (ha)= 2.89 Curve Number (CN)= 75.0
Ia (mm)= 3.80 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.480 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 41.424
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.475

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
NASHYD (6000)	Area (ha)= 0.60 Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)= 3.77 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.16

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26

0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.127 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 50.051
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.574

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (4000) ID= 1 DT= 1.0 min	Area (ha)= 0.39 Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.08	0.31
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40

0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	92.35
over (min)	5.00	15.00
Storage Coeff. (min)=	1.46 (ii)	14.09 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.42	0.08

			TOTALS
PEAK FLOW	(cms)=	0.05	0.05	0.062 (iii)
TIME TO PEAK	(hrs)=	1.02	1.30	1.22
RUNOFF VOLUME	(mm)=	86.25	45.17	53.37
TOTAL RAINFALL	(mm)=	87.25	87.25	87.25
RUNOFF COEFFICIENT	=	0.99	0.52	0.61

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1000)	Area (ha)= 2.39
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.79	0.60
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37

0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	442.25	
over (min)	5.00	12.00	
Storage Coeff. (min)=	2.08 (ii)	11.68 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	0.37	0.10	
			TOTALS
PEAK FLOW (cms)=	0.42	0.44	0.668 (iii)
TIME TO PEAK (hrs)=	1.03	1.20	1.13
RUNOFF VOLUME (mm)=	86.25	66.66	72.53
TOTAL RAINFALL (mm)=	87.25	87.25	87.25
RUNOFF COEFFICIENT =	0.99	0.76	0.83

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| STANDHYD (  2000)|   Area    (ha)=   0.89
|ID= 1 DT= 1.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  30.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97

0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	442.25		
over (min)	5.00	9.00		
Storage Coeff. (min)=	1.28 (ii)	8.29 (ii)		
Unit Hyd. Tpeak (min)=	5.00	9.00		
Unit Hyd. peak (cms)=	0.44	0.13		
			TOTALS	
PEAK FLOW (cms)=	0.16	0.19	0.300 (iii)	
TIME TO PEAK (hrs)=	1.02	1.13	1.07	
RUNOFF VOLUME (mm)=	86.25	66.66	72.53	
TOTAL RAINFALL (mm)=	87.25	87.25	87.25	
RUNOFF COEFFICIENT =	0.99	0.76	0.83	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0027)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (1000):	2.39	0.668	1.13	72.53
+	ID2= 2 (2000):	0.89	0.300	1.07	72.53
	ID = 3 (0027):	3.28	0.964	1.07	72.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB		
STANDHYD (3000)	Area (ha)=	0.22

|ID= 1 DT= 1.0 min | Total Imp(%)= 20.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.04	0.18
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97

0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	143.44		
over (min)	5.00	11.00		
Storage Coeff. (min)=	1.28 (ii)	10.54 (ii)		
Unit Hyd. Tpeak (min)=	5.00	11.00		
Unit Hyd. peak (cms)=	0.44	0.11		
			TOTALS	
PEAK FLOW (cms)=	0.00	0.04	0.044 (iii)	
TIME TO PEAK (hrs)=	1.02	1.22	1.20	
RUNOFF VOLUME (mm)=	86.25	50.26	50.59	
TOTAL RAINFALL (mm)=	87.25	87.25	87.25	
RUNOFF COEFFICIENT =	0.99	0.58	0.58	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0028)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	
ID1= 1 (0027):	3.28	0.964	1.07	72.53	
+ ID2= 2 (3000):	0.22	0.044	1.20	50.59	
	==========	==========	==========	==========	
ID = 3 (0028):	3.50	0.997	1.12	71.15	

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0029)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)

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        ID1= 1 (  0028):     3.50   0.997     1.12    71.15
      + ID2= 2 (  4000):     0.39   0.062     1.22    53.37
        ================================================
        ID = 3 (  0029):     3.89   1.057     1.12    69.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0029):     3.89   1.057     1.12    69.37
      + ID2= 2 (  6000):     0.60   0.127     1.20    50.05
        ================================================
        ID = 3 (  0023):     4.49   1.173     1.13    66.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      1.173      1.13      66.79
   OUTFLOW: ID= 1 (  0008)      4.490      0.756      1.38      65.88

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 64.46
                  TIME SHIFT OF PEAK FLOW         (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1100

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| CALIB            |
| NASHYD   (  7000)|   Area    (ha)=   0.07   Curve Number   (CN)= 79.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

```
     Unit Hyd Qpeak  (cms)=   0.067

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   1.017
     RUNOFF VOLUME    (mm)=  46.567
     TOTAL RAINFALL   (mm)=  87.251
     RUNOFF COEFFICIENT   =   0.534

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  5000):     2.89   0.480     1.23    41.42
     + ID2= 2 (  7000):     0.07   0.022     1.02    46.57
       ================================================
       ID = 3 (  0010):     2.96   0.490     1.22    41.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0010):     2.96   0.490     1.22    41.55
     + ID2= 2 (  0008):     4.49   0.756     1.38    65.88
       ================================================
       ID = 1 (  0010):     7.45   1.230     1.27    56.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
=======================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\da44f429-18d4-49d0-909a-01107736a134\s
Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\da44f429-18d4-49d0-909a-01107736a134\s

DATE: 06/02/2026 TIME: 08:46:54

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener 10-yr **
****

| CHICAGO STORM |
| Ptotal= 56.28 mm |

IDF curve parameters: A=2221.000
B= 12.000
C= 0.908
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.16	0.75	29.81	1.50	12.83	2.25	4.55
0.08	3.56	0.83	70.75	1.58	10.86	2.33	4.22
0.17	4.07	0.92	169.55	1.67	9.37	2.42	3.93
0.25	4.73	1.00	89.76	1.75	8.20	2.50	3.68
0.33	5.62	1.08	51.82	1.83	7.27	2.58	3.45
0.42	6.88	1.17	34.57	1.92	6.52	2.67	3.25
0.50	8.77	1.25	25.13	2.00	5.90	2.75	3.08

0.58	11.83	1.33	19.35	2.08	5.37	2.83	2.92
0.67	17.41	1.42	15.52	2.17	4.93	2.92	2.77

CALIB			
NASHYD (5000)	Area (ha)=	2.89	Curve Number (CN)= 75.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.80	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.17	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08

0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Unit Hyd Qpeak (cms)= 0.649

PEAK FLOW (cms)= 0.228 (i)
TIME TO PEAK (hrs)= 1.233
RUNOFF VOLUME (mm)= 20.083
TOTAL RAINFALL (mm)= 56.282
RUNOFF COEFFICIENT = 0.357

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (6000)	Area (ha)=	0.60	Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.16	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93

0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Unit Hyd Qpeak (cms)= 0.143

PEAK FLOW (cms)= 0.064 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 25.469
TOTAL RAINFALL (mm)= 56.282
RUNOFF COEFFICIENT = 0.453

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (4000)	Area (ha)= 0.39
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	0.08	0.31

Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	100.00	100.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92

0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	39.32	
over (min)	5.00	20.00	
Storage Coeff. (min)=	1.68 (ii)	19.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.40	0.06	
			TOTALS
PEAK FLOW (cms)=	0.03	0.02	0.035 (iii)
TIME TO PEAK (hrs)=	1.02	1.38	1.03
RUNOFF VOLUME (mm)=	55.28	22.14	28.74
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.39	0.51

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (1000)	Area (ha)= 2.39
ID= 1 DT= 1.0 min	Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.79	0.60
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	2.00	2.00
Length (m)=	180.00	180.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55

0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	229.61	
over (min)	5.00	15.00	
Storage Coeff. (min)=	2.39 (ii)	14.87 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.34	0.08	
			TOTALS
PEAK FLOW (cms)=	0.28	0.22	0.366 (iii)

TIME TO PEAK (hrs)=	1.03	1.27	1.05
RUNOFF VOLUME (mm)=	55.28	37.78	43.03
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.67	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (2000)| Area (ha)= 0.89
ID= 1 DT= 1.0 min | Total Imp(%)= 75.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.67	0.22
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68

0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	262.21	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.47 (ii)	9.52 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.42	0.12	
			TOTALS
PEAK FLOW (cms)=	0.11	0.10	0.172 (iii)
TIME TO PEAK (hrs)=	1.02	1.15	1.05
RUNOFF VOLUME (mm)=	55.28	37.78	43.02
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.67	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0027)

1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (1000):	2.39	0.366	1.05	43.03
+	ID2= 2 (2000):	0.89	0.172	1.05	43.02
	ID = 3 (0027):	3.28	0.539	1.05	43.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB		
STANDHYD (3000)	Area (ha)=	0.22
ID= 1 DT= 1.0 min	Total Imp(%)=	20.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.04	0.18
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45

0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	66.11	
over (min)	5.00	15.00	
Storage Coeff. (min)=	1.47 (ii)	14.09 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.42	0.08	
			TOTALS
PEAK FLOW (cms)=	0.00	0.02	0.019 (iii)
TIME TO PEAK (hrs)=	1.02	1.28	1.28
RUNOFF VOLUME (mm)=	55.28	25.55	25.81
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.45	0.46

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0028)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)

```
        ID1= 1 (  0027):     3.28   0.539     1.05    43.03
      + ID2= 2 (  3000):     0.22   0.019     1.28    25.81
        ================================================
        ID = 3 (  0028):     3.50   0.546     1.05    41.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0029)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0028):     3.50   0.546     1.05    41.94
      + ID2= 2 (  4000):     0.39   0.035     1.03    28.74
        ================================================
        ID = 3 (  0029):     3.89   0.580     1.05    40.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0029):     3.89   0.580     1.05    40.62
      + ID2= 2 (  6000):     0.60   0.064     1.20    25.47
        ================================================
        ID = 3 (  0023):     4.49   0.616     1.05    38.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      0.616      1.05      38.60
   OUTFLOW: ID= 1 (  0008)      4.490      0.366      1.45      37.69

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 59.36
```

TIME SHIFT OF PEAK FLOW (min)= 24.00
MAXIMUM STORAGE USED (ha.m.)= 0.0809

CALIB NASHYD (7000) ID= 1 DT= 1.0 min	Area (ha)= 0.07	Curve Number (CN)= 79.0
	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.04	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08

```
                0.583    8.77 | 1.333   25.13 | 2.083    5.90 |  2.83    3.08
                0.600   11.83 | 1.350   19.35 | 2.100    5.37 |  2.85    2.92
                0.617   11.83 | 1.367   19.35 | 2.117    5.37 |  2.87    2.92
                0.633   11.83 | 1.383   19.35 | 2.133    5.37 |  2.88    2.92
                0.650   11.83 | 1.400   19.35 | 2.150    5.37 |  2.90    2.92
                0.667   11.83 | 1.417   19.35 | 2.167    5.37 |  2.92    2.92
                0.683   17.41 | 1.433   15.52 | 2.183    4.93 |  2.93    2.77
                0.700   17.41 | 1.450   15.52 | 2.200    4.93 |  2.95    2.77
                0.717   17.41 | 1.467   15.52 | 2.217    4.93 |  2.97    2.77
                0.733   17.41 | 1.483   15.52 | 2.233    4.93 |  2.98    2.77
                0.750   17.41 | 1.500   15.52 | 2.250    4.93 |  3.00    2.77

     Unit Hyd Qpeak  (cms)=   0.067

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   1.017
     RUNOFF VOLUME    (mm)=  23.360
     TOTAL RAINFALL   (mm)=  56.282
     RUNOFF COEFFICIENT   =   0.415

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  5000):     2.89   0.228     1.23    20.08
      + ID2= 2 (  7000):     0.07   0.011     1.02    23.36
        ================================================
        ID = 3 (  0010):     2.96   0.233     1.22    20.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.233     1.22    20.16
      + ID2= 2 (  0008):     4.49   0.366     1.45    37.69
        ================================================
        ID = 1 (  0010):     7.45   0.536     1.40    30.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
======================
```

```
       V    V   I    SSSSS  U   U    A    L             (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\34d44240-6dca-4b50-991b-1dd61b549bbb\s
Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\34d44240-6dca-4b50-991b-1dd61b549bbb\s

DATE: 06/02/2026 TIME: 08:54:28

USER:

COMMENTS: _____

****
** SIMULATION : Hazel **
****

READ STORM	Filename: C:\Users\sabjiv4671\AppData\Local\Temp\4c5ae6d0-b29f-409d-b375-a4ff164ae0bd\130a20bd
Ptotal=285.00 mm	Comments: Hazel

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	12.08	2.03	24.17	2.03	36.25	6.00
0.08	2.03	12.17	2.03	24.25	2.03	36.33	6.00
0.17	2.03	12.25	2.03	24.33	2.03	36.42	6.00
0.25	2.03	12.33	2.03	24.42	2.03	36.50	6.00
0.33	2.03	12.42	2.03	24.50	2.03	36.58	6.00
0.42	2.03	12.50	2.03	24.58	2.03	36.67	6.00
0.50	2.03	12.58	2.03	24.67	2.03	36.75	6.00
0.58	2.03	12.67	2.03	24.75	2.03	36.83	6.00
0.67	2.03	12.75	2.03	24.83	2.03	36.92	6.00
0.75	2.03	12.83	2.03	24.92	2.03	37.00	6.00
0.83	2.03	12.92	2.03	25.00	2.03	37.08	4.00
0.92	2.03	13.00	2.03	25.08	2.03	37.17	4.00
1.00	2.03	13.08	2.03	25.17	2.03	37.25	4.00
1.08	2.03	13.17	2.03	25.25	2.03	37.33	4.00
1.17	2.03	13.25	2.03	25.33	2.03	37.42	4.00
1.25	2.03	13.33	2.03	25.42	2.03	37.50	4.00
1.33	2.03	13.42	2.03	25.50	2.03	37.58	4.00
1.42	2.03	13.50	2.03	25.58	2.03	37.67	4.00
1.50	2.03	13.58	2.03	25.67	2.03	37.75	4.00
1.58	2.03	13.67	2.03	25.75	2.03	37.83	4.00
1.67	2.03	13.75	2.03	25.83	2.03	37.92	4.00
1.75	2.03	13.83	2.03	25.92	2.03	38.00	4.00
1.83	2.03	13.92	2.03	26.00	2.03	38.08	6.00
1.92	2.03	14.00	2.03	26.08	2.03	38.17	6.00
2.00	2.03	14.08	2.03	26.17	2.03	38.25	6.00
2.08	2.03	14.17	2.03	26.25	2.03	38.33	6.00
2.17	2.03	14.25	2.03	26.33	2.03	38.42	6.00
2.25	2.03	14.33	2.03	26.42	2.03	38.50	6.00
2.33	2.03	14.42	2.03	26.50	2.03	38.58	6.00
2.42	2.03	14.50	2.03	26.58	2.03	38.67	6.00
2.50	2.03	14.58	2.03	26.67	2.03	38.75	6.00
2.58	2.03	14.67	2.03	26.75	2.03	38.83	6.00
2.67	2.03	14.75	2.03	26.83	2.03	38.92	6.00
2.75	2.03	14.83	2.03	26.92	2.03	39.00	6.00
2.83	2.03	14.92	2.03	27.00	2.03	39.08	13.00
2.92	2.03	15.00	2.03	27.08	2.03	39.17	13.00
3.00	2.03	15.08	2.03	27.17	2.03	39.25	13.00
3.08	2.03	15.17	2.03	27.25	2.03	39.33	13.00
3.17	2.03	15.25	2.03	27.33	2.03	39.42	13.00
3.25	2.03	15.33	2.03	27.42	2.03	39.50	13.00
3.33	2.03	15.42	2.03	27.50	2.03	39.58	13.00
3.42	2.03	15.50	2.03	27.58	2.03	39.67	13.00
3.50	2.03	15.58	2.03	27.67	2.03	39.75	13.00
3.58	2.03	15.67	2.03	27.75	2.03	39.83	13.00
3.67	2.03	15.75	2.03	27.83	2.03	39.92	13.00
3.75	2.03	15.83	2.03	27.92	2.03	40.00	13.00
3.83	2.03	15.92	2.03	28.00	2.03	40.08	17.00
3.92	2.03	16.00	2.03	28.08	2.03	40.17	17.00

4.00	2.03	16.08	2.03	28.17	2.03	40.25	17.00
4.08	2.03	16.17	2.03	28.25	2.03	40.33	17.00
4.17	2.03	16.25	2.03	28.33	2.03	40.42	17.00
4.25	2.03	16.33	2.03	28.42	2.03	40.50	17.00
4.33	2.03	16.42	2.03	28.50	2.03	40.58	17.00
4.42	2.03	16.50	2.03	28.58	2.03	40.67	17.00
4.50	2.03	16.58	2.03	28.67	2.03	40.75	17.00
4.58	2.03	16.67	2.03	28.75	2.03	40.83	17.00
4.67	2.03	16.75	2.03	28.83	2.03	40.92	17.00
4.75	2.03	16.83	2.03	28.92	2.03	41.00	17.00
4.83	2.03	16.92	2.03	29.00	2.03	41.08	13.00
4.92	2.03	17.00	2.03	29.08	2.03	41.17	13.00
5.00	2.03	17.08	2.03	29.17	2.03	41.25	13.00
5.08	2.03	17.17	2.03	29.25	2.03	41.33	13.00
5.17	2.03	17.25	2.03	29.33	2.03	41.42	13.00
5.25	2.03	17.33	2.03	29.42	2.03	41.50	13.00
5.33	2.03	17.42	2.03	29.50	2.03	41.58	13.00
5.42	2.03	17.50	2.03	29.58	2.03	41.67	13.00
5.50	2.03	17.58	2.03	29.67	2.03	41.75	13.00
5.58	2.03	17.67	2.03	29.75	2.03	41.83	13.00
5.67	2.03	17.75	2.03	29.83	2.03	41.92	13.00
5.75	2.03	17.83	2.03	29.92	2.03	42.00	13.00
5.83	2.03	17.92	2.03	30.00	2.03	42.08	23.00
5.92	2.03	18.00	2.03	30.08	2.03	42.17	23.00
6.00	2.03	18.08	2.03	30.17	2.03	42.25	23.00
6.08	2.03	18.17	2.03	30.25	2.03	42.33	23.00
6.17	2.03	18.25	2.03	30.33	2.03	42.42	23.00
6.25	2.03	18.33	2.03	30.42	2.03	42.50	23.00
6.33	2.03	18.42	2.03	30.50	2.03	42.58	23.00
6.42	2.03	18.50	2.03	30.58	2.03	42.67	23.00
6.50	2.03	18.58	2.03	30.67	2.03	42.75	23.00
6.58	2.03	18.67	2.03	30.75	2.03	42.83	23.00
6.67	2.03	18.75	2.03	30.83	2.03	42.92	23.00
6.75	2.03	18.83	2.03	30.92	2.03	43.00	23.00
6.83	2.03	18.92	2.03	31.00	2.03	43.08	13.00
6.92	2.03	19.00	2.03	31.08	2.03	43.17	13.00
7.00	2.03	19.08	2.03	31.17	2.03	43.25	13.00
7.08	2.03	19.17	2.03	31.25	2.03	43.33	13.00
7.17	2.03	19.25	2.03	31.33	2.03	43.42	13.00
7.25	2.03	19.33	2.03	31.42	2.03	43.50	13.00
7.33	2.03	19.42	2.03	31.50	2.03	43.58	13.00
7.42	2.03	19.50	2.03	31.58	2.03	43.67	13.00
7.50	2.03	19.58	2.03	31.67	2.03	43.75	13.00
7.58	2.03	19.67	2.03	31.75	2.03	43.83	13.00
7.67	2.03	19.75	2.03	31.83	2.03	43.92	13.00
7.75	2.03	19.83	2.03	31.92	2.03	44.00	13.00
7.83	2.03	19.92	2.03	32.00	2.03	44.08	13.00
7.92	2.03	20.00	2.03	32.08	2.03	44.17	13.00
8.00	2.03	20.08	2.03	32.17	2.03	44.25	13.00
8.08	2.03	20.17	2.03	32.25	2.03	44.33	13.00

8.17	2.03	20.25	2.03	32.33	2.03	44.42	13.00
8.25	2.03	20.33	2.03	32.42	2.03	44.50	13.00
8.33	2.03	20.42	2.03	32.50	2.03	44.58	13.00
8.42	2.03	20.50	2.03	32.58	2.03	44.67	13.00
8.50	2.03	20.58	2.03	32.67	2.03	44.75	13.00
8.58	2.03	20.67	2.03	32.75	2.03	44.83	13.00
8.67	2.03	20.75	2.03	32.83	2.03	44.92	13.00
8.75	2.03	20.83	2.03	32.92	2.03	45.00	13.00
8.83	2.03	20.92	2.03	33.00	2.03	45.08	53.00
8.92	2.03	21.00	2.03	33.08	2.03	45.17	53.00
9.00	2.03	21.08	2.03	33.17	2.03	45.25	53.00
9.08	2.03	21.17	2.03	33.25	2.03	45.33	53.00
9.17	2.03	21.25	2.03	33.33	2.03	45.42	53.00
9.25	2.03	21.33	2.03	33.42	2.03	45.50	53.00
9.33	2.03	21.42	2.03	33.50	2.03	45.58	53.00
9.42	2.03	21.50	2.03	33.58	2.03	45.67	53.00
9.50	2.03	21.58	2.03	33.67	2.03	45.75	53.00
9.58	2.03	21.67	2.03	33.75	2.03	45.83	53.00
9.67	2.03	21.75	2.03	33.83	2.03	45.92	53.00
9.75	2.03	21.83	2.03	33.92	2.03	46.00	53.00
9.83	2.03	21.92	2.03	34.00	2.03	46.08	38.00
9.92	2.03	22.00	2.03	34.08	2.03	46.17	38.00
10.00	2.03	22.08	2.03	34.17	2.03	46.25	38.00
10.08	2.03	22.17	2.03	34.25	2.03	46.33	38.00
10.17	2.03	22.25	2.03	34.33	2.03	46.42	38.00
10.25	2.03	22.33	2.03	34.42	2.03	46.50	38.00
10.33	2.03	22.42	2.03	34.50	2.03	46.58	38.00
10.42	2.03	22.50	2.03	34.58	2.03	46.67	38.00
10.50	2.03	22.58	2.03	34.67	2.03	46.75	38.00
10.58	2.03	22.67	2.03	34.75	2.03	46.83	38.00
10.67	2.03	22.75	2.03	34.83	2.03	46.92	38.00
10.75	2.03	22.83	2.03	34.92	2.03	47.00	38.00
10.83	2.03	22.92	2.03	35.00	2.03	47.08	13.00
10.92	2.03	23.00	2.03	35.08	2.03	47.17	13.00
11.00	2.03	23.08	2.03	35.17	2.03	47.25	13.00
11.08	2.03	23.17	2.03	35.25	2.03	47.33	13.00
11.17	2.03	23.25	2.03	35.33	2.03	47.42	13.00
11.25	2.03	23.33	2.03	35.42	2.03	47.50	13.00
11.33	2.03	23.42	2.03	35.50	2.03	47.58	13.00
11.42	2.03	23.50	2.03	35.58	2.03	47.67	13.00
11.50	2.03	23.58	2.03	35.67	2.03	47.75	13.00
11.58	2.03	23.67	2.03	35.75	2.03	47.83	13.00
11.67	2.03	23.75	2.03	35.83	2.03	47.92	13.00
11.75	2.03	23.83	2.03	35.92	2.03	48.00	13.00
11.83	2.03	23.92	2.03	36.00	2.03		
11.92	2.03	24.00	2.03	36.08	6.00		
12.00	2.03	24.08	2.03	36.17	6.00		

```
--------------------
| CALIB            |
| NASHYD   (  5000)|   Area    (ha)=   2.89   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   3.80   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.17

     Unit Hyd Qpeak  (cms)=   0.649

     PEAK FLOW       (cms)=   0.391 (i)
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 215.355
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.756

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  6000)|   Area    (ha)=   0.60   Curve Number   (CN)= 82.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   3.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.16

     Unit Hyd Qpeak  (cms)=   0.143

     PEAK FLOW       (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 233.641
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.820

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  4000)|   Area    (ha)=   0.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------

                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.08         0.31
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     100.00       100.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00        50.08
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.67 (ii)   18.80 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
```

```
     Unit Hyd. peak  (cms)=       0.29         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.04          0.052 (iii)
     TIME TO PEAK    (hrs)=      45.67        46.17          46.08
     RUNOFF VOLUME    (mm)=     284.00       225.60         237.25
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.79           0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  1000)|   Area    (ha)=   2.39
|ID= 1 DT= 5.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  30.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.79         0.60
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     180.00       180.00
     Mannings n             =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00       147.02
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.81 (ii)   18.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.25         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.23          0.337 (iii)
     TIME TO PEAK    (hrs)=      46.00        46.08          46.08
     RUNOFF VOLUME    (mm)=     284.00       260.99         267.89
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.92           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  2000)|   Area    (ha)=   0.89
|ID= 1 DT= 5.0 min |   Total Imp(%)=  75.00   Dir. Conn.(%)=  30.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.67         0.22
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00       147.04
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.34 (ii)   11.51 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.09         0.129 (iii)
     TIME TO PEAK    (hrs)=      45.67        46.08         46.08
     RUNOFF VOLUME    (mm)=     284.00       260.99        267.89
     TOTAL RAINFALL   (mm)=     285.00       285.00        285.00
     RUNOFF COEFFICIENT   =       1.00         0.92          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0027)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  1000):     2.39   0.337    46.08   267.89
      + ID2= 2 (  2000):     0.89   0.129    46.08   267.89
        ================================================
        ID = 3 (  0027):     3.28   0.466    46.08   267.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  3000)|   Area    (ha)=   0.22
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.04         0.18
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00        63.06
               over (min)        5.00        20.00
     Storage Coeff.  (min)=       2.34 (ii)   15.20 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.30         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.03          0.030 (iii)
     TIME TO PEAK    (hrs)=      45.50        46.08          46.08
     RUNOFF VOLUME    (mm)=     284.00       235.27         235.72
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.83           0.83

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0028)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0027):     3.28   0.466    46.08   267.89
      + ID2= 2 (  3000):     0.22   0.030    46.08   235.72
        ================================================
        ID = 3 (  0028):     3.50   0.497    46.08   265.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------


--------------------
| ADD HYD  (  0029)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0028):     3.50   0.497    46.08   265.87
```

```
      + ID2= 2 (  4000):     0.39   0.052    46.08   237.25
        ==================================================
        ID = 3 (  0029):     3.89   0.549    46.08   263.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0029):     3.89   0.549    46.08   263.00
      + ID2= 2 (  6000):     0.60   0.084    46.08   233.64
        ==================================================
        ID = 3 (  0023):     4.49   0.633    46.08   259.08

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.5730      0.0890
                           0.0030      0.0100   |    0.7490      0.1050
                           0.0050      0.0210   |    0.7730      0.1220
                           0.0060      0.0330   |    0.8840      0.1400
                           0.0070      0.0460   |    1.0730      0.1590
                           0.0320      0.0590   |    1.3170      0.1790
                           0.1900      0.0740   |    1.6080      0.2000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.490      0.633     46.08     259.08
   OUTFLOW: ID= 1 (  0008)      4.490      0.610     46.17     258.89

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 96.30
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0926

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  7000)|   Area    (ha)=   0.07   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.04

     Unit Hyd Qpeak  (cms)=   0.067

     PEAK FLOW       (cms)=   0.006 (i)
```

```
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 135.700
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.476

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  5000):     2.89   0.391    46.08   215.35
      + ID2= 2 (  7000):     0.07   0.006    46.08   135.70
        ====================================================
        ID = 3 (  0010):     2.96   0.397    46.08   213.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0010):     2.96   0.397    46.08   213.47
      + ID2= 2 (  0008):     4.49   0.610    46.17   258.89
        ====================================================
        ID = 1 (  0010):     7.45   1.005    46.08   240.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

 FINISH
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======================
```

Pumping Station Post-Dev Modelling

Post-Development Catchment SCS Numbers- Pumping Station Option
51 Hawkesville Road
Project: 2401775
12-Dec-25

Curve Number

CATCHMENT	Area (ha.)	Soil Group	Landuse	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)
1000	1.992	C	(5)	98	99
	0.498	C	(3)	79	89
Total (1000)	**2.490**	-	-	**95**	**97**
2	0.696	C	(2)	98	99
	0.464	C	(2)	79	89
Total (2000)	**1.160**	-	-	**91**	**95**
3000	0.336	C	(3)	79	89
	0.084	C	(5)	98	99
Total (3000)	**0.420**	-	-	**83**	**91**
4000	0.570	C	(4)	73	86
	2.110	C	(3)	79	89
Total (4000)	**2.780**	-	-	**78**	**89**
5000	0.090	C	(5)	98	99
	0.510	C	(3)	79	89
Total (5000)	**0.600**	-	-	**82**	**91**
Total	**7.450**				

SCS CURVE PARAMETERS	A	B	C	D
(1) Residential districts (1/8 acre or less (stacked townhouses)	77	85	90	92
(2) Residential districts (1/4 acre or less)	61	75	83	87
(3) Open space (lawns, parks, golf course, cemeteries, etc.)	51	68	79	84
(4) Woods (fair)	36	60	73	79
(5) Paved Parking Lots, roofs, driveway, etc	98	98	98	98

Urban Hydrology for Small Watershed (TR-55) User Manual

Intial Abstraction

CATCHMENT	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)	S	IA (mm)
1000	95	97	7.9	1.57
2000	91	95	13.4	2.67
3000	79	89	31.4	3.14
4000	78	89	31.4	3.14
5000	82	91	25.1	3.77

1.0mm ≤ IA ≤5.0mm

CN ≤ 70	IA = 0.075 X S
CN > 70 ≤ 80	IA = 0.10 X S
CN > 80 ≤ 90	IA = 0.15 X S
CN > 90	IA = 0.2 X S

S = (25400 / CN) - 254

Time to Peak

CATCHMENT	L (m)	Sw (%)	C	Tc (min.)	TP (hr) of IUH
1000	180	2	0.76	10	0.12
2000	80	2	0.62	10	0.12
3000	50	2	0.55	11	0.13
4000	135	13	0.20	15	0.17
5000	70	7.2	0.305	12	0.14

AIRPORT FORMULA (C < 0.4) $Tc = 3.26 \times (1.1 - C) \times L0.5 / SW^{0.33}$

Bransby Williams (C>0.4) $Tc = 0.057 \times L / (SW^{0.2} \times A^{0.1})$

Where:

Tc = Time of concentration

L= Watershed length, m

Sw = Watershed slope %

A=Watershed area, ha

C = Runoff Coefficient, C=0.2 x (1-I) + 0.9 x I

I= Impervious Ratio

Tp=Time to peak: (N-1)/NxTc

N = 3, Number of linear reseirvoirs

* If the Tc<10 min (inlet time), 10 min is applied for Tc

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
December 18, 2025

Catchment 3000: Proposed Stormwater Management Facility - Pumping Station Option

ELEV (m)	INC. DEPTH (m)	ACTIVE SURFACE AREA (m^2)	FOREBAY SURFACE AREA (m^2)	INCREMENTAL FOREBAY VOLUME (m^3)	ACCUM. FOREBAY VOLUME (m^3)	PERM. POOL SURFACE AREA (m^2)	INCREMENTAL PERM. POOL VOLUME (m^3)	ACCUM. PERM. POOL VOLUME (m^3)	INCREMENTAL ACTIVE VOLUME (m^3)	ACCUM. STORAGE VOLUME (m^3)	
335.5	0.00	15.23	15.23	0.00	0.00	--	--	--	--	--	**Bottom of Forebay**
335.6	0.10	24.92	24.92	2.01	2.01	--	--	--	--	--	
335.7	0.20	35.49	35.49	3.02	5.03	--	--	--	--	--	
335.8	0.30	46.7	46.70	4.11	9.14	--	--	--	--	--	
335.9	0.40	58.57	58.57	5.26	14.4	--	--	--	--	--	
336	0.50	71.08	71.08	6.48	20.88	--	--	--	--	--	
336.1	0.60	84.24	84.24	7.77	28.65	--	--	--	--	--	
336.2	0.70	98.04	98.04	9.11	37.76	--	--	--	--	--	
336.3	0.80	112.49	112.50	10.53	48.29	--	--	--	--	--	
336.4	0.90	127.59	127.59	12.00	60.29	--	--	--	--	--	
336.5	1.00	372.87	372.87	25.02	81.58	372.87	0.00	0.00	--	--	**Top of Forebay/Bottom of Permanent Pool**
336.6	1.10	444.18	--	--	--	444.18	40.85	40.85	--	--	
336.7	1.20	517.08	--	--	--	517.08	48.06	88.92	--	--	
336.8	1.30	1,003.11	--	--	--	1003.11	76.01	164.93	0.00	0.00	**Top of Permanent Pool, Orifice 1**
336.9	1.40	1,098.85	--	--	--	--	--	--	105.10	105.10	
337	1.50	1,195.41	--	--	--	--	--	--	114.71	219.81	
337.1	1.60	1,289.63	--	--	--	--	--	--	124.25	344.07	
337.2	1.70	1,379.60	--	--	--	--	--	--	133.46	477.53	
337.3	1.80	1,468.14	--	--	--	--	--	--	142.39	619.92	**Orifice 2**
337.4	1.90	1,553.50	--	--	--	--	--	--	151.08	771.00	
337.5	2.00	1,635.13	--	--	--	--	--	--	159.43	930.43	
337.6	2.10	1,711.58	--	--	--	--	--	--	167.34	1097.76	**CB Lip/Orifice 3**
337.7	2.20	1,781.57	--	--	--	--	--	--	174.66	1272.42	
337.8	2.30	1,845.92	--	--	--	--	--	--	181.37	1453.80	**Weir**
337.9	2.40	1,899.12	--	--	--	--	--	--	187.25	1641.05	
338	2.50	1,952.16	--	--	--	--	--	--	192.56	1833.61	**Top of Pond**

ORIFICE No. 1 CONTROL

Invert =	336.80	m
Q =	0.013	m^3/s
Cd =	0.63	
H =	1.16	m
2g =	19.62	
A =	0.004	m^2
D=	0.075	m

ORIFICE No. 2 CONTROL

Invert =	337.30	m
Q =	0.195	m^3/s
Cd =	0.63	
H =	0.52	m
2g =	19.62	
A =	0.096	m^2
D=	0.350	m

ORIFICE No. 3 CONTROL

Invert =	335.50	m
Q =	0.343	m^3/s
Cd =	0.63	
H =	2.34	m
2g =	19.62	
A =	0.080	m^2
D=	0.320	m

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067

WEIR DISCHARGE

Elev	H	L	Q
m	m	m	m^3/s
337.80	0.00	4.00	0.00
337.90	0.10	4.00	0.22
338.00	0.20	4.00	0.61

Stormwater Management Pond (continued)

ELEVATION	STAGE (m)	STORAGE (m^3)	ORIFICE No. 1 CONTROL (m^3/s)	ORIFICE No. 2 CONTROL (m^3/s)	ORIFICE No. 3 CONTROL (m^3/s)	WEIR DISCHARGE (m^3/s)	TOTAL DISCHARGE (m^3/s)	
336.80	0.000	0.00	0.000	0.000	0.000	0.000	0.000	**Top of Permanent Pool, Orifice 1**
336.90	0.100	105.10	0.002	0.000	0.000	0.000	0.002	
337.00	0.200	219.81	0.005	0.000	0.000	0.000	0.005	
337.10	0.300	344.07	0.006	0.000	0.000	0.000	0.006	
337.20	0.400	477.53	0.007	0.000	0.000	0.000	0.007	
337.30	0.500	619.92	0.008	0.000	0.000	0.000	0.008	**Orifice 2**
337.40	0.600	771.00	0.009	0.020	0.000	0.000	0.030	
337.50	0.700	930.43	0.010	0.042	0.000	0.000	0.052	
337.60	0.800	1097.76	0.011	0.095	0.000	0.000	0.106	**CB Lip/Orifice 3**
337.70	0.900	1272.42	0.011	0.127	0.321	0.000	0.459	
337.80	1.000	1453.80	0.012	0.153	0.328	0.000	0.493	**Weir**
337.90	1.100	1641.05	0.013	0.175	0.336	0.215	0.739	
338.00	1.200	1833.61	0.013	0.195	0.343	0.608	1.159	**Top of Pond**

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
December 18, 2025

Stormwater Management Facility

Forebay - Pumping Station Option

Forebay Length =	21.0	m	(Dist)
Forebay Top Width =	7.0	m	
Active Forebay Depth =	1.0	m	(d)
Active Forebay Bottom Width =	1.0	m	
Approximate Forebay Volume =	81.58	m^3	
Length Width Ratio =	3.0	:1	(r)
25 mm Storm Peak Flowrate =	0.008	m^3/s	(Q25mm)
5 Year Storm Inflow Rate =	0.634	m^3/s	(Q5)
Desired Forebay Velocity =	0.500	m/s	(Vf)
Desired Settling Velocity (recommended) =	0.0003	m/s	(Vs)

Settling Length

Dist = ((r x Q25mm)/Vs)^.5 =	8.9	m	25mm

Forebay length (22 m) is less than the settling length.

Dispersion Length

Dist = (8 x Q5)/(d x Vf) =	10.1	m	5 Year

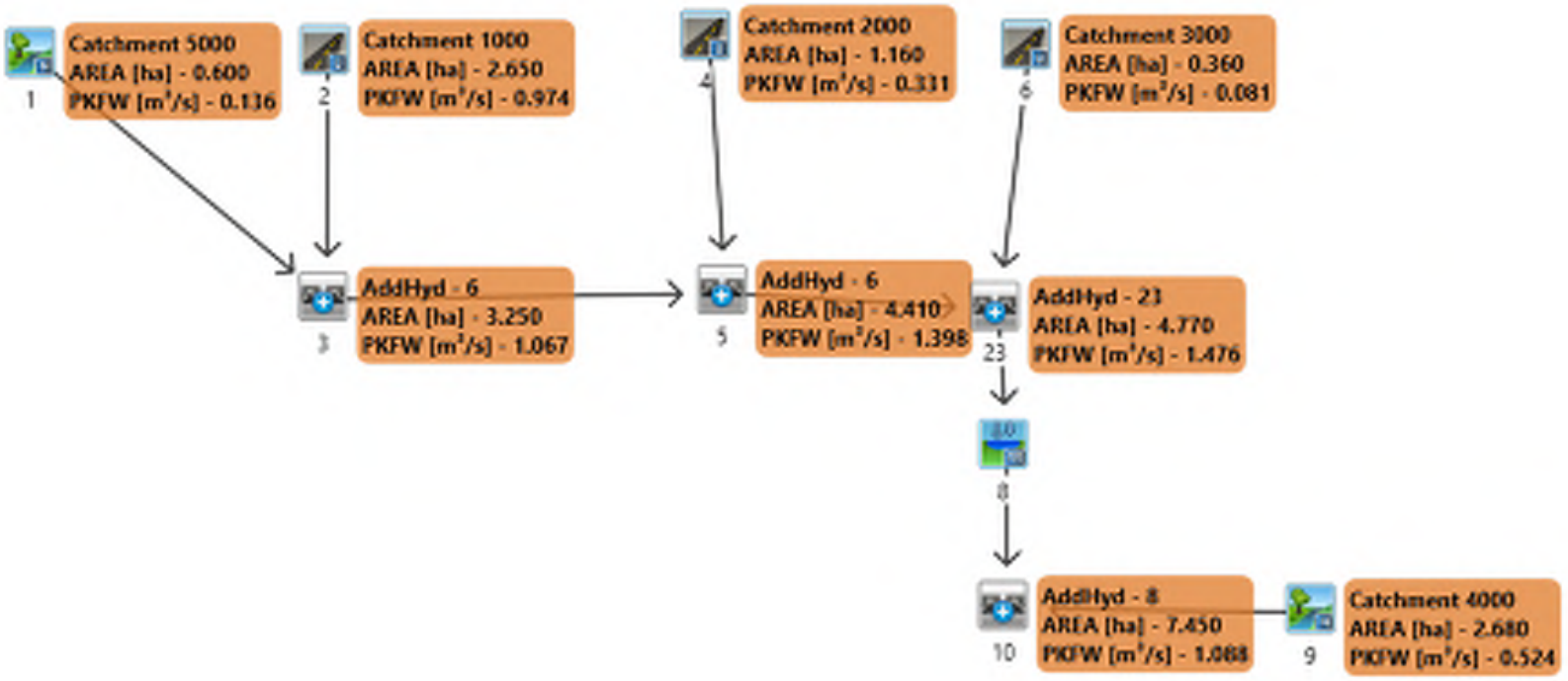
Forebay length (22 m) exceeds dispersion length (10.5 m).

Flow Velocity in Forebay

Cross-sectional Area =	4	m^2	
Cross-sectional Area (With Permanent Pool) =	6.55	m^2	A
Q5 =	0.634	m^3/s	
Velocity = Q5/A =	0.10	m/s	5 Year

The average flow velocity through the forebay meets the allowable velocity of 0.15 m/s.

Pumping Station Option - VO Schematic



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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


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DATE: 03/04/2026                          TIME: 11:00:30

USER:



COMMENTS: _____________________________________________________________


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  ********************************************
  ** SIMULATION : City of Kitchener - 25mm      **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 509.000
| Ptotal= 25.03 mm |                          B=   6.000
--------------------                          C=   0.799
```

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	1.47	1.00	6.93	2.00	4.30	3.00	1.98
0.08	1.56	1.08	10.85	2.08	3.90	3.08	1.90
0.17	1.67	1.17	25.26	2.17	3.57	3.17	1.83
0.25	1.80	1.25	74.93	2.25	3.29	3.25	1.76
0.33	1.94	1.33	32.48	2.33	3.06	3.33	1.70
0.42	2.12	1.42	18.06	2.42	2.86	3.42	1.64
0.50	2.33	1.50	12.36	2.50	2.68	3.50	1.59
0.58	2.60	1.58	9.37	2.58	2.53	3.58	1.54
0.67	2.95	1.67	7.55	2.67	2.40	3.67	1.50
0.75	3.42	1.75	6.33	2.75	2.28	3.75	1.45
0.83	4.10	1.83	5.46	2.83	2.17	3.83	1.41
0.92	5.13	1.92	4.81	2.92	2.07	3.92	1.37

CALIB NASHYD (0009) ID= 1 DT= 1.0 min	Area (ha)= 2.68	Curve Number (CN)= 78.0
	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83

0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.046 (i)
TIME TO PEAK (hrs)= 1.533

RUNOFF VOLUME (mm)= 5.121
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.205

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0001)	Area (ha)=	0.60	Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.14	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59

0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.012 (i)
TIME TO PEAK (hrs)= 1.517
RUNOFF VOLUME (mm)= 5.866
TOTAL RAINFALL (mm)= 25.026
RUNOFF COEFFICIENT = 0.234

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 2.65 Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00

Length (m)= 180.00 180.00
Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50

0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	35.56		
over (min)	5.00	30.00		
Storage Coeff. (min)=	3.31 (ii)	29.63 (ii)		
Unit Hyd. Tpeak (min)=	5.00	30.00		
Unit Hyd. peak (cms)=	0.29	0.04		
			TOTALS	
PEAK FLOW (cms)=	0.21	0.03	0.212 (iii)	
TIME TO PEAK (hrs)=	1.37	1.87	1.37	
RUNOFF VOLUME (mm)=	24.03	11.58	17.80	
TOTAL RAINFALL (mm)=	25.03	25.03	25.03	
RUNOFF COEFFICIENT =	0.96	0.46	0.71	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):	0.60	0.012	1.52	5.87
+ ID2= 2 (0002):	2.65	0.212	1.37	17.80
ID = 3 (0003):	3.25	0.218	1.37	15.59

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (0004)	Area (ha)= 1.16		
ID= 1 DT= 1.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 30.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.46
Dep. Storage	(mm)=	1.00	2.67
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	1.47	1.017	6.93	2.017	4.30	3.02	1.98
0.033	1.47	1.033	6.93	2.033	4.30	3.03	1.98
0.050	1.47	1.050	6.93	2.050	4.30	3.05	1.98
0.067	1.47	1.067	6.93	2.067	4.30	3.07	1.98
0.083	1.47	1.083	6.93	2.083	4.30	3.08	1.98
0.100	1.56	1.100	10.85	2.100	3.90	3.10	1.90
0.117	1.56	1.117	10.85	2.117	3.90	3.12	1.90
0.133	1.56	1.133	10.85	2.133	3.90	3.13	1.90
0.150	1.56	1.150	10.85	2.150	3.90	3.15	1.90
0.167	1.56	1.167	10.85	2.167	3.90	3.17	1.90
0.183	1.67	1.183	25.26	2.183	3.57	3.18	1.83
0.200	1.67	1.200	25.26	2.200	3.57	3.20	1.83
0.217	1.67	1.217	25.26	2.217	3.57	3.22	1.83
0.233	1.67	1.233	25.26	2.233	3.57	3.23	1.83
0.250	1.67	1.250	25.26	2.250	3.57	3.25	1.83
0.267	1.80	1.267	74.93	2.267	3.29	3.27	1.76
0.283	1.80	1.283	74.93	2.283	3.29	3.28	1.76
0.300	1.80	1.300	74.93	2.300	3.29	3.30	1.76
0.317	1.80	1.317	74.93	2.317	3.29	3.32	1.76
0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64

0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	22.36	
over (min)	5.00	22.00	
Storage Coeff. (min)=	2.04 (ii)	21.51 (ii)	
Unit Hyd. Tpeak (min)=	5.00	22.00	
Unit Hyd. peak (cms)=	0.37	0.05	
			TOTALS
PEAK FLOW (cms)=	0.06	0.02	0.064 (iii)
TIME TO PEAK (hrs)=	1.37	1.73	1.37
RUNOFF VOLUME (mm)=	24.03	8.90	13.42
TOTAL RAINFALL (mm)=	25.03	25.03	25.03
RUNOFF COEFFICIENT =	0.96	0.36	0.54

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):     3.25   0.218     1.37    15.59
     + ID2= 2 (  0004):     1.16   0.064     1.37    13.42
       ================================================
       ID = 3 (  0005):     4.41   0.282     1.37    15.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.29
     Dep. Storage     (mm)=       1.00         3.14
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      50.00        50.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.017    1.47 | 1.017    6.93 | 2.017    4.30 |  3.02    1.98
 0.033    1.47 | 1.033    6.93 | 2.033    4.30 |  3.03    1.98
 0.050    1.47 | 1.050    6.93 | 2.050    4.30 |  3.05    1.98
 0.067    1.47 | 1.067    6.93 | 2.067    4.30 |  3.07    1.98
 0.083    1.47 | 1.083    6.93 | 2.083    4.30 |  3.08    1.98
 0.100    1.56 | 1.100   10.85 | 2.100    3.90 |  3.10    1.90
 0.117    1.56 | 1.117   10.85 | 2.117    3.90 |  3.12    1.90
 0.133    1.56 | 1.133   10.85 | 2.133    3.90 |  3.13    1.90
 0.150    1.56 | 1.150   10.85 | 2.150    3.90 |  3.15    1.90
 0.167    1.56 | 1.167   10.85 | 2.167    3.90 |  3.17    1.90
 0.183    1.67 | 1.183   25.26 | 2.183    3.57 |  3.18    1.83
 0.200    1.67 | 1.200   25.26 | 2.200    3.57 |  3.20    1.83
 0.217    1.67 | 1.217   25.26 | 2.217    3.57 |  3.22    1.83
 0.233    1.67 | 1.233   25.26 | 2.233    3.57 |  3.23    1.83
 0.250    1.67 | 1.250   25.26 | 2.250    3.57 |  3.25    1.83
 0.267    1.80 | 1.267   74.93 | 2.267    3.29 |  3.27    1.76
 0.283    1.80 | 1.283   74.93 | 2.283    3.29 |  3.28    1.76
 0.300    1.80 | 1.300   74.93 | 2.300    3.29 |  3.30    1.76
 0.317    1.80 | 1.317   74.93 | 2.317    3.29 |  3.32    1.76
```

0.333	1.80	1.333	74.93	2.333	3.29	3.33	1.76
0.350	1.94	1.350	32.49	2.350	3.06	3.35	1.70
0.367	1.94	1.367	32.48	2.367	3.06	3.37	1.70
0.383	1.94	1.383	32.48	2.383	3.06	3.38	1.70
0.400	1.94	1.400	32.48	2.400	3.06	3.40	1.70
0.417	1.94	1.417	32.48	2.417	3.06	3.42	1.70
0.433	2.12	1.433	18.06	2.433	2.86	3.43	1.64
0.450	2.12	1.450	18.06	2.450	2.86	3.45	1.64
0.467	2.12	1.467	18.06	2.467	2.86	3.47	1.64
0.483	2.12	1.483	18.06	2.483	2.86	3.48	1.64
0.500	2.12	1.500	18.06	2.500	2.86	3.50	1.64
0.517	2.33	1.517	12.36	2.517	2.68	3.52	1.59
0.533	2.33	1.533	12.36	2.533	2.68	3.53	1.59
0.550	2.33	1.550	12.36	2.550	2.68	3.55	1.59
0.567	2.33	1.567	12.36	2.567	2.68	3.57	1.59
0.583	2.33	1.583	12.36	2.583	2.68	3.58	1.59
0.600	2.60	1.600	9.37	2.600	2.53	3.60	1.54
0.617	2.60	1.617	9.37	2.617	2.53	3.62	1.54
0.633	2.60	1.633	9.37	2.633	2.53	3.63	1.54
0.650	2.60	1.650	9.37	2.650	2.53	3.65	1.54
0.667	2.60	1.667	9.37	2.667	2.53	3.67	1.54
0.683	2.95	1.683	7.55	2.683	2.40	3.68	1.50
0.700	2.95	1.700	7.55	2.700	2.40	3.70	1.50
0.717	2.95	1.717	7.55	2.717	2.40	3.72	1.50
0.733	2.95	1.733	7.55	2.733	2.40	3.73	1.50
0.750	2.95	1.750	7.55	2.750	2.40	3.75	1.50
0.767	3.42	1.767	6.33	2.767	2.28	3.77	1.45
0.783	3.42	1.783	6.33	2.783	2.28	3.78	1.45
0.800	3.42	1.800	6.33	2.800	2.28	3.80	1.45
0.817	3.42	1.817	6.33	2.817	2.28	3.82	1.45
0.833	3.42	1.833	6.33	2.833	2.28	3.83	1.45
0.850	4.10	1.850	5.46	2.850	2.17	3.85	1.41
0.867	4.10	1.867	5.46	2.867	2.17	3.87	1.41
0.883	4.10	1.883	5.46	2.883	2.17	3.88	1.41
0.900	4.10	1.900	5.46	2.900	2.17	3.90	1.41
0.917	4.10	1.917	5.46	2.917	2.17	3.92	1.41
0.933	5.13	1.933	4.81	2.933	2.07	3.93	1.37
0.950	5.13	1.950	4.81	2.950	2.07	3.95	1.37
0.967	5.13	1.967	4.81	2.967	2.07	3.97	1.37
0.983	5.13	1.983	4.81	2.983	2.07	3.98	1.37
1.000	5.13	2.000	4.81	3.000	2.07	4.00	1.37

Max.Eff.Inten.(mm/hr)=	74.93	6.61	
over (min)	5.00	26.00	
Storage Coeff. (min)=	1.54 (ii)	25.45 (ii)	
Unit Hyd. Tpeak (min)=	5.00	26.00	
Unit Hyd. peak (cms)=	0.42	0.04	
			TOTALS
PEAK FLOW (cms)=	0.01	0.00	0.013 (iii)
TIME TO PEAK (hrs)=	1.35	1.83	1.35

```
     RUNOFF VOLUME    (mm)=      24.03         5.36          9.05
     TOTAL RAINFALL   (mm)=      25.03        25.03         25.03
     RUNOFF COEFFICIENT   =       0.96         0.21          0.36

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):     4.41   0.282     1.37    15.02
      + ID2= 2 (  0006):     0.36   0.013     1.35     9.05
        ================================================
        ID = 3 (  0023):     4.77   0.295     1.37    14.57

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0520      0.0980
                           0.0020      0.0220   |    0.1060      0.1140
                           0.0050      0.0320   |    0.4350      0.1300
                           0.0060      0.0440   |    0.4700      0.1480
                           0.0070      0.0560   |    0.7150      0.1660
                           0.0080      0.0690   |    1.1370      0.1860
                           0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      0.295      1.37      14.57
   OUTFLOW: ID= 1 (  0008)      4.770      0.007      4.23      10.88
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.52
```

```
                    TIME SHIFT OF PEAK FLOW         (min)=172.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0616

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     4.77   0.007     4.23    10.88
      + ID2= 2 (  0009):     2.68   0.046     1.53     5.12
        ================================================
        ID = 3 (  0010):     7.45   0.050     1.55     8.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                    *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\e4
83cdcd-9d9c-4eb7-85b8-fae40fd2be9e\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\e4
83cdcd-9d9c-4eb7-85b8-fae40fd2be9e\s


DATE: 03/04/2026                          TIME: 11:00:30

USER:
```

COMMENTS: _____

```
  ***********************************************
  ** SIMULATION : City of Kitchener - 25yr      **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=3258.000
| Ptotal= 70.23 mm |                          B=  15.000
--------------------                          C=   0.936
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.66	0.75	39.43	1.50	16.71	2.25	5.48
0.08	4.18	0.83	90.02	1.58	14.03	2.33	5.04
0.17	4.84	0.92	197.33	1.67	11.99	2.42	4.66
0.25	5.72	1.00	112.57	1.75	10.40	2.50	4.33
0.33	6.91	1.08	67.57	1.83	9.14	2.58	4.04
0.42	8.61	1.17	45.68	1.92	8.12	2.67	3.78
0.50	11.18	1.25	33.29	2.00	7.28	2.75	3.55
0.58	15.34	1.33	25.55	2.08	6.58	2.83	3.34
0.67	22.92	1.42	20.37	2.17	5.98	2.92	3.16

```
--------------------
| CALIB            |
| NASHYD   (  0009)|   Area    (ha)=   2.68   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48

0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.369 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 32.446
TOTAL RAINFALL (mm)= 70.233

RUNOFF COEFFICIENT = 0.462

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 0.60	Curve Number (CN)= 82.0	Ia (mm)= 3.77	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.14

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55

0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.097 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 36.141
TOTAL RAINFALL (mm)= 70.233
RUNOFF COEFFICIENT = 0.515

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0002)
ID= 1 DT= 1.0 min

Area (ha)= 2.65
Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04

0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Max.Eff.Inten.(mm/hr)=	197.33	270.58	
over (min)	5.00	14.00	
Storage Coeff. (min)=	2.25 (ii)	13.94 (ii)	
Unit Hyd. Tpeak (min)=	5.00	14.00	
Unit Hyd. peak (cms)=	0.35	0.08	
			TOTALS
PEAK FLOW (cms)=	0.62	0.24	0.721 (iii)
TIME TO PEAK (hrs)=	1.03	1.25	1.03
RUNOFF VOLUME (mm)=	69.23	50.15	59.69
TOTAL RAINFALL (mm)=	70.23	70.23	70.23
RUNOFF COEFFICIENT =	0.99	0.71	0.85

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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     0.60   0.097     1.18    36.14
      + ID2= 2 (  0002):     2.65   0.721     1.03    59.69
        ====================================================
        ID = 3 (  0003):     3.25   0.783     1.05    55.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   1.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  30.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.70         0.46
     Dep. Storage     (mm)=       1.00         2.67
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
     0.017    3.66 | 0.767   39.43 | 1.517   16.71 |  2.27    5.48
     0.033    3.66 | 0.783   39.43 | 1.533   16.71 |  2.28    5.48
     0.050    3.66 | 0.800   39.43 | 1.550   16.71 |  2.30    5.48
     0.067    3.66 | 0.817   39.43 | 1.567   16.71 |  2.32    5.48
     0.083    3.66 | 0.833   39.43 | 1.583   16.71 |  2.33    5.48
     0.100    4.18 | 0.850   90.01 | 1.600   14.03 |  2.35    5.04
     0.117    4.18 | 0.867   90.02 | 1.617   14.03 |  2.37    5.04
     0.133    4.18 | 0.883   90.02 | 1.633   14.03 |  2.38    5.04
     0.150    4.18 | 0.900   90.02 | 1.650   14.03 |  2.40    5.04
     0.167    4.18 | 0.917   90.02 | 1.667   14.03 |  2.42    5.04
     0.183    4.84 | 0.933  197.33 | 1.683   11.99 |  2.43    4.66
     0.200    4.84 | 0.950  197.33 | 1.700   11.99 |  2.45    4.66
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0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33
0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Max.Eff.Inten.(mm/hr)=	197.33	179.78	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.38 (ii)	9.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.43	0.11	
			TOTALS
PEAK FLOW (cms)=	0.17	0.15	0.257 (iii)
TIME TO PEAK (hrs)=	1.02	1.18	1.05
RUNOFF VOLUME (mm)=	69.23	44.00	51.56
TOTAL RAINFALL (mm)=	70.23	70.23	70.23
RUNOFF COEFFICIENT =	0.99	0.63	0.73

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0003):	3.25	0.783	1.05	55.34
	+ ID2= 2 (0004):	1.16	0.257	1.05	51.56
	ID = 3 (0005):	4.41	1.040	1.05	54.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0006)	Area (ha)= 0.36		
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00	Dir. Conn.(%)= 20.00	
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.29
Dep. Storage	(mm)=	1.00	3.14
Average Slope	(%)=	2.00	2.00
Length	(m)=	50.00	50.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.66	0.767	39.43	1.517	16.71	2.27	5.48
0.033	3.66	0.783	39.43	1.533	16.71	2.28	5.48
0.050	3.66	0.800	39.43	1.550	16.71	2.30	5.48
0.067	3.66	0.817	39.43	1.567	16.71	2.32	5.48
0.083	3.66	0.833	39.43	1.583	16.71	2.33	5.48
0.100	4.18	0.850	90.01	1.600	14.03	2.35	5.04
0.117	4.18	0.867	90.02	1.617	14.03	2.37	5.04
0.133	4.18	0.883	90.02	1.633	14.03	2.38	5.04
0.150	4.18	0.900	90.02	1.650	14.03	2.40	5.04
0.167	4.18	0.917	90.02	1.667	14.03	2.42	5.04
0.183	4.84	0.933	197.33	1.683	11.99	2.43	4.66
0.200	4.84	0.950	197.33	1.700	11.99	2.45	4.66
0.217	4.84	0.967	197.33	1.717	11.99	2.47	4.66
0.233	4.84	0.983	197.33	1.733	11.99	2.48	4.66
0.250	4.84	1.000	197.33	1.750	11.99	2.50	4.66
0.267	5.72	1.017	112.57	1.767	10.40	2.52	4.33

0.283	5.72	1.033	112.57	1.783	10.40	2.53	4.33
0.300	5.72	1.050	112.57	1.800	10.40	2.55	4.33
0.317	5.72	1.067	112.57	1.817	10.40	2.57	4.33
0.333	5.72	1.083	112.57	1.833	10.40	2.58	4.33
0.350	6.91	1.100	67.57	1.850	9.14	2.60	4.04
0.367	6.91	1.117	67.57	1.867	9.14	2.62	4.04
0.383	6.91	1.133	67.57	1.883	9.14	2.63	4.04
0.400	6.91	1.150	67.57	1.900	9.14	2.65	4.04
0.417	6.91	1.167	67.57	1.917	9.14	2.67	4.04
0.433	8.61	1.183	45.68	1.933	8.12	2.68	3.78
0.450	8.61	1.200	45.68	1.950	8.12	2.70	3.78
0.467	8.61	1.217	45.68	1.967	8.12	2.72	3.78
0.483	8.61	1.233	45.68	1.983	8.12	2.73	3.78
0.500	8.61	1.250	45.68	2.000	8.12	2.75	3.78
0.517	11.18	1.267	33.29	2.017	7.28	2.77	3.55
0.533	11.18	1.283	33.29	2.033	7.28	2.78	3.55
0.550	11.18	1.300	33.29	2.050	7.28	2.80	3.55
0.567	11.18	1.317	33.29	2.067	7.28	2.82	3.55
0.583	11.18	1.333	33.29	2.083	7.28	2.83	3.55
0.600	15.34	1.350	25.55	2.100	6.58	2.85	3.34
0.617	15.34	1.367	25.55	2.117	6.58	2.87	3.34
0.633	15.34	1.383	25.55	2.133	6.58	2.88	3.34
0.650	15.34	1.400	25.55	2.150	6.58	2.90	3.34
0.667	15.34	1.417	25.55	2.167	6.58	2.92	3.34
0.683	22.92	1.433	20.37	2.183	5.98	2.93	3.16
0.700	22.92	1.450	20.37	2.200	5.98	2.95	3.16
0.717	22.92	1.467	20.37	2.217	5.98	2.97	3.16
0.733	22.92	1.483	20.37	2.233	5.98	2.98	3.16
0.750	22.92	1.500	20.37	2.250	5.98	3.00	3.16

Max.Eff.Inten.(mm/hr)=	197.33	75.25	
over (min)	5.00	11.00	
Storage Coeff. (min)=	1.04 (ii)	10.08 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	0.47	0.11	
			TOTALS
PEAK FLOW (cms)=	0.04	0.04	0.054 (iii)
TIME TO PEAK (hrs)=	1.02	1.22	1.13
RUNOFF VOLUME (mm)=	69.23	33.44	40.58
TOTAL RAINFALL (mm)=	70.23	70.23	70.23
RUNOFF COEFFICIENT =	0.99	0.48	0.58

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0005):     4.41   1.040     1.05    54.35
     + ID2= 2 (  0006):     0.36   0.054     1.13    40.58
       ================================================
       ID = 3 (  0023):     4.77   1.093     1.05    53.31

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0520      0.0980
                           0.0020      0.0220   |    0.1060      0.1140
                           0.0050      0.0320   |    0.4350      0.1300
                           0.0060      0.0440   |    0.4700      0.1480
                           0.0070      0.0560   |    0.7150      0.1660
                           0.0080      0.0690   |    1.1370      0.1860
                           0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      1.093      1.05      53.31
   OUTFLOW: ID= 1 (  0008)      4.770      0.446      1.48      48.98
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.80
                  TIME SHIFT OF PEAK FLOW         (min)= 26.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1357

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     4.77   0.446     1.48    48.98
     + ID2= 2 (  0009):     2.68   0.369     1.20    32.45
       ================================================
```

```
        ID = 3 (  0010):     7.45   0.744     1.32    43.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\90
9257ba-31e4-4d2c-9185-7b75c081da42\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\90
9257ba-31e4-4d2c-9185-7b75c081da42\s


DATE: 03/04/2026                          TIME: 11:00:30

USER:



COMMENTS: _____________________________________________________________

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  ********************************************
  ** SIMULATION : City of Kitchener - 2yr       **
  ********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 743.000
| Ptotal= 34.25 mm |                          B=   6.000
--------------------                          C=   0.799
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  3.00 hrs
                         Storm time step    =  5.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.83 |  0.75   15.84 |  1.50    7.97 |  2.25    3.69
                0.08    3.09 |  0.83   36.87 |  1.58    7.02 |  2.33    3.50
                0.17    3.41 |  0.92  109.37 |  1.67    6.28 |  2.42    3.32
                0.25    3.80 |  1.00   47.42 |  1.75    5.69 |  2.50    3.17
                0.33    4.31 |  1.08   26.37 |  1.83    5.21 |  2.58    3.02
                0.42    5.00 |  1.17   18.04 |  1.92    4.80 |  2.67    2.90
                0.50    5.98 |  1.25   13.68 |  2.00    4.46 |  2.75    2.78
                0.58    7.49 |  1.33   11.02 |  2.08    4.17 |  2.83    2.67
                0.67   10.12 |  1.42    9.24 |  2.17    3.92 |  2.92    2.58


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--------------------
| CALIB            |
| NASHYD   (  0009)|   Area    (ha)=   2.68   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    2.83 | 0.767   15.84 | 1.517    7.97 |  2.27    3.69
               0.033    2.83 | 0.783   15.84 | 1.533    7.97 |  2.28    3.69
               0.050    2.83 | 0.800   15.84 | 1.550    7.97 |  2.30    3.69
               0.067    2.83 | 0.817   15.84 | 1.567    7.97 |  2.32    3.69
               0.083    2.83 | 0.833   15.84 | 1.583    7.97 |  2.33    3.69
               0.100    3.09 | 0.850   36.87 | 1.600    7.02 |  2.35    3.50
               0.117    3.09 | 0.867   36.87 | 1.617    7.02 |  2.37    3.50
               0.133    3.09 | 0.883   36.87 | 1.633    7.02 |  2.38    3.50
               0.150    3.09 | 0.900   36.87 | 1.650    7.02 |  2.40    3.50
```

0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.096 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 9.421
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.275

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB

| NASHYD (0001)| Area (ha)= 0.60 Curve Number (CN)= 82.0
|ID= 1 DT= 1.0 min | Ia (mm)= 3.77 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.14

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67

0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.026 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 10.774
TOTAL RAINFALL (mm)= 34.253
RUNOFF COEFFICIENT = 0.315

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
STANDHYD (0002)
ID= 1 DT= 1.0 min

Area (ha)= 2.65
Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32

0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	74.31	
over (min)	5.00	23.00	
Storage Coeff. (min)=	2.85 (ii)	22.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	23.00	
Unit Hyd. peak (cms)=	0.32	0.05	
			TOTALS
PEAK FLOW (cms)=	0.32	0.06	0.328 (iii)
TIME TO PEAK (hrs)=	1.03	1.40	1.03
RUNOFF VOLUME (mm)=	33.25	18.65	25.95
TOTAL RAINFALL (mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT =	0.97	0.54	0.76

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     0.60   0.026     1.18    10.77
     + ID2= 2 (  0002):     2.65   0.328     1.03    25.95
       ================================================
       ID = 3 (  0003):     3.25   0.342     1.03    23.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   1.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  30.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.70         0.46
     Dep. Storage     (mm)=       1.00         2.67
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.017    2.83 | 0.767   15.84 | 1.517    7.97 |  2.27    3.69
             0.033    2.83 | 0.783   15.84 | 1.533    7.97 |  2.28    3.69
             0.050    2.83 | 0.800   15.84 | 1.550    7.97 |  2.30    3.69
             0.067    2.83 | 0.817   15.84 | 1.567    7.97 |  2.32    3.69
             0.083    2.83 | 0.833   15.84 | 1.583    7.97 |  2.33    3.69
             0.100    3.09 | 0.850   36.87 | 1.600    7.02 |  2.35    3.50
             0.117    3.09 | 0.867   36.87 | 1.617    7.02 |  2.37    3.50
             0.133    3.09 | 0.883   36.87 | 1.633    7.02 |  2.38    3.50
             0.150    3.09 | 0.900   36.87 | 1.650    7.02 |  2.40    3.50
             0.167    3.09 | 0.917   36.87 | 1.667    7.02 |  2.42    3.50
             0.183    3.41 | 0.933  109.37 | 1.683    6.28 |  2.43    3.32
             0.200    3.41 | 0.950  109.37 | 1.700    6.28 |  2.45    3.32
             0.217    3.41 | 0.967  109.37 | 1.717    6.28 |  2.47    3.32
             0.233    3.41 | 0.983  109.37 | 1.733    6.28 |  2.48    3.32
             0.250    3.41 | 1.000  109.37 | 1.750    6.28 |  2.50    3.32
             0.267    3.80 | 1.017   47.42 | 1.767    5.69 |  2.52    3.17
             0.283    3.80 | 1.033   47.42 | 1.783    5.69 |  2.53    3.17
             0.300    3.80 | 1.050   47.42 | 1.800    5.69 |  2.55    3.17
             0.317    3.80 | 1.067   47.42 | 1.817    5.69 |  2.57    3.17
```

0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02
0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	48.84	
over (min)	5.00	17.00	
Storage Coeff. (min)=	1.75 (ii)	16.00 (ii)	
Unit Hyd. Tpeak (min)=	5.00	17.00	
Unit Hyd. peak (cms)=	0.40	0.07	
			TOTALS
PEAK FLOW (cms)=	0.09	0.04	0.100 (iii)
TIME TO PEAK (hrs)=	1.02	1.30	1.03
RUNOFF VOLUME (mm)=	33.25	15.02	20.48
TOTAL RAINFALL (mm)=	34.25	34.25	34.25
RUNOFF COEFFICIENT =	0.97	0.44	0.60

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)

1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0003):	3.25	0.342	1.03	23.14
+	ID2= 2 (0004):	1.16	0.100	1.03	20.48
	ID = 3 (0005):	4.41	0.442	1.03	22.44

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0006)	Area (ha)= 0.36	
ID= 1 DT= 1.0 min	Total Imp(%)= 20.00	Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.29
Dep. Storage	(mm)=	1.00	3.14
Average Slope	(%)=	2.00	2.00
Length	(m)=	50.00	50.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	2.83	0.767	15.84	1.517	7.97	2.27	3.69
0.033	2.83	0.783	15.84	1.533	7.97	2.28	3.69
0.050	2.83	0.800	15.84	1.550	7.97	2.30	3.69
0.067	2.83	0.817	15.84	1.567	7.97	2.32	3.69
0.083	2.83	0.833	15.84	1.583	7.97	2.33	3.69
0.100	3.09	0.850	36.87	1.600	7.02	2.35	3.50
0.117	3.09	0.867	36.87	1.617	7.02	2.37	3.50
0.133	3.09	0.883	36.87	1.633	7.02	2.38	3.50
0.150	3.09	0.900	36.87	1.650	7.02	2.40	3.50
0.167	3.09	0.917	36.87	1.667	7.02	2.42	3.50
0.183	3.41	0.933	109.37	1.683	6.28	2.43	3.32
0.200	3.41	0.950	109.37	1.700	6.28	2.45	3.32
0.217	3.41	0.967	109.37	1.717	6.28	2.47	3.32
0.233	3.41	0.983	109.37	1.733	6.28	2.48	3.32
0.250	3.41	1.000	109.37	1.750	6.28	2.50	3.32
0.267	3.80	1.017	47.42	1.767	5.69	2.52	3.17
0.283	3.80	1.033	47.42	1.783	5.69	2.53	3.17
0.300	3.80	1.050	47.42	1.800	5.69	2.55	3.17
0.317	3.80	1.067	47.42	1.817	5.69	2.57	3.17
0.333	3.80	1.083	47.42	1.833	5.69	2.58	3.17
0.350	4.31	1.100	26.37	1.850	5.21	2.60	3.02
0.367	4.31	1.117	26.37	1.867	5.21	2.62	3.02
0.383	4.31	1.133	26.37	1.883	5.21	2.63	3.02

0.400	4.31	1.150	26.37	1.900	5.21	2.65	3.02
0.417	4.31	1.167	26.37	1.917	5.21	2.67	3.02
0.433	5.00	1.183	18.04	1.933	4.80	2.68	2.90
0.450	5.00	1.200	18.04	1.950	4.80	2.70	2.90
0.467	5.00	1.217	18.04	1.967	4.80	2.72	2.90
0.483	5.00	1.233	18.04	1.983	4.80	2.73	2.90
0.500	5.00	1.250	18.04	2.000	4.80	2.75	2.90
0.517	5.98	1.267	13.68	2.017	4.46	2.77	2.78
0.533	5.98	1.283	13.68	2.033	4.46	2.78	2.78
0.550	5.98	1.300	13.68	2.050	4.46	2.80	2.78
0.567	5.98	1.317	13.68	2.067	4.46	2.82	2.78
0.583	5.98	1.333	13.68	2.083	4.46	2.83	2.78
0.600	7.49	1.350	11.02	2.100	4.17	2.85	2.67
0.617	7.49	1.367	11.02	2.117	4.17	2.87	2.67
0.633	7.49	1.383	11.02	2.133	4.17	2.88	2.67
0.650	7.49	1.400	11.02	2.150	4.17	2.90	2.67
0.667	7.49	1.417	11.02	2.167	4.17	2.92	2.67
0.683	10.12	1.433	9.24	2.183	3.92	2.93	2.58
0.700	10.12	1.450	9.24	2.200	3.92	2.95	2.58
0.717	10.12	1.467	9.24	2.217	3.92	2.97	2.58
0.733	10.12	1.483	9.24	2.233	3.92	2.98	2.58
0.750	10.12	1.500	9.24	2.250	3.92	3.00	2.58

Max.Eff.Inten.(mm/hr)=	109.37	16.26		
over (min)	5.00	19.00		
Storage Coeff. (min)=	1.32 (ii)	18.01 (ii)		
Unit Hyd. Tpeak (min)=	5.00	19.00		
Unit Hyd. peak (cms)=	0.44	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.02	0.01	0.021 (iii)	
TIME TO PEAK (hrs)=	1.02	1.37	1.02	
RUNOFF VOLUME (mm)=	33.25	9.81	14.47	
TOTAL RAINFALL (mm)=	34.25	34.25	34.25	
RUNOFF COEFFICIENT =	0.97	0.29	0.42	

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0023)					
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.	
	(ha)	(cms)	(hrs)	(mm)	

```
        ID1= 1 (  0005):     4.41   0.442     1.03    22.44
      + ID2= 2 (  0006):     0.36   0.021     1.02    14.47
        ================================================
        ID = 3 (  0023):     4.77   0.462     1.03    21.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0520      0.0980
                          0.0020      0.0220   |    0.1060      0.1140
                          0.0050      0.0320   |    0.4350      0.1300
                          0.0060      0.0440   |    0.4700      0.1480
                          0.0070      0.0560   |    0.7150      0.1660
                          0.0080      0.0690   |    1.1370      0.1860
                          0.0300      0.0830   |    0.0000      0.0000

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      0.462      1.03      21.84
   OUTFLOW: ID= 1 (  0008)      4.770      0.034      2.97      17.65
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.35
                  TIME SHIFT OF PEAK FLOW         (min)=116.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0857

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     4.77   0.034     2.97    17.65
      + ID2= 2 (  0009):     2.68   0.096     1.18     9.42
        ================================================
        ID = 3 (  0010):     7.45   0.101     1.20    14.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
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       V    V   I    SSSSS  U   U    A    L             (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\63e8e9b8-5b0e-41f3-898b-79c0d25247b2\s
Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\63e8e9b8-5b0e-41f3-898b-79c0d25247b2\s

DATE: 03/04/2026 TIME: 11:00:30

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener - 50yr **
****

| CHICAGO STORM | Ptotal= 77.43 mm |

IDF curve parameters: A=3886.000
B= 16.000
C= 0.950
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs

Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.81	0.75	44.21	1.50	18.51	2.25	5.83
0.08	4.38	0.83	100.30	1.58	15.47	2.33	5.34
0.17	5.12	0.92	215.47	1.67	13.16	2.42	4.92
0.25	6.10	1.00	125.05	1.75	11.37	2.50	4.56
0.33	7.44	1.08	75.67	1.83	9.94	2.58	4.23
0.42	9.35	1.17	51.24	1.92	8.79	2.67	3.95
0.50	12.24	1.25	37.29	2.00	7.84	2.75	3.69
0.58	16.96	1.33	28.54	2.08	7.06	2.83	3.47
0.67	25.56	1.42	22.66	2.17	6.39	2.92	3.26

CALIB NASHYD (0009) ID= 1 DT= 1.0 min	Area (ha)= 2.68	Curve Number (CN)= 78.0
	Ia (mm)= 3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23

0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.434 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 37.820
TOTAL RAINFALL (mm)= 77.432
RUNOFF COEFFICIENT = 0.488

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB					
NASHYD (0001)	Area (ha)=	0.60	Curve Number (CN)=	82.0	
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.14			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83

0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.113 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 41.926
TOTAL RAINFALL (mm)= 77.432

RUNOFF COEFFICIENT = 0.541

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 2.65
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95

0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	334.92		
over (min)	5.00	12.00		
Storage Coeff. (min)=	2.17 (ii)	11.04 (ii)		
Unit Hyd. Tpeak (min)=	5.00	12.00		
Unit Hyd. peak (cms)=	0.36	0.10		
			TOTALS	
PEAK FLOW (cms)=	0.69	0.30	0.841 (iii)	
TIME TO PEAK (hrs)=	1.03	1.20	1.05	
RUNOFF VOLUME (mm)=	76.43	56.82	66.62	
TOTAL RAINFALL (mm)=	77.43	77.43	77.43	
RUNOFF COEFFICIENT =	0.99	0.73	0.86	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	0.60	0.113	1.18	41.93
+ ID2= 2 (0002):	2.65	0.841	1.05	66.62
ID = 3 (0003):	3.25	0.917	1.05	62.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   1.16
|ID= 1 DT= 1.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  30.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.70         0.46
     Dep. Storage     (mm)=       1.00         2.67
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
      TIME     RAIN |   TIME     RAIN |'  TIME     RAIN |   TIME     RAIN
       hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |    hrs   mm/hr
     0.017    3.81 | 0.767   44.21 | 1.517   18.51 |  2.27    5.83
     0.033    3.81 | 0.783   44.21 | 1.533   18.51 |  2.28    5.83
     0.050    3.81 | 0.800   44.21 | 1.550   18.51 |  2.30    5.83
     0.067    3.81 | 0.817   44.21 | 1.567   18.51 |  2.32    5.83
     0.083    3.81 | 0.833   44.21 | 1.583   18.51 |  2.33    5.83
     0.100    4.38 | 0.850  100.30 | 1.600   15.47 |  2.35    5.34
     0.117    4.38 | 0.867  100.30 | 1.617   15.47 |  2.37    5.34
     0.133    4.38 | 0.883  100.30 | 1.633   15.47 |  2.38    5.34
     0.150    4.38 | 0.900  100.30 | 1.650   15.47 |  2.40    5.34
     0.167    4.38 | 0.917  100.30 | 1.667   15.47 |  2.42    5.34
     0.183    5.12 | 0.933  215.47 | 1.683   13.16 |  2.43    4.92
     0.200    5.12 | 0.950  215.47 | 1.700   13.16 |  2.45    4.92
     0.217    5.12 | 0.967  215.47 | 1.717   13.16 |  2.47    4.92
     0.233    5.12 | 0.983  215.47 | 1.733   13.16 |  2.48    4.92
     0.250    5.12 | 1.000  215.47 | 1.750   13.16 |  2.50    4.92
     0.267    6.10 | 1.017  125.06 | 1.767   11.37 |  2.52    4.56
     0.283    6.10 | 1.033  125.05 | 1.783   11.37 |  2.53    4.56
     0.300    6.10 | 1.050  125.05 | 1.800   11.37 |  2.55    4.56
     0.317    6.10 | 1.067  125.05 | 1.817   11.37 |  2.57    4.56
     0.333    6.10 | 1.083  125.05 | 1.833   11.37 |  2.58    4.56
     0.350    7.44 | 1.100   75.67 | 1.850    9.94 |  2.60    4.23
     0.367    7.44 | 1.117   75.67 | 1.867    9.94 |  2.62    4.23
     0.383    7.44 | 1.133   75.67 | 1.883    9.94 |  2.63    4.23
     0.400    7.44 | 1.150   75.67 | 1.900    9.94 |  2.65    4.23
     0.417    7.44 | 1.167   75.67 | 1.917    9.94 |  2.67    4.23
     0.433    9.35 | 1.183   51.24 | 1.933    8.79 |  2.68    3.95
     0.450    9.35 | 1.200   51.24 | 1.950    8.79 |  2.70    3.95
     0.467    9.35 | 1.217   51.24 | 1.967    8.79 |  2.72    3.95
     0.483    9.35 | 1.233   51.24 | 1.983    8.79 |  2.73    3.95
     0.500    9.35 | 1.250   51.24 | 2.000    8.79 |  2.75    3.95
     0.517   12.24 | 1.267   37.29 | 2.017    7.84 |  2.77    3.69
```

0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69
0.600	16.96	1.350	28.54	2.100	7.06	2.85	3.47
0.617	16.96	1.367	28.54	2.117	7.06	2.87	3.47
0.633	16.96	1.383	28.54	2.133	7.06	2.88	3.47
0.650	16.96	1.400	28.54	2.150	7.06	2.90	3.47
0.667	16.96	1.417	28.54	2.167	7.06	2.92	3.47
0.683	25.56	1.433	22.66	2.183	6.39	2.93	3.26
0.700	25.56	1.450	22.66	2.200	6.39	2.95	3.26
0.717	25.56	1.467	22.66	2.217	6.39	2.97	3.26
0.733	25.56	1.483	22.66	2.233	6.39	2.98	3.26
0.750	25.56	1.500	22.66	2.250	6.39	3.00	3.26

Max.Eff.Inten.(mm/hr)=	215.47	205.96	
over (min)	5.00	11.00	
Storage Coeff. (min)=	1.34 (ii)	10.16 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	0.44	0.11	
			TOTALS
PEAK FLOW (cms)=	0.19	0.17	0.277 (iii)
TIME TO PEAK (hrs)=	1.02	1.18	1.05
RUNOFF VOLUME (mm)=	76.43	50.33	58.15
TOTAL RAINFALL (mm)=	77.43	77.43	77.43
RUNOFF COEFFICIENT =	0.99	0.65	0.75

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0005)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0003):	3.25	0.917	1.05	62.07
	+ ID2= 2 (0004):	1.16	0.277	1.05	58.15
		==========	==========	==========	==========
	ID = 3 (0005):	4.41	1.194	1.05	61.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB		
STANDHYD (0006)	Area (ha)=	0.36

|ID= 1 DT= 1.0 min | Total Imp(%)= 20.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.07	0.29
Dep. Storage	(mm)=	1.00	3.14
Average Slope	(%)=	2.00	2.00
Length	(m)=	50.00	50.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.81	0.767	44.21	1.517	18.51	2.27	5.83
0.033	3.81	0.783	44.21	1.533	18.51	2.28	5.83
0.050	3.81	0.800	44.21	1.550	18.51	2.30	5.83
0.067	3.81	0.817	44.21	1.567	18.51	2.32	5.83
0.083	3.81	0.833	44.21	1.583	18.51	2.33	5.83
0.100	4.38	0.850	100.30	1.600	15.47	2.35	5.34
0.117	4.38	0.867	100.30	1.617	15.47	2.37	5.34
0.133	4.38	0.883	100.30	1.633	15.47	2.38	5.34
0.150	4.38	0.900	100.30	1.650	15.47	2.40	5.34
0.167	4.38	0.917	100.30	1.667	15.47	2.42	5.34
0.183	5.12	0.933	215.47	1.683	13.16	2.43	4.92
0.200	5.12	0.950	215.47	1.700	13.16	2.45	4.92
0.217	5.12	0.967	215.47	1.717	13.16	2.47	4.92
0.233	5.12	0.983	215.47	1.733	13.16	2.48	4.92
0.250	5.12	1.000	215.47	1.750	13.16	2.50	4.92
0.267	6.10	1.017	125.06	1.767	11.37	2.52	4.56
0.283	6.10	1.033	125.05	1.783	11.37	2.53	4.56
0.300	6.10	1.050	125.05	1.800	11.37	2.55	4.56
0.317	6.10	1.067	125.05	1.817	11.37	2.57	4.56
0.333	6.10	1.083	125.05	1.833	11.37	2.58	4.56
0.350	7.44	1.100	75.67	1.850	9.94	2.60	4.23
0.367	7.44	1.117	75.67	1.867	9.94	2.62	4.23
0.383	7.44	1.133	75.67	1.883	9.94	2.63	4.23
0.400	7.44	1.150	75.67	1.900	9.94	2.65	4.23
0.417	7.44	1.167	75.67	1.917	9.94	2.67	4.23
0.433	9.35	1.183	51.24	1.933	8.79	2.68	3.95
0.450	9.35	1.200	51.24	1.950	8.79	2.70	3.95
0.467	9.35	1.217	51.24	1.967	8.79	2.72	3.95
0.483	9.35	1.233	51.24	1.983	8.79	2.73	3.95
0.500	9.35	1.250	51.24	2.000	8.79	2.75	3.95
0.517	12.24	1.267	37.29	2.017	7.84	2.77	3.69
0.533	12.24	1.283	37.29	2.033	7.84	2.78	3.69
0.550	12.24	1.300	37.29	2.050	7.84	2.80	3.69
0.567	12.24	1.317	37.29	2.067	7.84	2.82	3.69
0.583	12.24	1.333	37.29	2.083	7.84	2.83	3.69

```
                0.600   16.96 | 1.350   28.54 | 2.100    7.06 |  2.85    3.47
                0.617   16.96 | 1.367   28.54 | 2.117    7.06 |  2.87    3.47
                0.633   16.96 | 1.383   28.54 | 2.133    7.06 |  2.88    3.47
                0.650   16.96 | 1.400   28.54 | 2.150    7.06 |  2.90    3.47
                0.667   16.96 | 1.417   28.54 | 2.167    7.06 |  2.92    3.47
                0.683   25.56 | 1.433   22.66 | 2.183    6.39 |  2.93    3.26
                0.700   25.56 | 1.450   22.66 | 2.200    6.39 |  2.95    3.26
                0.717   25.56 | 1.467   22.66 | 2.217    6.39 |  2.97    3.26
                0.733   25.56 | 1.483   22.66 | 2.233    6.39 |  2.98    3.26
                0.750   25.56 | 1.500   22.66 | 2.250    6.39 |  3.00    3.26

     Max.Eff.Inten.(mm/hr)=     215.47        88.04
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.01 (ii)    9.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.47         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.05          0.065 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.20           1.13
     RUNOFF VOLUME    (mm)=      76.43        38.92          46.41
     TOTAL RAINFALL   (mm)=      77.43        77.43          77.43
     RUNOFF COEFFICIENT   =       0.99         0.50           0.60

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):     4.41   1.194     1.05    61.04
      + ID2= 2 (  0006):     0.36   0.065     1.13    46.41
        ================================================
        ID = 3 (  0023):     4.77   1.258     1.05    59.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
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                          0.0000      0.0000   |    0.0520      0.0980
                          0.0020      0.0220   |    0.1060      0.1140
                          0.0050      0.0320   |    0.4350      0.1300
                          0.0060      0.0440   |    0.4700      0.1480
                          0.0070      0.0560   |    0.7150      0.1660
                          0.0080      0.0690   |    1.1370      0.1860
                          0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      1.258      1.05      59.93
   OUTFLOW: ID= 1 (  0008)      4.770      0.508      1.47      55.60
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.43
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1508

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     4.77   0.508     1.47    55.60
     + ID2= 2 (  0009):     2.68   0.434     1.20    37.82
       ================================================
       ID = 3 (  0010):     7.45   0.862     1.23    49.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

Output filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2bf4eadf-a944-45fe-a01a-8be7f3a5493d\s
Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\2bf4eadf-a944-45fe-a01a-8be7f3a5493d\s

DATE: 03/04/2026 TIME: 11:00:29

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener - 5yr **
****

| CHICAGO STORM |
| Ptotal= 47.23 mm |

IDF curve parameters: A=1593.000
B= 11.000
C= 0.879
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	3.03	0.75	24.58	1.50	11.05	2.25	4.23
0.08	3.38	0.83	57.37	1.58	9.45	2.33	3.94
0.17	3.82	0.92	139.25	1.67	8.23	2.42	3.70
0.25	4.38	1.00	72.71	1.75	7.28	2.50	3.48
0.33	5.14	1.08	42.10	1.83	6.51	2.58	3.28
0.42	6.19	1.17	28.36	1.92	5.89	2.67	3.11
0.50	7.74	1.25	20.87	2.00	5.37	2.75	2.95

0.58	10.23	1.33	16.27	2.08	4.93	2.83	2.81
0.67	14.72	1.42	13.21	2.17	4.55	2.92	2.68

CALIB			
NASHYD (0009)	Area (ha)=	2.68	Curve Number (CN)= 78.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.14	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.15	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95

0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.183 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 16.799
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.356

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 0.60	Curve Number (CN)= 82.0	# of Linear Res.(N)= 3.00	U.H. Tp(hrs)= 0.14

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70

0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.049 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 19.038
TOTAL RAINFALL (mm)= 47.233
RUNOFF COEFFICIENT = 0.403

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB	
STANDHYD (0002)	Area (ha)= 2.65
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.12	0.53

Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81

0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Max.Eff.Inten.(mm/hr)=	139.25	138.70	
over (min)	5.00	18.00	
Storage Coeff. (min)=	2.59 (ii)	17.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	18.00	
Unit Hyd. peak (cms)=	0.33	0.06	
			TOTALS
PEAK FLOW (cms)=	0.42	0.12	0.457 (iii)
TIME TO PEAK (hrs)=	1.03	1.32	1.03
RUNOFF VOLUME (mm)=	46.23	29.51	37.87
TOTAL RAINFALL (mm)=	47.23	47.23	47.23
RUNOFF COEFFICIENT =	0.98	0.62	0.80

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		0.60	0.049	1.18	19.04
+ ID2= 2 (0002):		2.65	0.457	1.03	37.87
ID = 3 (0003):		3.25	0.484	1.05	34.39

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0004)	Area (ha)= 1.16		
ID= 1 DT= 1.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 30.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	0.70	0.46	
Dep. Storage (mm)=	1.00	2.67	
Average Slope (%)=	2.00	2.00	
Length (m)=	80.00	80.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68

```
              0.733   14.72 | 1.483   13.21 | 2.233    4.55 |  2.98    2.68
              0.750   14.72 | 1.500   13.21 | 2.250    4.55 |  3.00    2.68

     Max.Eff.Inten.(mm/hr)=     139.25        95.61
               over (min)        5.00        13.00
     Storage Coeff.  (min)=       1.59 (ii)   12.48 (ii)
     Unit Hyd. Tpeak (min)=       5.00        13.00
     Unit Hyd. peak  (cms)=       0.41         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.07          0.147 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.23           1.03
     RUNOFF VOLUME    (mm)=      46.23        24.79          31.21
     TOTAL RAINFALL   (mm)=      47.23        47.23          47.23
     RUNOFF COEFFICIENT   =       0.98         0.52           0.66


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     3.25   0.484     1.05    34.39
      + ID2= 2 (  0004):     1.16   0.147     1.03    31.21
        ================================================
        ID = 3 (  0005):     4.41   0.629     1.03    33.55

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.29
     Dep. Storage     (mm)=       1.00         3.14
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      50.00        50.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.03	0.767	24.58	1.517	11.05	2.27	4.23
0.033	3.03	0.783	24.58	1.533	11.05	2.28	4.23
0.050	3.03	0.800	24.58	1.550	11.05	2.30	4.23
0.067	3.03	0.817	24.58	1.567	11.05	2.32	4.23
0.083	3.03	0.833	24.58	1.583	11.05	2.33	4.23
0.100	3.38	0.850	57.37	1.600	9.45	2.35	3.94
0.117	3.38	0.867	57.37	1.617	9.45	2.37	3.94
0.133	3.38	0.883	57.37	1.633	9.45	2.38	3.94
0.150	3.38	0.900	57.37	1.650	9.45	2.40	3.94
0.167	3.38	0.917	57.37	1.667	9.45	2.42	3.94
0.183	3.82	0.933	139.25	1.683	8.23	2.43	3.70
0.200	3.82	0.950	139.25	1.700	8.23	2.45	3.70
0.217	3.82	0.967	139.25	1.717	8.23	2.47	3.70
0.233	3.82	0.983	139.25	1.733	8.23	2.48	3.70
0.250	3.82	1.000	139.25	1.750	8.23	2.50	3.70
0.267	4.38	1.017	72.71	1.767	7.28	2.52	3.48
0.283	4.38	1.033	72.71	1.783	7.28	2.53	3.48
0.300	4.38	1.050	72.71	1.800	7.28	2.55	3.48
0.317	4.38	1.067	72.71	1.817	7.28	2.57	3.48
0.333	4.38	1.083	72.71	1.833	7.28	2.58	3.48
0.350	5.14	1.100	42.10	1.850	6.51	2.60	3.28
0.367	5.14	1.117	42.10	1.867	6.51	2.62	3.28
0.383	5.14	1.133	42.10	1.883	6.51	2.63	3.28
0.400	5.14	1.150	42.10	1.900	6.51	2.65	3.28
0.417	5.14	1.167	42.10	1.917	6.51	2.67	3.28
0.433	6.19	1.183	28.36	1.933	5.89	2.68	3.11
0.450	6.19	1.200	28.36	1.950	5.89	2.70	3.11
0.467	6.19	1.217	28.36	1.967	5.89	2.72	3.11
0.483	6.19	1.233	28.36	1.983	5.89	2.73	3.11
0.500	6.19	1.250	28.36	2.000	5.89	2.75	3.11
0.517	7.74	1.267	20.87	2.017	5.37	2.77	2.95
0.533	7.74	1.283	20.87	2.033	5.37	2.78	2.95
0.550	7.74	1.300	20.87	2.050	5.37	2.80	2.95
0.567	7.74	1.317	20.87	2.067	5.37	2.82	2.95
0.583	7.74	1.333	20.87	2.083	5.37	2.83	2.95
0.600	10.23	1.350	16.27	2.100	4.93	2.85	2.81
0.617	10.23	1.367	16.27	2.117	4.93	2.87	2.81
0.633	10.23	1.383	16.27	2.133	4.93	2.88	2.81
0.650	10.23	1.400	16.27	2.150	4.93	2.90	2.81
0.667	10.23	1.417	16.27	2.167	4.93	2.92	2.81
0.683	14.72	1.433	13.21	2.183	4.55	2.93	2.68
0.700	14.72	1.450	13.21	2.200	4.55	2.95	2.68
0.717	14.72	1.467	13.21	2.217	4.55	2.97	2.68
0.733	14.72	1.483	13.21	2.233	4.55	2.98	2.68
0.750	14.72	1.500	13.21	2.250	4.55	3.00	2.68

Max.Eff.Inten.(mm/hr)= 139.25 34.22

```
                over (min)        5.00        14.00
     Storage Coeff.  (min)=       1.20 (ii)   13.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        14.00
     Unit Hyd. peak  (cms)=       0.45         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.02          0.030 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.28           1.03
     RUNOFF VOLUME    (mm)=      46.23        17.42          23.16
     TOTAL RAINFALL   (mm)=      47.23        47.23          47.23
     RUNOFF COEFFICIENT   =       0.98         0.37           0.49

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):     4.41   0.629     1.03    33.55
      + ID2= 2 (  0006):     0.36   0.030     1.03    23.16
        ================================================
        ID = 3 (  0023):     4.77   0.659     1.03    32.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0520      0.0980
                           0.0020      0.0220   |    0.1060      0.1140
                           0.0050      0.0320   |    0.4350      0.1300
                           0.0060      0.0440   |    0.4700      0.1480
                           0.0070      0.0560   |    0.7150      0.1660
                           0.0080      0.0690   |    1.1370      0.1860
                           0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      0.659      1.03      32.77
   OUTFLOW: ID= 1 (  0008)      4.770      0.100      2.02      28.46
```

```
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.19
                  TIME SHIFT OF PEAK FLOW        (min)= 59.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1123

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     4.77   0.100     2.02    28.46
      + ID2= 2 (  0009):     2.68   0.183     1.20    16.80
        ================================================
        ID = 3 (  0010):     7.45   0.190     1.20    24.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
================================================================================
========================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\be
3b943d-0a63-4673-8c2c-348300670cb1\s
  Summary filename:
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C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\be3b943d-0a63-4673-8c2c-348300670cb1\s

DATE: 03/04/2026 TIME: 11:00:30

USER:

COMMENTS: _____

****
** SIMULATION : City of Kitchener 100-yr **
****

CHICAGO STORM
Ptotal= 87.25 mm

IDF curve parameters: A=4688.000
B= 17.000
C= 0.962
used in: INTENSITY = A / (t + B)^C

Duration of storm = 3.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.11	0.75	50.61	1.50	21.03	2.25	6.40
0.08	4.76	0.83	113.86	1.58	17.51	2.33	5.85
0.17	5.59	0.92	239.65	1.67	14.84	2.42	5.37
0.25	6.71	1.00	141.46	1.75	12.77	2.50	4.95
0.33	8.24	1.08	86.38	1.83	11.13	2.58	4.58
0.42	10.44	1.17	58.67	1.92	9.80	2.67	4.26
0.50	13.78	1.25	42.69	2.00	8.71	2.75	3.97
0.58	19.23	1.33	32.61	2.08	7.81	2.83	3.72
0.67	29.17	1.42	25.83	2.17	7.05	2.92	3.49

CALIB
NASHYD (0009)
ID= 1 DT= 1.0 min

Area (ha)= 2.68 Curve Number (CN)= 78.0
Ia (mm)= 3.14 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.15

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.524 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 45.422
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.521

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0001)	Area (ha)=	0.60	Curve Number (CN)= 82.0
ID= 1 DT= 1.0 min	Ia (mm)=	3.77	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.14	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26

0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.136 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 50.051
TOTAL RAINFALL (mm)= 87.251
RUNOFF COEFFICIENT = 0.574

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0002) | ID= 1 DT= 1.0 min	Area (ha)= 2.65 Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40

0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40
0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	387.38
over (min)	5.00	11.00
Storage Coeff. (min)=	2.08 (ii)	10.58 (ii)
Unit Hyd. Tpeak (min)=	5.00	11.00
Unit Hyd. peak (cms)=	0.37	0.11

				TOTALS
PEAK FLOW	(cms)=	0.77	0.36	0.974 (iii)
TIME TO PEAK	(hrs)=	1.03	1.18	1.05
RUNOFF VOLUME	(mm)=	86.25	66.03	76.14
TOTAL RAINFALL	(mm)=	87.25	87.25	87.25
RUNOFF COEFFICIENT	=	0.99	0.76	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	0.60	0.136	1.18	50.05
	+ ID2= 2 (0002):	2.65	0.974	1.05	76.14
	ID = 3 (0003):	3.25	1.067	1.05	71.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0004)	Area (ha)= 1.16		
ID= 1 DT= 1.0 min	Total Imp(%)= 60.00	Dir. Conn.(%)= 30.00	
		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.46
Dep. Storage	(mm)=	1.00	2.67
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	4.11	0.767	50.61	1.517	21.03	2.27	6.40
0.033	4.11	0.783	50.61	1.533	21.03	2.28	6.40
0.050	4.11	0.800	50.61	1.550	21.03	2.30	6.40
0.067	4.11	0.817	50.61	1.567	21.03	2.32	6.40
0.083	4.11	0.833	50.61	1.583	21.03	2.33	6.40

0.100	4.76	0.850	113.86	1.600	17.51	2.35	5.85
0.117	4.76	0.867	113.86	1.617	17.51	2.37	5.85
0.133	4.76	0.883	113.86	1.633	17.51	2.38	5.85
0.150	4.76	0.900	113.86	1.650	17.51	2.40	5.85
0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	241.45	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.28 (ii)	9.74 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.44	0.12	
			TOTALS
PEAK FLOW (cms)=	0.21	0.20	0.331 (iii)
TIME TO PEAK (hrs)=	1.02	1.18	1.05
RUNOFF VOLUME (mm)=	86.25	59.12	67.25

```
     TOTAL RAINFALL   (mm)=      87.25        87.25          87.25
     RUNOFF COEFFICIENT   =       0.99         0.68           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     3.25   1.067     1.05    71.32
      + ID2= 2 (  0004):     1.16   0.331     1.05    67.25
        ================================================
        ID = 3 (  0005):     4.41   1.398     1.05    70.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.29
     Dep. Storage     (mm)=       1.00         3.14
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      50.00        50.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.017    4.11 | 0.767   50.61 | 1.517   21.03 |  2.27    6.40
              0.033    4.11 | 0.783   50.61 | 1.533   21.03 |  2.28    6.40
              0.050    4.11 | 0.800   50.61 | 1.550   21.03 |  2.30    6.40
              0.067    4.11 | 0.817   50.61 | 1.567   21.03 |  2.32    6.40
              0.083    4.11 | 0.833   50.61 | 1.583   21.03 |  2.33    6.40
              0.100    4.76 | 0.850  113.86 | 1.600   17.51 |  2.35    5.85
              0.117    4.76 | 0.867  113.86 | 1.617   17.51 |  2.37    5.85
              0.133    4.76 | 0.883  113.86 | 1.633   17.51 |  2.38    5.85
              0.150    4.76 | 0.900  113.86 | 1.650   17.51 |  2.40    5.85
```

0.167	4.76	0.917	113.86	1.667	17.51	2.42	5.85
0.183	5.59	0.933	239.65	1.683	14.84	2.43	5.37
0.200	5.59	0.950	239.65	1.700	14.84	2.45	5.37
0.217	5.59	0.967	239.65	1.717	14.84	2.47	5.37
0.233	5.59	0.983	239.65	1.733	14.84	2.48	5.37
0.250	5.59	1.000	239.65	1.750	14.84	2.50	5.37
0.267	6.71	1.017	141.46	1.767	12.77	2.52	4.95
0.283	6.71	1.033	141.46	1.783	12.77	2.53	4.95
0.300	6.71	1.050	141.46	1.800	12.77	2.55	4.95
0.317	6.71	1.067	141.46	1.817	12.77	2.57	4.95
0.333	6.71	1.083	141.46	1.833	12.77	2.58	4.95
0.350	8.24	1.100	86.39	1.850	11.13	2.60	4.58
0.367	8.24	1.117	86.38	1.867	11.13	2.62	4.58
0.383	8.24	1.133	86.38	1.883	11.13	2.63	4.58
0.400	8.24	1.150	86.38	1.900	11.13	2.65	4.58
0.417	8.24	1.167	86.38	1.917	11.13	2.67	4.58
0.433	10.44	1.183	58.67	1.933	9.80	2.68	4.26
0.450	10.44	1.200	58.67	1.950	9.80	2.70	4.26
0.467	10.44	1.217	58.67	1.967	9.80	2.72	4.26
0.483	10.44	1.233	58.67	1.983	9.80	2.73	4.26
0.500	10.44	1.250	58.67	2.000	9.80	2.75	4.26
0.517	13.78	1.267	42.69	2.017	8.71	2.77	3.97
0.533	13.78	1.283	42.69	2.033	8.71	2.78	3.97
0.550	13.78	1.300	42.69	2.050	8.71	2.80	3.97
0.567	13.78	1.317	42.69	2.067	8.71	2.82	3.97
0.583	13.78	1.333	42.69	2.083	8.71	2.83	3.97
0.600	19.23	1.350	32.61	2.100	7.81	2.85	3.72
0.617	19.23	1.367	32.61	2.117	7.81	2.87	3.72
0.633	19.23	1.383	32.61	2.133	7.81	2.88	3.72
0.650	19.23	1.400	32.61	2.150	7.81	2.90	3.72
0.667	19.23	1.417	32.61	2.167	7.81	2.92	3.72
0.683	29.17	1.433	25.83	2.183	7.05	2.93	3.49
0.700	29.17	1.450	25.83	2.200	7.05	2.95	3.49
0.717	29.17	1.467	25.83	2.217	7.05	2.97	3.49
0.733	29.17	1.483	25.83	2.233	7.05	2.98	3.49
0.750	29.17	1.500	25.83	2.250	7.05	3.00	3.49

Max.Eff.Inten.(mm/hr)=	239.65	105.78	
over (min)	5.00	9.00	
Storage Coeff. (min)=	0.97 (ii)	8.85 (ii)	
Unit Hyd. Tpeak (min)=	5.00	9.00	
Unit Hyd. peak (cms)=	0.48	0.13	
			TOTALS
PEAK FLOW (cms)=	0.05	0.06	0.081 (iii)
TIME TO PEAK (hrs)=	1.02	1.18	1.12
RUNOFF VOLUME (mm)=	86.25	46.66	54.56
TOTAL RAINFALL (mm)=	87.25	87.25	87.25
RUNOFF COEFFICIENT =	0.99	0.53	0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0023)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0005):	4.41	1.398	1.05	70.25
	+ ID2= 2 (0006):	0.36	0.081	1.12	54.56
	ID = 3 (0023):	4.77	1.476	1.05	69.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0008)		OVERFLOW IS ON			
IN= 2---> OUT= 1					
DT= 1.0 min		OUTFLOW	STORAGE	OUTFLOW	STORAGE
		(cms)	(ha.m.)	(cms)	(ha.m.)
		0.0000	0.0000	0.0520	0.0980
		0.0020	0.0220	0.1060	0.1140
		0.0050	0.0320	0.4350	0.1300
		0.0060	0.0440	0.4700	0.1480
		0.0070	0.0560	0.7150	0.1660
		0.0080	0.0690	1.1370	0.1860
		0.0300	0.0830	0.0000	0.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0023)	4.770	1.476	1.05	69.07
OUTFLOW: ID= 1 (0008)	4.770	0.688	1.40	64.74
OVERFLOW:ID= 3 (0003)	0.000	0.000	0.00	0.00

TOTAL NUMBER OF SIMULATION OVERFLOW = 0
CUMULATIVE TIME OF OVERFLOW (HOURS) = 0.00
PERCENTAGE OF TIME OVERFLOWING (%) = 0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 46.60
TIME SHIFT OF PEAK FLOW (min)= 21.00
MAXIMUM STORAGE USED (ha.m.)= 0.1641

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--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     4.77   0.688     1.40    64.74
      + ID2= 2 (  0009):     2.68   0.524     1.20    45.42
        ================================================
        ID = 3 (  0010):     7.45   1.088     1.33    57.79

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
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DATE: 03/04/2026                          TIME: 11:00:30

USER:



COMMENTS: _____________________________________________________________
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  ***********************************************
  ** SIMULATION : City of Kitchener 10-yr       **
  ***********************************************

--------------------
| CHICAGO STORM    |    IDF curve parameters: A=2221.000
| Ptotal= 56.28 mm |                          B=  12.000
--------------------                          C=   0.908
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  3.00 hrs
                       Storm time step    =  5.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.16 |  0.75   29.81 |  1.50   12.83 |  2.25    4.55
                0.08    3.56 |  0.83   70.75 |  1.58   10.86 |  2.33    4.22
                0.17    4.07 |  0.92  169.55 |  1.67    9.37 |  2.42    3.93
                0.25    4.73 |  1.00   89.76 |  1.75    8.20 |  2.50    3.68
                0.33    5.62 |  1.08   51.82 |  1.83    7.27 |  2.58    3.45
                0.42    6.88 |  1.17   34.57 |  1.92    6.52 |  2.67    3.25
                0.50    8.77 |  1.25   25.13 |  2.00    5.90 |  2.75    3.08
                0.58   11.83 |  1.33   19.35 |  2.08    5.37 |  2.83    2.92
                0.67   17.41 |  1.42   15.52 |  2.17    4.93 |  2.92    2.77


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| CALIB            |
| NASHYD   (  0009)|   Area    (ha)=   2.68   Curve Number   (CN)= 78.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.017    3.16 | 0.767   29.81 | 1.517   12.83 |  2.27    4.55
               0.033    3.16 | 0.783   29.81 | 1.533   12.83 |  2.28    4.55
               0.050    3.16 | 0.800   29.81 | 1.550   12.83 |  2.30    4.55
               0.067    3.16 | 0.817   29.81 | 1.567   12.83 |  2.32    4.55
               0.083    3.16 | 0.833   29.81 | 1.583   12.83 |  2.33    4.55
               0.100    3.56 | 0.850   70.75 | 1.600   10.86 |  2.35    4.22
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0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Unit Hyd Qpeak (cms)= 0.682

PEAK FLOW (cms)= 0.258 (i)
TIME TO PEAK (hrs)= 1.200
RUNOFF VOLUME (mm)= 22.632
TOTAL RAINFALL (mm)= 56.282
RUNOFF COEFFICIENT = 0.402

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.60   Curve Number   (CN)= 82.0
|ID= 1 DT= 1.0 min |   Ia      (mm)=   3.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92

0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Unit Hyd Qpeak (cms)= 0.164

PEAK FLOW (cms)= 0.068 (i)
TIME TO PEAK (hrs)= 1.183
RUNOFF VOLUME (mm)= 25.469
TOTAL RAINFALL (mm)= 56.282
RUNOFF COEFFICIENT = 0.453

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB STANDHYD (0002)	Area (ha)= 2.65
ID= 1 DT= 1.0 min	Total Imp(%)= 80.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.12	0.53
Dep. Storage	(mm)=	1.00	1.57
Average Slope	(%)=	2.00	2.00
Length	(m)=	180.00	180.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93

0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	194.07	
over (min)	5.00	16.00	
Storage Coeff. (min)=	2.39 (ii)	15.74 (ii)	
Unit Hyd. Tpeak (min)=	5.00	16.00	
Unit Hyd. peak (cms)=	0.34	0.07	
			TOTALS
PEAK FLOW (cms)=	0.52	0.17	0.579 (iii)
TIME TO PEAK (hrs)=	1.03	1.28	1.03
RUNOFF VOLUME (mm)=	55.28	37.47	46.37
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.67	0.82

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL

THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0003)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	0.60	0.068	1.18	25.47
	+ ID2= 2 (0002):	2.65	0.579	1.03	46.37
	ID = 3 (0003):	3.25	0.619	1.05	42.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0004)	Area (ha)= 1.16
ID= 1 DT= 1.0 min	Total Imp(%)= 60.00 Dir. Conn.(%)= 30.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.70	0.46
Dep. Storage	(mm)=	1.00	2.67
Average Slope	(%)=	2.00	2.00
Length	(m)=	80.00	80.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68

0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68
0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	135.50	
over (min)	5.00	11.00	
Storage Coeff. (min)=	1.47 (ii)	10.94 (ii)	
Unit Hyd. Tpeak (min)=	5.00	11.00	
Unit Hyd. peak (cms)=	0.42	0.10	
			TOTALS
PEAK FLOW (cms)=	0.15	0.10	0.196 (iii)
TIME TO PEAK (hrs)=	1.02	1.20	1.03
RUNOFF VOLUME (mm)=	55.28	32.12	39.07
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.57	0.69

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| ADD HYD  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0003):     3.25   0.619     1.05    42.51
      + ID2= 2 (  0004):     1.16   0.196     1.03    39.07
        ================================================
        ID = 3 (  0005):     4.41   0.814     1.05    41.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.36
|ID= 1 DT= 1.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.29
     Dep. Storage     (mm)=       1.00         3.14
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      50.00        50.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   1.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	3.16	0.767	29.81	1.517	12.83	2.27	4.55
0.033	3.16	0.783	29.81	1.533	12.83	2.28	4.55
0.050	3.16	0.800	29.81	1.550	12.83	2.30	4.55
0.067	3.16	0.817	29.81	1.567	12.83	2.32	4.55
0.083	3.16	0.833	29.81	1.583	12.83	2.33	4.55
0.100	3.56	0.850	70.75	1.600	10.86	2.35	4.22
0.117	3.56	0.867	70.75	1.617	10.86	2.37	4.22
0.133	3.56	0.883	70.75	1.633	10.86	2.38	4.22
0.150	3.56	0.900	70.75	1.650	10.86	2.40	4.22
0.167	3.56	0.917	70.75	1.667	10.86	2.42	4.22
0.183	4.07	0.933	169.55	1.683	9.37	2.43	3.93
0.200	4.07	0.950	169.55	1.700	9.37	2.45	3.93
0.217	4.07	0.967	169.55	1.717	9.37	2.47	3.93
0.233	4.07	0.983	169.55	1.733	9.37	2.48	3.93
0.250	4.07	1.000	169.55	1.750	9.37	2.50	3.93
0.267	4.73	1.017	89.76	1.767	8.20	2.52	3.68
0.283	4.73	1.033	89.76	1.783	8.20	2.53	3.68
0.300	4.73	1.050	89.76	1.800	8.20	2.55	3.68
0.317	4.73	1.067	89.76	1.817	8.20	2.57	3.68
0.333	4.73	1.083	89.76	1.833	8.20	2.58	3.68

0.350	5.62	1.100	51.82	1.850	7.27	2.60	3.45
0.367	5.62	1.117	51.82	1.867	7.27	2.62	3.45
0.383	5.62	1.133	51.82	1.883	7.27	2.63	3.45
0.400	5.62	1.150	51.82	1.900	7.27	2.65	3.45
0.417	5.62	1.167	51.82	1.917	7.27	2.67	3.45
0.433	6.88	1.183	34.57	1.933	6.52	2.68	3.25
0.450	6.88	1.200	34.57	1.950	6.52	2.70	3.25
0.467	6.88	1.217	34.57	1.967	6.52	2.72	3.25
0.483	6.88	1.233	34.57	1.983	6.52	2.73	3.25
0.500	6.88	1.250	34.57	2.000	6.52	2.75	3.25
0.517	8.77	1.267	25.13	2.017	5.90	2.77	3.08
0.533	8.77	1.283	25.13	2.033	5.90	2.78	3.08
0.550	8.77	1.300	25.13	2.050	5.90	2.80	3.08
0.567	8.77	1.317	25.13	2.067	5.90	2.82	3.08
0.583	8.77	1.333	25.13	2.083	5.90	2.83	3.08
0.600	11.83	1.350	19.35	2.100	5.37	2.85	2.92
0.617	11.83	1.367	19.35	2.117	5.37	2.87	2.92
0.633	11.83	1.383	19.35	2.133	5.37	2.88	2.92
0.650	11.83	1.400	19.35	2.150	5.37	2.90	2.92
0.667	11.83	1.417	19.35	2.167	5.37	2.92	2.92
0.683	17.41	1.433	15.52	2.183	4.93	2.93	2.77
0.700	17.41	1.450	15.52	2.200	4.93	2.95	2.77
0.717	17.41	1.467	15.52	2.217	4.93	2.97	2.77
0.733	17.41	1.483	15.52	2.233	4.93	2.98	2.77
0.750	17.41	1.500	15.52	2.250	4.93	3.00	2.77

Max.Eff.Inten.(mm/hr)=	169.55	51.70	
over (min)	5.00	12.00	
Storage Coeff. (min)=	1.11 (ii)	11.61 (ii)	
Unit Hyd. Tpeak (min)=	5.00	12.00	
Unit Hyd. peak (cms)=	0.46	0.10	
			TOTALS
PEAK FLOW (cms)=	0.03	0.02	0.040 (iii)
TIME TO PEAK (hrs)=	1.02	1.23	1.03
RUNOFF VOLUME (mm)=	55.28	23.40	29.76
TOTAL RAINFALL (mm)=	56.28	56.28	56.28
RUNOFF COEFFICIENT =	0.98	0.42	0.53

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 79.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0005):     4.41   0.814     1.05    41.61
     + ID2= 2 (  0006):     0.36   0.040     1.03    29.76
       ================================================
       ID = 3 (  0023):     4.77   0.854     1.05    40.71

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |    0.0520      0.0980
                          0.0020      0.0220   |    0.1060      0.1140
                          0.0050      0.0320   |    0.4350      0.1300
                          0.0060      0.0440   |    0.4700      0.1480
                          0.0070      0.0560   |    0.7150      0.1660
                          0.0080      0.0690   |    1.1370      0.1860
                          0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      0.854      1.05      40.71
   OUTFLOW: ID= 1 (  0008)      4.770      0.261      1.58      36.39
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.54
                  TIME SHIFT OF PEAK FLOW         (min)= 32.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1215

--------------------------------------------------------------------------------

-------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
-------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0008):     4.77   0.261     1.58    36.39
     + ID2= 2 (  0009):     2.68   0.258     1.20    22.63
       ================================================
       ID = 3 (  0010):     7.45   0.371     1.53    31.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat

  Output  filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\34
d44240-6dca-4b50-991b-1dd61b549bbb\s
  Summary filename:
C:\Users\sabjiv4671\AppData\Local\Civica\VH5\9d8df083-0ce4-48e9-8de2-ed505cf9485f\34
d44240-6dca-4b50-991b-1dd61b549bbb\s


DATE: 03/04/2026                          TIME: 11:02:13

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------
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  ********************************************
  ** SIMULATION : Hazel                      **
  ********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\sabjiv4671\AppD
|                  |              ata\Local\Temp\
```

	14bf9805-b59e-45c8-8083-2e4d54f21415\130a20bd
Ptotal=285.00 mm	Comments: Hazel

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	12.08	2.03	24.17	2.03	36.25	6.00
0.08	2.03	12.17	2.03	24.25	2.03	36.33	6.00
0.17	2.03	12.25	2.03	24.33	2.03	36.42	6.00
0.25	2.03	12.33	2.03	24.42	2.03	36.50	6.00
0.33	2.03	12.42	2.03	24.50	2.03	36.58	6.00
0.42	2.03	12.50	2.03	24.58	2.03	36.67	6.00
0.50	2.03	12.58	2.03	24.67	2.03	36.75	6.00
0.58	2.03	12.67	2.03	24.75	2.03	36.83	6.00
0.67	2.03	12.75	2.03	24.83	2.03	36.92	6.00
0.75	2.03	12.83	2.03	24.92	2.03	37.00	6.00
0.83	2.03	12.92	2.03	25.00	2.03	37.08	4.00
0.92	2.03	13.00	2.03	25.08	2.03	37.17	4.00
1.00	2.03	13.08	2.03	25.17	2.03	37.25	4.00
1.08	2.03	13.17	2.03	25.25	2.03	37.33	4.00
1.17	2.03	13.25	2.03	25.33	2.03	37.42	4.00
1.25	2.03	13.33	2.03	25.42	2.03	37.50	4.00
1.33	2.03	13.42	2.03	25.50	2.03	37.58	4.00
1.42	2.03	13.50	2.03	25.58	2.03	37.67	4.00
1.50	2.03	13.58	2.03	25.67	2.03	37.75	4.00
1.58	2.03	13.67	2.03	25.75	2.03	37.83	4.00
1.67	2.03	13.75	2.03	25.83	2.03	37.92	4.00
1.75	2.03	13.83	2.03	25.92	2.03	38.00	4.00
1.83	2.03	13.92	2.03	26.00	2.03	38.08	6.00
1.92	2.03	14.00	2.03	26.08	2.03	38.17	6.00
2.00	2.03	14.08	2.03	26.17	2.03	38.25	6.00
2.08	2.03	14.17	2.03	26.25	2.03	38.33	6.00
2.17	2.03	14.25	2.03	26.33	2.03	38.42	6.00
2.25	2.03	14.33	2.03	26.42	2.03	38.50	6.00
2.33	2.03	14.42	2.03	26.50	2.03	38.58	6.00
2.42	2.03	14.50	2.03	26.58	2.03	38.67	6.00
2.50	2.03	14.58	2.03	26.67	2.03	38.75	6.00
2.58	2.03	14.67	2.03	26.75	2.03	38.83	6.00
2.67	2.03	14.75	2.03	26.83	2.03	38.92	6.00
2.75	2.03	14.83	2.03	26.92	2.03	39.00	6.00
2.83	2.03	14.92	2.03	27.00	2.03	39.08	13.00
2.92	2.03	15.00	2.03	27.08	2.03	39.17	13.00
3.00	2.03	15.08	2.03	27.17	2.03	39.25	13.00
3.08	2.03	15.17	2.03	27.25	2.03	39.33	13.00
3.17	2.03	15.25	2.03	27.33	2.03	39.42	13.00
3.25	2.03	15.33	2.03	27.42	2.03	39.50	13.00
3.33	2.03	15.42	2.03	27.50	2.03	39.58	13.00
3.42	2.03	15.50	2.03	27.58	2.03	39.67	13.00
3.50	2.03	15.58	2.03	27.67	2.03	39.75	13.00
3.58	2.03	15.67	2.03	27.75	2.03	39.83	13.00
3.67	2.03	15.75	2.03	27.83	2.03	39.92	13.00

3.75	2.03	15.83	2.03	27.92	2.03	40.00	13.00
3.83	2.03	15.92	2.03	28.00	2.03	40.08	17.00
3.92	2.03	16.00	2.03	28.08	2.03	40.17	17.00
4.00	2.03	16.08	2.03	28.17	2.03	40.25	17.00
4.08	2.03	16.17	2.03	28.25	2.03	40.33	17.00
4.17	2.03	16.25	2.03	28.33	2.03	40.42	17.00
4.25	2.03	16.33	2.03	28.42	2.03	40.50	17.00
4.33	2.03	16.42	2.03	28.50	2.03	40.58	17.00
4.42	2.03	16.50	2.03	28.58	2.03	40.67	17.00
4.50	2.03	16.58	2.03	28.67	2.03	40.75	17.00
4.58	2.03	16.67	2.03	28.75	2.03	40.83	17.00
4.67	2.03	16.75	2.03	28.83	2.03	40.92	17.00
4.75	2.03	16.83	2.03	28.92	2.03	41.00	17.00
4.83	2.03	16.92	2.03	29.00	2.03	41.08	13.00
4.92	2.03	17.00	2.03	29.08	2.03	41.17	13.00
5.00	2.03	17.08	2.03	29.17	2.03	41.25	13.00
5.08	2.03	17.17	2.03	29.25	2.03	41.33	13.00
5.17	2.03	17.25	2.03	29.33	2.03	41.42	13.00
5.25	2.03	17.33	2.03	29.42	2.03	41.50	13.00
5.33	2.03	17.42	2.03	29.50	2.03	41.58	13.00
5.42	2.03	17.50	2.03	29.58	2.03	41.67	13.00
5.50	2.03	17.58	2.03	29.67	2.03	41.75	13.00
5.58	2.03	17.67	2.03	29.75	2.03	41.83	13.00
5.67	2.03	17.75	2.03	29.83	2.03	41.92	13.00
5.75	2.03	17.83	2.03	29.92	2.03	42.00	13.00
5.83	2.03	17.92	2.03	30.00	2.03	42.08	23.00
5.92	2.03	18.00	2.03	30.08	2.03	42.17	23.00
6.00	2.03	18.08	2.03	30.17	2.03	42.25	23.00
6.08	2.03	18.17	2.03	30.25	2.03	42.33	23.00
6.17	2.03	18.25	2.03	30.33	2.03	42.42	23.00
6.25	2.03	18.33	2.03	30.42	2.03	42.50	23.00
6.33	2.03	18.42	2.03	30.50	2.03	42.58	23.00
6.42	2.03	18.50	2.03	30.58	2.03	42.67	23.00
6.50	2.03	18.58	2.03	30.67	2.03	42.75	23.00
6.58	2.03	18.67	2.03	30.75	2.03	42.83	23.00
6.67	2.03	18.75	2.03	30.83	2.03	42.92	23.00
6.75	2.03	18.83	2.03	30.92	2.03	43.00	23.00
6.83	2.03	18.92	2.03	31.00	2.03	43.08	13.00
6.92	2.03	19.00	2.03	31.08	2.03	43.17	13.00
7.00	2.03	19.08	2.03	31.17	2.03	43.25	13.00
7.08	2.03	19.17	2.03	31.25	2.03	43.33	13.00
7.17	2.03	19.25	2.03	31.33	2.03	43.42	13.00
7.25	2.03	19.33	2.03	31.42	2.03	43.50	13.00
7.33	2.03	19.42	2.03	31.50	2.03	43.58	13.00
7.42	2.03	19.50	2.03	31.58	2.03	43.67	13.00
7.50	2.03	19.58	2.03	31.67	2.03	43.75	13.00
7.58	2.03	19.67	2.03	31.75	2.03	43.83	13.00
7.67	2.03	19.75	2.03	31.83	2.03	43.92	13.00
7.75	2.03	19.83	2.03	31.92	2.03	44.00	13.00
7.83	2.03	19.92	2.03	32.00	2.03	44.08	13.00

7.92	2.03	20.00	2.03	32.08	2.03	44.17	13.00
8.00	2.03	20.08	2.03	32.17	2.03	44.25	13.00
8.08	2.03	20.17	2.03	32.25	2.03	44.33	13.00
8.17	2.03	20.25	2.03	32.33	2.03	44.42	13.00
8.25	2.03	20.33	2.03	32.42	2.03	44.50	13.00
8.33	2.03	20.42	2.03	32.50	2.03	44.58	13.00
8.42	2.03	20.50	2.03	32.58	2.03	44.67	13.00
8.50	2.03	20.58	2.03	32.67	2.03	44.75	13.00
8.58	2.03	20.67	2.03	32.75	2.03	44.83	13.00
8.67	2.03	20.75	2.03	32.83	2.03	44.92	13.00
8.75	2.03	20.83	2.03	32.92	2.03	45.00	13.00
8.83	2.03	20.92	2.03	33.00	2.03	45.08	53.00
8.92	2.03	21.00	2.03	33.08	2.03	45.17	53.00
9.00	2.03	21.08	2.03	33.17	2.03	45.25	53.00
9.08	2.03	21.17	2.03	33.25	2.03	45.33	53.00
9.17	2.03	21.25	2.03	33.33	2.03	45.42	53.00
9.25	2.03	21.33	2.03	33.42	2.03	45.50	53.00
9.33	2.03	21.42	2.03	33.50	2.03	45.58	53.00
9.42	2.03	21.50	2.03	33.58	2.03	45.67	53.00
9.50	2.03	21.58	2.03	33.67	2.03	45.75	53.00
9.58	2.03	21.67	2.03	33.75	2.03	45.83	53.00
9.67	2.03	21.75	2.03	33.83	2.03	45.92	53.00
9.75	2.03	21.83	2.03	33.92	2.03	46.00	53.00
9.83	2.03	21.92	2.03	34.00	2.03	46.08	38.00
9.92	2.03	22.00	2.03	34.08	2.03	46.17	38.00
10.00	2.03	22.08	2.03	34.17	2.03	46.25	38.00
10.08	2.03	22.17	2.03	34.25	2.03	46.33	38.00
10.17	2.03	22.25	2.03	34.33	2.03	46.42	38.00
10.25	2.03	22.33	2.03	34.42	2.03	46.50	38.00
10.33	2.03	22.42	2.03	34.50	2.03	46.58	38.00
10.42	2.03	22.50	2.03	34.58	2.03	46.67	38.00
10.50	2.03	22.58	2.03	34.67	2.03	46.75	38.00
10.58	2.03	22.67	2.03	34.75	2.03	46.83	38.00
10.67	2.03	22.75	2.03	34.83	2.03	46.92	38.00
10.75	2.03	22.83	2.03	34.92	2.03	47.00	38.00
10.83	2.03	22.92	2.03	35.00	2.03	47.08	13.00
10.92	2.03	23.00	2.03	35.08	2.03	47.17	13.00
11.00	2.03	23.08	2.03	35.17	2.03	47.25	13.00
11.08	2.03	23.17	2.03	35.25	2.03	47.33	13.00
11.17	2.03	23.25	2.03	35.33	2.03	47.42	13.00
11.25	2.03	23.33	2.03	35.42	2.03	47.50	13.00
11.33	2.03	23.42	2.03	35.50	2.03	47.58	13.00
11.42	2.03	23.50	2.03	35.58	2.03	47.67	13.00
11.50	2.03	23.58	2.03	35.67	2.03	47.75	13.00
11.58	2.03	23.67	2.03	35.75	2.03	47.83	13.00
11.67	2.03	23.75	2.03	35.83	2.03	47.92	13.00
11.75	2.03	23.83	2.03	35.92	2.03	48.00	13.00
11.83	2.03	23.92	2.03	36.00	2.03		
11.92	2.03	24.00	2.03	36.08	6.00		
12.00	2.03	24.08	2.03	36.17	6.00		

```
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| NASHYD   (  0009)|   Area    (ha)=   2.68   Curve Number   (CN)= 78.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   3.14   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.15

     Unit Hyd Qpeak  (cms)=   0.682

     PEAK FLOW       (cms)=   0.369 (i)
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 223.442
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.784

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=   0.60   Curve Number   (CN)= 82.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   3.77   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.164

     PEAK FLOW       (cms)=   0.084 (i)
     TIME TO PEAK    (hrs)=  46.083
     RUNOFF VOLUME    (mm)= 232.939
     TOTAL RAINFALL   (mm)= 285.000
     RUNOFF COEFFICIENT   =   0.817

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=   2.65
|ID= 1 DT= 5.0 min |   Total Imp(%)=  80.00   Dir. Conn.(%)=  50.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.12         0.53
     Dep. Storage     (mm)=       1.00         1.57
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     180.00       180.00
     Mannings n             =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00       130.97
```

```
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.81 (ii)   19.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.25         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.20         0.18          0.377 (iii)
     TIME TO PEAK    (hrs)=      46.08        46.17          46.08
     RUNOFF VOLUME    (mm)=     284.00       259.71         271.85
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.91           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0003)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):     0.60   0.084    46.08   232.94
      + ID2= 2 (  0002):     2.65   0.377    46.08   271.85
        ================================================
        ID = 3 (  0003):     3.25   0.461    46.08   264.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=   1.16
|ID= 1 DT= 5.0 min |   Total Imp(%)=  60.00   Dir. Conn.(%)=  30.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.70         0.46
     Dep. Storage     (mm)=       1.00         2.67
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      80.00        80.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00        90.77
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.34 (ii)   13.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.08
                                                        *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.05         0.12          0.166 (iii)
     TIME TO PEAK    (hrs)=      45.67        46.08          46.08
     RUNOFF VOLUME    (mm)=     284.00       249.51         259.85
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.88           0.91

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0003):     3.25   0.461    46.08   264.67
     + ID2= 2 (  0004):     1.16   0.166    46.08   259.85
       ================================================
       ID = 3 (  0005):     4.41   0.627    46.08   263.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   0.36
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  20.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.29
     Dep. Storage     (mm)=       1.00         3.14
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      50.00        50.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=      53.00        50.16
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       1.76 (ii)   12.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.32         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.01         0.04          0.050 (iii)
     TIME TO PEAK    (hrs)=      45.50        46.08          46.08
     RUNOFF VOLUME    (mm)=     284.00       227.39         238.69
     TOTAL RAINFALL   (mm)=     285.00       285.00         285.00
     RUNOFF COEFFICIENT   =       1.00         0.80           0.84
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  79.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):     4.41   0.627    46.08   263.40
      + ID2= 2 (  0006):     0.36   0.050    46.08   238.69
        ================================================
        ID = 3 (  0023):     4.77   0.678    46.08   261.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS ON
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000      0.0000   |    0.0520      0.0980
                           0.0020      0.0220   |    0.1060      0.1140
                           0.0050      0.0320   |    0.4350      0.1300
                           0.0060      0.0440   |    0.4700      0.1480
                           0.0070      0.0560   |    0.7150      0.1660
                           0.0080      0.0690   |    1.1370      0.1860
                           0.0300      0.0830   |    0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0023)      4.770      0.678     46.08     261.54
   OUTFLOW: ID= 1 (  0008)      4.770      0.639     46.17     260.95
   OVERFLOW:ID= 3 (  0003)      0.000      0.000      0.00       0.00

                  TOTAL NUMBER OF SIMULATION OVERFLOW  =     0
                  CUMULATIVE TIME OF OVERFLOW  (HOURS) =  0.00
                  PERCENTAGE OF TIME OVERFLOWING   (%) =  0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 94.25
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1689
```

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0010)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0008):     4.77   0.639    46.17   260.95
      + ID2= 2 (  0009):     2.68   0.369    46.08   223.44
        ================================================
        ID = 3 (  0010):     7.45   1.004    46.08   247.46

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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Stormceptor EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

06/04/2026

Province:	Ontario
City:	St. Jacobs
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Site Name:	Hawkesville - CC Option

Drainage Area (ha):	4.10
% Imperviousness:	65.00

Runoff Coefficient 'c': 0.69

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	50.0

Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	107.19
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	2013
Estimated Average Annual Sediment Volume (L/yr):	1636

Project Name:	51 Hawkesville Road
Project Number:	2401775
Designer Name:	Sabrina Jivani
Designer Company:	GEI
Designer Email:	sjivani@geiconsultants.com
Designer Phone:	416-689-7699
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	32
EFO5	37
EFO6	42
EFO8	49
EFO10	54
EFO12	58

Recommended Stormceptor EFO Model: EFO10

Estimated Net Annual Sediment (TSS) Load Reduction (%): 54

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

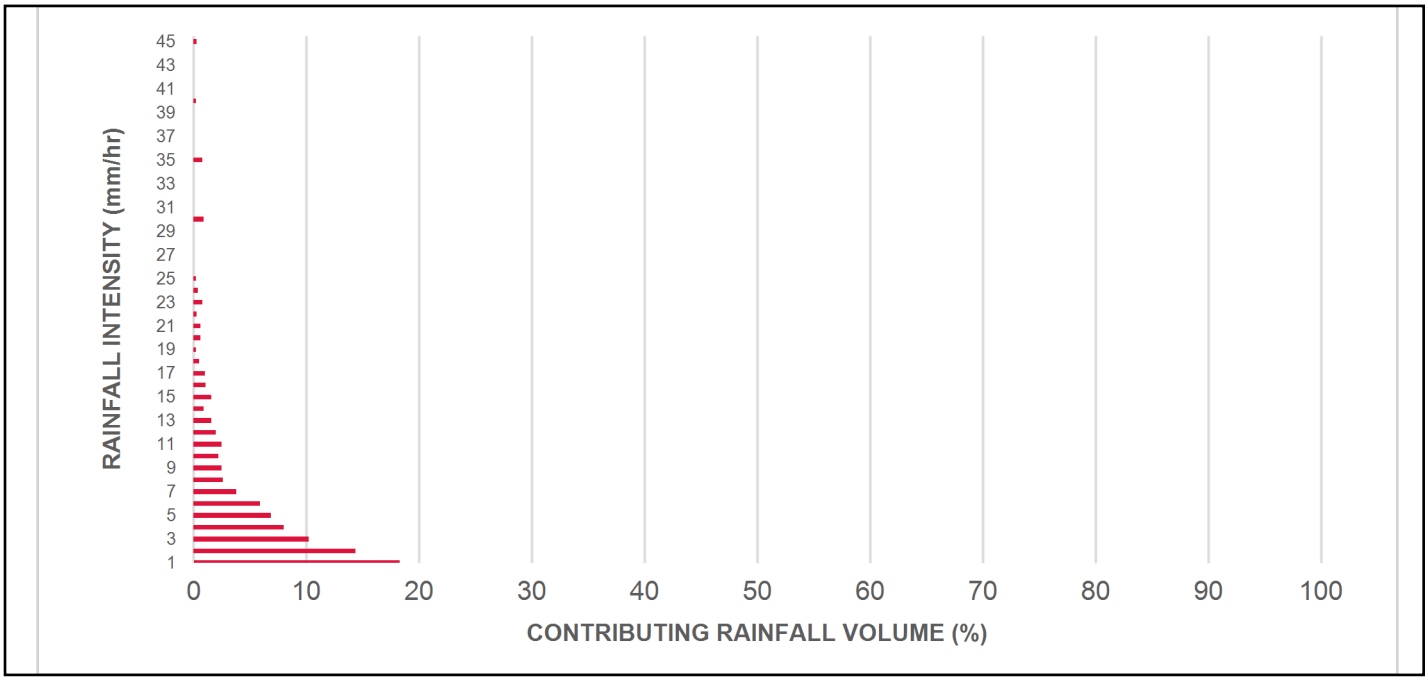
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

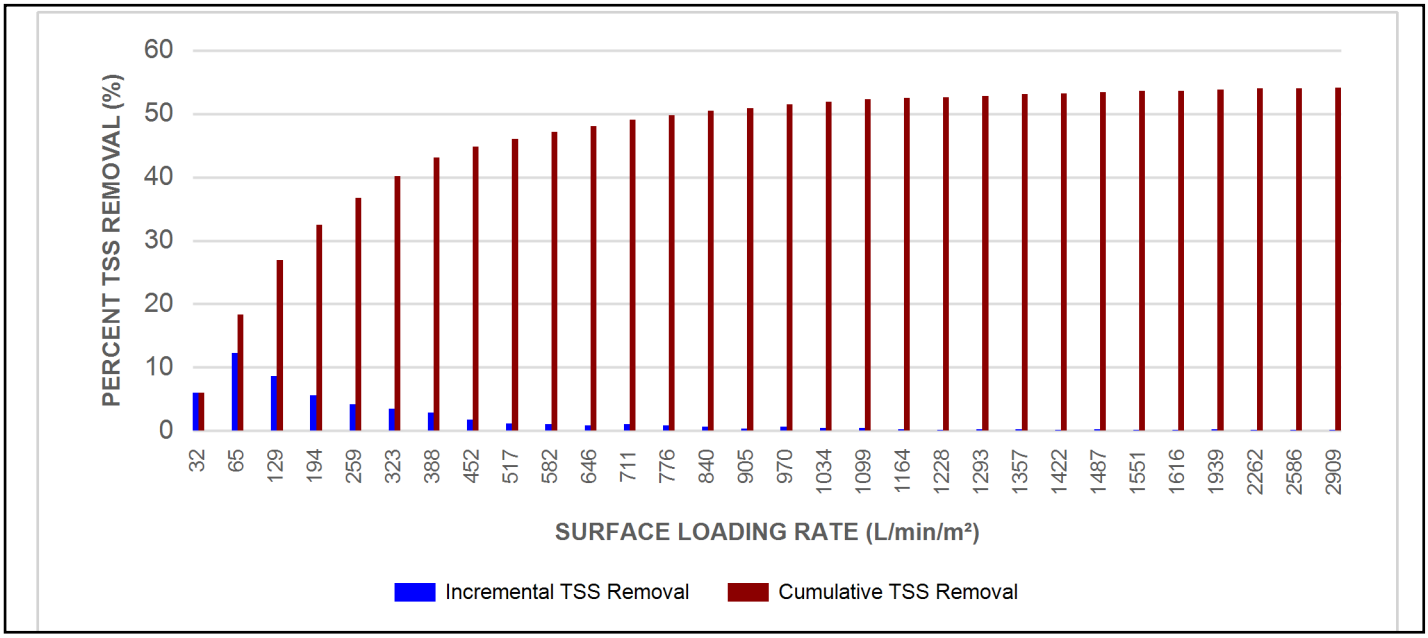
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.93	236.0	32.0	70	6.0	6.0
1.00	18.3	26.8	7.86	472.0	65.0	67	12.3	18.3
2.00	14.4	41.3	15.73	944.0	129.0	60	8.6	26.9
3.00	10.2	51.5	23.59	1416.0	194.0	55	5.6	32.5
4.00	8.0	59.5	31.46	1888.0	259.0	53	4.2	36.7
5.00	6.9	66.4	39.32	2359.0	323.0	50	3.5	40.2
6.00	5.9	72.3	47.19	2831.0	388.0	49	2.9	43.1
7.00	3.8	76.1	55.05	3303.0	452.0	47	1.8	44.8
8.00	2.6	78.7	62.92	3775.0	517.0	45	1.2	46.0
9.00	2.5	81.1	70.78	4247.0	582.0	43	1.1	47.1
10.00	2.2	83.3	78.65	4719.0	646.0	42	0.9	48.0
11.00	2.5	85.8	86.51	5191.0	711.0	41	1.0	49.0
12.00	2.0	87.8	94.38	5663.0	776.0	41	0.8	49.8
13.00	1.6	89.4	102.24	6134.0	840.0	41	0.7	50.5
14.00	0.9	90.4	110.10	6606.0	905.0	41	0.4	50.9
15.00	1.6	91.9	117.97	7078.0	970.0	40	0.6	51.5
16.00	1.1	93.0	125.83	7550.0	1034.0	40	0.4	51.9
17.00	1.0	94.0	133.70	8022.0	1099.0	39	0.4	52.3
18.00	0.5	94.6	141.56	8494.0	1164.0	38	0.2	52.5
19.00	0.2	94.8	149.43	8966.0	1228.0	37	0.1	52.6
20.00	0.6	95.4	157.29	9438.0	1293.0	36	0.2	52.8
21.00	0.6	96.1	165.16	9909.0	1357.0	35	0.2	53.1
22.00	0.3	96.4	173.02	10381.0	1422.0	34	0.1	53.2
23.00	0.8	97.2	180.89	10853.0	1487.0	32	0.3	53.4
24.00	0.4	97.6	188.75	11325.0	1551.0	31	0.1	53.6
25.00	0.2	97.8	196.62	11797.0	1616.0	30	0.0	53.6
30.00	0.9	98.7	235.94	14156.0	1939.0	25	0.2	53.8
35.00	0.8	99.5	275.26	16516.0	2262.0	21	0.2	54.0
40.00	0.2	99.7	314.58	18875.0	2586.0	18	0.0	54.0
45.00	0.3	100.0	353.91	21234.0	2909.0	16	0.0	54.1
Estimated Net Annual Sediment (TSS) Load Reduction =								**54 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

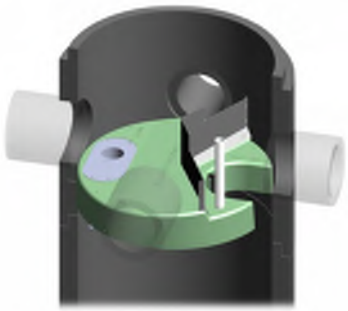
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

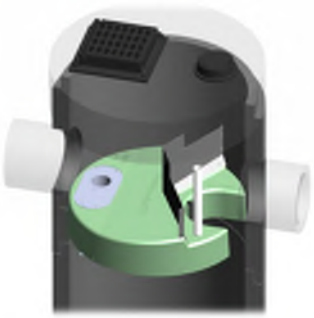
DESIGN FLEXIBILITY

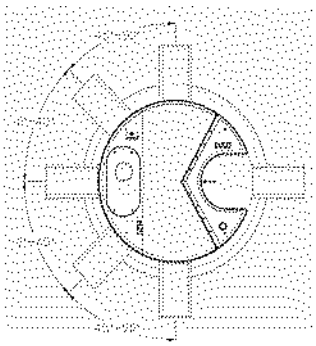
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

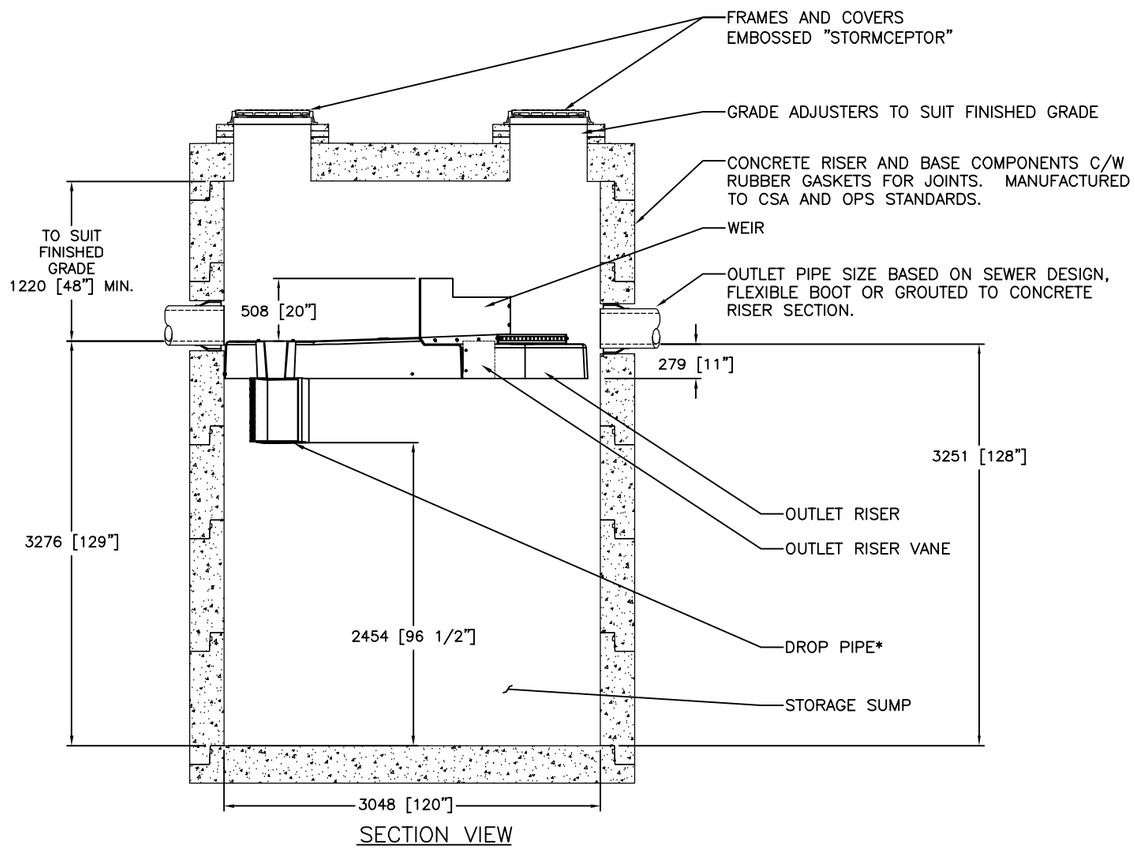
3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-

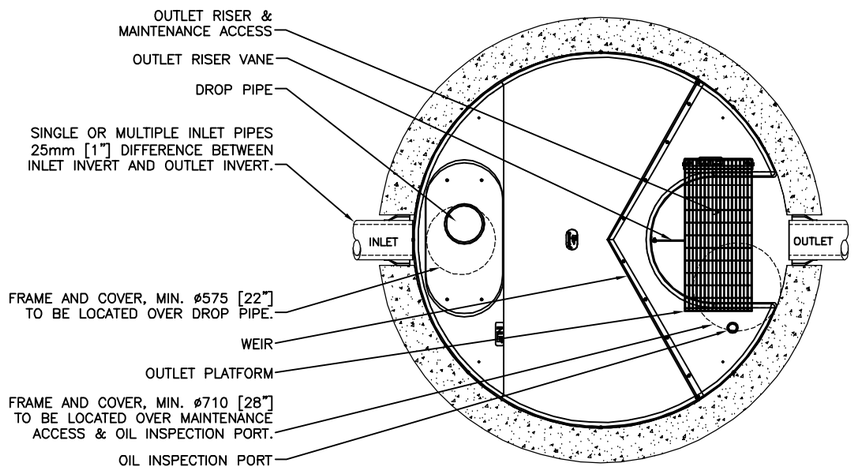
entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

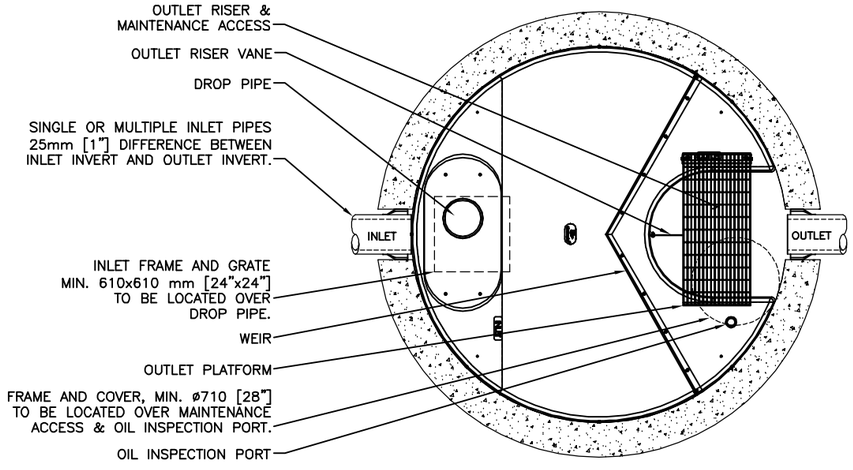
DRAWING NOT TO BE USED FOR CONSTRUCTION



SECTION VIEW



PLAN VIEW (STANDARD)



PLAN VIEW (INLET TOP)

GENERAL NOTES:

* MAXIMUM SURFACE LOADING RATE (SLR) INTO LOWER CHAMBER THROUGH DROP PIPE IS 1135 L/min/m^2 (27.9 gpm/ft^2) FOR STORMCEPTOR EF10 AND 535 L/min/m^2 (13.1 gpm/ft^2) FOR STORMCEPTOR EFO10 (OIL CAPTURE CONFIGURATION).

1. ALL DIMENSIONS INDICATED ARE IN MILLIMETERS (INCHES) UNLESS OTHERWISE SPECIFIED.
2. STORMCEPTOR STRUCTURE INLET AND OUTLET PIPE SIZE AND ORIENTATION SHOWN FOR INFORMATIONAL PURPOSES ONLY.
3. UNLESS OTHERWISE NOTED, BYPASS INFRASTRUCTURE, SUCH AS ALL UPSTREAM DIVERSION STRUCTURES, CONNECTING STRUCTURES, OR PIPE CONDUITS CONNECTING TO COMPLETE THE STORMCEPTOR SYSTEM SHALL BE PROVIDED AND ADDRESSED SEPARATELY.
4. DRAWING FOR INFORMATION PURPOSES ONLY. REFER TO ENGINEER'S SITE/UTILITY PLAN FOR STRUCTURE ORIENTATION.
5. NO PRODUCT SUBSTITUTIONS SHALL BE ACCEPTED UNLESS SUBMITTED 10 DAYS PRIOR TO PROJECT BID DATE, OR AS DIRECTED BY THE ENGINEER OF RECORD.

FOR SITE SPECIFIC DRAWINGS PLEASE CONTACT YOUR LOCAL STORMCEPTOR REPRESENTATIVE. SITE SPECIFIC DRAWINGS ARE BASED ON THE BEST AVAILABLE INFORMATION AT THE TIME. SOME FIELD REVISIONS TO THE SYSTEM LOCATION OR CONNECTION PIPING MAY BE NECESSARY BASED ON AVAILABLE SPACE OR SITE CONFIGURATION REVISIONS. ELEVATIONS SHOULD BE MAINTAINED EXCEPT WHERE NOTED ON BYPASS STRUCTURE (IF REQUIRED).

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STRUCTURE (LIFTING CLUTCHES PROVIDED)
C. CONTRACTOR WILL INSTALL AND LEVEL THE STRUCTURE, SEALING THE JOINTS, LINE ENTRY AND EXIT POINTS (NON-SHRINK GROUT WITH APPROVED WATERSTOP OR FLEXIBLE BOOT)
D. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT THE DEVICE FROM CONSTRUCTION-RELATED EROSION RUNOFF.
E. DEVICE ACTIVATION, BY CONTRACTOR, SHALL OCCUR ONLY AFTER SITE HAS BEEN STABILIZED AND THE STORMCEPTOR UNIT IS CLEAN AND FREE OF DEBRIS.

STANDARD DETAIL
NOT FOR CONSTRUCTION

SITE SPECIFIC DATA REQUIREMENTS

STORMCEPTOR MODEL	EFO10				
STRUCTURE ID					*
HYDROCARBON STORAGE REQ'D (L)					*
WATER QUALITY FLOW RATE (L/s)					
PEAK FLOW RATE (L/s)					*
RETURN PERIOD OF PEAK FLOW (yrs)					*
DRAINAGE AREA (HA)					*
DRAINAGE AREA IMPERVIOUSNESS (%)					*
PIPE DATA:	I.E.	MAT'L	DIA	SLOPE %	HGL
INLET #1	*	*	*	*	*
INLET #2	*	*	*	*	*
OUTLET	*	*	*	*	*

* PER ENGINEER OF RECORD

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MARK	DATE	REVISION DESCRIPTION	BY
1	6/8/18	OUTLET PLATFORM	JSK
0	5/26/17	INITIAL RELEASE	JSK

Stormceptor® EF

SCALE = NTS

imbrium®
407 FAIRVIEW DRIVE, WHITBY, ON L1N 9A9
TF 800-565-4967 CA +1 416-960-9900 INTL +1 416-960-9900

DATE: 10/24/2017

DESIGNED:	DRAWN:
JSK	JSK
CHECKED:	APPROVED:
BSF	SP
PROJECT No.:	SEQUENCE No.:
EFO10	*

SHEET: 1 OF 1

H:\IMBRIUM\PRODUCTS\STORMCEPTOR EF\40 DRAWINGS & DETAILS\STANDARD DETAILS\EFO STANDARD DETAILS\EFO10-DETAIL.DWG 4/12/2018 11:09 AM

Stormceptor EF Sizing Report

Imbrium® Systems
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

12/12/2025

Province:	Ontario
City:	St. Jacobs
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34
Site Name:	
Drainage Area (ha):	3.25
% Imperviousness:	68.00

Runoff Coefficient 'c': 0.70

Project Name:	51 Hawkesville Road
Project Number:	2401775
Designer Name:	Sabrina Jivani
Designer Company:	GEI
Designer Email:	sjivani@geiconsultants.com
Designer Phone:	416-689-7699
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	50.0
Required Water Quality Runoff Volume Capture (%):	90.00
Estimated Water Quality Flow Rate (L/s):	87.18
Oil / Fuel Spill Risk Site?	Yes
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Influent TSS Concentration (mg/L):	200
Estimated Average Annual Sediment Load (kg/yr):	1607
Estimated Average Annual Sediment Volume (L/yr):	1307

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EFO4	34
EFO5	40
EFO6	45
EFO8	52
EFO10	56
EFO12	59

Recommended Stormceptor EFO Model: EFO8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 52

Water Quality Runoff Volume Capture (%): > 90

THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

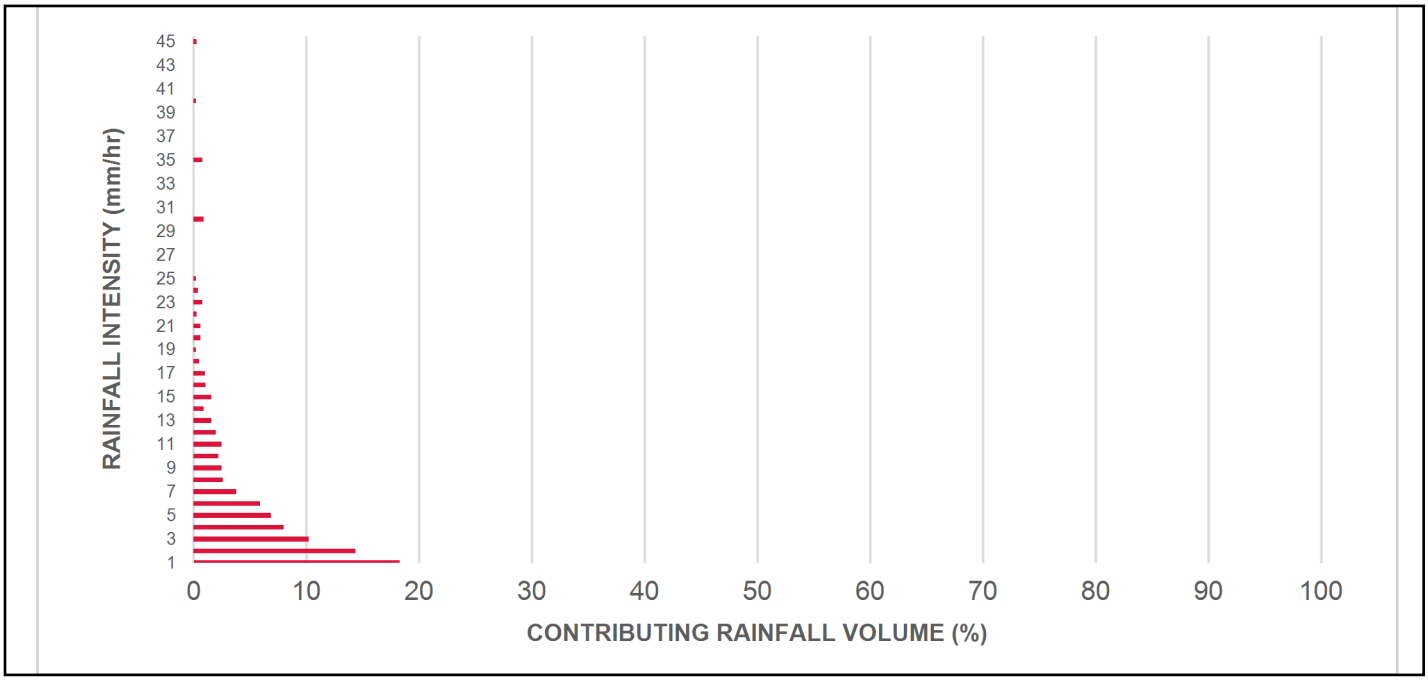
►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

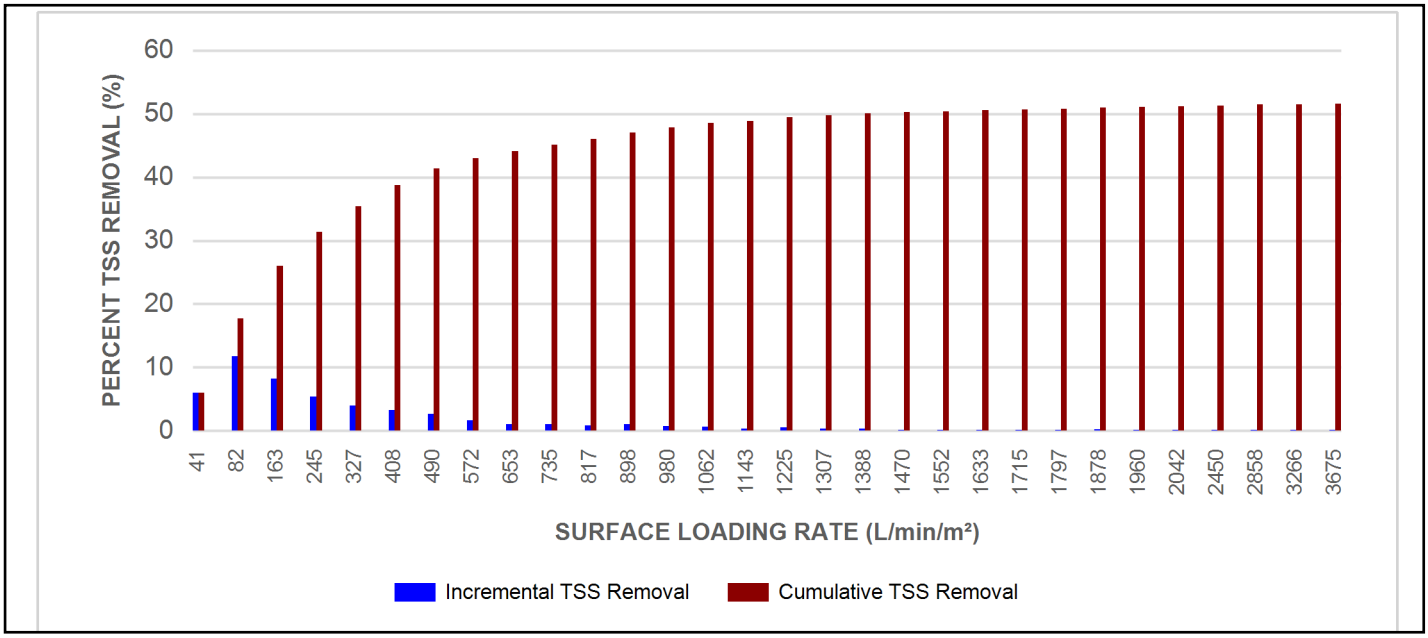
Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
0.50	8.5	8.5	3.20	192.0	41.0	70	6.0	6.0
1.00	18.3	26.8	6.40	384.0	82.0	64	11.7	17.7
2.00	14.4	41.3	12.79	768.0	163.0	57	8.3	26.0
3.00	10.2	51.5	19.19	1151.0	245.0	53	5.4	31.4
4.00	8.0	59.5	25.59	1535.0	327.0	50	4.0	35.4
5.00	6.9	66.4	31.98	1919.0	408.0	48	3.3	38.7
6.00	5.9	72.3	38.38	2303.0	490.0	45	2.7	41.4
7.00	3.8	76.1	44.78	2687.0	572.0	43	1.6	43.0
8.00	2.6	78.7	51.17	3070.0	653.0	42	1.1	44.1
9.00	2.5	81.1	57.57	3454.0	735.0	41	1.0	45.1
10.00	2.2	83.3	63.97	3838.0	817.0	41	0.9	46.0
11.00	2.5	85.8	70.36	4222.0	898.0	41	1.0	47.0
12.00	2.0	87.8	76.76	4606.0	980.0	40	0.8	47.8
13.00	1.6	89.4	83.16	4989.0	1062.0	39	0.6	48.5
14.00	0.9	90.4	89.55	5373.0	1143.0	38	0.4	48.8
15.00	1.6	91.9	95.95	5757.0	1225.0	37	0.6	49.4
16.00	1.1	93.0	102.35	6141.0	1307.0	36	0.4	49.8
17.00	1.0	94.0	108.75	6525.0	1388.0	34	0.4	50.1
18.00	0.5	94.6	115.14	6909.0	1470.0	32	0.2	50.3
19.00	0.2	94.8	121.54	7292.0	1552.0	31	0.1	50.4
20.00	0.6	95.4	127.94	7676.0	1633.0	29	0.2	50.6
21.00	0.6	96.1	134.33	8060.0	1715.0	28	0.2	50.7
22.00	0.3	96.4	140.73	8444.0	1797.0	27	0.1	50.8
23.00	0.8	97.2	147.13	8828.0	1878.0	25	0.2	51.0
24.00	0.4	97.6	153.52	9211.0	1960.0	24	0.1	51.1
25.00	0.2	97.8	159.92	9595.0	2042.0	23	0.0	51.2
30.00	0.9	98.7	191.90	11514.0	2450.0	19	0.2	51.3
35.00	0.8	99.5	223.89	13433.0	2858.0	17	0.1	51.5
40.00	0.2	99.7	255.87	15352.0	3266.0	15	0.0	51.5
45.00	0.3	100.0	287.86	17271.0	3675.0	13	0.0	51.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**52 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF5 / EFO5	1.5	5	90	762	30	762	30	710	25
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

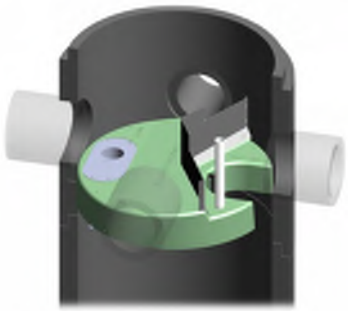
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

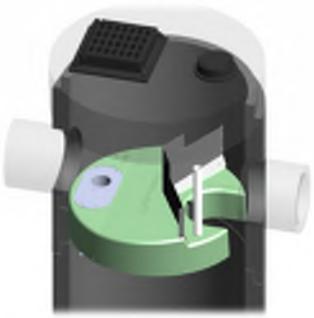
DESIGN FLEXIBILITY

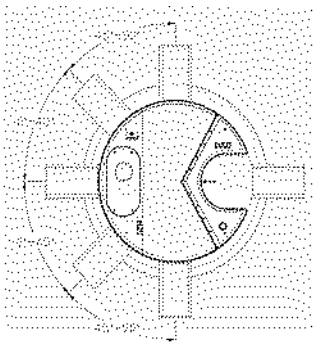
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF5 / EFO5	1.5	5	1.62	5.3	420	111	305	10	2124	75	2612	5758
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results
Stormceptor® EFO

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	42	1320	35	1980	24
30	70	690	42	1350	35	2010	24
60	67	720	41	1380	34	2040	23
90	63	750	41	1410	34	2070	23
120	61	780	41	1440	33	2100	23
150	58	810	41	1470	32	2130	22
180	56	840	41	1500	32	2160	22
210	54	870	41	1530	31	2190	22
240	53	900	41	1560	31	2220	21
270	52	930	40	1590	30	2250	21
300	51	960	40	1620	29	2280	21
330	50	990	40	1650	29	2310	21
360	49	1020	40	1680	28	2340	20
390	48	1050	39	1710	28	2370	20
420	47	1080	39	1740	27	2400	20
450	47	1110	38	1770	27	2430	20
480	46	1140	38	1800	26	2460	19
510	45	1170	37	1830	26	2490	19
540	44	1200	37	1860	26	2520	19
570	43	1230	37	1890	25	2550	19
600	42	1260	36	1920	25	2580	18
630	42	1290	36	1950	24	2600	26

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREAMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit** S**eparators**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The minimum sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1	4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
	5 ft (1524 mm) Diameter OGS Units:	1.95 m^3 sediment / 420 L oil
	6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
	8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
	10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
	12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing of the OGS shall be determined by use of a minimum ten (10) years of local historical rainfall data provided by Environment Canada. Sizing shall also be determined by use of the sediment removal performance data derived from the ISO 14034 ETV third-party verified laboratory testing data from testing conducted in accordance with the Canadian ETV protocol Procedure for Laboratory Testing of Oil-Grit Separators, as follows:

3.2.1 Sediment removal efficiency for a given surface loading rate and its associated flow rate shall be based on sediment removal efficiency demonstrated at the seven (7) tested surface loading rates specified in the protocol, ranging 40 L/min/m^2 to 1400 L/min/m^2, and as stated in the ISO 14034 ETV Verification Statement for the OGS device.

3.2.2 Sediment removal efficiency for surface loading rates between 40 L/min/m^2 and 1400 L/min/m^2 shall be based on linear interpolation of data between consecutive tested surface loading rates.

3.2.3 Sediment removal efficiency for surface loading rates less than the lowest tested surface loading rate of 40 L/min/m^2 shall be assumed to be identical to the sediment removal efficiency at 40 L/min/m^2. No extrapolation shall be allowed that results in a sediment removal efficiency that is greater than that demonstrated at 40 L/min/m^2.

3.2.4 Sediment removal efficiency for surface loading rates greater than the highest tested surface loading rate of 1400 L/min/m^2 shall assume zero sediment removal for the portion of flow that exceeds 1400 L/min/m^2, and shall be calculated using a simple proportioning formula, with 1400 L/min/m^2 in the numerator and the higher surface loading rate in the denominator, and multiplying the resulting fraction times the sediment removal efficiency at 1400 L/min/m^2.

The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

3.4 LIGHT LIQUID RE-ENTRAINMENT SIMULATION TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of completed third-party Light Liquid Re-entrainment Simulation Testing in accordance with the Canadian ETV **Program's Procedure for Laboratory Testing of Oil-Grit Separators,** with results reported within the Canadian ETV or ISO 14034 ETV verification. This re-

entrainment testing is conducted with the device pre-loaded with low density polyethylene (LDPE) plastic beads as a surrogate for light liquids such as oil and fuel. Testing is conducted on the same OGS unit tested for sediment removal to assess whether light liquids captured after a spill are effectively retained at high flow rates.

3.4.1 For an OGS device to be an acceptable stormwater treatment device on a site where vehicular traffic occurs and the potential for an oil or fuel spill exists, the OGS device must have reported verified performance results of greater than 99% cumulative retention of LDPE plastic beads for the five specified surface loading rates (ranging 200 L/min/m^2 to 2600 L/min/m^2) in accordance with the Light Liquid Re-entrainment Simulation Testing within the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.** However, an OGS device shall not be allowed if the Light Liquid Re-entrainment Simulation Testing was performed with screening components within the OGS device that are effective at retaining the LDPE plastic beads, but would not be expected to retain light liquids such as oil and fuel.

2401775 51-55 Hawkesville Road
Township of Woolwich
OUR FILE: 2401775 - 421067
January 10, 2024

Stormwater Management Facility
Outlet Pipe
Riprap Outlet Protection Design Calculations

Flow Rate

Pipe Diameter (D_o) =	0.600	m
Maximum Flow =	0.906	m^3/s

The rip rap will be sized to stay in place at a flow rate of 0.906 m^3/s, the maximum flow rate for a 600mm diameter pipe at 2%.

Rip Rap Required Dimensions

Dimensions for the rip rap were taken from Figure 7.45 (Erosion and Sediment Control Handbook, 1986) which is appended to this summary.

Rip Rap Depth (d) =	0.27	m	
Apron Length (L_a) =	5.00	m	
Median Stone Size (d_{50}) =	0.15	m	
Upstream Apron Width (W_u) =	1.8	m	($3 \times D_o$)
Downstream Apron Width (W_d) =	5.6	m	($D_o + L_a$)

The above represents the minimum parameters of the rip rap to prevent wash out.

Conclusions

Therefore, the proposed 150 mm diameter rip rap with a depth of 0.27m will stay in place at the maximum design flow rate.

The required apron length (La) of 5 m is equal to the specified length of 5 m.

The required upstream and downstream apron widths of 1.8 m and 5.6 m are less than the specified widths of 2 m and 6 m.

References:

Goldman, Steven J., Jackson, Katharine, and Bursztynsky, Taras A., 1986 Erosion and Sediment Control Handbook. New York: McGraw-Hill Incorporated.

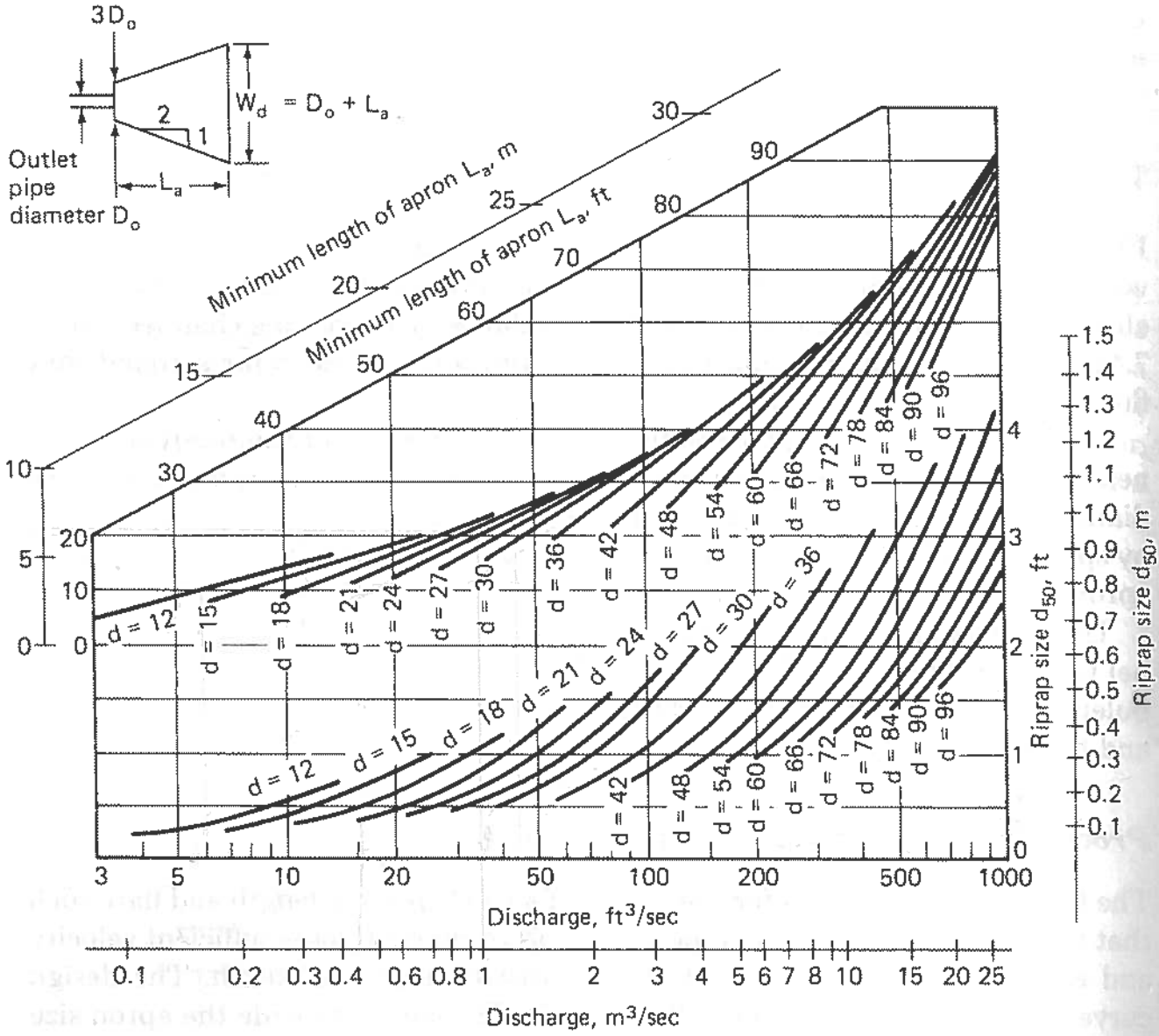


Fig. 7.45 Design of riprap outlet protection from a round pipe flowing full; minimum tailwater conditions. (6, 14)

51-55 Hawkesville Road
Township of Woolwich (St Jacobs)
Date: December 9, 2025

Monthly Water Balance (Pre-Development Conditions)

PRE-DEVELOPMENT CONDITIONS

Contributing Catchments: All Catchments
Contributing Area = 7.45 ha
Percent Impervious = 10.0%

Soil Type: Sandy silt to silty sand
Vegetation: Shallow rooted
Root Zone Depth = 0.62m
Soil Moisture Retention Capacity (mm) = 125

Runoff Factor = 0.55

Evapotranspiration Factor for Impervious Surfaces = 0.35

Month	Daily Average Temperature (°C)	Monthly Heat Index (I)	Unadjusted Daily Potential Evapotranspiration (mm)	Correction Factors	Adjusted Potential Evapotranspiration (PE) (mm)	Average Precipitation (P) (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (ST) (mm)	ΔS (mm)	Pervious ET	Actual Evapotrans-piration (AE) (mm)	Pervious ET - Actual ET	Moisture Deficit (D) (mm)	Moisture Surplus (S) (mm)	Water Runoff (RO) (mm)	Snow Melt Runoff (mm)	Total Recharge and Runoff (mm)	Actual Runoff (mm)	Runoff Volume (m^3)	Recharge Volume (m^3)
Jan	-6.9	0.0	0.0	24.3	0.0	56.4	56.4		289.6	0.0		0.0	0.0	0.0	0.0	3.1	0.0	3.1	1.7	126	103
Feb	-6.7	0.0	0.0	24.6	0.0	52.9	52.9		342.5	0.0		0.0	0.0	0.0	0.0	1.5	0.0	1.5	0.8	63	51
Mar	-1.5	0.0	0.0	30.6	0.0	58.3	58.3		400.8	0.0		0.0	0.0	0.0	0.0	0.8	0.0	0.8	0.4	31	26
Apr	5.6	1.2	0.9	33.6	30.2	79.1	48.9		100.8	0.0	30.2	28.3	2.0	2.0	32.2	17.1	27.6	44.7	24.6	1,831	1,498
May	12.3	3.9	2.0	37.8	75.6	78.1	2.5		100.8	0.0	75.6	70.7	4.9	4.9	80.5	48.8	136.2	185.0	101.8	7,581	6,202
Jun	17.3	6.6	2.8	38.4	107.5	84.4	-23.1	-23.1	103.0	2.2	86.6	81.0	5.6	26.6	111.0	79.9	68.1	148.0	81.4	6,064	4,961
Jul	19.5	7.9	3.3	38.7	127.7	89.9	-37.8	-60.9	76.0	-27.0	116.9	109.3	7.6	18.4	7.6	43.7	34.0	77.8	42.8	3,188	2,608
Aug	18.6	7.3	3.1	36.0	111.6	77.0	-34.6	-95.5	57.0	-19.0	96.0	89.8	6.2	21.8	6.2	25.0	3.9	28.9	15.9	1,184	969
Sep	15.0	5.3	2.3	31.2	71.8	75.1	3.3		60.3	3.3	71.8	67.1	4.7	4.7	73.1	49.0	3.0	52.0	28.6	2,132	1,745
Oct	8.5	2.2	1.3	28.5	37.1	77.5	40.5		100.8	40.5	37.1	34.6	2.4	2.4	0.0	24.5	2.0	26.5	14.6	1,087	889
Nov	2.4	0.3	0.4	24.3	9.7	76.6	66.9		167.7	66.9	9.7	9.1	0.6	0.6	0.0	12.3	1.0	13.3	7.3	543	445
Dec	-3.3	0.0	0.0	23.1	0.0	65.5	65.5		233.2	0.0		0.0	0.0	0.0	0.0	6.1	0.0	6.1	3.4	251	206
Total		**34.7**				**870.8**	**299.6**				**523.9**	**489.8**	**34.1**	**81.4**	**310.6**	**311.9**	**275.8**	**587.7**	**323.2**	**24,080**	**19,702**

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1991-2020 for Elora
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*
Monthy Heat Index (I) from Table 2 of *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance*
Correction Factors from Table 6 of *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance*
Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (183mm/year) / Average Annual Evapotranspiration for Pervious Surfaces (523.9mm/year) = 0.35
Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces) + (Pervious Silt Till Percentage of Site x Average Annual Runoff for Pervious Silt Till Surfaces)] / Total Annual Recharge & Runoff

51-55 Hawkesville Road
Township of Woolwich (St Jacobs)
Date: December 9, 2025

Split into catchments if using infiltration galleries
POST-DEVELOPMENT CONDITIONS

Monthly Water Balance (Post-Development Conditions)

Contributing Catchments: All Catchments

Soil Type: Sandy silt to silty sand
Vegetation: Shallow rooted

Runoff Factor = 0.70

Contributing Area = 7.45 ha
Percent Impervious = 40.0%

Root Zone Depth = 0.62m
Soil Moisture Retention Capacity (mm) = 125

Evapotranspiration Factor for Impervious Surfaces = 0.35

Month	Daily Average Temperature	Monthly Heat Index (I)	Unadjusted Daily Potential Evapotranspiration	Correction Factors	Adjusted Potential Evapotranspiration (PE)	Average Precipitation (P)	P-PE	Accum. Pot. Water Loss	Storage (ST)	ΔS	Pervious ET	Actual Evapotrans-piration (AE)	Pervious ET - Actual ET	Moisture Deficit (D)	Moisture Surplus (S)	Water Runoff (RO)	Snow Melt Runoff	Total Recharge and Runoff	Actual Runoff	Runoff Volume	Recharge Volume	Enhanced Recharge Volume
	(°C)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)		(mm)		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(m^3)	(m^3)	(m^3)
Jan	-6.9	0.0	0.0	24.3	0.0	56.4	56.4		289.6	0.0		0.0	0.0	0.0	0.0	4.5	0.0	4.5	3.1	233	100	47
Feb	-6.7	0.0	0.0	24.6	0.0	52.9	52.9		342.5	0.0		0.0	0.0	0.0	0.0	2.2	0.0	2.2	1.6	116	50	23
Mar	-1.5	0.0	0.0	30.6	0.0	58.3	58.3		400.8	0.0		0.0	0.0	0.0	0.0	1.1	0.0	1.1	0.8	58	25	12
Apr	5.6	1.2	0.9	33.6	30.2	79.1	48.9		100.8	0.0	30.2	22.4	7.9	7.9	38.1	20.1	27.6	47.6	33.3	2,484	1,065	415
May	12.3	3.9	2.0	37.8	75.6	78.1	2.5		100.8	0.0	75.6	55.9	19.7	19.7	95.3	57.7	136.2	193.9	135.7	10,110	4,333	1,266
Jun	17.3	6.6	2.8	38.4	107.5	84.4	-23.1	-23.1	103.0	2.2	86.6	64.1	22.5	43.5	127.9	92.8	68.1	160.9	112.6	8,389	3,595	1,145
Jul	19.5	7.9	3.3	38.7	127.7	89.9	-37.8	-60.9	76.0	-27.0	116.9	86.5	30.4	41.2	30.4	61.6	34.0	95.6	67.0	4,988	2,138	912
Aug	18.6	7.3	3.1	36.0	111.6	77.0	-34.6	-95.5	57.0	-19.0	96.0	71.0	25.0	40.6	25.0	43.3	3.9	47.2	33.0	2,461	1,055	513
Sep	15.0	5.3	2.3	31.2	71.8	75.1	3.3		60.3	3.3	71.8	53.1	18.7	18.7	87.1	65.2	3.0	68.2	47.7	3,556	1,524	673
Oct	8.5	2.2	1.3	28.5	37.1	77.5	40.5		100.8	40.5	37.1	27.4	9.6	9.6	6.2	35.7	2.0	37.7	26.4	1,967	843	390
Nov	2.4	0.3	0.4	24.3	9.7	76.6	66.9		167.7	66.9	9.7	7.2	2.5	2.5	0.0	17.9	1.0	18.9	13.2	984	422	195
Dec	-3.3	0.0	0.0	23.1	0.0	65.5	65.5		233.2	0.0		0.0	0.0	0.0	0.0	8.9	0.0	8.9	6.3	466	200	93
Total		**34.7**				**870.8**	**299.6**				**523.9**	**387.5**	**136.3**	**183.7**	**410.0**	**410.9**	**275.8**	**686.7**	**480.7**	**35,812**	**15,348**	**5,684**
																					Total Recharge Volume	**21,032**
																					Total Change in Recharge Volume (pre-development volume - post-development volume)	-1,330
																						0.0675

Notes: Precipitation and Temperature data from Environment Canada Climate Normals 1991-2020 for Elora
Monthly water balance strategy as outlined in the document *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance (Thornthwaite and Mather, 1957)*
Monthy Heat Index (I) from Table 2 of *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance*
Correction Factors from Table 6 of *Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance*
Evaporation Factor for Impervious Surfaces = Average Annual Evapotranspiration for Impervious Surfaces (183mm/year) / Average Annual Evapotranspiration for Pervious Surfaces (523.9mm/year) = 0.35
Runoff Factor = [(Impervious Percentage of Site x Average Annual Runoff for Impervious Surfaces) + (Pervious Silt Till Percentage of Site x Average Annual Runoff for Pervious Silt Till Surfaces)] / Total Annual Recharge & Runoff

51-55 Hawkesville Road
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Date: December 9, 2025

Infiltration Galleries - Catchment 1000

Total estimated no. galleries based on Site Plan Layout and Lots
4m x 2m x 0.5m: 31 galleries
6m x 2m x 0.5m: 3 galleries
7m x 2m x 0.5m: 1 gallery

A = contact area of structure =	298.00	sq m
V = runoff volume to be infiltrated =	49.17	cu m
P = percolation rate of native soils =	8.4	mm/hr

T = retention time = Solve for T

T = (1000 x V) / (P x n x A) = 19.64 hours or 0.8 day draindown period

Contributing Area	0.450	ha	(Area to Infiltration Gallery)	
Recharge Time	19.64	hours	/	0.82 days
Recharge Volume Potential	49.17	m^3		

Month	Total Runoff (mm)	No. of days	Max Potential Recharge (m^3)	Available Recharge (m^3)	Enhanced Recharge (m^3)	No. of Events
Jan	5.8	31	1,862	26	25	1.0
Feb	2.9	28	1,682	13	12	0.5
Mar	1.4	31	1,862	6	6	0.5
Apr	46.4	30	1,802	209	198	4.5
May	185.1	31	1,862	833	791	16.5
Jun	160.2	30	1,802	721	685	14.0
Jul	107.5	31	1,862	484	460	9.5
Aug	64.4	31	1,862	290	275	6.0
Sep	80.8	30	1,802	363	345	7.5
Oct	48.0	31	1,862	216	205	4.5
Nov	24.0	30	1,802	108	103	2.5
Dec	11.5	31	1,862	52	49	1.5
Total	**738**	**365**	**21,928**	**3,321**	**3,155**	**69**

Total Recharge & Runoff (mm): depth of rainfall that becomes recharge and runoff, per the monthly water balance

Max Potential Recharge (m^3): the maximum volume the infiltration gallery can contain and infiltrate in a month, considering storage volume and draindown time

Available Recharge (m^3): the total recharge and runoff depth over the contributing area

Enhanced Recharge (m^3): 95% of the available recharge, up to the capacity of the infiltration gallery

No. of Events: the number of times the infiltration gallery is filled to capacity per month to produce the volume of enhanced recharge.

Infiltration Galleries - Catchment 2000

A = contact area of structure = 80.00 sq m
V = runoff volume to be infiltrated = 26.40 cu m
P = percolation rate of native soils = 8.4 mm/hr

T = retention time = Solve for T

T = (1000 x V) / (P x n x A) = 39.29 hours or 1.6 day draindown period

Contributing Area 0.250 ha (Area to Infiltration Gallery)
Recharge Time 39.29 hours / 1.64 days
Recharge Volume Potential 26.40 m^3

Month	Total Runoff (mm)	No. of days	Max Potential Recharge (m^3)	Available Recharge (m^3)	Enhanced Recharge (m^3)	No. of Events
Jan	9.3	31	500	23	22	1.0
Feb	4.6	28	452	12	11	0.5
Mar	2.3	31	500	6	6	0.5
Apr	91.2	30	484	228	216	8.5
May	369.0	31	500	923	475	18.0
Jun	309.7	30	484	774	460	17.5
Jul	190.5	31	500	476	452	17.5
Aug	99.9	31	500	250	237	9.0
Sep	138.0	30	484	345	328	12.5
Oct	78.0	31	500	195	185	7.5
Nov	39.0	30	484	98	93	4.0
Dec	18.6	31	500	46	44	2.0
Total	**1350**	**365**	**5,887**	**3,375**	**2,529**	**99**

Total Recharge & Runoff (mm): depth of rainfall that becomes recharge and runoff, per the monthly water balance

Max Potential Recharge (m^3): the maximum volume the infiltration gallery can contain and infiltrate in a month, considering storage volume and draindown time

Available Recharge (m^3): the total recharge and runoff depth over the contributing area

Enhanced Recharge (m^3): 95% of the available recharge, up to the capacity of the infiltration gallery

No. of Events: the number of times the infiltration gallery is filled to capacity per month to produce the volume of enhanced recharge.

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
June 4, 2026

Sediment Clean Out and Drying Area Calculations - Chris Court Option

Cleanout Frequency Calculation

	Units	Stormwater Management Facility	
Imperviousness	%	65	
Annual Loading	kg/ha	3,097	
Wet Density	kg/m^3	1,230	
Annual Loading	m^3/ha/year	2.5	
Contributing Catchment Area	ha	4.49	
Loading Volume per year	m^3/year	11.31	
Total Volume of Forebay	m^3	29.75	1/3 of forebay volume
Cleanout Frequency	Years	1	
Cleanout Frequency with Upstream OGS	Years	4.2	

Notes:

- All values are based on the Stormwater Management Planning and Design Manual (MOE 2003 rev. 2023), Table 6.3 and calculation protocol

- For this calculation, a third of the volume of the forebay has been used to determine the cleanout frequency

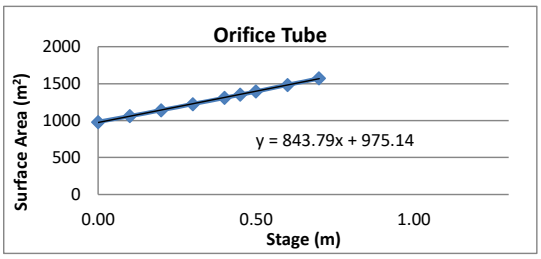
Sediment Drying Area Calculation (Chris Court Option)

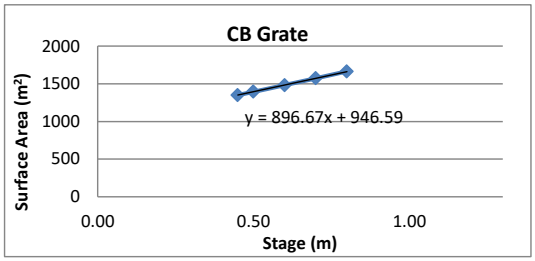
Forebay Sediment Capacity=	29.75	m^3	*based on 1/3 forebay volume / clean out frequency of 4.2 yrs
Sediment Drying Area=	98	m^2	
Max Height=	1	m	(Max height with 4:1 angle of repose)
Provided volume=	32.7	m^3	V= area x h/3

2401775 51-55 Hawkesville Rd
Township of Woolwich
Our File: 2401775 - 421067
June 4, 2026

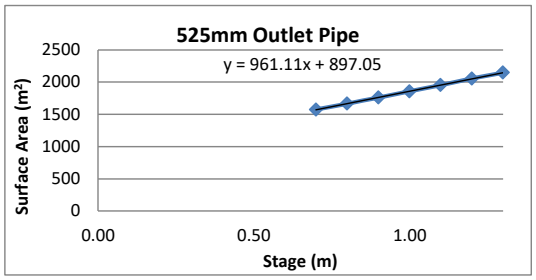
Drawdown Calculations - Chris Court Option SWM Pond

Elevation	Stage (m)	Surface area (m^2)	
337.80	0.00	982.00	**Top of Permanent Pool**
337.90	0.10	1060.70	
338.00	0.20	1141.30	
338.10	0.30	1223.90	
338.20	0.40	1308.30	
338.25	0.45	1351.50	**CB Grate**
338.30	0.50	1394.70	
338.40	0.60	1483.00	
338.50	0.70	1573.20	
338.60	0.80	1665.40	
338.70	0.90	1759.50	**Weir**
338.80	1.00	1855.40	
338.90	1.10	1953.30	
339.00	1.20	2053.20	
339.10	1.30	2147.10	**Overflow**





Orifice 1: 337.80 to 338.50 (at which point orifice control ends, controlled by downstream outlet pipe)



Outlet Pipe: 338.50 (elevation at which flows are controlled by outlet pipe and not 75mm orifice) to 339.10

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_o}$$ Eq. 4.11 (MOE, 2003)

	Orifice Tube 75mm Orifice		DICB Grate 0.632m x 1.2m		Outlet Pipe 525mm STM
Given: d =	0.075			Given: d =	0.525
A_o =	0.004	A_o =	0.758	A_o =	0.216
C_2 =	843.79	C_2 =	896.67	C_2 =	961.11
C_3 =	975.14	C_3 =	946.59	C_3 =	897.05

Storm	Ponding Depth	Outlet h (m)	Orifice 1 Drawdown (hr)	Outlet h (m)	CB Grate Drawdown (hr)	Outlet h (m)	CB Grate Drawdown (hr)	Total Drawdown (hr)
25mm	338.26	0.46	34.1	0.01	0.0	0.00	0.0	34
2 Year	338.32	0.52	36.9	0.07	0.1	0.00	0.0	37
5 Year	338.40	0.60	40.6	0.15	0.1	0.00	0.0	41
10 Year	338.45	0.65	42.5	0.20	0.1	0.00	0.0	43
25 Year	338.51	0.71	45.2	0.26	0.1	0.71	0.9	46
50 Year	338.55	0.75	47.1	0.30	0.2	0.75	0.9	48
100 Year	338.63	0.83	50.2	0.38	0.2	0.83	1.0	51
Regional	338.52	0.72	45.7	0.27	0.1	0.72	0.9	47

Appendix F Hydrant Test and Fire Flow Calculations

Item 1: Spira Hydrant Test Results (June 12, 2025)

Item 2: Email Correspondence with Region of Waterloo (May 8, 2026)

Item 3: FUS Fire Flow Calculations

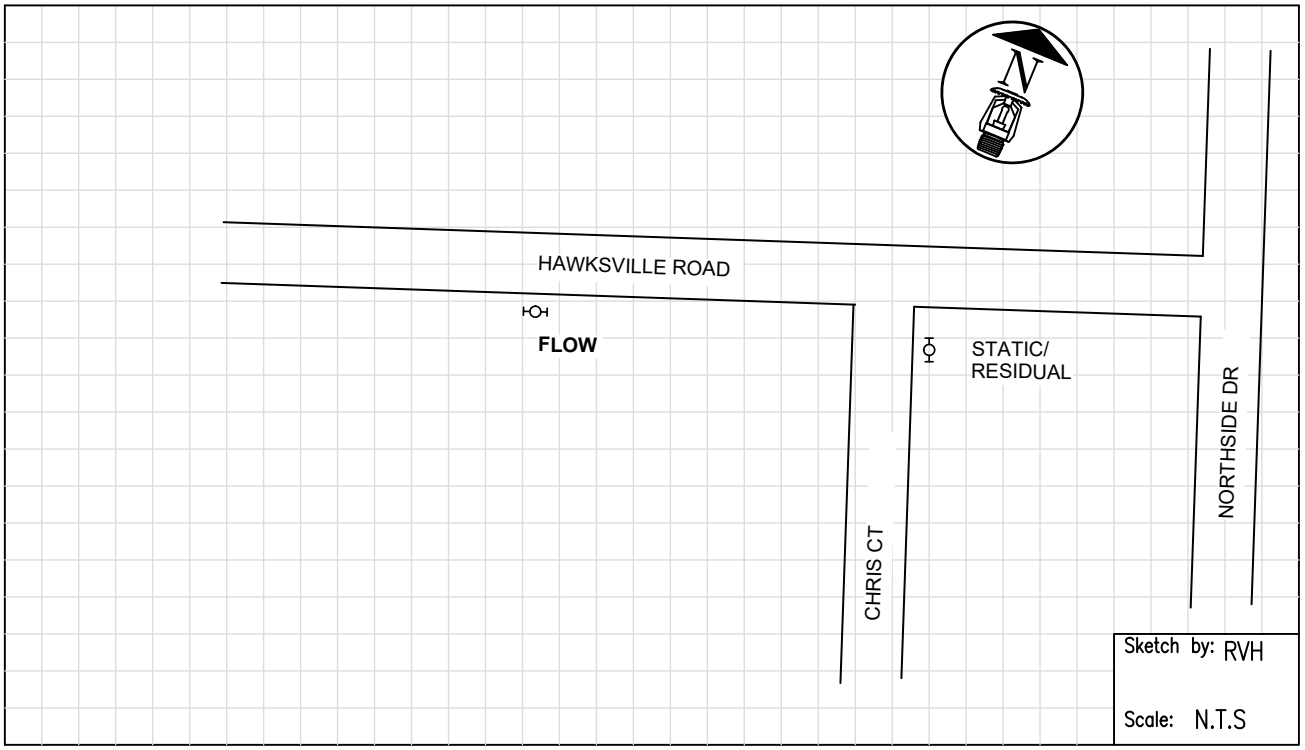
SPIRA FIRE PROTECTION LTD.
31 HAYES AVE., GUELPH, ONTARIO N1E 5V6 Phone: (519) 823-1150 Fax: (519) 822-7752 www.spira.ca

WATER SUPPLY TEST

Facility Name: Proposed Development	File/Project #: 58160
Facility Address: 51–55 (27–47) Hawkesville Road, St. Jacobs, Ontario	
Tested by: Ron Van Hulst	Witnessed by: Township Of Woolwich
Size of Main: ø6"	Comments: Hydrant Could Only Be Flowed On One Port Due To Fresh Seeded Lawn
☒ Dead End ☐ Two Ways ☐ Loop	
Flow Hydrant Location: Nest Hydrant Located On South Side Of Hawkesville Rd West Of Residual Hydrant	
Residual Hydrant Location: Hydrant Located On South Side Of Hawkesville Rd, East Of Chris Ct	
Static Pressure: 43 psi	Date: Jun 12, 2025
Time: 10:00 ☒ AM ☐ PM	

Test No.	No. of Outlets	Orifice Size (in.)	Pitot Reading (psi)	Equivalent Flow gpm (U.S.)	Total Flow gpm (U.S.)	Residual Pressure (psi)	Comments
1	1	2½"	12	646	646	27	
2							
3							
4							

Site Map:



Name and Address of authority who should recieve a copy.

Woolwich Township Waterworks Dept. Att: Scott Orton – sorton@woolwich.ca

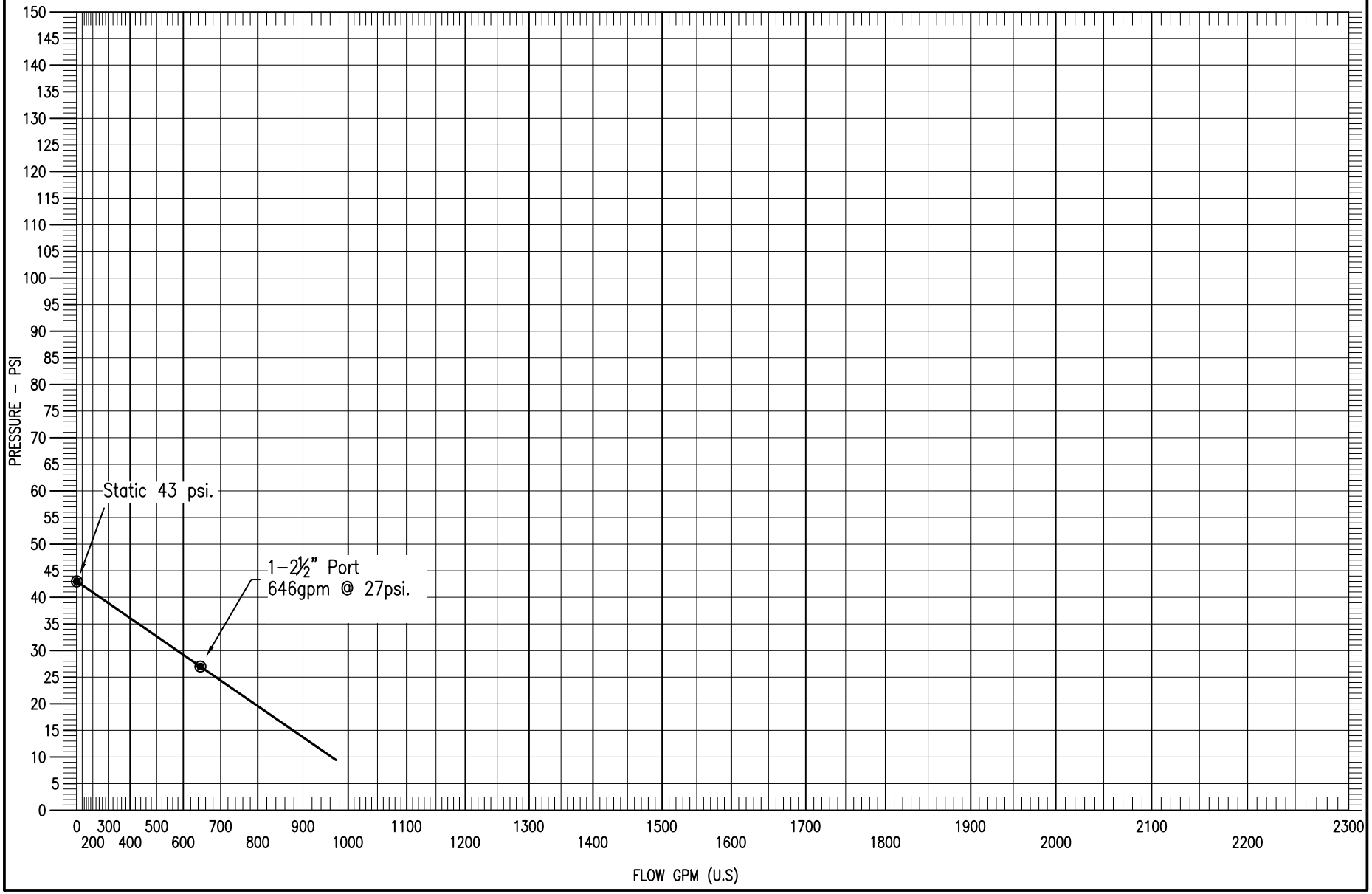
SPIRA FIRE PROTECTION LTD.

31 HAYES AVE., GUELPH, ONTARIO N1E 5V6 Phone: (519) 823-1150 Fax: (519) 822-7752

Facility Name: Proposed Development File/Project # 58160

Facility Address: 51–55 (27–47) Hawkesville Road, St. Jacobs, Ontario

Tested by: Ron Van Hulst /Township Of Woolwich Date: _____



Jivani, Sabrina

From: Grier, Patrick
Sent: Friday, May 8, 2026 2:54 PM
To: Jivani, Sabrina
Subject: FW: ZBL & OPA - 51 & 55 Hawkesville Road - Polocorp Inc. 421067

Follow Up Flag: Follow up
Flag Status: Completed

Sabrina,

See the comments below on the fire flow calcs

GEI Canada

PATRICK GRIER, P.Eng.
Senior Project Engineer
519.748.1440 cell: 226.755.2899
330 Trillium Drive | Unit D | Kitchener, ON N2E 3J2 | Canada

From: William Towns <wtowns@regionofwaterloo.ca>
Sent: Friday, May 8, 2026 2:43 PM
To: Grier, Patrick <PGrier@geiconsultants.com>
Cc: Julie Tot <jtot@woolwich.ca>; Stephen Dykstra <sdykstra@woolwich.ca>
Subject: [EXT] RE: ZBL & OPA - 51 & 55 Hawkesville Road - Polocorp Inc. 421067

EXTERNAL EMAIL

Hi Patrick, received the following from Water Services in relation to the fire flow calculations provided in the updated FSR dated March 9:

- We acknowledge that the applicant has demonstrated fire flow requirements using the Ontario Building Code (OBC) methodology. However, when applying the Fire Underwriters Survey (FUS) approach, the required fire flow is estimated to exceed the available system capacity. The Region has undertaken preliminary hydraulic modeling which indicates that with the proposed upsizing to a 200mm watermain on Hawkesville Road, the system can supply approximately 150 L/s at the connection point to the subject lands. While this represents an improvement over existing conditions, it remains below the fire flow demand calculated using the FUS methodology.
- As such, the applicant has not demonstrated that existing or proposed infrastructure can provide adequate servicing for the proposed development. The applicant is advised to submit a formal model request to WaterServicesDistributionDevelopment@regionofwaterloo.ca to either confirm or revise these initial results, and to discuss further with Regional staff. Revised servicing recommendations may be required.

Let me know if you have any questions on this – happy to convene a meeting with our Water Services staff once the model request's been submitted.

Best,

Will

From: William Towns
Sent: May 4, 2026 2:49 PM
To: 'Grier, Patrick' <PGrier@geiconsultants.com>
Cc: Sharon Daniel <SDaniel@regionofwaterloo.ca>; Steve Sieunarine <SSieunarine@regionofwaterloo.ca>; Cheryl Marcy <CMarcy@regionofwaterloo.ca>; Julie Tot <jtot@woolwich.ca>; Stephen Dykstra <sdykstra@woolwich.ca>
Subject: RE: ZBL & OPA - 51 & 55 Hawkesville Road - Polocorp Inc. 421067

Hi Patrick – again can't speak for Sharon on item #1, but re: #2, Julie Tot at the Township has promised a response this week on the connection downstream of the SWM facility. I will follow up ASAP.

Will

From: Grier, Patrick <PGrier@geiconsultants.com>
Sent: May 1, 2026 4:40 PM
To: William Towns <wtowns@regionofwaterloo.ca>
Cc: Sharon Daniel <SDaniel@regionofwaterloo.ca>; Steve Sieunarine <SSieunarine@regionofwaterloo.ca>; Cheryl Marcy <CMarcy@regionofwaterloo.ca>
Subject: RE: ZBL & OPA - 51 & 55 Hawkesville Road - Polocorp Inc. 421067

CAUTION! EXTERNAL SENDER
Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Hello all,

Any update on this?

GEI
Canada

PATRICK GRIER, P.Eng.
Senior Project Engineer
519.748.1440 cell: 226.755.2899
330 Trillium Drive | Unit D | Kitchener, ON N2E 3J2 | Canada

From: William Towns <wtowns@regionofwaterloo.ca>
Sent: Monday, April 27, 2026 3:37 PM
To: Grier, Patrick <PGrier@geiconsultants.com>
Cc: Sharon Daniel <SDaniel@regionofwaterloo.ca>; Steve Sieunarine <SSieunarine@regionofwaterloo.ca>; Cheryl Marcy <CMarcy@regionofwaterloo.ca>
Subject: [EXT] RE: ZBL & OPA - 51 & 55 Hawkesville Road - Polocorp Inc. 421067

EXTERNAL EMAIL

Hi Patrick, thanks for checking in. I'll defer to Sharon on the design storm.

In terms of the Township – question's been posed and I'm waiting on a response from Lori. Will follow up this week.

Project No: 421067
Designed By: SJ
Checked By:

FIRE UNDERWRITERS SURVEY CALCULATIONS

51-55 Hawkesville Road
Township of Woolwich (St. Jacobs)

Date: 6/4/2026

Parameters from Water Supple for Public Fire Protection, Fire Underwriters Survey (2020)

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	0%

Block	Floor Area (m2)	# Floors	# Units	Gross Floor Area (m2)	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)				
Single Detached	150	2	1	300	1.5	5716	6000	-0.15	5100	0	0	0.2	0.2	0.15	0.1	0.65	3315	8415	8000	133
Townhouse Units with Firewalls Every 2 Units	107	2	2	428	1.5	6827	7000	-0.15	5950	0	0	0.2	0.00	0.15	0.05	0.4	2380	8330	8000	133
Stacked Towns (6 Units) with Firewalls Every 2 Units	67	2	2	268	1.5	5402	5000	-0.15	4250	0	0	0.15	0.2	0.00	0.2	0.55	2338	6588	7000	117

Appendix G Rail Corridor Drainage

Item 1: Railway Corridor – Culverts and Channels Conveyance Capacity Calculation

Item 2: Drainage Information Received from Region

Item 3: Drainage Areas

Item 4: Summary of VO Modelling Results

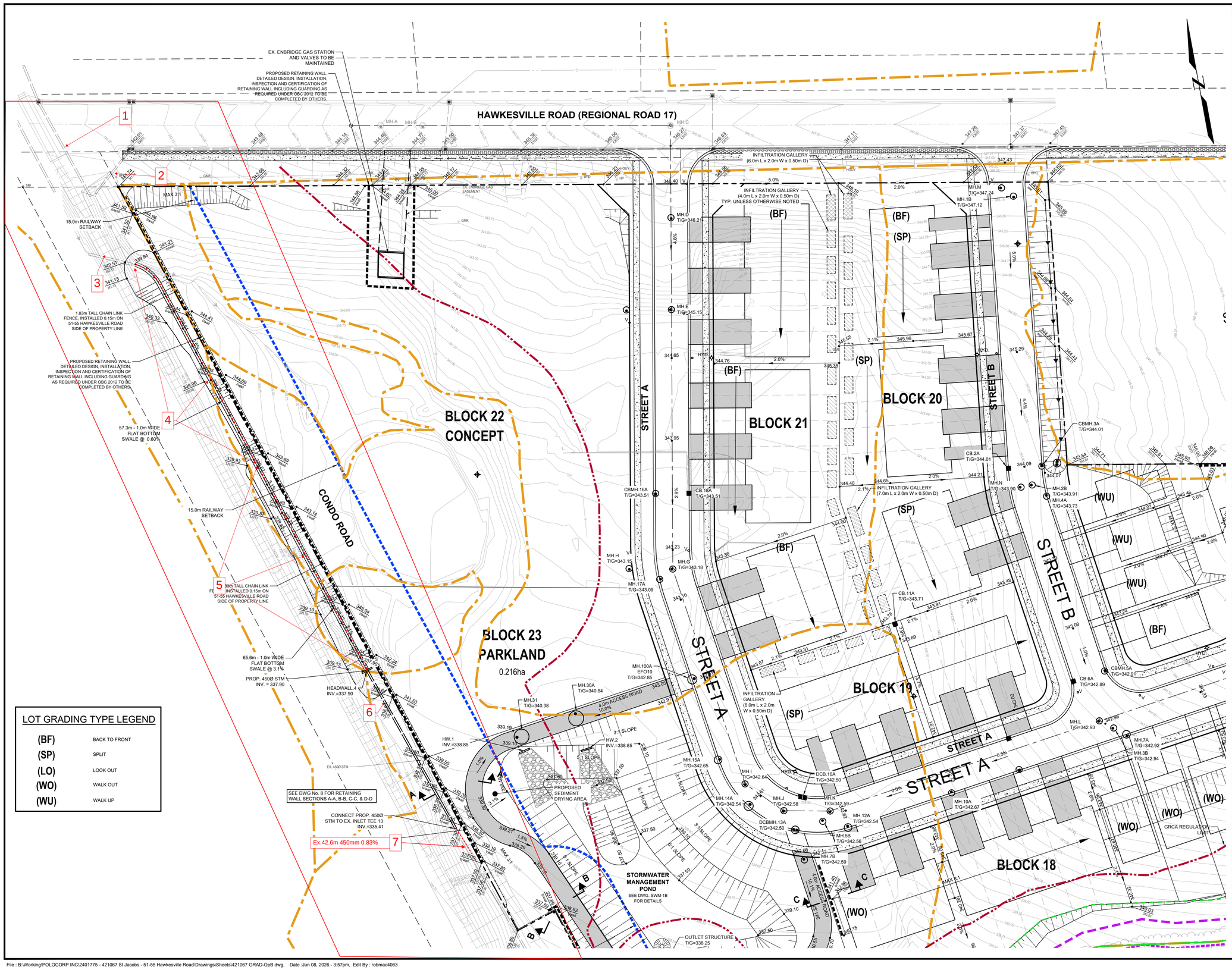
Railway Corridor - Conveyance Capacity

TOWNSHIP OF CENTRE WELLINGTON (ELORA)

51-55 Hawkesville Road

		Proposed Sewer						
	No.	Length (m)	Pipe Size (mm)	Type of Pipe	Grade %	Capacity (m^3/s)	Full Flow Velocity (m/s)	Time of Flow (min.)
	Post Development Conditions							
Existing	**1**	25.7	450	0.013	1.63	0.378	2.38	0.18
Existing	**2**	12.2	375	0.013	3.78	0.354	3.21	0.06
Existing	**3**	10.6	525	0.013	2.11	0.649	3.00	0.06
Proposed	**4**	57.3	channel		0.60	2.1	1.27	0.47
Proposed	**5**	65.6	channel		3.10	4.8	2.89	0.54
Proposed	**6**	43.2	450	0.013	5.76	0.711	4.47	0.16
Existing	**7**	42.6	450	0.013	0.83	0.270	1.70	0.42
Existing	**8**	56.8	overland flow channel		1.00	6.8	2.11	0.45
Existing	**9**	30.6	450	0.013	7.04	0.786	4.94	0.10
Existing	**7-9**	Maximum capacity downstream of Inlet Tee 13 (storm sewer and ditch)				**7.070**		

Minimum diameter = 300 mm
Minimum acceptable velocity = 0.75 m/s
Maximum acceptable velocity = 4.5 m/s





NOTES :

1. TOPOGRAPHIC SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING ON MAY 6, 2023, OCTOBER 24, 2023 AND FEBRUARY 29, 2024.
2. DRIPLINE FEATURE DELINEATION COMPLETED BY DOUGAN AND ASSOCIATES ECOLOGICAL CONSULTING AND DESIGN, DATED JUNE 10, 2024.
3. DRAFT PLAN OF SUBDIVISION PROVIDED BY POLOCORP, DATED MAY 19, 2026.
4. LEGAL BOUNDARY TAKEN FROM PLAN OF SURVEY PROVIDED BY JD BARNES LIMITED, DATED MAY 17, 2024.
5. BOREHOLE LOCATIONS PROVIDED BY GEI CONSULTANTS CANADA LTD., DATED JUNE 2024.
6. EXISTING INFRASTRUCTURE INFORMATION ON HAWKESVILLE ROAD OBTAINED FROM REGION OF WATERLOO, "REGIONAL ROAD No. 17 ROAD IMPROVEMENTS, ST. JACOBS", DATED JULY 27, 2021.
7. EXISTING GAS MAIN INFORMATION PROVIDED BY ENBRIDGE GAS INC., RECEIVED SEPT. 12, 2023.
8. GROUNDWATER LEVEL CONTOURS INTERPRETED BASED ON MEASUREMENTS MADE MAY 3, 2024, WITH ADJUSTMENTS MADE TO ACCOUNT FOR DIFFERENCES IN MONITORING WELL DEPTH. NOT TO BE CONSTRUED AS SEASONAL HIGH GROUNDWATER LEVEL SURFACE. INTERPRETATION OF THE SEASONAL HIGH GROUNDWATER LEVEL SURFACE IS SUBJECT TO COLLECTION OF ADDITIONAL DATA.
9. EXTERNAL EXISTING CONTOURS AT PROPERTY #47 HAWKESVILLE ROAD FROM GRCA ONLINE WEB MAP, RETRIEVED 2024-12-03.

LEGEND

- PROPERTY LINE
- EX. SANITARY SEWER
- EX. STORM SEWER
- EX. WATERMAIN
- EX. GAS LINE
- EX. TREELINE
- EX. CONIFEROUS / DECIDUOUS TREES
- PROP. SANITARY SEWER
- PROP. STORM SEWER
- PROP. WATERMAIN
- GRCA REGULATION LIMIT
- GRCA FLOODPLAIN LIMIT
- ELC DELINEATION
- CONSERVATIVE DRIPLINE (PROVIDED BY DOUGAN AND ASSOCIATES)
- DRIPLINE 10.0m BUFFER (PROVIDED BY DOUGAN AND ASSOCIATES)
- TOP OF STABLE SLOPE
- TOP OF STABLE SLOPE 6.0m SETBACK
- 15.0m RAILWAY SETBACK
- GROUNDWATER CONTOURS (SEE NOTE 8)
- MAJOR OVERLAND FLOW

LOT GRADING TYPE LEGEND

(BF)	BACK TO FRONT
(SP)	SPLIT
(LO)	LOOK OUT
(WO)	WALK OUT
(WU)	WALK UP

BENCHMARK

CUT CROSS IN BACK OF CURB BESIDE 1ST SIDE INLET CATCH BASIN EAST OF EAST DRIVEWAY INTO SITE.
CC100 = 346.618m

SURVEYOR INFORMATION

GEI CONSULTANTS CANADA LTD
650 WOODLAWN ROAD, BLOCK C, UNIT 2,
GUELPH, ON, N1K 1B8
PHONE: 1-800-810-3281

No.	DESCRIPTION	DATE	CHKD BY
5	RE-ISSUED FOR APPROVAL	2026-06-08	P.G.
4	RE-ISSUED FOR APPROVAL	2026-03-09	P.G.
3	RE-ISSUED FOR APPROVAL	2025-12-17	P.G.
2	INTERIM STOCKPILE PLAN	2025-07-17	P.G.
1	ISSUED FOR APPROVAL	2025-01-23	A.E.K.

REVISIONS

TOWNSHIP OF WOOLWICH (ST JACOBS)
REGION OF WATERLOO

POLOCORP INC.
51 HAWKESVILLE ROAD

DRAFT PLAN OF SUBDIVISION NUMBER:

REGISTERED PLAN NUMBER :

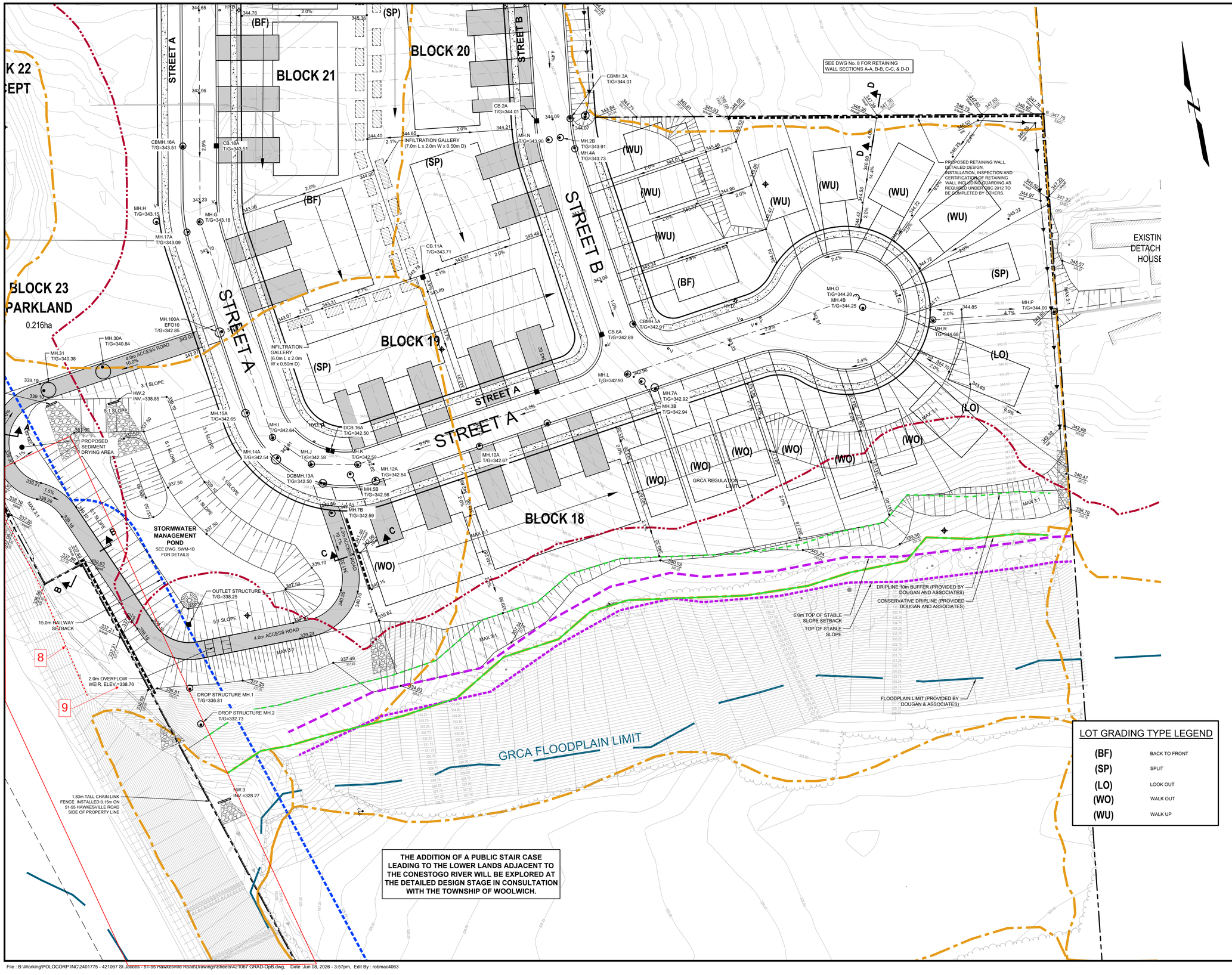
LICENSED PROFESSIONAL ENGINEER — June 8/26 — P.F. GRIER — 100188305 — PROVINCE OF ONTARIO

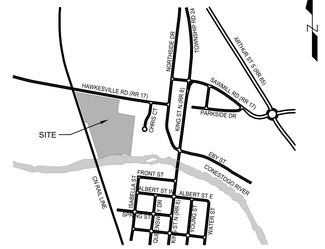
CHRIS COURT OPTION (FORMERLY OPTION 3)

PRELIMINARY GRADING PLAN
1 of 2

GEI Consultants
330 TRILLIUM DRIVE UNIT D
KITCHENER, ONTARIO N2E3J2
800.810.3281

DESIGN BY:	P.G. / B.L.	SCALE: 1:400	PROJECT No. 2401775
CHECKED BY:	P.G.		
DRAWN BY:	B.L.	DATE: OCTOBER 2025	DRAWING No. 6
CITY FILE NUMBER :	- -		





KEY PLAN
N.T.S

NOTES :

1. TOPOGRAPHIC SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING ON MAY 6, 2023, OCTOBER 24, 2023 AND FEBRUARY 29, 2024.
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- GRCA FLOODPLAIN LIMIT
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BENCHMARK

CUT CROSS IN BACK OF CURB BESIDE 1ST SIDE INLET CATCH BASIN EAST OF EAST DRIVEWAY INTO SITE.
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GEI CONSULTANTS CANADA LTD
650 WOODLAWN ROAD,
BLOCK C, UNIT 2,
GUELPH, ON, N1K 1B8
PHONE: 1-800-810-3281

No.	DESCRIPTION	DATE	CHKD BY
	REVISIONS		
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4	RE-ISSUED FOR APPROVAL	2026-03-09	P.G.
3	RE-ISSUED FOR APPROVAL	2025-12-17	P.G.
2	INTERIM STOCKPILE PLAN	2025-07-17	P.G.
1	ISSUED FOR APPROVAL	2025-01-23	A.E.K.

TOWNSHIP OF WOOLWICH (ST JACOBS)
REGION OF WATERLOO

POLOCORP INC.
51 HAWKESVILLE ROAD

DRAFT PLAN OF SUBDIVISION NUMBER:

REGISTERED PLAN NUMBER :

LICENSED PROFESSIONAL ENGINEER — June 8/26 — P.F. GRIER — 100188305 — PROVINCE OF ONTARIO

CHRIS COURT OPTION (FORMERLY OPTION 3)

PRELIMINARY GRADING PLAN
2 of 2

GEI Consultants
330 TRILLIUM DRIVE
UNIT D
KITCHENER, ONTARIO N2E3J2
800.810.3281

DESIGN BY:	P.G. / B.L.	SCALE: 1:400	PROJECT No. 2401775
CHECKED BY:	P.G.		DRAWING No. 7
DRAWN BY:	B.L.	DATE: OCTOBER 2025	
CITY FILE NUMBER :	- -		

Items Received from Region of Waterloo

1.51
0.35

0.80
0.40

0.82
0.40

0.44
0.35

0.75
0.35

1.07
0.35

2.81
0.15

0.13
.40

0.13
.40

0.63
.45

0.34
0.35

0.20
0.45

0.30
0.45

0.10
0.45

0.26
0.45

0.11
0.45

DSICB2

DSICBMH1

12.2m-375mmØ STM @ 3.58%

75.0m-375mmØ STM @ 3.22%

SICBMH3

SICB4

64.0m-375mmØ STM @ 2.48%

DI6A

71.0m-375mmØ STM @ 1.17%

SICBMH5

SICB8

71.0m-375mmØ STM @ 0.85%

SICBMH7

DI10A
SICB10

SICBMH9

HIGH
POINT

SICB12

SICB11

SICBMH13

SICBMH14

SICBMH15

DSICBMH18

DSICBMH17

54.8m-375mmØ STM @ 0.53%

9.7m-375mmØ STM @ -0.55%

43.0m-300mmØ STM @ 0.55%

47.1m-375mmØ STM @ 0.55%

18.8m-375mmØ STM @ 0.60%

DICB17A
SICBMH17

SICBMH19

CBMH20

SICBMH21

CBMH22
EXDICBMH28.1

33.2m-525mmØ STM @ 0.76%

7.9m-450mmØ STM @ 2.27%

46.2m-375mmØ STM @ 1.50%

69.2m-300mmØ STM @ 1.28%

23.8m-300mmØ STM @ 0.98%

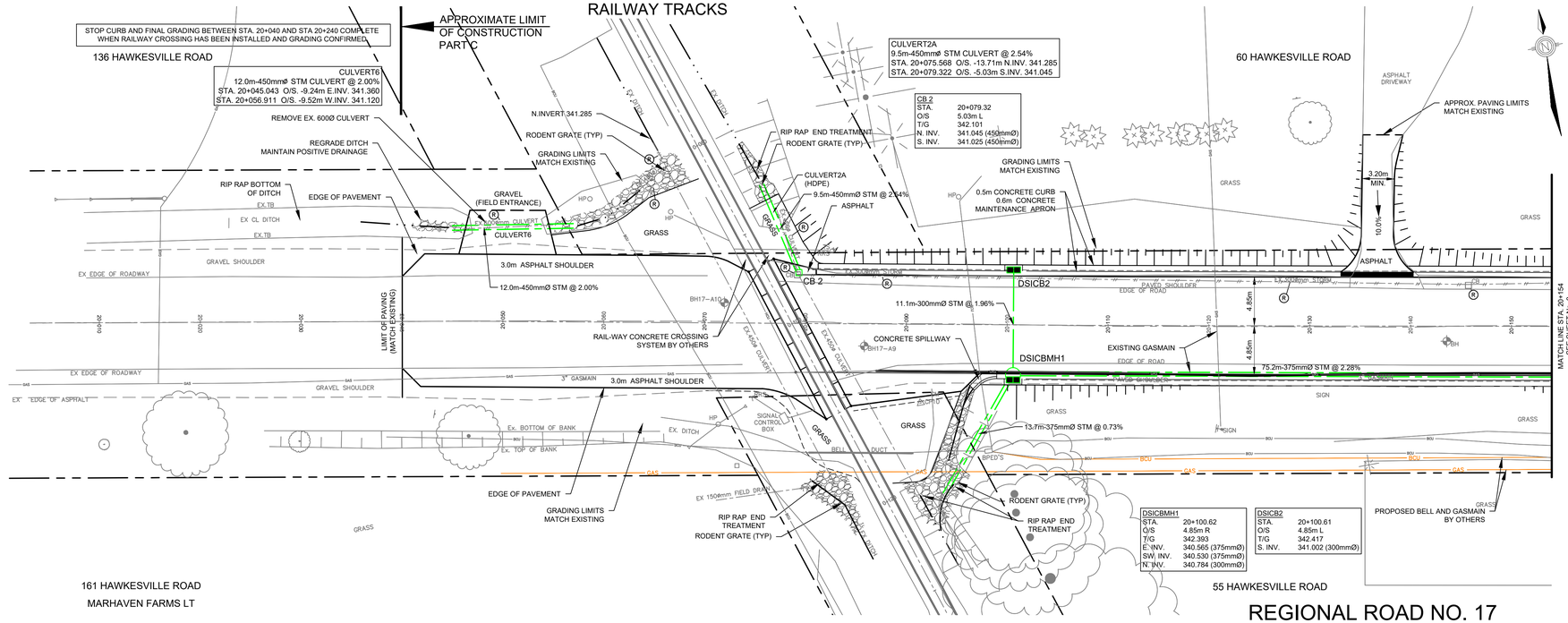
Region of Waterloo

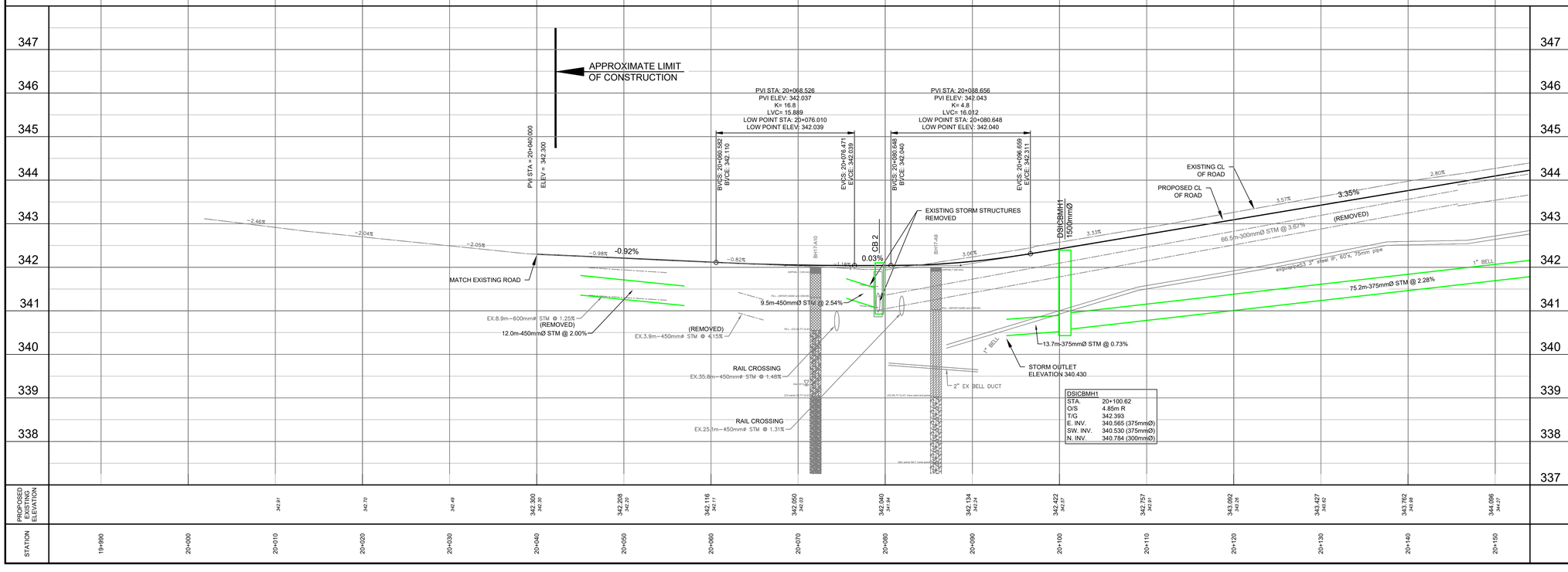
HAWKESVILLE - SAWMILL RD
ST. JACOBS

FILE No. 05603
DRAWN BY Laura Rivera
DATE June 3, 2020
SCALE nts
FILE I:\DCCADD\des-5500\cd05603\02-Drawings\Storm Design\2020\5603DEM.dwg

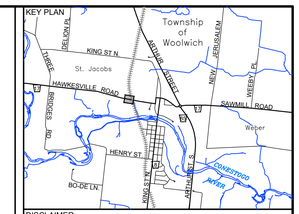
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WATERLOO - ST. JACOBS RAILWAY TRACKS





KEY PLAN



DISCLAIMER:

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

NOTES:

1. FOR CATCHBASIN, AND CATCHBASIN MANHOLES, OFFSETS ARE GIVEN TO THE EDGE OF PAVEMENT. GRATE ELEVATIONS ARE THE FINISHED PAVEMENT ELEVATIONS. FOR MANHOLES, AND OTHER STRUCTURES, OFFSETS ARE GIVEN TO THE CENTER OF THE STRUCTURE AND ELEVATIONS ARE THE FINISHED PAVEMENT ELEVATIONS.
2. THE REQUIRED MINIMUM M.O.E. CLEAR SEPARATION BETWEEN WATERMAINS AND STORM/SANITARY SEWERS WILL BE 2.50m HORIZONTALLY AND 0.50m VERTICALLY.
3. MAINTENANCE HOLE TAPER CONES AND FRAMES SHALL ALL BE ROTATED TO ENSURE THE COVER IS NOT POSITIONED IN THE WHEEL PATH.
4. ALL CATCHBASIN LEADS TO BE 2.00% UNLESS NOTED.
5. ALL SANITARY SERVICES ARE 100mmØ UNLESS NOTED.
6. ALL WATER SERVICES ARE 25mmØ PEX UNLESS NOTED.
7. DRIVEWAY AND ENTRANCE RAMPS ARE TO BE CONCRETE UNLESS NOTED AS PER RMW STANDARD DRAWING 222.
8. CONCRETE SIDEWALK TO BE 125mm THICK (RESIDENTIAL) AS PER RMW STANDARD DRAWING 261.
9. ALL STORM SEWERS/LEADS WITH LESS THAN 1.20m COVER SHALL BE INSULATED.
10. ACCESS TO ALL PROPERTIES MUST BE MAINTAINED AT ALL TIMES.
11. WATERMAIN ELEVATIONS MAY BE DEEPER IN SOME LOCATIONS THAN 2.0m MIN., TO PERMIT SANITARY SERVICES TO BE INSTALLED AT 2.0% GRADE

Region of Waterloo

CONTROLLING B.M.

THE BASE TOPOGRAPHIC SURVEY IN THIS DRAWING WAS COMPLETED IN UTM COORDINATES USING GLOBAL POSITIONING EQUIPMENT USING THE NAD 83 ZONE 17 GRID. CONTACT THE REGION OF WATERLOO, DESIGN AND CONSTRUCTION DIVISION, SURVEY GROUP FOR DESCRIPTIONS, COORDINATES AND ELEVATIONS OF CONTROL POINTS.

No.	ISSUE/REVISION	BY	DATE
6	AS BUILT DRAWING	LVW	JULY 27, 2021
5	REVISED GRADING	LVW	JULY 13, 2020
4	ISSUED FOR CONSTRUCTION	LVW	JUNE 8, 2020
3	ISSUED FOR MECP APPROVAL	LVW	JUNE 5, 2020
2	CORRECTED MATCH LINES	LVW	APRIL 2020
1	ISSUED FOR TENDER	LVW	MARCH 2020

PART C
REGIONAL ROAD No. 17
ROAD IMPORVEMENTS
ST. JACOBS

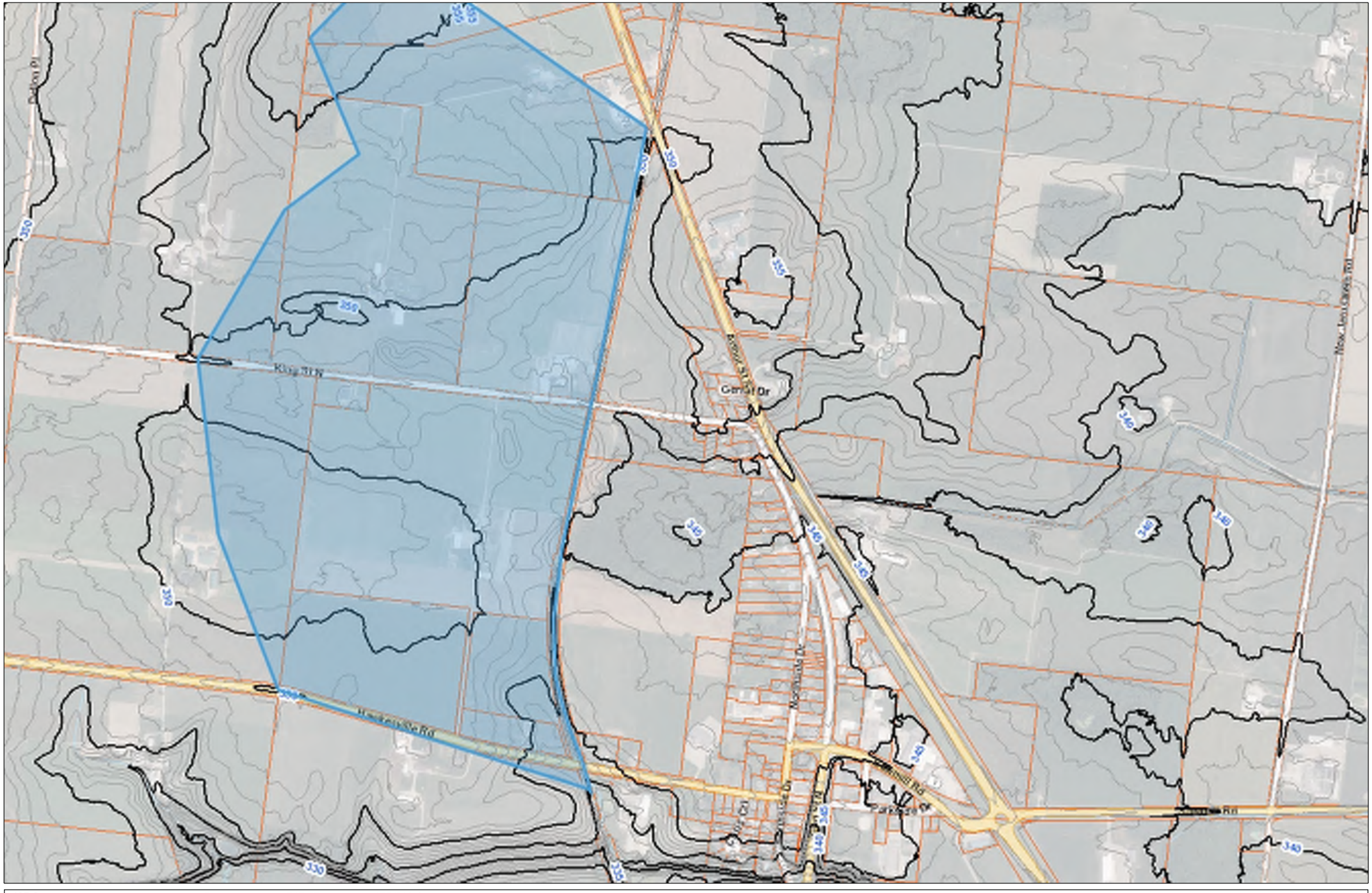
HAWKESVILLE ROAD
PLAN AND PROFILE

DRAWN BY: L.R.	CONTRACT No. 2020-135
CHECKED BY: L.V.W.	FILE No. 5603
DATE: JANUARY 2020	DRAWING No. 000
SCALE HOR. 1:250 VERT. 1:50	SHEET No. 9 OF 16
LAYOUT NAME: PP9	

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Region of Waterloo

Transportation & Environmental Services



495.3 0 247.65 495.3 Meters

NAD_1983_UTM_Zone_17N

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

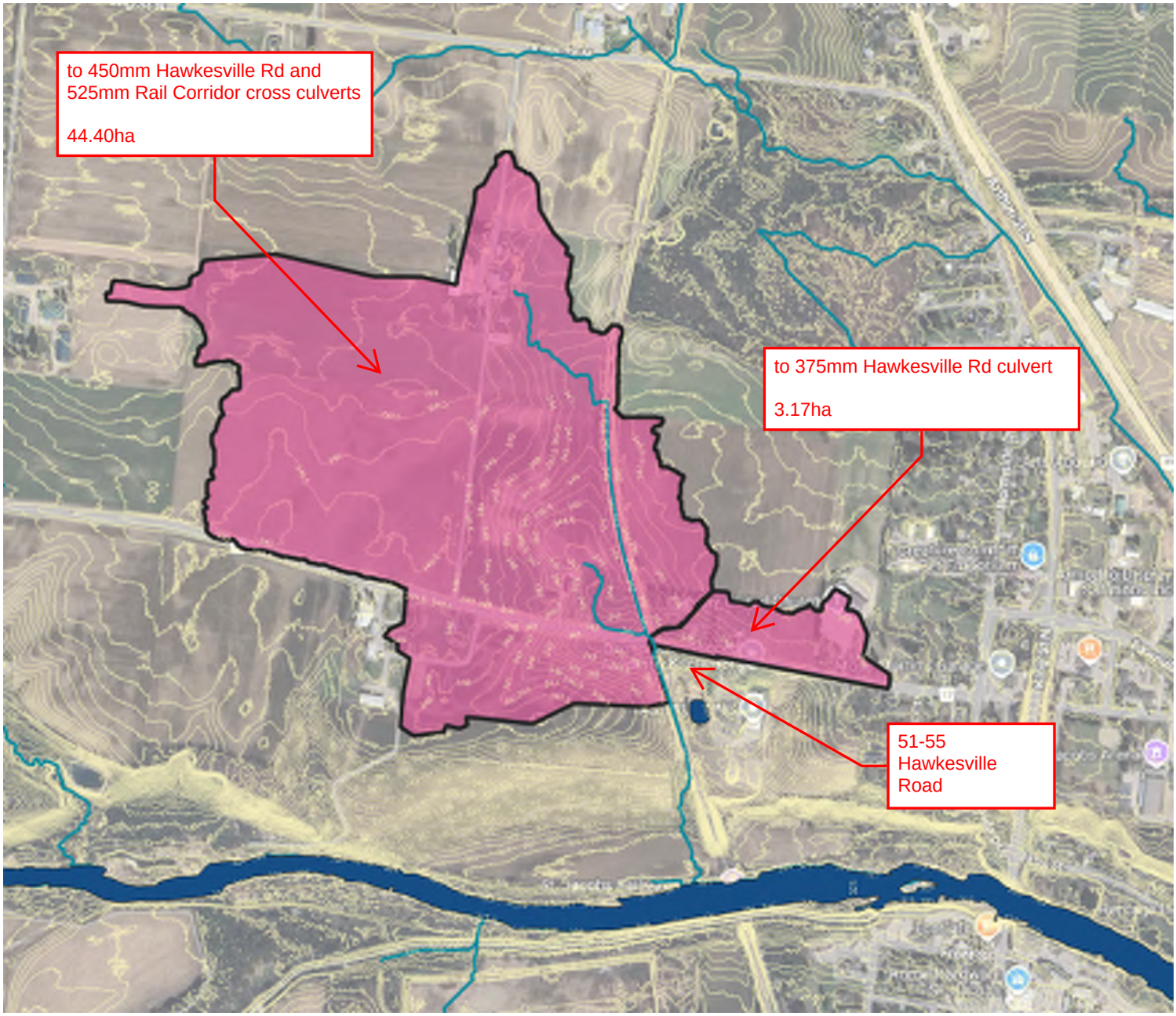
Legend

- Contours
  - 1m
  - 5m
- Private Roads
- Railways
- Highways
- Regional Roads
- Roads
- Proposed Roads
- Future Roads
- Watercourses
- Rivers
- Teranet Ownership Parcels

Scale 1: 9,750

Notes

Delineated Drainage Area for north end of Rail Corridor Ditch



Pre-Development Catchment SCS Numbers - Railway Corridor
51-55 Hawkesville Road
Project: 2401775
4-Jun-26

Curve Number

CATCHMENT	Area (ha.)	Soil Group	Landuse	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)
1000 (RC Cross culerts drainage area)	39.60	B	(2)	78	89
	2.58	C	(2)	85	92
	2.22	B/C	(1)	98	99
Total (1000)	**44.40**	**-**	**-**	**79**	**90**
2000 (Hawkesville ROW drainage Area)	0.95	C	(1)	98	99
	2.22	C	(3)	79	89
Total (2000)	**3.17**	**-**	**-**	**85**	**92**

SCS CURVE PARAMETERS	A	B	C	D
(1) Paved Parking Lots, roofs, driveway, etc	98	98	98	98
(2) Row Crops (Straight Row, Good Hydrologic Condition)	67	78	85	89
(3) Open space (lawns, parks, golf course, cemeteries, etc.)	51	68	79	84
(4) Woods (fair)	36	60	73	79

Urban Hydrology for Small Watershed (TR-55) User Manual

Intial Abstraction

CATCHMENT	SCS CURVE NO. (AMC-2)	SCS CURVE NO. (AMC-3)	S	IA (mm)
1000	79	90	28.2	2.82
2000	85	92	22.1	3.31

1.0mm ≤ IA ≤5.0mm

CN ≤ 70 IA = 0.075 X S

CN > 70 ≤ 80 IA = 0.10 X S

CN > 80 ≤ 90 IA = 0.15 X S

CN > 90 IA = 0.2 X S

S = (25400 / CN) - 254

Standhyd IA:
Pervious area=1mm
Impervious Area=5mm

Time to Peak

CATCHMENT	L (m)	Sw (%)	C	Tc (min.)	TP (hr) of IUH
1000	850	1	0.24	83	1.50
2000	285	0.5	0.20	63	0.70

AIRPORT FORMULA (C < 0.4) $Tc = 3.26 X (1.1 - C) X L0.5 / SW^{0.33}$

Bransby Williams (C>0.4) $Tc = 0.057 X L / (SW^{0.2} X A^{0.1})$

Where:

Tc = Time of concentration

L= Watershed length, m

Sw = Watershed slope %

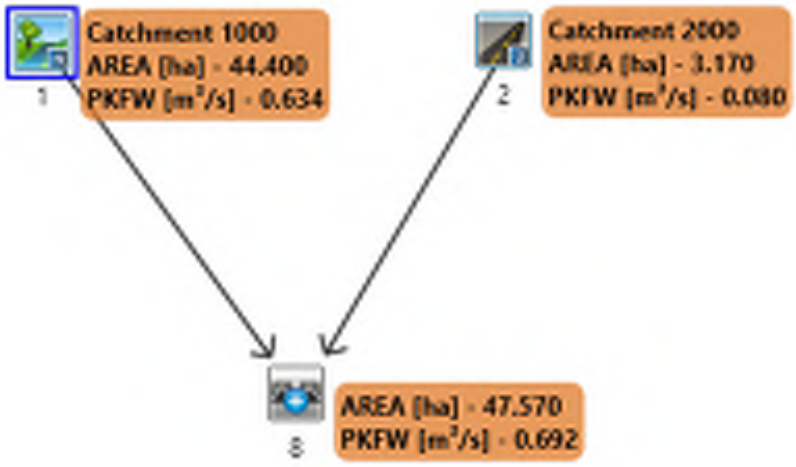
A=Watershed area, ha

C = Runoff Coefficient, C=0.2 x (1-I) + 0.9 x I

I= Impervious Ratio

Tp=Time to peak: (N-1)/NxTc

N = 3, Number of linear reservoirs


Catchment 1000
AREA [ha] - 44.400
PKFW [m³/s] - 0.634
1
Catchment 2000
AREA [ha] - 3.170
PKFW [m³/s] - 0.080
2
AREA [ha] - 47.570
PKFW [m³/s] - 0.692
3

```
================================================================================
=======================

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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                  *****  S U M M A R Y   O U T P U T  *****


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DATE: 06/04/2026                          TIME: 12:07:42

USER:


COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : City of Kitchener - 25yr      **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                 5.0
```

```
    [ Ptot= 70.23 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    1.27  2.85  32.05 0.46   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 70.23 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.15  2.08  41.53 0.59   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    1.38  2.77  32.69  n/a   0.000
*
================================================================================
========================


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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 06/04/2026                          TIME: 12:07:42

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COMMENTS: _____

```
  ************************************************
  ** SIMULATION : City of Kitchener - 2yr       **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  5.0
    [ Ptot= 34.25 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    0.34  3.08   8.84 0.26   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 34.25 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.05  1.08  13.95 0.41   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    0.37  3.03   9.18  n/a   0.000
*
================================================================================
=======================


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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 06/04/2026                          TIME: 12:07:42

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COMMENTS: _____________________________________________________________


  ********************************************
  ** SIMULATION : City of Kitchener - 50yr      **
  ********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  5.0
    [ Ptot= 77.43 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    1.50  2.83  37.49 0.48   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 77.43 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.19  2.00  47.64 0.62   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    1.62  2.75  38.16  n/a   0.000
*
 FINISH

================================================================================
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```

```
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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 06/04/2026                          TIME: 12:07:42

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COMMENTS: _____________________________________________________________


  ************************************************
  ** SIMULATION : City of Kitchener - 5yr       **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  5.0
    [ Ptot= 47.23 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    0.63  2.95  16.25 0.34   0.000
```

```
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 47.23 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.08  1.08  23.15 0.49   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    0.69  2.88  16.71  n/a   0.000
*
================================================================================
=======================


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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 06/04/2026                          TIME: 12:07:42

USER:


COMMENTS: _____________________________________________________________
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  ***********************************************
  ** SIMULATION : City of Kitchener 100-yr      **
  ***********************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  5.0
    [ Ptot= 87.25 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    1.81  2.83  45.17 0.52   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 87.25 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.24  1.90  56.17 0.64   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    1.96  2.73  45.90  n/a   0.000
*
================================================================================
======================


       V    V   I    SSSSS  U   U    A    L              (v 6.2.2017)
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        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
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       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
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DATE: 06/04/2026 TIME: 12:07:42

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : City of Kitchener 10-yr       **
  ************************************************

  W/E COMMAND             HYD ID   DT    AREA  ' Qpeak Tpeak   R.V. R.C.   Qbase
                                  min     ha   '  cms   hrs     mm          cms

      START @  0.00 hrs
      --------------------
    CHIC STORM                  5.0
    [ Ptot= 56.28 mm ]
*
 ** CALIB NASHYD         0001  1  1.0   44.40    0.87  2.88  22.14 0.39   0.000
    [CN=79.0         ]
    [ N = 3.0:Tp 1.50]
*
    CHIC STORM                  5.0
    [ Ptot= 56.28 mm ]
*
 *  CALIB STANDHYD       0002  1  1.0    3.17    0.10  1.08  30.13 0.54   0.000
    [I%=10.0:S%= 0.50]
*
    ADD [  0001+  0002]  0008  3  1.0   47.57    0.95  2.82  22.67  n/a   0.000
*
```