HYDROLOGY AND HYDRAULICS REPORT

Lower Trent Region Conservation Authority

And

The Municipality of Brighton

FHIMP ON22-004

For the

Butler Creek Floodplain Mapping Update

March 1, 2024

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1 Introduction

Lower Trent Region Conservation Authority (LTC) has partnered with Municipality of Brighton (Brighton) along with provincial and federal partners to lead the Butler Creek Floodplain Mapping Update. Butler Creek was previously mapped in the 1980s and the data is no longer current.

With acquired funding through the federal Flood Hazard Identification Mapping Program (FHIMP) and Brighton, LTC has undertaken a leadership role in the production of updated mapping for Butler Creek. The objective is to provide a floodplain mapping update that will allow LTC and Brighton staff to make informed planning and regulation decisions. Jewell Engineering Inc. (Jewell) is pleased to support this initiative through the technical analysis and reporting described herein.

The driving forces for this project include climate change, improved modelling techniques and software programs, improved data acquisition tools, land use changes, and updated infrastructure that can dramatically influence flood behaviour and floodplain extents.

The need for accurate, detailed floodplain mapping that factors in climate change forecasting has become increasingly evident as flood damages become the largest cost to the Canadian economy out of any other natural hazard. Updated floodplain maps are needed to protect human life, property, and infrastructure from the damaging effects of flooding that is occurring with increased frequency.

The funds deployed by the federal and local governments to complete this updated floodplain mapping provide a dual benefit; it protects the local community from potential flood hazards and reduces the dependence on provincial and federal funds associated with the Disaster Financial Assistance Arrangements (DFAA) administered by Public Safety Canada. While Butler Creek is small relative to some larger scale creeks and rivers, the principles and need for accurate floodplain maps are the same.

The Butler Creek watershed extends from a central point in the Municipality of Brighton and drains south through the Municipality of Brighton before its outlet to Presqu'ile Bay and ultimately Lake Ontario.

The urban area within the Municipality of Brighton is subject to the maximum peak flows produced by the watershed and as a result, the flood hazard has been studied using a 2-dimensional hydraulic model that provides greater detail in terms of extents, depths, water surface elevations, and velocities.

2 Background

Previous studies (see list below) were commissioned with the intent to reduce the flood risk at certain locations along Butler Creek.

- *1988 Butler Creek Flood Reduction Study* prepared by Totten Sims Hubicki Associates
- *1978 Fill and Floodline Mapping Study* prepared by Totten Sims Hubicki Associates.
- *2016 Tackaberry Ridge East Subdivision Phase 1 Preliminary SWM Report* prepared by GGG

A brief summary of key findings from each of the above reports is provided below.

1978 Fill and Floodline Mapping Study; Totten Sims Hubicki Associates

The *Fill and Floodline Mapping Study* was intended to determine the floodline based on regional storm criteria, and to establish fill and construction control lines. The authors identified areas along Butler Creek that would experience the most substantial flooding impact, with areas in the vicinity of the CN Railway crossings being the greatest concern. It was concluded that the discharge capacity of the bridges at the CN rail crossings and at Ontario Street needed to be improved. Recommendations included reducing flooding occurring downstream of CNR by increasing the discharge capacity of the secondary channel to divert flows during peak runoff periods.

1988 Butler Creek Flood Reduction Study; Totten Sims Hubicki Associates

This study conducted by Totten Sims Hubicki Associates was an extension of the *Butler Creek Flood Damage Reduction Study* prepared by students at the University of Guelph, with the purpose of reviewing and updating findings. Based on their conclusions, the report authors believed that all studied structures that cross Butler Creek met MTC Design flood criteria, but did not all have sufficient capacity to accommodate the regional and 100-yr flood. It was concluded that most of the anticipated damages would occur east of Ontario Street, north of the CN rail line. As a result, it was recommended that the Ontario Street profile grade be raised to act as a "dike," and that the two-zone concept be considered for the study area.

2016 Tackaberry Ridge East Subdivision Phase 1 Preliminary SWM Report; GGG Group

The preliminary SWM report prepared by Greer Galloway Group Inc. (GGG) in 2016 was reviewed since it includes discussion and figures relating to the change in drainage pattern as a result of the Tackaberry Ridge East Subdivision and other nearby developments. The report describes the conveyance of the drainage towards Pinnacle Street. It notes that the development area and external contributing lands will be captured within the Pinnacle Street storm sewer network and drained south. In a review of the topographic survey, Pinnacle Street drains south before its outlets to Arena Creek at the north side of the rail tracks. The Tackaberry Ridge development area ultimately redirects flows received by the pipe network from Butler Creek to Arena Creek. As a result, a dashed green line has been included in the Jewell catchment area drawings in Appendix B.

The topographic data indicates that in an emergency storm, the overland flow from this area would continue to drain towards Butler Creek. The sub-catchment 101 for Arena Creek (dashed green line) is included in *both* Butler and Arena Creek catchment areas to avoid an underestimate of the peak runoff rates since the Timmins storm, particularly with climate change considerations, would exceed the pipe inlet and conveyance capacities.

3 Study Area

The study area focuses on the communities adjacent to Butler Creek primarily located within the urban area in the Municipality of Brighton. The study area was outlined at the beginning of the project by LTC and an excerpt of this study area is provided in Figures 3-1 (Butler Creek) and 3-2 (Arena Creek), where the red line represents the existing flood line.

The Butler Creek watershed extends from a central point in the Municipality of Brighton to the inlet of Presqu'ile Bay. Butler Creek drains south and through the urban area of Brighton before discharging to Presqu'ile Bay. The Arena Creek watershed is due east of the Butler Creek watershed. The northern-most point of the Arena Creek watershed is just north of Highway 2. A portion of Arena Creek's watershed overlaps with the Butler Creek watershed, given that there is a storm pipe located in the Butler Creek area that drains south along Pinnacle Street and outlets to Arena Creek.

Butler Creek is the primary focus of the mapping update, with Arena Creek added as a supplemental scope to accommodate anticipated development pressures near the eastern portion of the Municipality.

Existing and future build-out conditions were considered. Guidance for future development was obtained from Schedule A of the Municipality of Brighton Official Plan that outlines land use designations for the Brighton Urban Area. Map 2 of Schedule A is included in Appendix A.

The watershed characteristics for Butler Creek are described in the following section.

Figure 3-1: Excerpt of Existing Butler Creek Mapping Extent from LTC Request for Proposal

Figure 3-2: Excerpt of Supplemental Arena Creek Mapping Extent from LTC Request for Proposal

4 Hydrology

The hydrology assessment was prepared for several nodes of interest throughout the Butler Creek watershed. Various methodologies were applied and compared to determine representative peak flows at each node. Each methodology was carefully considered prior to the selection of the peak flows for use in the hydraulic model, including potential increases in flows due to spring melt conditions.

The subject watershed is within *Zone 3* of *Flood Hazard Criteria Zones for Ontario Conservation Authorities*. Therefore, the flood standard for Butler Creek is the 100-yr or Timmins event; whichever produces the greater peak flow.

The detailed hydrologic analysis for the purpose of quantifying the peak flow rates at Butler Creek is described below.

A detailed discussion of each individual modeling method, including their input parameters, is described in the following subsections.

4.1 Data Sources

Data collection is an integral component of the hydrologic assessment. A description of each primary data source applied in the analysis is provided below.

4.1.1 LiDAR, Catchment Areas & Terrain

The Butler Creek watershed has a total area of 25.8 km^2 and traverses the community of Brighton before it outlets to Lake Ontario. Catchment boundaries are identified in Appendix B.

Jewell discretized the watershed into several sub-catchments based on confluence points and nodes of interest. A particular hydrologic node of interest is Node B; this node corresponds to the stream flow gauge location for Butler Creek.

Catchment areas were delineated using topographic information from the following sources.

1) Provincial LiDAR developed and published by *Land Information Ontario* was reviewed in combination with ESRI server data information to assist in delineation of the sub-catchment boundaries. The sub-catchment configurations are similar to those delineated in the 1988 TSH Study, however Jewell completed a detailed review of the contour information and updated the sub-catchment boundaries accordingly.

2) Jewell completed a topographic survey and inspections within the particular urban areas of Brighton to confirm the boundary extents. Near urban areas, LiDAR can be limited as it does not show pipe networks or culverts. The field inspection allowed for the sub-catchments and dividing boundaries for the urban portions of Butler and Arena Creeks to be confirmed.

4.1.2 Soils and Land Cover

A soils map is provided in Appendix C. Soils information was obtained from the Soil Survey Complex database produced by the *Ontario Ministry of Agriculture, Food and Rural Affairs* in cooperation with the *Ontario Ministry of Natural Resources and Forestry*.

The soils are predominantly classified as Hydrologic Soils Groups (HSG) B. The HSG classification for soils is used to identify drainage characteristics for various soil types. An excerpt from Chapter 8 of the *1997 MTO Drainage Management Manual* that describes drainage characteristics for each HSG is provided below. The Butler Creek watershed has 54% HSG B coverage as shown in Appendix B and Table 4-1. A significant portion of HSG A and HSG C soils are also present within the watershed with 23% and 18% coverage, respectively.

Table 4-1: Butler Creek HSG Summary

HSG Soils Group	Area (ha)	Land coverage (%)
A	640.0	23
B	1497.9	54
C	493.5	18
D	122.0	4

The hydrologic soil group is used to classify soils into groups of various runoff potential.

The Soil Conservation Service (SCS) classifies bare thoroughly wet soils into four hydrologic soil groups (A, B, C and D). SCS descriptions of the four groups, modified slightly to suit Ontario conditions, are as follows: (Design Chart 1.09)

A: High infiltration and transmission rates when thoroughly wet, eg. deep, well drained to excessively-drained sands and gravels. These soils have a low runoff potential.

B: Moderate infiltration and transmission rates when thoroughly wet, such as moderately deep to deep open textured loam.

C: Slow infiltration and transmission rates when thoroughly wet, eg. fine to moderately fine-textured soils such as silty clay loam.

D: Very slow infiltration and transmission rates when thoroughly wet, eg. clay loams with a high swelling potential. These soils have the highest runoff potential.

In Ontario, soils have been found to lie between the main groups given above, and have therefore been interpolated as AB, BC, CD as appropriate, such as Guelph loam, which is classified as BC.

Figure 4-1: Excerpt from 1997 MTO DMM Describing Hydrologic Soils Group Classifications

The soils data is used to develop curve numbers (CNs) that are a key modelling parameter used in the Soil Conservation Service (now known as the *National Resources Conservation Service*) methodology for estimating the proportion of precipitation that will runoff the lands and the portion that will be "lost" through infiltration. CNs are a function of soil type, land cover, slope, and land use. The higher the CN – the greater the proportion of precipitation that is expected to runoff the lands. CNs are representative of the pervious portion of the watershed. Jewell followed the guidance in MTO Design Chart 1.09 to determine curve numbers for the discretized catchments.

Land cover information was obtained from the Ontario Land Cover Compilation (OLCC), a database owned by *Land Information Ontario,* provided by the *Ontario Ministry of Natural Resources and Forestry*. A review of land coverage for the Butler Creek watershed shows that the land use is

predominantly cultivated land, woods, and water. A summary of land coverage percentage is provided in Table 4-2.

Table 4-2: Butler Creek Land Cover Summary

Land Cover	Area (ha)	Land Coverage (%)
Woods	464.5	17
Cultivated	1419.3	52
Urban	276.7	10
Water	583.2	21
Bedrock	9.64	0

4.1.3 Meteorologic Inputs

Environment Canda (EC) intensity-duration frequency (IDF) curves for data collected at the Trenton Airport station is the best available data record (see Appendix E). Jewell reviewed the station data from Kingston, Belleville, and Trenton. The Trenton station yields the longest record of data and is in closest proximity to Butler Creek.

Jewell sent an inquiry to Environment and Climate Change Canada (ECCC) seeking hourly rainfall data for the area. Hourly data is of interest to better understand the rainfall depths and patterns that produced the stream flow gauge readings. However, the ECCC representatives noted that the only nearby rainfall stations were Belleville (data record beginning October of 2021) and Point Petre (data record beginning June of 2004). Given the short data record for the Belleville station, it was not selected. The Point Petre station is at the south limit of Prince Edward County, which is known to have different rainfall depths and distributions relative to the Brighton and Trenton area. Therefore, neither of these stations were selected for calibration of the hydrology model.

In September of 2004, there was a large rainfall event associated with the remnants of Hurricane Frances. This event produced extreme rainfall volumes between Cobourg and Kingston, including the Brighton area. The precipitation totals reported for the event at nearby stations are included below.

Table 4-3: September 8/9 2004, Hurricane Frances Precipitation Summaries

Station		M.S.C			EC IDF Curves	
		Sept 8	**Sept 9**	**Total**	**12-Hr**	**24-Hr**
Kingston	6104175	57.2	64.6	121.8	NA	NA
Belleville	6150689	81.4	35.5	116.9	114.4	124.5
Trenton	6158875	4.6	107.2	111.8	109.6	123.7
Cobourg	6151689	66.4	27.4	93.8	NA	NA
Cobourg	6151684				81.8	82.2

For context, the nearest station at Trenton Airport has a 100-yr statistical rainfall depth for 12-hr and 24-hr durations of 96.5mm and 108.1mm respectively. With Brighton centrally located between Cobourg and Belleville, the rainfall depth produced in 2004 was similar to a statistical 100-yr rainfall event.

Given the magnitude of the precipitation, it was well documented locally for both rainfall volume and its hourly distribution (see Figure 4-2). This data, combined with the 2004 stream flow gauge data (which is the highest on record), provided opportunity to calibrate the hydrologic model to known data values. This is discussed further in Section 4.3.

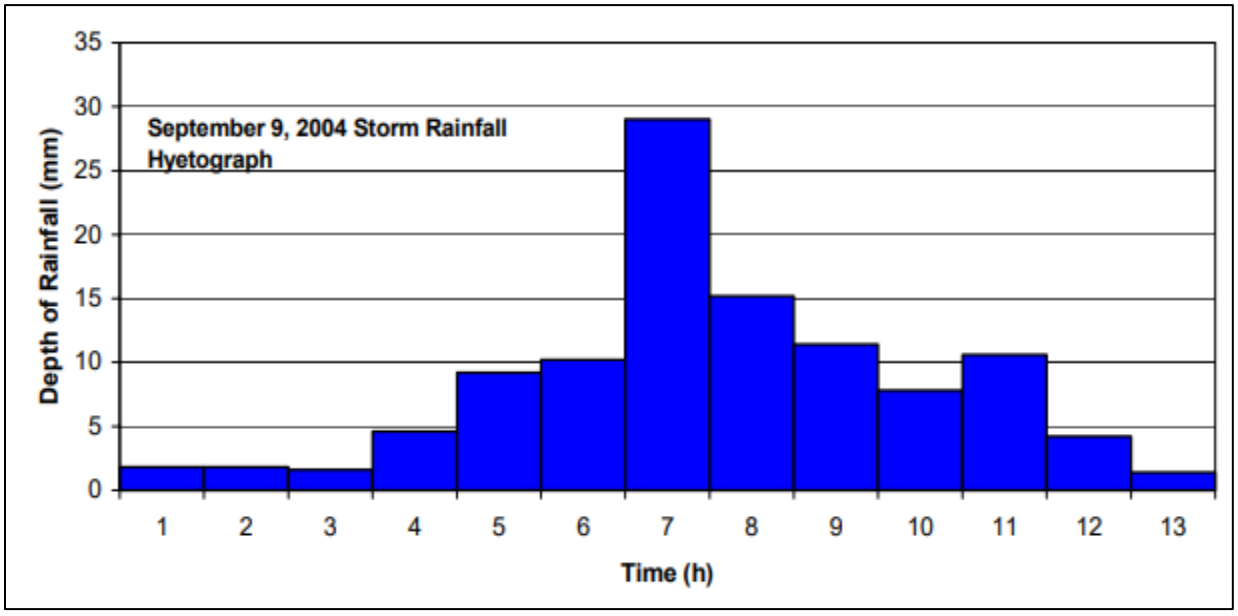

Figure 4-2: Excerpt from 2008 Potter Creek MDP Illustrating Hurricane Frances Rainfall Hyetograph

The regulatory storm for Butler and Arena Creeks is the Timmins event. The hourly inputs are described in literature values and are reproduced below from Ministry of Transportation 1997. An areal reduction factor of 0.94 was applied to the precipitation depths using an equivalent circular area of 70.7km^2.

Table 4-4: Timmins Event with Areal Reduction

Design Chart 1.04			
Equivalent Circular Diameter.		**9.488**	**km**
Equivalent Circular Area		**70.7**	**km2**
% of Timmins Storm Req'd		**94%**	
hour	**Depth (mm) No Reduction**	**Depth (mm) With Reduction**	**Depth (mm) Climate Change**
1	15	14.1	17.6

2	20	18.8	23.5
3	10	9.4	11.8
4	3	2.82	3.5
5	5	4.7	5.9
6	20	18.8	23.5
7	43	40.42	50.5
8	20	18.8	23.5
9	23	21.62	27.0
10	13	12.22	15.3
11	13	12.22	15.3
12	8	7.52	9.4
TOTAL	**193.0**	**181.4**	**226.8**

An important consideration in the precipitation data is the potential impacts in rainfall depths due to climate change. LTC, in partnership with FHIMP representatives, identified the recommended approach to quantify increased rainfall depths due to climate change. The methodology, rainfall depths, and peak flow results associated with the climate change scenario are discussed further in Section 4.5.

Jewell also participated in discussions with ECCC staff regarding precipitation statistics and the approach to assess and calculate outliers. As part of these discussions, Jewell acquired and reviewed the ECCC precipitation statistics tool. This review confirmed Jewell's in-house spreadsheet is consistent with the ECCC methodology. Jewell's in-house precipitation tool was used to include the 200-yr and 500-yr events since these return period events are not included in the standard Environment Canada IDF curves. The spreadsheet calculates the precipitation frequency curve using a Gumbel distribution.

Jewell included a test for outliers in the precipitation records. A rainfall depth with a standard deviation of 2.5 would be within the 95% confidence interval; the 2004 rainfall depth was found to be 5.7 times the standard deviation from the mean, corresponding to a theoretical 312-yr return period. All of the measured rainfall data has been included in our analysis. However, we note that the outlier resulting from the 2004 data may be omitted for statistical correctness at the discretion of the project partners. The large rainfall event in 2004 that skews the data set (see Table 4-5) could be considered a historic event, and it would be reasonable to have it categorized alongside the Timmins storm. Since the Timmins event is more severe than the 2004 rainfall, it would continue to govern in an assessment of historical storms.

Table 4-5: Unadjusted vs. Adjusted Trenton Airport Runoff Volumes

Storm Event	Rainfall Volume (mm)		% Difference
	Unadjusted	2004 Outlier Removed	
50-yr	98.6	86.7	13.7%
100-yr	108.1	94.3	14.7%
200-yr	117.6	101.8	15.6%
500-yr	130.1	111.6	16.5%
*Timmins	193.0	-	-

**Timmins Storm from MTO Design Chart 1.04*

4.1.3.1 Selection of Event Duration

An analysis of the watershed response was completed using Visual OTTHYMO. The recommended return period storms for floodplain mapping are derived from SCS and AES distributions with varying durations. In an assessment of the critical return period storm, Jewell compared the peak outflows from a VO model (see Section 4.3) for the 6, 12, and 24-hr duration events with both distributions. Any event less than 6 hours is not recommended since shorter duration events do not produce significant enough rainfall volumes to govern as the regulatory storm event.

The results are summarized in Table 4-6. Since the 24-hr duration with an SCS distribution produces the largest peak runoff rate, this criterion was selected for the rainfall-runoff model discussed further in Section 4.3. It is noted that the selection of the 24-hr, SCS Type II distribution for the governing return period storm is consistent with the findings from the 1988 TSH study.

Table 4-6: Comparison of AES vs. SCS Distributions with Varying Storm Durations (No Adjustment to Rainfall Depths)

Storm Duration (hr)	AES (m^3/s)	SCS (m^3/s)
6	16.5	29.6
12	19.2	37.4
24	21.5	38.1

4.1.4 Water Survey of Canada Stream Flows

There is a stream flow gauge located along Butler Creek at *Water Survey of Canada (WSOC)* Station 02D018 titled 'Proctors Creek Near Brighton'. The gauge is located near the intersection of County Road 30 and County Road 26, with a receiving drainage area that includes the upper half of the total Butler Creek watershed (see Figure 4-3).

The flow data of interest is the *Annual Maximum Instantaneous Peak Discharge.* The record length for the gauge is relatively short from 2003 to 2021, with only 16 years of annual instantaneous maximum peaks. Given the short data record, the prudent approach is to consider stream flow gauges for hydrologically similar watersheds. The flow gauges listed below were utilized to extend the data record. These gauges were selected based on similar watershed characteristics, record of stream flow gauge data, and proximity to the Butler Creek gauge. Areal differences are accommodated with a transposition of flows as described in Section 4.3. The stream flow gauge locations are shown in Figure 4-3.

Table 4-7: List of Local Stream Flow Gauges for Extended Data Record

Name	Station ID	Length of Record	Gross Drainage Area (km^2)
Wilton Creek near Napanee	02HM004	1965 - 2020	105
Shelter Valley Brook near Grafton	02HD010	1967 - 2021	63.8
Consecon Creek at Allisonville	02HE002	1970 - 2022	119.0
Cold Creek at Orland	02HK007	1982 - 2021	161.0
Rawdon Creek near West Huntingdon	02HK008	1983 - 2021	93.0
Mayhew Creek near Trenton	02HK011	1994 - 2021	33.0
Proctors (Butler) Creek near Brighton	02HD018	2003 - 2021	16.8

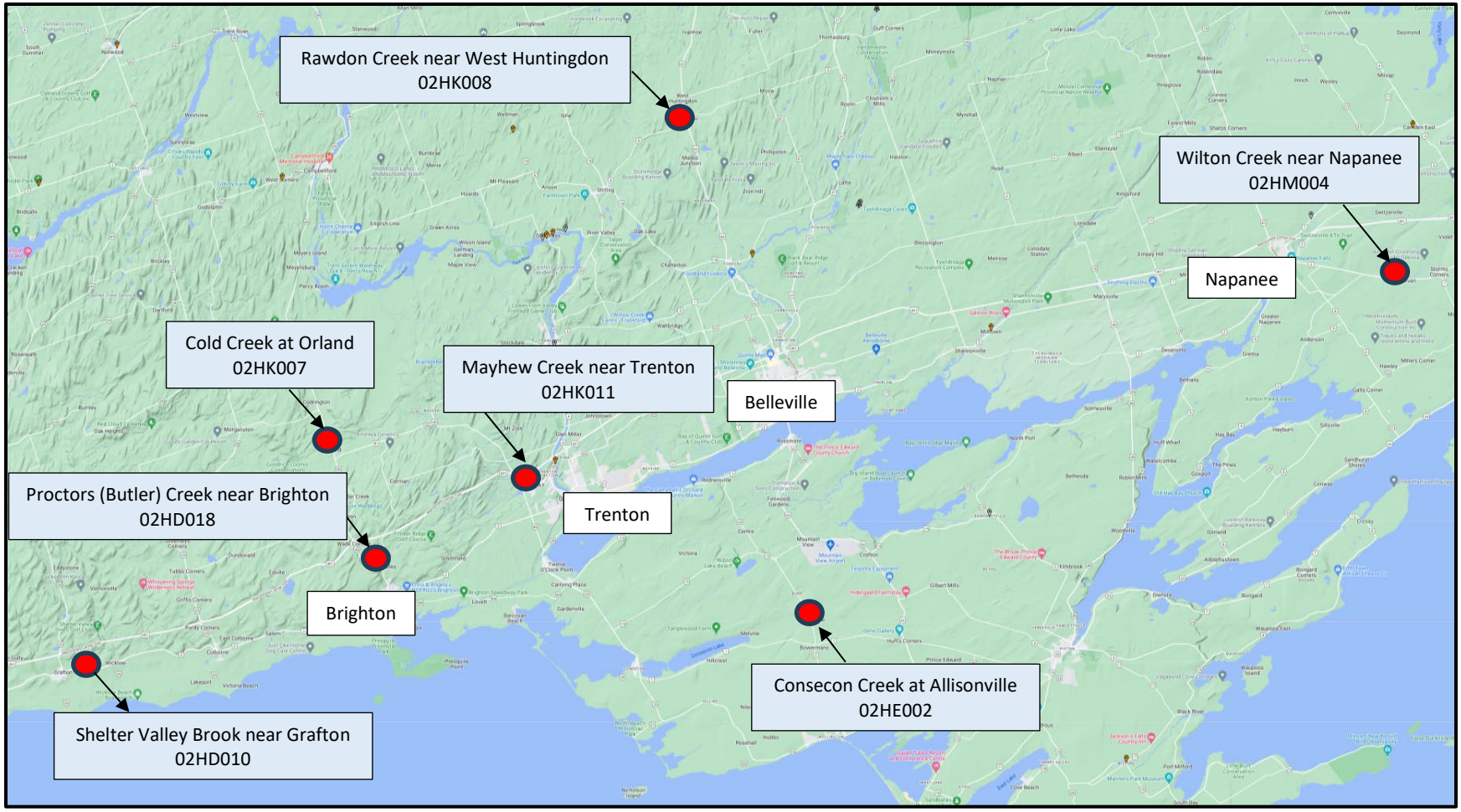

Figure 4-3: Local Water Survey of Canada Stream Flow Gauge Locations Near Butler Creek

4.2 Flood Frequency Analysis

The Consolidated Frequency Analysis V3.1 was used to complete the general frequency analysis with the 3-parameter lognormal distribution. The detailed results are reported in Appendix G for frequencies from the 2-yr up to the 500-yr return period.

For the purposes of obtaining return period flood flows, the General Frequency Analysis (GFA) component can be employed and is a recommended method in the 2002 MNR guidelines. This statistical component performs a peak flow frequency analysis using various methods. Parameters other than peak flows, such as stage or precipitation data, can also be calculated using a GFA.

From an assessment of the stream flow records, it is evident that the majority of the annual instantaneous peaks occur in the spring. This suggests a high probability that a severe flood event would be the result of a snowmelt event, or a combination of a snowmelt and precipitation event. The stream flow gauge records provide the best indication of the anticipated flow rates for a snowmelt and/or combined snowmelt & precipitation event. For this reason, the prudent approach is to complete a detailed assessment of nearby stream flow gauges to comprehend the expected flows in this scenario.

Since the Butler Creek data record does not have a sufficient data record for a single station GFA, the period of record was extended using the WSOC stream flow gauges listed previously in Table 4-7.

4.2.1 Instantaneous Peak Flow Unit Rate vs. Drainage Area

There are noticeable area differences among the drainage areas contributing to each local flow gauge of interest. Generally speaking, the average unit flow rate per square kilometer *decreases* as the drainage area *increases* (see Figure 4-4).

Larger drainage areas have unit flow rates in the range of 0.10 to 0.15 m^3/km^2. For example, given a theoretical drainage area of 150 km^2, one would expect the annual instantaneous peak on any given year to be approximately 19.5 m^3/s (0.13 x 150 = 19.5).

Smaller drainage areas have higher unit flow rates. One can see that Butler Creek follows the trend by having the greatest average unit rate at 0.31 m^3/km^2.

The trend identified in the chart below is an important consideration when analyzing a stream flow gauge with a relatively small drainage area; it ensures that the increase in peak flow per unit area is accounted for to avoid underestimating the flow rates in the extended data record.

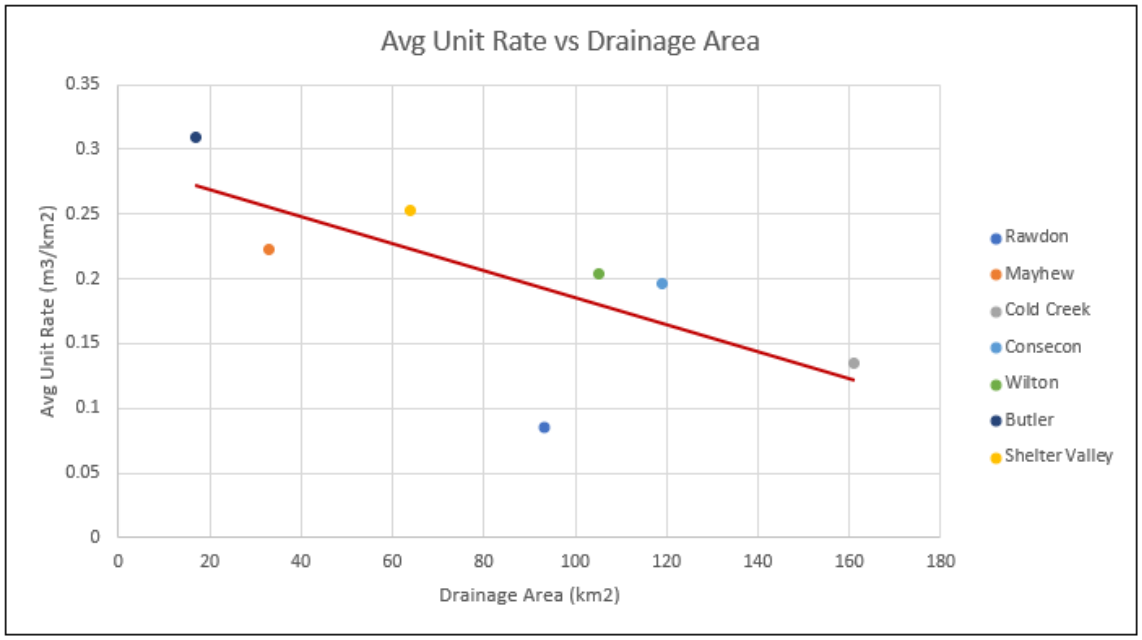

Figure 4-4: Graphical Display of Drainage Area vs. Annual Instantaneous Unit Peak Flows for Local Creeks

For the seven (7) drainage areas applied in the above chart, the average drainage area is 84.5 km^2 with an average unit rate of 0.20 based on the equation for the line of best fit. An adjustment factor was applied for each year of the extended data records to account for the flow rate vs drainage area relationship. This adjustment factor was used to gather a reasonable estimate for the Butler Creek instantaneous peak flow for each given year.

4.2.2 Merged Butler & Local Creek Data Record

Figure 4-6 illustrates the extended data record. The data points from 2003 to 2021 are obtained from the Butler Creek flow gauge, while the remaining data points are based on the adjusted instantaneous peaks from other nearby gauges.

4.2.3 General Frequency Analysis - Peak Flow Summary

The GFA results for the 50-, 100-, 200-, and 500-yr return periods are summarized in Table 4-8.

Table 4-8: Summary of Maximum Peak Flows from HEC-SSP General Frequency Analysis

Return Period	Peak Flow (m^3/s)
50-yr	18.8
100-yr	23.3
200-yr	37.3
500-yr	45.3

The results in Table 4-9 represent the expected peak flows at the Butler Creek flow gauge location. For return period flows that include the entire Butler Creek watershed, a transposition of flows is required (see Figure 3-5). The transposed return period flows for the full watershed are summarized in Table 4-10.

Transposition and interpolation of data from a stream gauge can be done based on the Modified Index Flood method as follows:

$Q2 = Q1 [A2 / A1]^{0.75}$

Where:
Q1 = Known peak discharge
Q2 = Unknown peak discharge
A1 = Known basin area
A2 = Unknown basin area

Figure 4-5: Excerpt from MTO Online Drainage Manual

Table 4-9: Summary of Maximum Peak Flows with Transposition of Flows Applied to Account for Full Watershed Area

Return Period	Peak Flow (m^3/s)
50-yr	27.9
100-yr	34.5
200-yr	42.4
500-yr	55.3

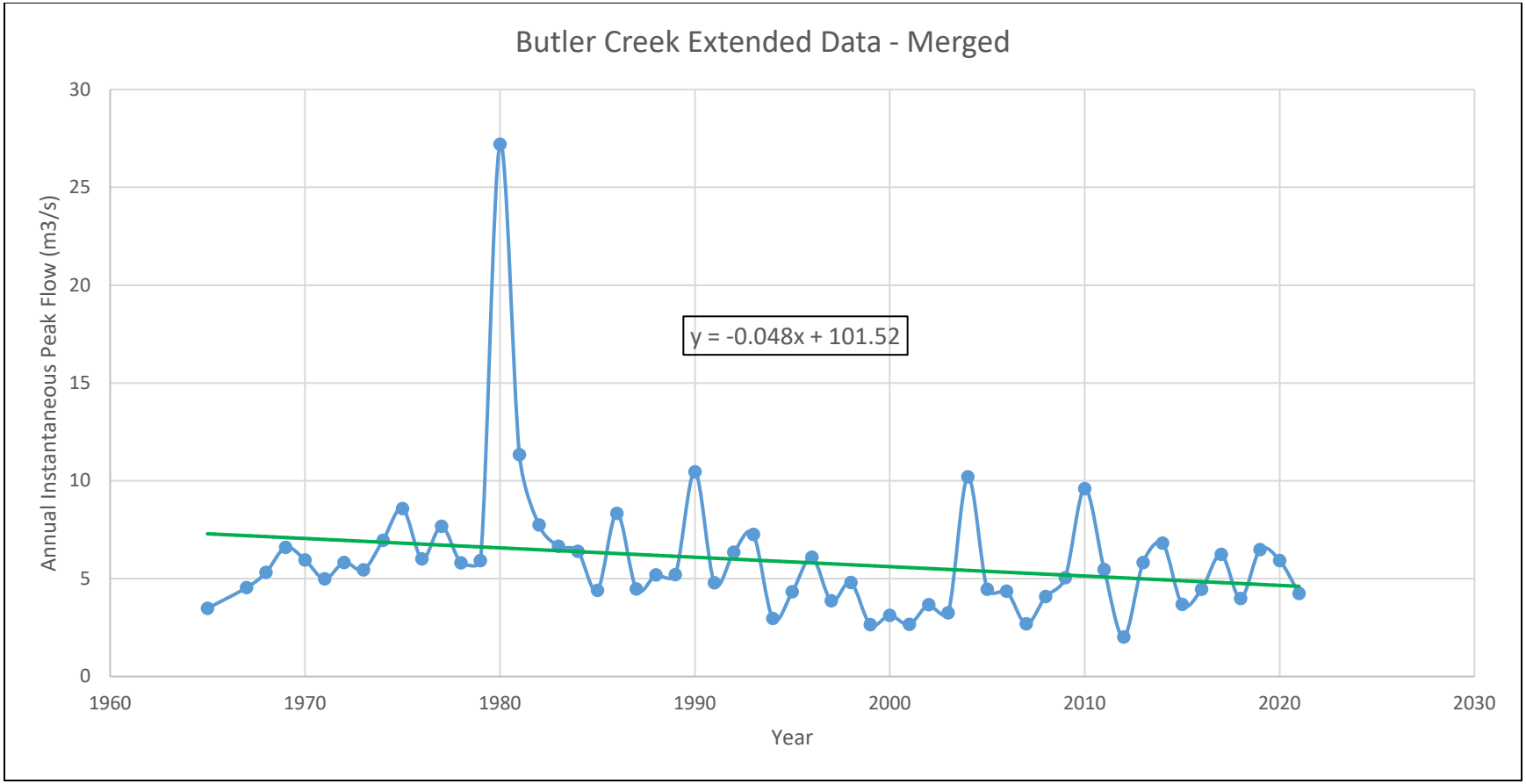

Figure 4-6: Summary of Annual Instantaneous Peak Flows with Extended Data for Butler Creek WSOC Flow Gauge

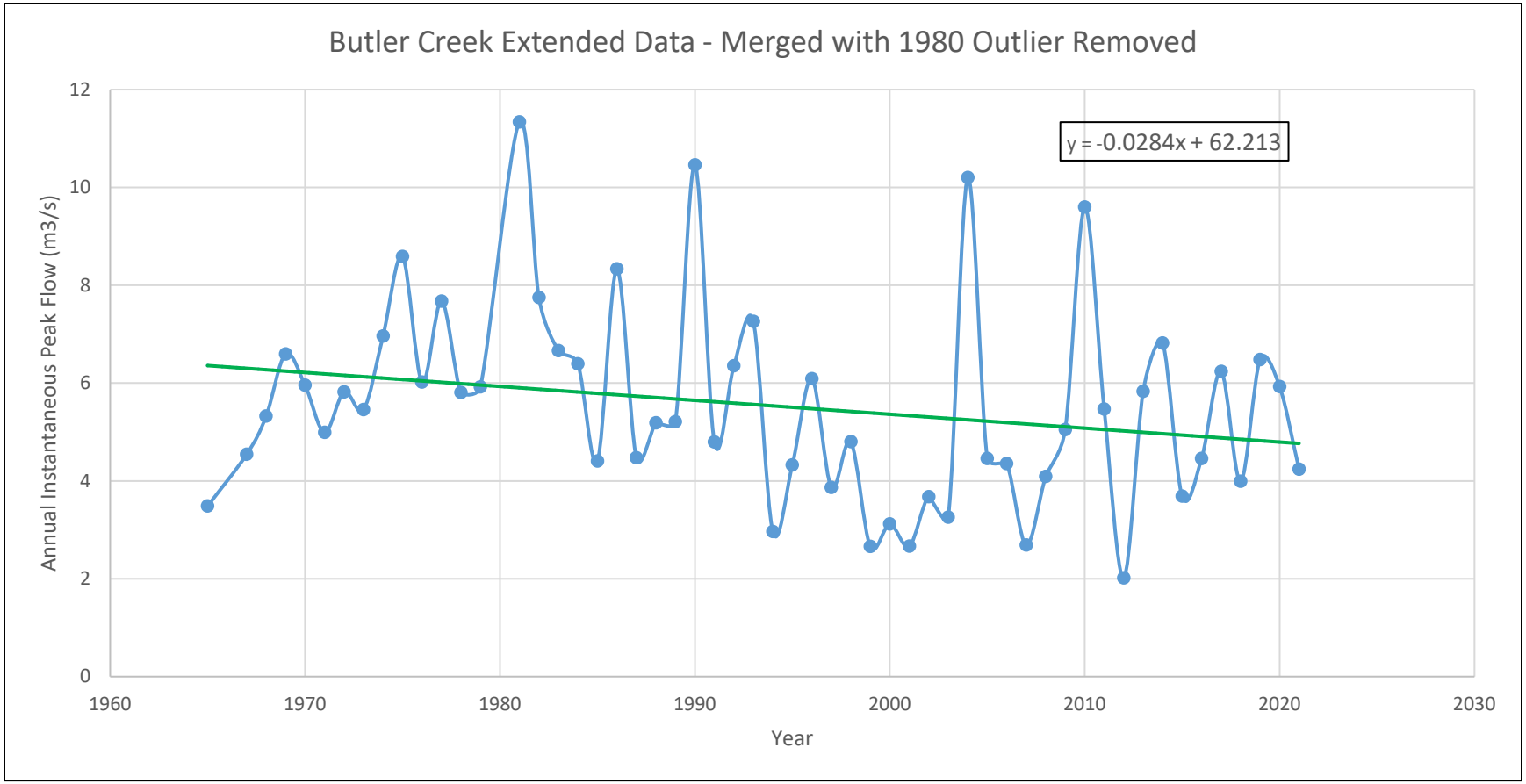

Figure 4-7: Summary of Annual Instantaneous Peak Flows with Extended Data for Butler Creek WSOC Flow Gauge; 1980 Outlier Removed

4.3 Rainfall-Runoff Modeling

The SCS Curve Number (CN) method is commonly applied in hydrology models for precipitation-driven runoff modeling applications. It relies on the soils and land use data to establish the loss method with calculation of a CN. The modeling approach is supported by Visual OTTHYMO (VO) and HEC-HMS.

All modelling programs are simplifications of reality and are limited in their capabilities. While VO and HMS are both well-established and recommended software programs, they are limited by input parameters and the uncertainty associated in the data sets and calculations used to produce these inputs. The modelling programs are acceptable for simulating peak flows to be used in the hydraulic model. The most recent software publications have been used for this project.

Both software programs were tested and HEC-HMS was selected for Butler Creek given the size of the watershed. VO was selected for Arena Creek since it is much smaller, although HEC-HMS would be equally suitable.

Notable input parameters for the HEC-HMS model includes:

- Precipitation – intensity, duration and frequency as well as distribution.
- Catchment area.
- Percent imperviousness – runoff volume, time to peak and peak flow increase with percent imperviousness.
- Soil conditions – these determine how much and how quickly water will be removed from runoff through infiltration. This may be expressed as a curve number, or by a runoff coefficient or using an infiltration model such as Horton's Infiltration.
- Slope – peak flows increase with slope.
- Initial abstraction – depth of precipitation input that is subtracted from the model and does not contribute to runoff. This value is different for impervious and pervious areas and is expressed as two values.
- Manning's n – frictional coefficient that affects the time to peak. This value is different for impervious and pervious areas and is expressed as two values.
- Basin lag or time to peak.

The peak flows simulated in VO for each storm event at their respective node of interest are summarized below. Recall that the node locations are illustrated in the catchment drawings in Appendix B.

Future full build-out conditions for the Municipality of Brighton per Schedule 2 of the Official Plan (see Appendix A) was also considered. The Municipality of Brighton is located at the downstream end of the overall Butler Creek watershed. In a full build-out scenario, the increase in hardened surfaces within the urban boundary will increase the peak flows from local developments. However, the peak runoff from these development areas would have a shorter time to peak relative to their existing condition. The result is a separation between the early peak from the urban areas and the larger peak from the majority of the remainder of the Butler Creek watershed, creating a slight decrease in peak flow in the regulatory storm event (see **Error! Reference source not found.**). Since the bulk of the upper Butler Creek watershed produces a much larger peak flow than the urban core of Brighton, it governs in the

maximum peak flow in the system. The existing conditions are used for the floodplain mapping update since this condition would yield slightly broader flood extents.

4.3.1 Calibration and Validation

Calibration of the model was completed through a 3-step process.

Step 1: Calibrate HEC-HMS model to Frances event by adjusting CN, storage coefficient and time of concentration.

Step 2: Calibrate model to 1% AEP using global adjustment to curve number.

Step 3: Calibrate to remaining return period events with dynamic AMC adjustment.

4.3.1.1 Calibration to Hurricane Frances

As noted in Section 4.2, the large rainfall event in September of 2004 was well documented locally in terms of hourly rainfall and total depth, both measured in millimeters. This rainfall data, combined with the stream flow gauge readings at that time for Butler Creek, allowed for a calibration assessment with the HMS model.

In previous studies of Hurricane Frances, led by neighbouring Quinte Conservation Authority, it was found that AMC II soil conditions for a rainfall-runoff model are not suitable for the analysis of the Frances event. It was concluded that hydrology programs need to be adjusted to AMC I when calculating peak flows for the Hurricane Frances event.

The Butler Creek stream flow gauge measurement was taken near the intersection of County Road 30 and County Road 26. This is the same location as Hydrologic Node A in the Jewell model. Therefore, only sub-catchment 301 and 302 can be calibrated. A review of their land cover and catchment characteristics indicates they are suitable candidates for a peak flow adjustment per Design Chart 1.06 of the 2008 MTO Drainage Manual.

Design Chart 1.06 is intended to adjust peak flows for catchments that have considerable watershed storage. Watershed storage can be abundant in catchments with heavy pond, swamps, wetland and lake coverage. Chart 1.06 allows for up to 25% coverage of these areas. For Butler Creek, sub-catchment 301 has 23% coverage of lakes and wetlands. Sub-catchment 302 has 23% lakes and wetland coverage. Per the design chart, a peak reduction factor is 0.55 for sub-catchment 301, and 0.77 for sub-catchment 302 is appropriate.

Based on the above information, Jewell adjusted the HMS model for AMC I and watershed storage to account for the dry conditions that were present when Hurricane Frances occurred. These adjustments are critical to ensure the peak flows ultimately applied in the regulatory event model are not underestimated as a result of the calibration technique. The calibrated model compares well to the stream flow gauge as seen in Figure 4-8.

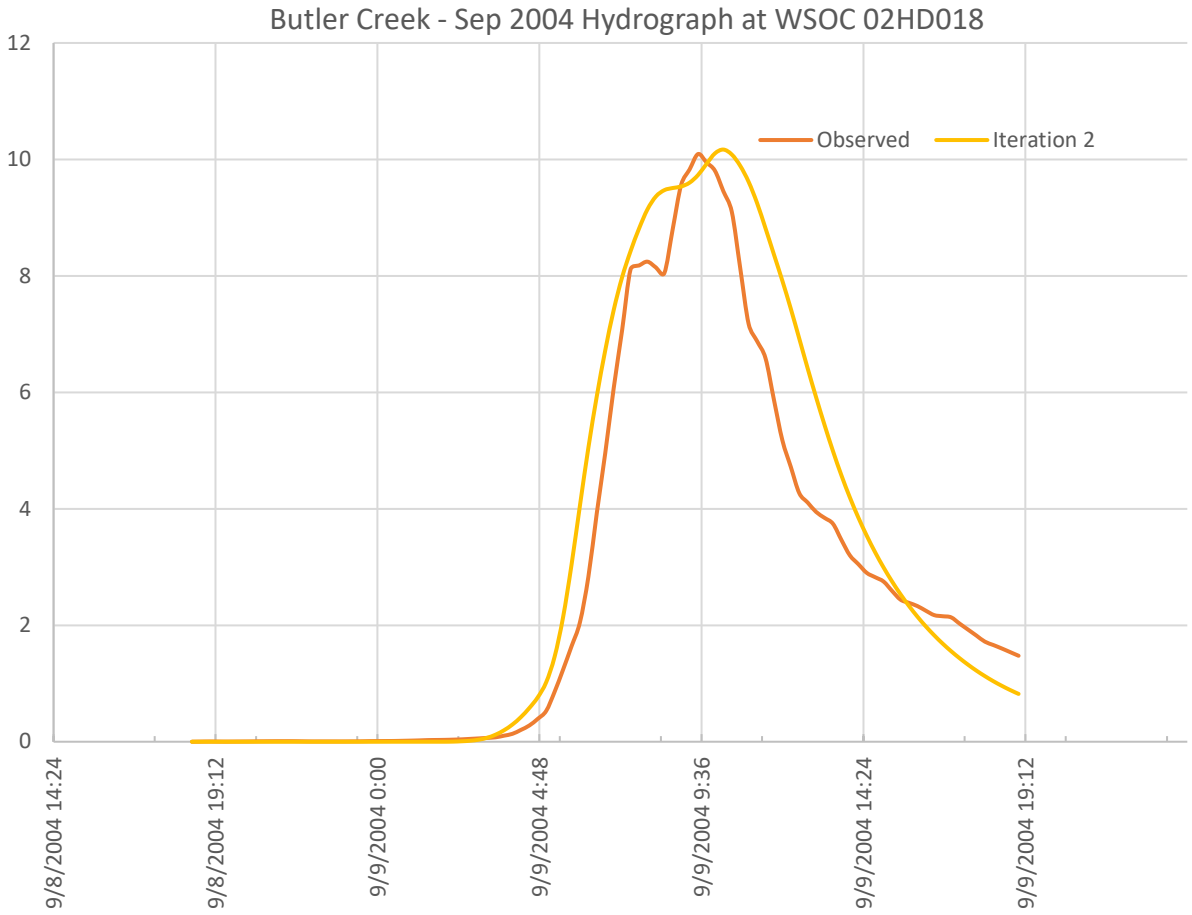

Figure 4-8: Butler Creek Model Calibration to Frances

4.3.1.2 Calibration to 1% AEP

After the shape and amplitude of the hydrograph was calibrated to the Frances event, the second step was to calibrate to the 100-yr return period event. This was completed by applying a global factor adjustment to the CNs until the 100-yr peak was reasonably reproduced by the model. This adjustment took into account the change from AMC 1 to AMCII conditions such that the adjusted model represented the AMC II conditions.

The events are plotted on semi-log scales in Figure 4-9. The yellow line represents the model outputs with calibration to the 100-yr event. While providing acceptable agreement with the GFA results in the 50-yr to 100-yr range, the HEC-HMS model underestimates the more frequent return period events and overestimates the less frequent events. It follows that the HEC-HMS model will overestimate the larger Timmins precipitation event that exceeds the return period precipitation depths.

Figure 4-9: Butler Creek Comparison of GFA and HMS Model – Calibration

4.3.1.3 Calibration to Full Range of Return Period Events

To correct the model for the full range of return period events, the HEC-HMS model is fitted to the GFA curve using a dynamic AMC adjustment. Antecedent moisture conditions, accounted in the curve numbers, which were matched at the 100-yr return period frequency, were adjusted higher for the more frequent return period events and lower for the less frequent events. CN value adjustments were tested in the HEC-HMS model by iteration until a good agreement was found with the GFA results. The process was repeated for each of the return period events. The corrected model results are shown Figure 4-9 as the red line.

The Timmins events for Butler Creek will follow the trajectory of the dashed red lines with peak flows determined from the corrected models as indicated by the red "X".

The dynamic adjustments are indicated in Figure 4-10.

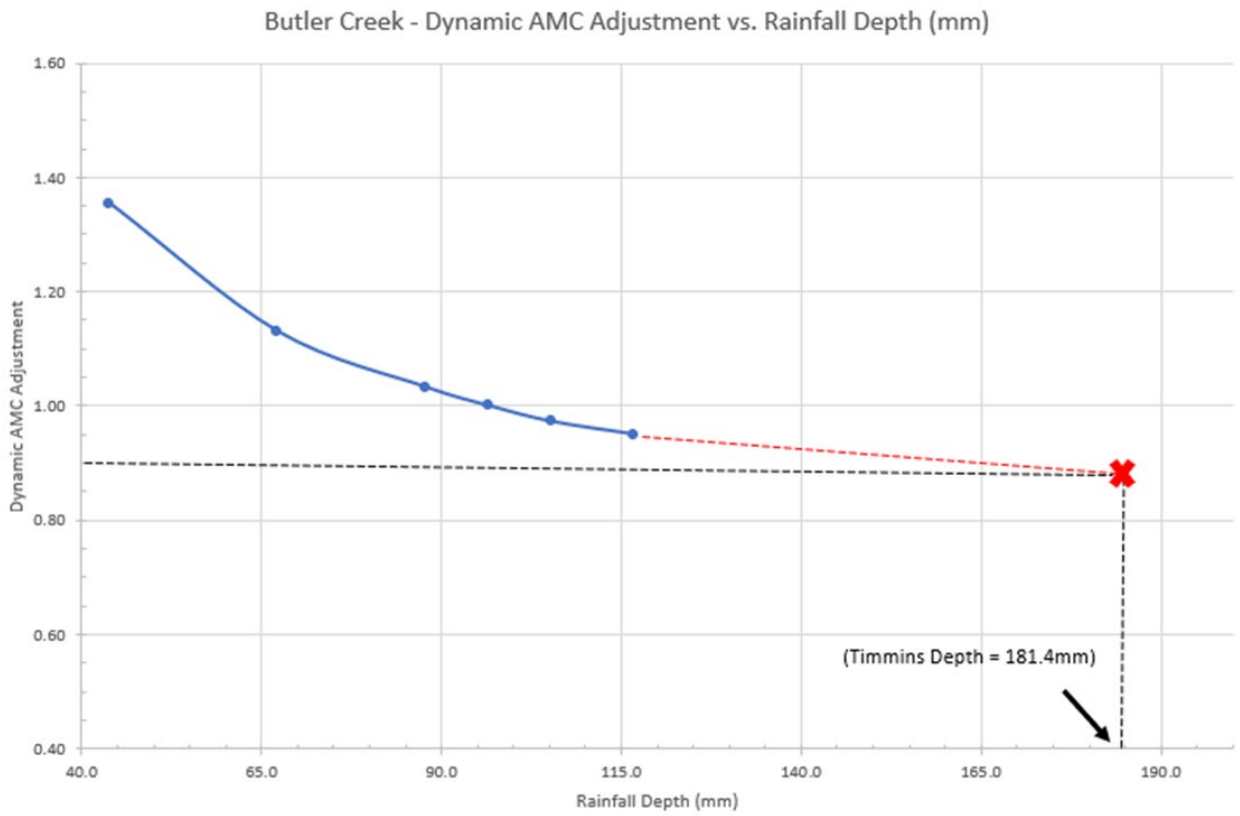

Figure 4-10: Dynamic AMC Adjustments for Butler Creek

4.3.2 Hydrologic Input Summary

A hydrology input summary is provided below in Table 4-10 for existing land cover and full development conditions based on the zoning identified in the Official Plan. This summarizes the area, curve number, time of concentration and storage coefficient applied for each sub-catchment.

Table 4-10: Summary of Hydrologic Inputs for Butler Creek Catchments in HMS Model

Catchment ID	Area (km2)	Initial Abstraction	CN	Impervious (%)	Time of Concentration (hr)	Storage Coefficient (hr)
301	4.50	5.00	37.6	0.0	0.81	1.51
302	13.68	5.00	42.3	0.0	1.75	3.25
303	1.92	5.00	36.7	0.0	0.81	1.39
304	5.73	5.00	39.5	7.2	0.74	1.26
305	1.57	5.00	40.0	33.3	0.40	0.68
306	0.16	5.00	38.9	20.0	0.40	0.68

4.3.3 Loss Method

Jewell selected the curve number loss method since it accounts for both land cover and hydrologic soils group information. It was also selected because of the reputable sources available for this information. Curve numbers were selected based on guidance from the CVC SWM guidelines in addition to MTO Design Charts. A look-up table was used to connect each land cover sub-area to its corresponding soil type. Attribute tables in ArcGIS were utilized to develop the detailed weighted curve number applied to each sub-catchment. Another common loss method that was investigated was the Green-Ampt method. However, it was not selected since this method was found to be extremely sensitive to the soil types and hydraulic conductivity values. Since no boreholes or test pits were included as part of the project, this loss method was not selected.

AMC II per Chapter 8 of the MTO Drainage Manual was applied for antecedent moisture conditions (AMC). This represents 'average' soil conditions. Saturated soil conditions (AMC III) were not selected because this condition, combined with the statistical return period rainfall events, would produce a peak flow beyond the selected return period frequency. Saturated conditions were also not selected because the General Frequency Analysis addressed spring melt conditions since the instantaneous annual peaks in the flow gauge data sets consistently occur during the spring snowmelt season.

4.3.4 Lag Time / Time of Concentration

Jewell applied the SCS Lag Time method to determine time of concentration and lag time values. This method was selected since it is derived from a study of watersheds that have drainage areas up to 24 km^2. The sub-catchments within Butler Creek have a maximum drainage area of 13.5 km2, which is with the range of accepted limits. It was also selected because it accounts for land cover and soil types by incorporating the curve number value to estimate a retardance factor. The SCS lag time method is described in the *Hydrology National Engineering Handbook* published by the United States Department of Agriculture and the Natural Resources Conservation Service.

4.3.5 Channel Routing

Channel routing was completed using the Muskingum-Cunge method. This method is applicable for reaches with relatively small slopes (majority of Butler Creek has a watershed slope of approximately 0.9%) and allows the user to input a cross-section to represent the ground surface data for the channel and overbank areas. Cross-sections were obtained from the terrain data and then simplified into an eight-point cross-section (see Figure 4-8).

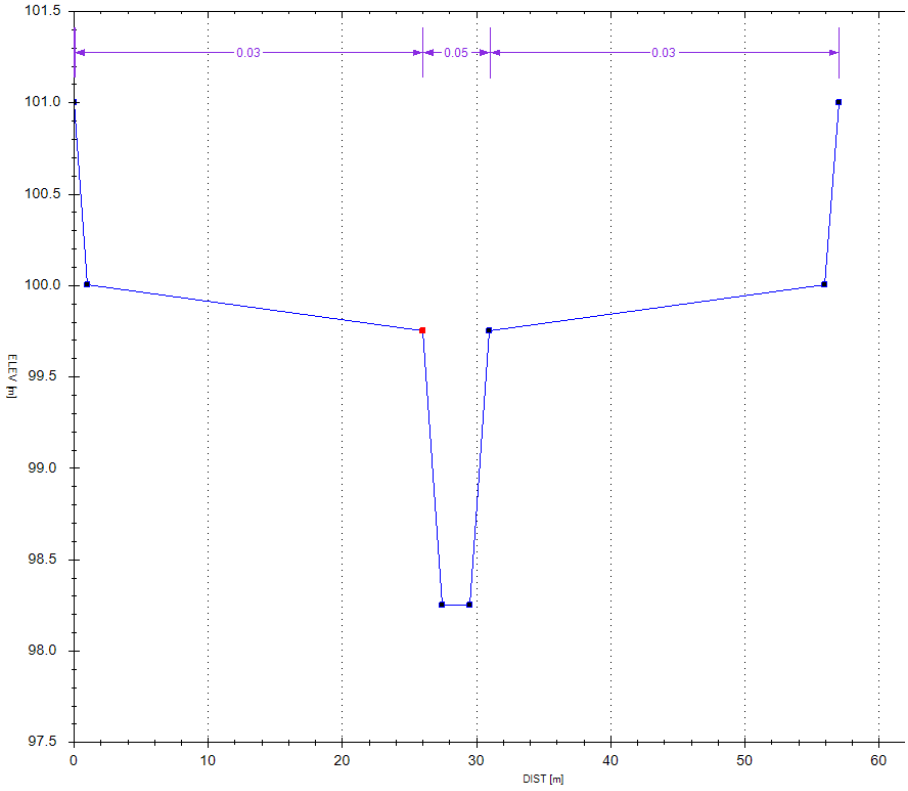

Figure 4-11: Example Channel Cross-Section

The Muskingum-Cunge method was also selected since it incorporates Manning's n values to represent expected roughness for the channel and overbank areas. The applied Manning's n values are based on the design charts in the *MTO Drainage Manual*.

4.4 Index Flood Analysis

Jewell employed the Index Flood Analysis following the methodology established by the Ontario Ministry of Natural Resources to estimate design flows and assess the hydrology of the contributing drainage area.

The Index Flood method relates the annual peak instantaneous flow determined for 247 stream gauges across Ontario to drainage area. Twelve regions across the province were identified as having similar characteristics and a regression curve was developed for each region. See Figure 4-12. Note that the Butler Creek watershed is located near the boundaries of Regions 1 and 8.

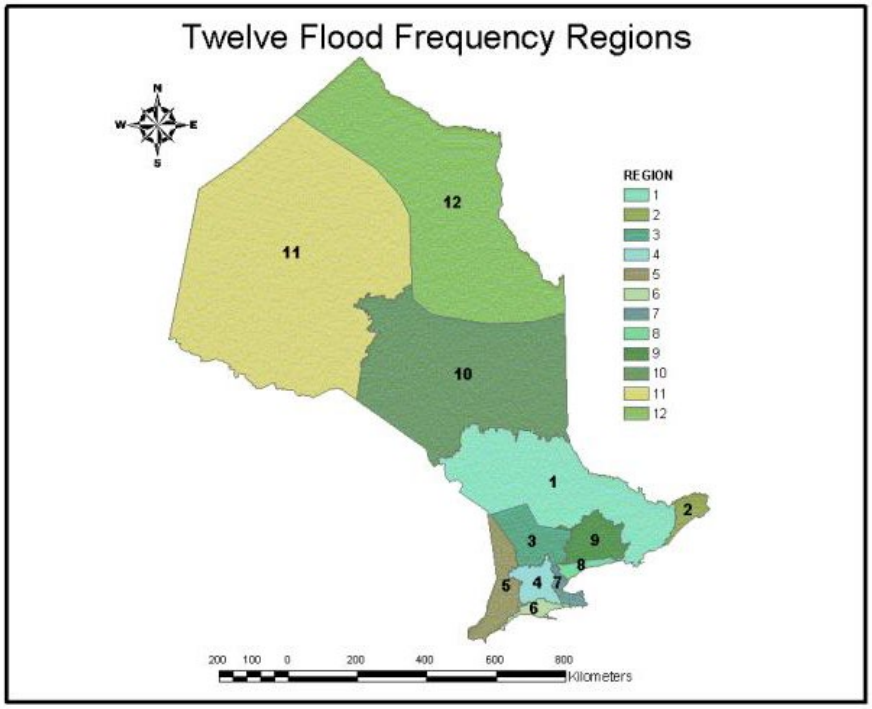

Figure 4-12: Index Flood Regions

The 2-yr flows are resolved directly from the equation using the constant and exponent from Table 4-17. Other return period flows may be derived from the 2-yr flow by multiplying with the factors provided in Table 4-18. The region is based on the location of the catchment and selects the appropriate constants; Butler Creek is near the boundary of Regions 1 and 8. Therefore, both methods were included in the Butler Creek presentation of peak flows from Section 4.1 (see Table 4-2).

Equation: Index Flood Method

$$Q_2 = CA^n$$

Where:

Q_2 = 2-year return period (3 parameter Log Normal) flood
A = Drainage Area (km^2)
C = constant
n = exponent (slope of the line)

Table 4-11: Table of Constant (C) and Exponent (n) for use in the Modified Index Flood Equation

Region	Constant (C)	Exponent n
1(a)	0.22 ($A < 60$ km^2)	1.000
1 (b)	0.73 ($A > 60$ km^2)	0.707
2	0.51	0.896
3	0.20	0.957
4	0.71	0.842
5	0.45	0.775
6	0.41	0.806
7	1.13	0.696
8	0.73	0.785
9	0.40	0.810
10	0.28	0.849
11	0.38	0.706
12	0.59	0.765

Table 4-12: Ratio of Various Flood Frequencies to Q_2

Region	$Q_{1.25}/Q_2$	Q_2/Q_2	Q_5/Q_2	Q_{10}/Q_2	Q_{20}/Q_2	Q_{50}/Q_2	Q_{100}/Q_2	Q_{200}/Q_2	Q_{500}/Q_2
1	0.95	1.00	1.24	1.43	1.62	1.86	2.04	2.23	2.48
2	0.94	1.00	1.29	1.52	1.74	2.04	2.25	2.45	2.72
3	0.93	1.00	1.33	1.62	1.89	2.25	2.54	2.82	3.19
4	0.93	1.00	1.32	1.57	1.80	2.13	2.37	2.60	2.92
5	0.94	1.00	1.27	1.50	1.74	2.06	2.34	2.62	2.96
6	0.91	1.00	1.43	1.78	2.13	2.60	2.96	3.33	3.84
7	0.94	1.00	1.27	1.47	1.66	1.90	2.07	2.24	2.47
8	0.92	1.00	1.43	1.85	2.30	2.96	3.46	4.00	4.77
9	0.94	1.00	1.27	1.50	1.72	2.02	2.26	2.49	2.80
10	0.95	1.00	1.20	1.35	1.48	1.64	1.77	1.90	2.07
11	0.93	1.00	1.33	1.62	1.90	2.32	2.67	3.05	3.55
12	0.94	1.00	1.22	1.38	1.52	1.68	1.80	1.90	2.05

Table 4-13: Limitation of Application of Index Flood Method Based on Drainage Area

Region	Minimum (km^2)	Maximum (km^2)
1	0.11	9270
2	76.1	3816
3	86.0	3960
4	2.5	5910
5	14.2	4300
6	5.2	697
7	63.5	293
8	4.9	800
9	24.3	1520
10	18.6	11900
11	0.7	24200
12	4250	94300

4.5 Climate Change

The technical requirements to address climate change were provided from the project partners in a technical memorandum titled *Incorporating Climate Change in Floodplain Mapping under the Flood Hazard Identification and Mapping Program.*

Butler Creek is located within Zone 3 of the *Flood Hazard Criteria Zones of Ontario and Conservation Authorities*. The Timmins event produces a significantly larger peak flow than the 100-yr storm. Therefore, the Timmins storm is the regulatory event.

Per the memorandum, the hourly rainfall that corresponds to the regulatory storm was adjusted using the mean annual temperature change obtained from the federal climate data portal for the Municipality of Brighton. Jewell followed the Ontario MNRFs recommendation of obtaining the value for the 50th percentile of the mean annual temperature change based on the CMIP5, RCP 4.5 scenario.

The year 2071 was selected since this is the furthest projected date in the Excel download from the federal climate data portal. The mean annual temperature change for the year 2071 is an increase of 3.2 degrees Celsius. An excerpt from the technical memo defining the equation used to convert historic rainfall intensity and temperature change to the future estimated rainfall intensity is provided below.

As a consequence of climate change, the Timmins event will increase from 181.4mm to 226.8mm (see Figure 4-4).

Determine future estimated rainfall intensity value (R_P), according to the historic estimated rainfall intensity (R_C) and the long term (30-year mean) annual mean temperature change (ΔT) using equation (1):

$$R_p = R_c \, x \, 1.07^{\Delta T} \qquad (1)$$

Figure 4-13: Excerpt from Technical Memo with Equation for Future Estimated Rainfall Intensities

It should be noted that climate change impacts on peak flows are inherently difficult to quantify due to the reality of Earth's extremely complex global atmospheric and hydrologic systems. The climate change adjustment applied above relies on the relationship between temperature increase and rainfall depth. Therefore, the adjustment addresses a climate change scenario for a precipitation-driven flood event.

Based on calculations and an assessment of the data, Jewell expects that climate change would have a more noticeable impact on precipitation-driven runoff events rather than a snowmelt driven runoff event.

The stream flow gauge data presented in Section 4 generally illustrates the expected return period flows that would occur during a freeze-thaw/snowmelt condition. This is because most instantaneous annual peaks occur in the spring months. These events produce high peak flows due to a large volume of stored water content that is released when warmer temperatures occur.

With warmer seasonal temperatures generally expected due to climate change, it is reasonable to expect less stored water content during the winter months, since the period of below-freezing temperatures would be shortened with higher average temperatures. With less stored water content, it is possible that instantaneous peaks produced in a spring melt condition may not increase even with increased rainfall depths for single event conditions.

Interestingly, the extended stream flow gauge data record from Section 4 shows a slight downward trend in annual instantaneous peak runoff based on the full data set obtained from local stream flow records. This supports the likelihood that climate change will have a greater impact on heavy precipitation-driven rainfall events rather than the freeze-thaw/snowmelt driven event. **Therefore, Jewell followed the guidance and information from the federate climate data portal**.

4.6 Arena Creek

As a supplementary component to the Butler Creek Floodplain Mapping Update, the flood hazard limit for Arena Creek will also be delineated since it flows through the eastern portion of the Municipality's urban area. With a substantial amount of Arena Creek and its catchment areas being located within the Municipality's urban boundary, a defined flood hazard limit will assist LTC and Brighton staff in responding to the development pressures expected within the vicinity of this creek system.

The methodologies and data sources applied in the Arena Creek hydrologic analysis are the same as those described for Butler Creek, with the exception of a flood frequency analysis. There is no flow gauge for Arena Creek due to its relatively small size. Stream flow gauges typically have large drainage areas and minimal development. Arena Creek is the opposite. It has a relatively small drainage area and needs to be assessed for a heavy future development scenario given the amount of its watershed that is within the urban boundary. Therefore, model simulations were completed using the VO software.

The sub-catchment areas for Arena Creek are shown in the supplemental catchment area drawing in Appendix B. This shows both Butler and Arena Creeks. One can see that Arena Creek has a much smaller watershed relative to Butler Creek. Land cover and soils maps for Arena Creek are included in Appendix B and C.

Arena Creek was discretized into six sub-catchments. The upper catchments (100, 101, & 200) will have relatively low development pressures in the future and can be represented with the Nashyd command. The downstream catchments (300, 400, & 500) are anticipated to have significant future development and were subsequently modeled using the Standhyd command. A comparison of hydrologic inputs for existing and future conditions is summarized below. Catchment 300 is assigned a Nashyd command in its current state given the low impervious area. However, the Official Plan indicates significant development in the future; therefore, Catchment 300 was translated to a Standhyd in the future full built-out scenario.

Table 4-14: Arena Creek Existing Condition Peak Flows at Each Hydrologic Node of Interest

Hydrologic Node	50-yr	100-yr	200-yr	500-yr	Timmins	Timmins + Climate Change
A	3.5	4.0	4.6	5.4	5.8	7.9
B	10.5	12.3	14.1	16.5	16.5	22.4
C	11.7	13.6	15.7	18.5	18.3	24.9
D	12.8	15.1	17.3	20.4	20.0	27.1

Table 4-15: Arena Creek Future Full Build-Out Condition Peak Flows at Each Hydrologic Node of Interest

Hydrologic Node	100-yr	Timmins	Timmins + Climate Change
A	4.5	6.2	8.4
B	14.5	17.1	22.6
C	17.3	20.1	26.5
D	20.8	23.8	31.4

Table 4-16: Summary of Core Hydrology Inputs for Rural Arena Creek Catchments (Existing Conditions)

Catchment ID	Command	Area (ha)	Mean Slope (%)	Watershed Length (m)	T_p (hr)	CN
100	Nashyd	61	4.6	1,331	0.72	65.8
101	Nashyd	82	7.7	1,301	0.47	72.3
200	Nashyd	24	4.6	767	0.32	78.7
300	Nashyd	48	4.0	491	0.18	87.8

Table 4-17: Summary of Core Hydrology Inputs for Urban Arena Creek Catchments (Existing Conditions)

Catchment ID	Command	Area (ha)	Channel Routing Length (m)	TIMP	XIMP
400	Standhyd	50	726	0.34	0.25
500	Standhyd	62	728	0.21	0.15

Table 4-18: Summary of Core Hydrology Inputs for Rural Arena Creek Catchments (Future Full Build-Out Conditions)

Catchment ID	Command	Area (ha)	Mean Slope (%)	Watershed Length (m)	T_p (hr)	CN
100	Nashyd	61	4.6	1,331	0.68	68.1
101	Nashyd	82	7.7	1,328	0.29	87.2
200	Nashyd	24	4.6	767	0.28	83.3

Table 4-19: Summary of Core Hydrology Inputs for Urban Arena Creek Catchments (Future Full Build-Out Conditions)

Catchment ID	Command	Area (ha)	Channel Routing Length (m)	TIMP	XIMP
300	Standhyd	48	491	0.54	0.39
400	Standhyd	50	726	0.65	0.50
500	Standhyd	62	728	0.65	0.50

4.7 Presentation of Peak Flows

The maximum peak flows for Butler Creek are summarized in Table 4-20. Since the Timmins storm yields a greater peak flow than the 100-yr event, **the Timmins storm is selected as the regulatory peak flow.** A climate adjustment was then applied to the regulatory storm to produce the climate-adjusted peak flow rate.

The peak flow rates in the table below will be applied in the hydraulic model to identify the flood hazard limits. Peak rates were selected after review of a variety of hydrologic modeling scenarios. The return period events are governed by the flow results from the SCS Curve Number method since this approach produced the largest peak values. The Timmins event was obtained using the SCS CN method since its peak flows for historic events can only be calculated using rainfall-runoff software programs.

Table 4-20: Summary of Maximum Peak Flows for Butler Creek

Hydrologic Node	Annual Exceedance Probability						Timmins*	Timmins + Climate Change
	50%	10%	2%	1%	0.5%	0.2%		
A	5.0	9.2	13.5	15.5	17.6	20.8	31.3	45.9
B	8.9	15.9	23.3	26.5	29.9	35.1	48.1	70.1
C	11.3	19.9	28.5	32.3	36.1	42.0	53.0	76.8
D	11.5	20.2	29.0	32.8	36.6	42.7	53.5	77.5

**Denotes regulatory storm event.*

A summary of peak flows for each of the hydrologic modeling methods is provided in Table 4-21. This includes the following methodologies:

- General Frequency Analysis
- SCS Curve Number
- Index Flood Analysis
- Climate Change Adjustments

Table 4-21: Summary of Peak Flows from Alternative Methods (m^3/s)

Return Period	1988 TSH	GFA	Index Flood		HMS
			Region 1	Region 8	
50-yr	25.8	27.9	11.2	28.7	29.0
100-yr	29.9	34.5	12.2	33.6	32.8
200-yr	-	42.4	13.4	38.8	36.6
500-yr	-	55.3	14.9	46.3	42.7
***Timmins**	96.8	-	-	-	**53.5**
Timmins + Climate Change					**77.5**

**Denotes regulatory storm event.*

5 Hydraulics

The hydraulic analysis was prepared using HEC-RAS version 6.4.1. The hydrology results from the HEC-HMS model were applied in the HEC-RAS model to delineate the flood hazard limits for the Butler Creek floodplain mapping update. The Butler Creek floodplain is characterized by a well-defined channel with several spill locations that result in localized urban areas that are particularly susceptible to the flood hazard. This section describes the following as they relate to Butler Creek:

- bathymetry,
- cross-sections,
- storage impacts,
- bridge/culvert crossings,
- and spill locations.

Model sensitivities, a comparison of historical and 2023/24 draft flood limits, and draft inundation boundaries for the 50-, 100-, 200-, Timmins, and Timmins plus Climate Change events are provided in Sections 6 and 7. The identification of buildings within the flood hazard limit is also discussed in Section 7.

5.1 Bathymetry, Cross-Sections, and Geometry for 2-Dimensional Modeling

The LiDAR data described in Section 4.1 of the Draft Hydrology Report was supplemented by site-specific survey data from Jewell survey crew using GPS and a total station. The GPS was the main equipment used for the bathymetric survey. The GPS survey results were converted to CGVD 2013 datum and imported into the terrain layer as an overlay to the LiDAR data. The projection settings in the model are NAD 1983 UTM Zone 18.

The Jewell bathymetric survey comprised of 140 cross sections with their locations highlighted in Figures 5-1 and 5-2. The bathymetry surface was derived using these cross sections in CAD and imported as a TIF file into the terrain layer of the HEC-RAS model. The precise topographic survey agreed well with the LiDAR data and supplemented areas near the channel, crossings and roads.

Historically, 1-dimensional hydraulic models have been used for floodplain mapping. This type of model requires cross-section data to be set up by the user to represent the geometry data applied in the hydraulic model calculations. With advancements in the HEC-RAS modelling software that is developed and distributed freely by the U.S. Army Corps of Engineers, 2-dimensional modelling presents an alternative that can provide added benefits depending on the creek of interest.

A 2-dimensional model was selected for Butler Creek for the following reasons:

- To simulate the flow in the overbank areas that are located within the Municipality of Brighton, including flow movement around the buildings located within the flood hazard limit.
- To investigate the spill quantities near Ontario Street, Butler Street, Cedar Street, and upstream of Harbour Street.
- To achieve more realistic modeling results in local spill areas or low-lying areas.
- To take advantage of detailed terrain and survey data that provide opportunity to use HEC-RAS software to produce output results for depth, velocity, and water surface elevations at any georeferenced location within the flood study area.

The terrain layer was used to develop a computational mesh that ultimately controls the movement of water through Butler Creek and the surrounding overbank areas. For each computation cell, an elevation-volume relationship is calculated to produce a single water surface elevation.

The Butler Creek model is comprised of 190,000 grid cells (not all are utilized), with smaller cells applied for the channel and specific areas of interest, such as road crossings or spill areas. The high number of cells is applied due to the density of the cells required to accurately represent the flood characteristics in the urban inundation areas.

The purpose of the customized mesh is to ensure accurate flow movement while utilizing a 5 second adaptive computational time step with output results set at 10-minute mapping intervals. The selected time step allowed the simulations to be completed in under 6 hours with minimal error.

The detailed 2D flow area established in the geometry editor of the hydraulic model provides the foundation for the dynamic mapping output. An example of the grid applied in the model is shown in Figure 5-3.

With the 2D modeling approach, cross sections are not needed to run the simulation. However, cross section water surface elevation (WSEL) plots for the 50-, 100-, 200-yr, Timmins and Timmins plus climate change events are shown for ten (10) cross sections within the study area per the map and cross section plots shown in Appendix J. These cross-section plots are useful for reviewing WSEL results as they relate to the channel cross sections for several storm events.

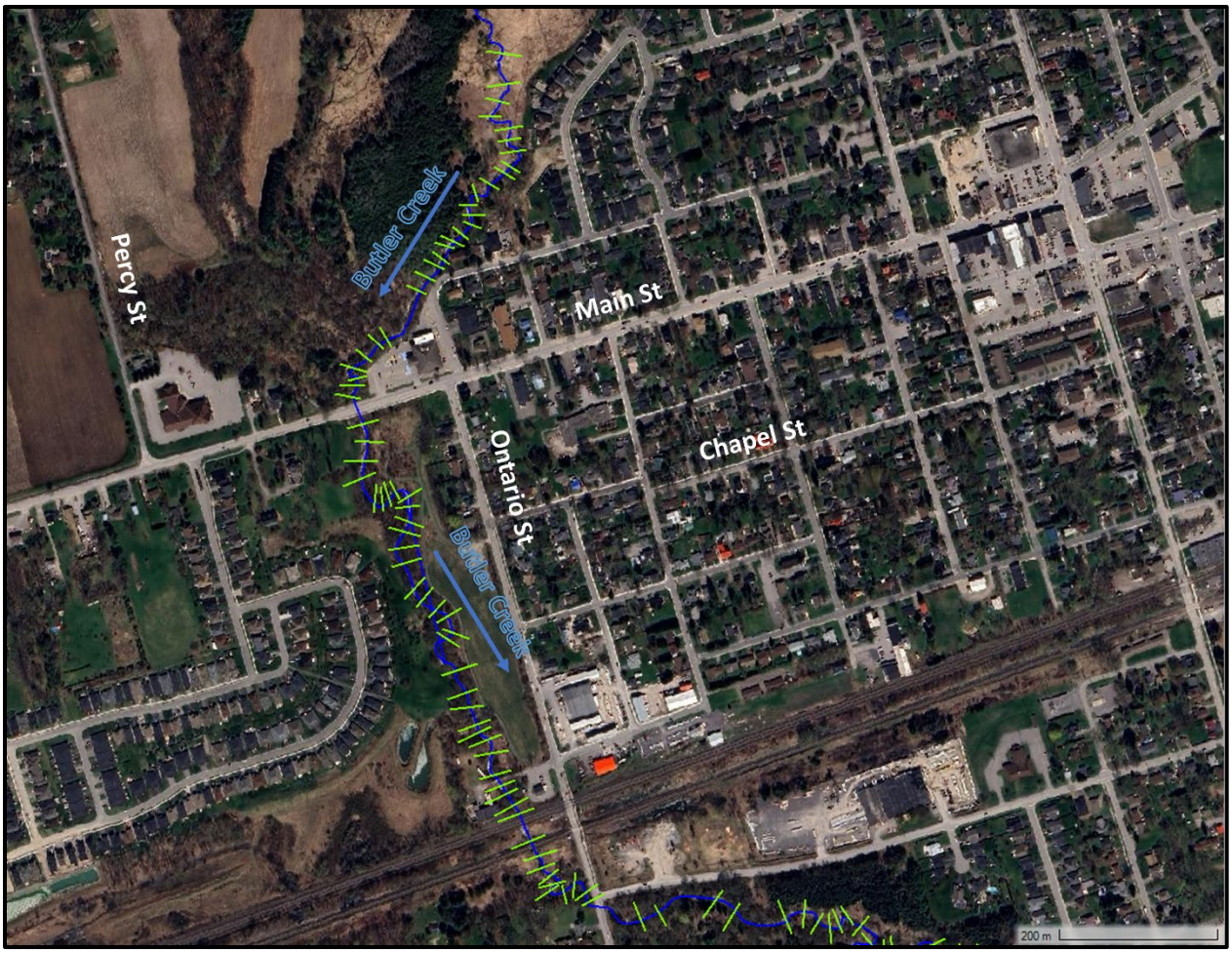

Figure 5-1: Locations of Surveyed Bathymetry Sections within Butler Creek Study Area Upstream of Ontario St

Figure 5-2: Locations of Surveyed Bathymetry Sections within Butler Creek Study Area Downstream of Ontario St

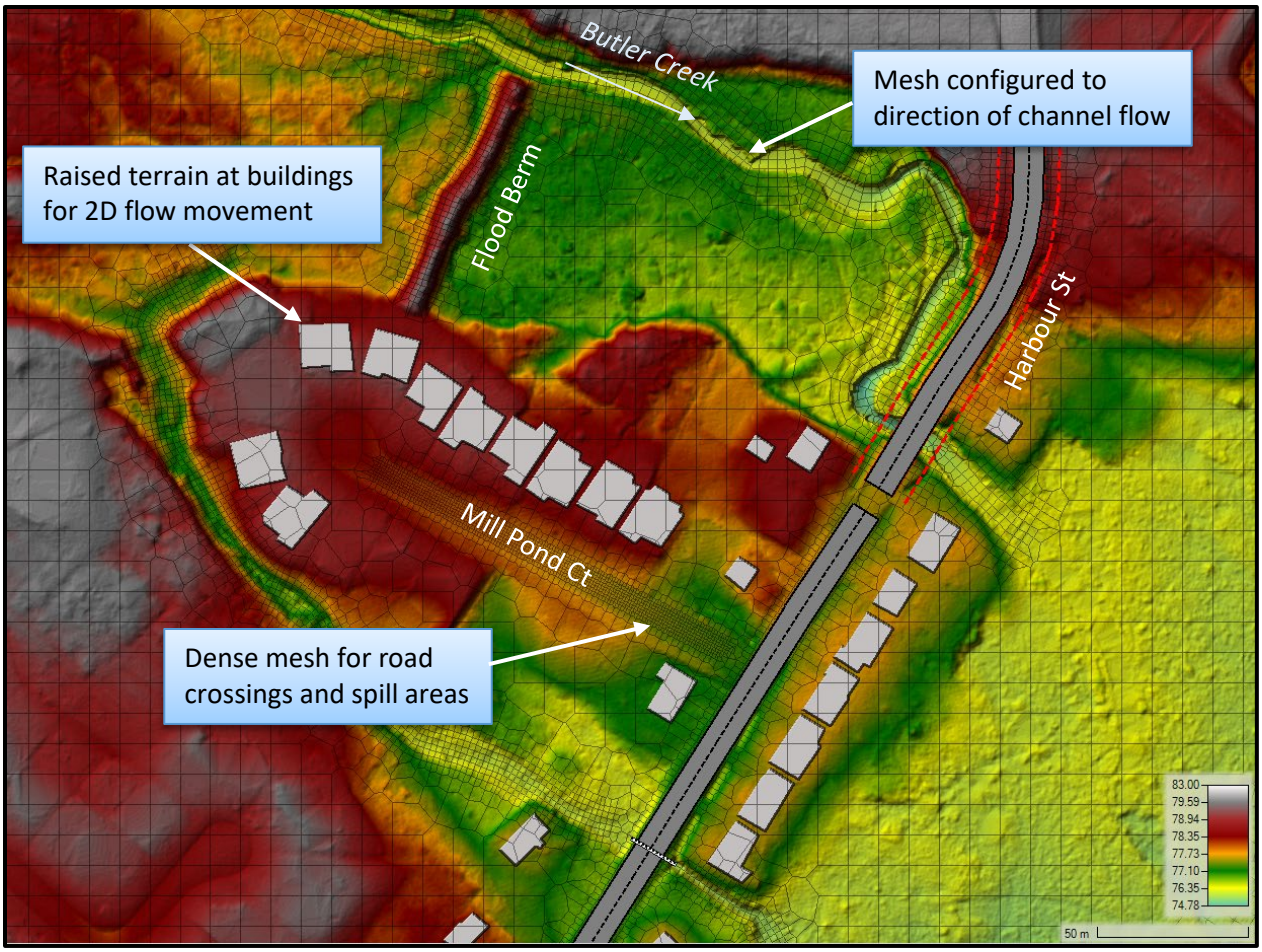

Figure 5-3: Example of Geometry Configuration for Butler Creek Model Setup

5.2 Internal and External Boundary Conditions

There are four (4) boundary conditions (BCs) for the 2D model (see Figure 5-4). Two of these are inflow boundary BCs and the other two are outflow BCs.

The 2D unsteady flow model received its flow data from an inflow hydrograph where the incoming flows change with time. The inflow hydrograph was obtained by the tabular output in the hydrologic model; each inflow BC corresponds to an inflow hydrograph. The table below summarizes the inflow peaks and their corresponding receiving catchments that were presented in Appendix B of the Draft Hydrology Report.

Since the study area is at the downstream portion of the Butler Creek watershed, Inflow BC 1 corresponds to Node B which includes majority of the runoff from the overall watershed. Node B receives runoff produced from Catchments 301, 302, 303, and 304. Inflow BC 2 includes the remaining inflows from Catchments 305 and 306. Inflow BC2 is located upstream of the railway tracks in a conservative approach to include the remaining flow, although it has minimal impact due to its smaller catchment areas and difference in lag times between the Butler Creek peak and the individual peaks for Catchments 305 and 306.

The outflow boundary condition at the downstream limit of the study area where Butler Creek outlets to Lake Ontario is established by the Lake Ontario water level. The seasonally high lake level for Lake Ontario was selected since a 100-yr water level for Lake Ontario combined with a 100-yr or Timmins storm would have a probability of occurrence well below the individual probability of 1% AEP storm or Timmins event. It is noted that the 100-yr lake level was provided by LTC. The 100-yr lake level and a seasonally high lake level were both tested to determine potential impacts to the floodline should the lake level be above its seasonal high (see Section 6.5 for further discussion). Due to the fall between Harbour Street and Lake Ontario, the flood hazard limit was not sensitive to the Lake Ontario water level.

A 2nd outflow boundary condition is applied at Butler Street West to capture the outflows from the spill upstream of Ontario Street. This spill drains towards Raglan Street and could be used to update previous floodplain work in the area once the Butler Creek floodplain mapping update is officially complete. The objective of the mapping update as it relates to this spill area is to locate and quantify the flows in the AEP, Timmins, and Timmins + CC events. This spill area is discussed further in Section 5.4.3.

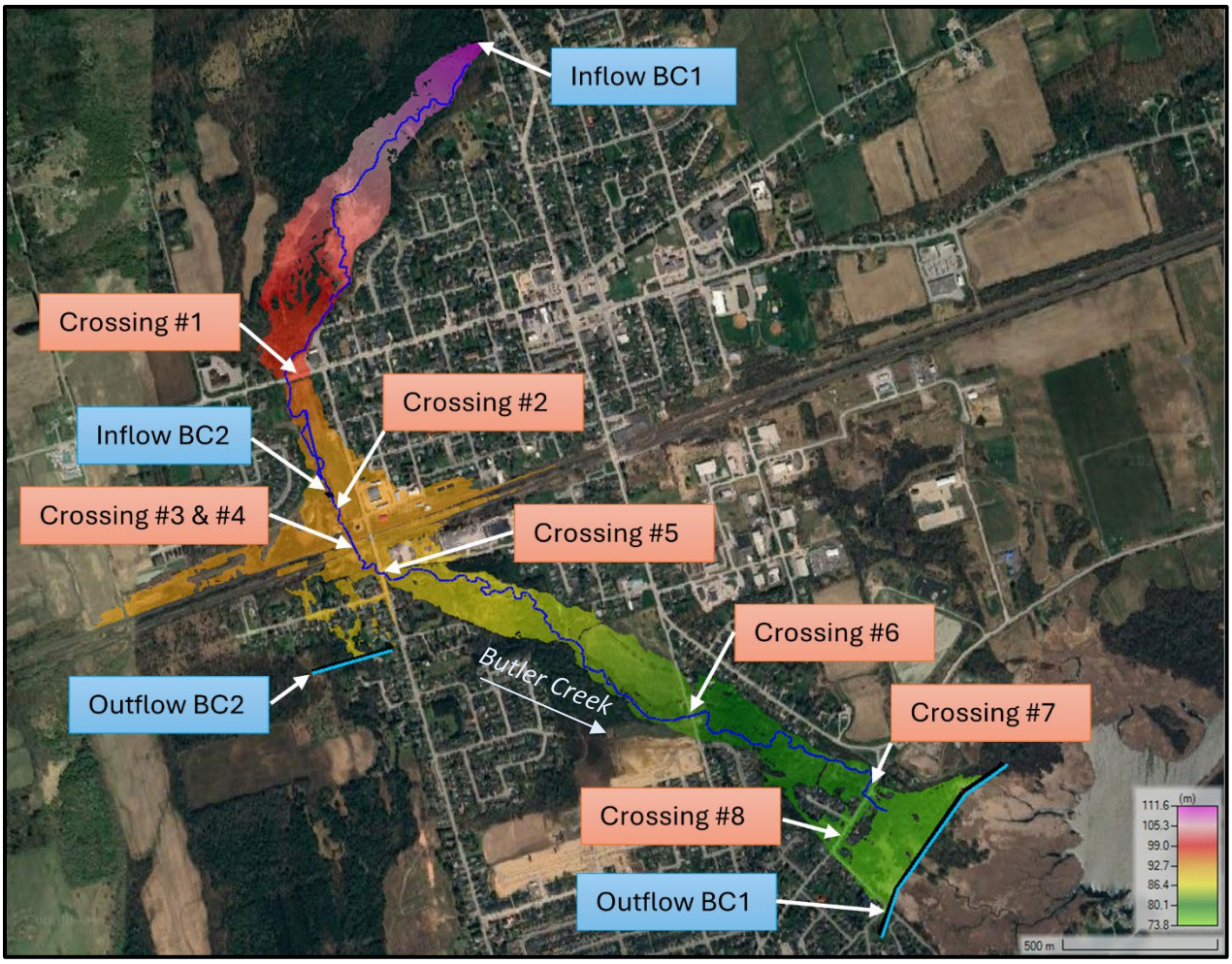

Figure 5-4: Locations of Culvert/Bridge Crossings and Inflow/Outflow Boundary Conditions (Timmins Water Level Overlay)

5.3 Culvert & Bridge Crossings

The hydraulic model simulates the effects of culvert and bridge crossings on the water surface elevations at each crossing. There are seven (7) structures that cross the main branch of Butler Creek and one (1) spill culvert at Harbour Street, for a total of eight (8) crossings of interest (see Figure 5-4).

This subsection summarizes the existing crossing configurations, stage-discharge curves, and the maximum water surface elevations at each road crossing. The purpose of the section is to address the impacts of the existing infrastructure on the overall floodplain delineation discussed in Section 7.

Note that excluding the above culverts of interest, an additional eighteen (17) culverts were measured and included in the hydraulic model (see Figure 5-5). These are considered connection culverts for the purpose of modeling the drainage path and flow movement of water in the spill area during the regulatory storm event.

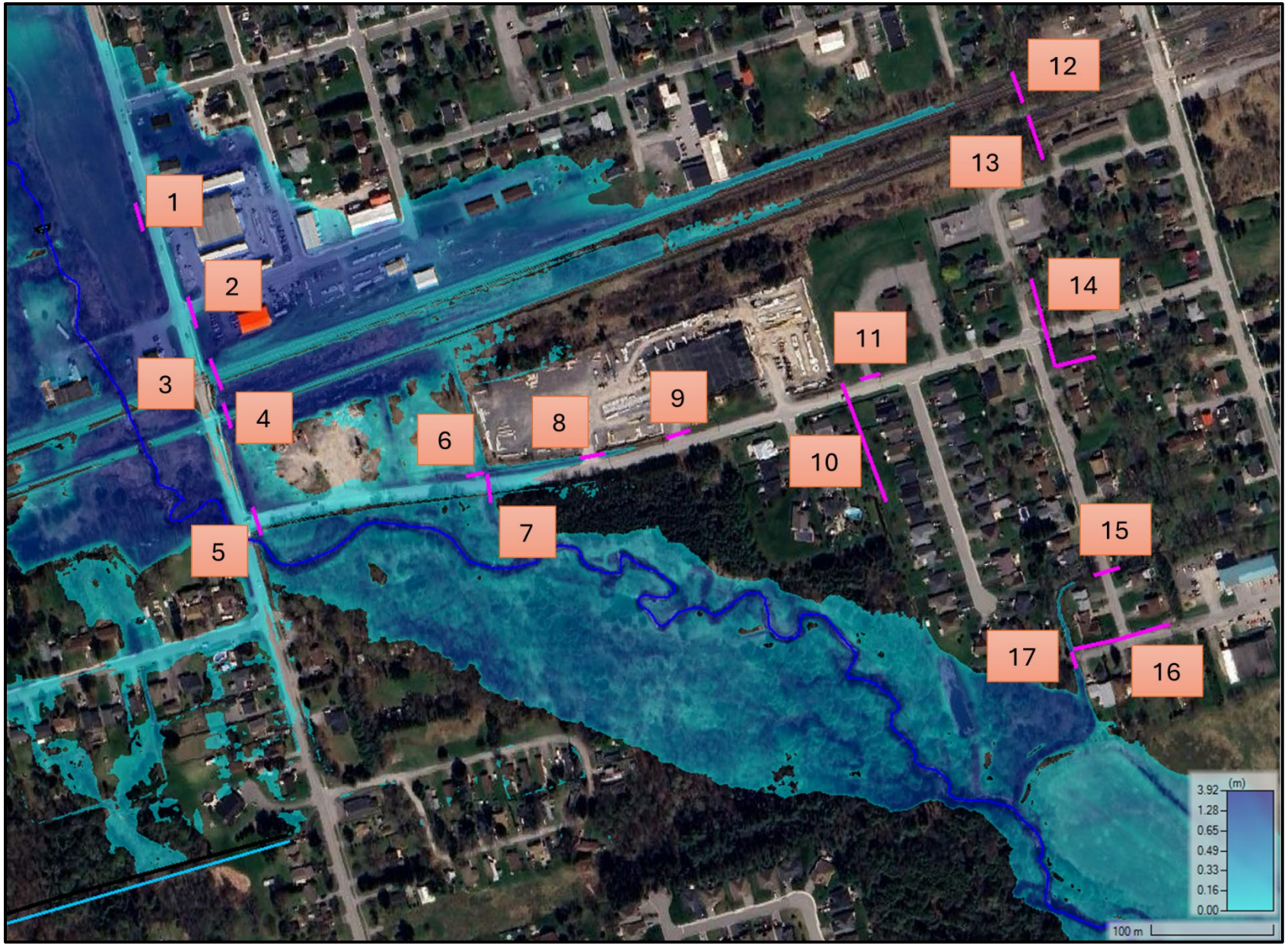

Figure 5-5: Connection Culvert Locations Included for Navigating Butler Creek Spill Near Ontario Street and Butler Street

5.3.1 Crossing #1: County Road 2 (Main Street)

The County Road 2 crossing is the first road crossing within the Butler Creek study area (upstream to downstream) and consists of a 6.2m span open footing concrete box culvert (see Figure 5-6).

A summary of the County Road 2 culvert is provided in Table 5-2. The stage and discharge hydrographs for this crossing are provided in Appendix I. The chart in Appendix I shows that the difference between headwater (HW) and tailwater (TW) elevations is nearly 2.1m. While the culvert is large and conveys up to 45.1 m^3/s in the Timmins event, the low point in the road is 1.9m above the top of culvert opening. Therefore, high flood depths are produced on the upstream side of the culvert when the Timmins event overwhelms the culvert capacity and spills over the road.

Figures 5-7 and 5-8 illustrate the extents of the Timmins floodplain with satellite and terrain background imagery. The spill point in the road is east of the culvert opening. Immediately upstream of the crossing is the Brighton YMCA. The flood depth against the YMCA building perimeter is up to 0.44m in the Timmins event; the YMCA building is not within the floodplain for the 1% annual exceedance probability (AEP) storm.

Figure 5-6: Elevation View on Upstream Side of Main Street Concrete Open Footing Box Culvert

Table 5-1: County Road 2 Crossing Summary

Road Name:		Main Street (Cty Rd 2)	
Coordinates:		44.039530, -77.748152	
Span (m) =	6.2	[1]Soffit (m) =	95.44
[2]Upstream Invert (m)		Downstream Invert (m)	
93.94		93.85	
Low Point of Road =		97.37	m
[3]Timmins WSEL =		98.22	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.85		x	
Depth*Velocity (m^2/s)		Recommended Limit = 0.8 (m^2/s)	
0.83		x	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL measured at immediate upstream side of bridge.

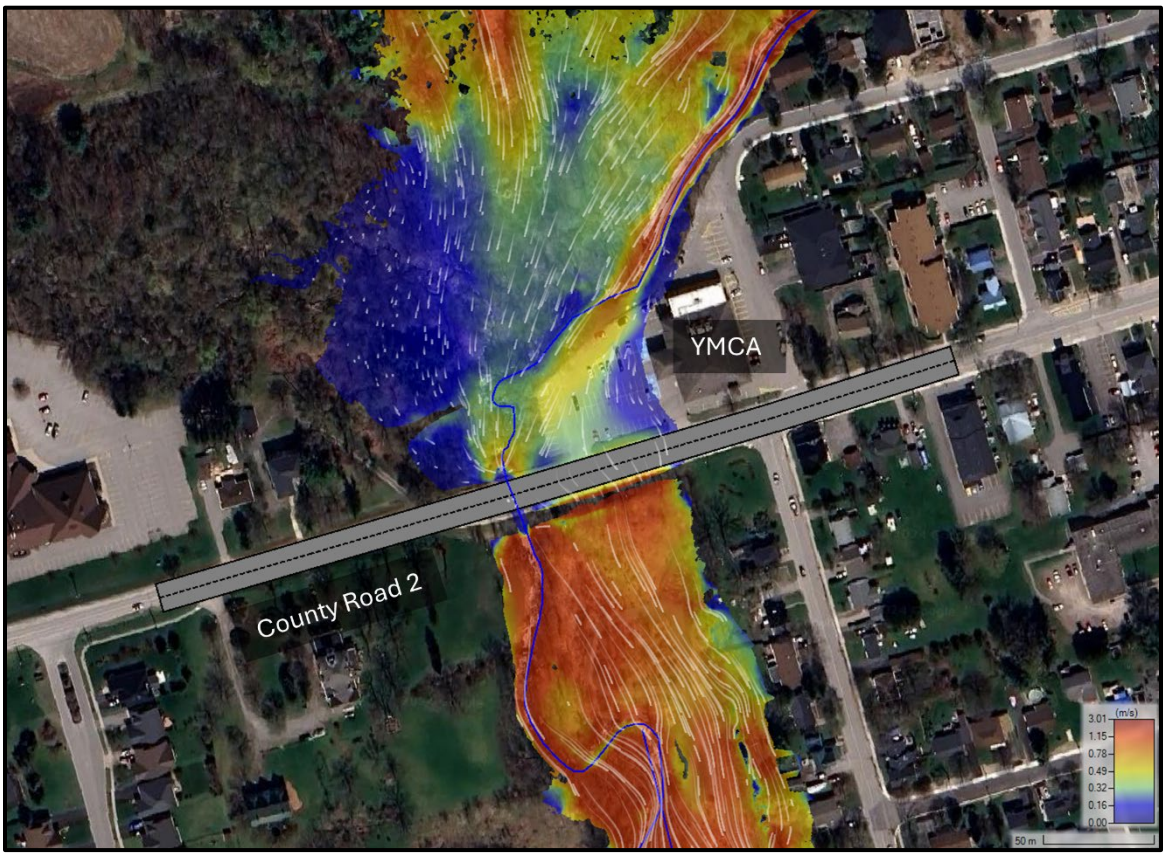

Figure 5-7: Schematic of Timmins Floodplain at County Road 2 (Main St) – Satellite Background

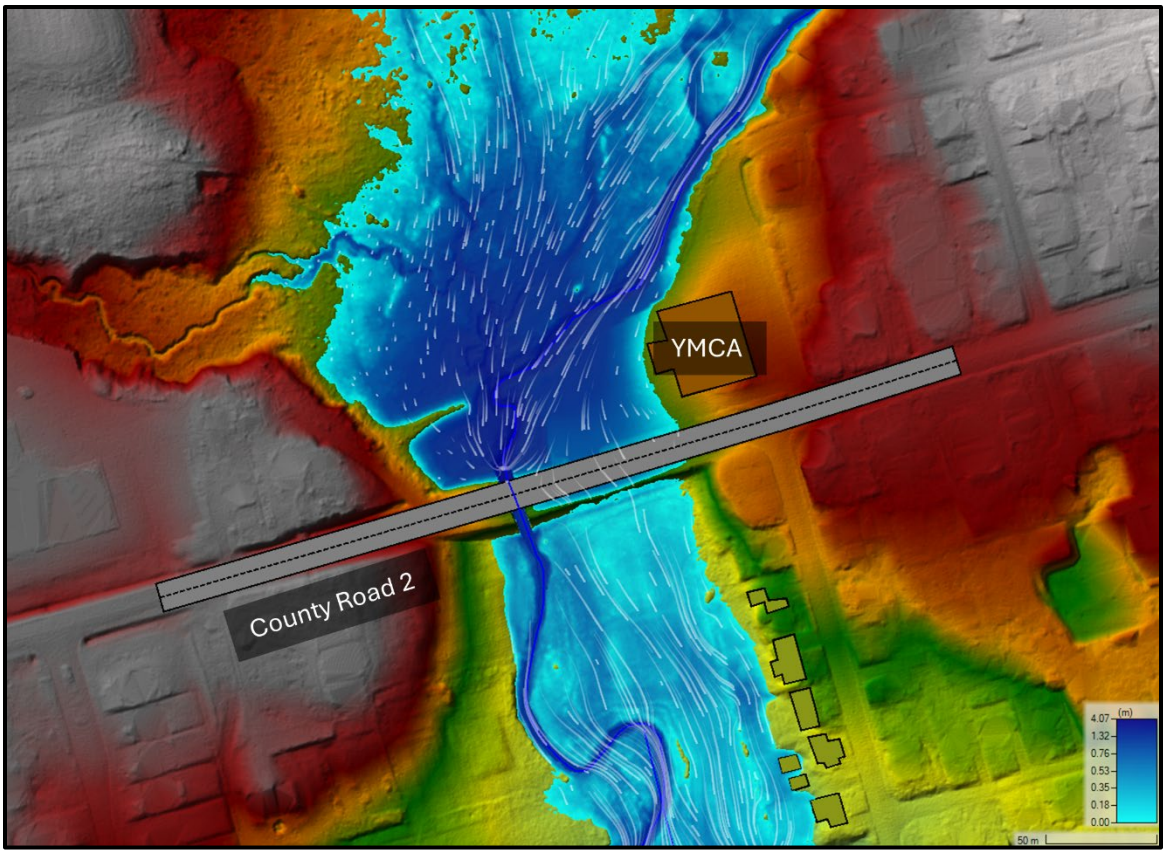

Figure 5-8: Schematic of Timmins Floodplain at County Rd 2 (Main St) – Terrain Background

5.3.2 Crossing #2: Entrance Off Monck Street

The entrance off Monck Street is located 59m upstream (north) of the railway tracks. The bridge has a 5.4m span (see Figure 5-9) and provides access to a private property on the west side of Butler Creek.

The low point along the entrance (91.47m) is 1.39m lower than the low point along the north railway tracks (92.86m) west of Ontario Street. Similarly, the low point along Ontario Street (north of the railway tracks) is 92.69m, 1.22m above the low point of Crossing #2. Since the north railway tracks and Ontario Street are much higher than the sag in the Crossing #2 entrance profile, there is no relief flow at this entrance until the water surface elevation (WSEL) is above elevation 92.69m. This results in the large flood depth at the entrance crossing of 1.72m in the Timmins event.

A summary of the entrance crossing is provided in Table 5-3. The stage and discharge hydrographs for this crossing are provided in Appendix I. The chart in Appendix I shows that the difference between HW and TW elevations is negligible in the regulatory event due to the backwater from the crossing at the north railway tracks. A discussion of the spill over Ontario Street and the railway tracks is provided in Section 5.4.1.

Figure 5-9: Elevation View of Entrance Bridge Off of Monck Street

Table 5-2: Crossing Summary of Private Entrance Near Monck Street

Road Name:		Private Entrance (Monck St)	
Coordinates:		44.035416, -77.745663	
Span (m) =	5.4	[1]Soffit (m) =	91.78
[2]Upstream Invert (m)		Downstream Invert (m)	
89.88		89.74	
Low Point of Road =		91.47	m
[3]Timmins WSEL =		93.19	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
1.72		x	
Depth*Velocity Calculated (m^2/s)		Recommended Limit = 0.8 (m^2/s)	
0.60		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL measured at immediate upstream side of bridge.

Figures 5-10 illustrate the extents of the Timmins floodplain in the vicinity of the entrance off Monck Street in addition to Crossings #3 and #4.

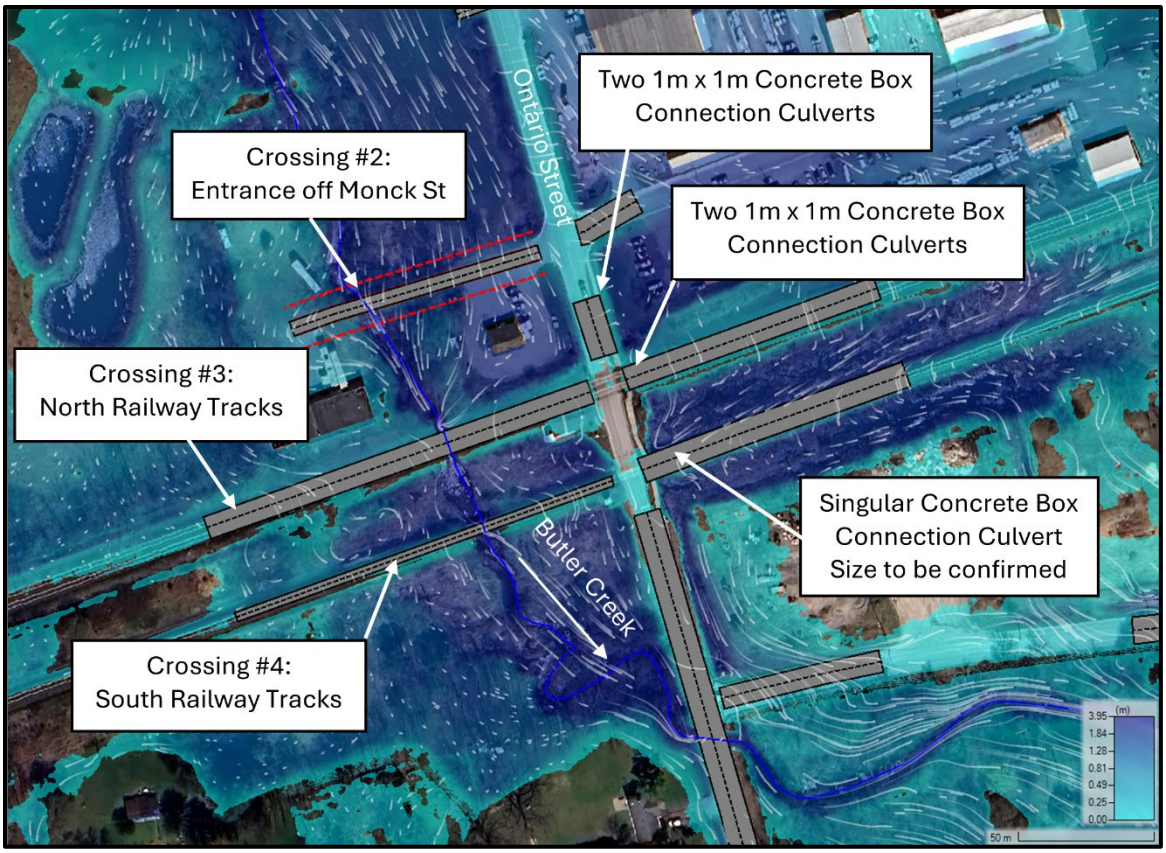

Figure 5-10: Schematic of Timmins Floodplain at Monck Street Entrance and Railway Tracks

5.3.3 Crossing #3: North Railway Crossing

The north railway crossing is a concrete open footing box culvert with a has a 3.4m span (see Figure 5-11). The north railway crossing has a relatively flat profile with a low point of 92.86m; this low point is higher than the road sag in Ontario Street on the upstream side of the rail tracks. Therefore, the north railway crossing causes the spill over Ontario Street that is discussed further in Section 5.4.1. This spill is significant and presents a flood hazard concern for the existing properties east of Ontario Street and north of the rail tracks.

A summary of Crossing #3 is provided in Table 5-4. The stage and discharge hydrographs for Crossing #3 are provided in Appendix I. The chart in Appendix I shows that the difference between HW and TW elevations is 0.79m. This large difference is expected considering the significant backwater imposed by the railway.

Figure 5-11: Image of Butler Creek North Railway Crossing

Table 5-3: North Railway Tracks Crossing Summary

Road Name:		North Railway Crossing (W. of Ont. St.)	
Coordinates:		44.034965, -77.745293	
Span (m) =	3.4	[1]Soffit (m) =	91.5
[2]Upstream Invert (m)		Downstream Invert (m)	
89.2		89.15	
Low Point of Road =		92.86	m
[3]Timmins WSEL =		93.15	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.29		✓	
Depth*Velocity Calculated (m^2/s)		Recommended Limit = 0.8 (m^2/s)	
0.20		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.
[3]Timmins WSEL measured at immediate upstream side of bridge.

5.3.4 Crossing #4: South Railway Crossing

The South Railway Crossing is immediately downstream of the north tracks. It is a dual opening concrete structure (see Figures 5-12 to 5-14). The west opening has a 3.0m span and the east opening has a 1.8m span. The concrete structures are old, with a 1939 stamp above the west opening and a 1918 stamp above the east opening. The railway profile elevation of the south tracks are lower than the north tracks, meaning the south tracks are not the cause of the Ontario Street spill north of the railways.

Due to the Ontario Street spill that occurs upstream, this crossing only receives 46.1 m^3/s of flow in the Timmins event, and the dual opening structure conveys up to 16.9 m^3/s in this event. The remainder of the 46.1 m^3/s spill over the tracks (see Figure 5-10).

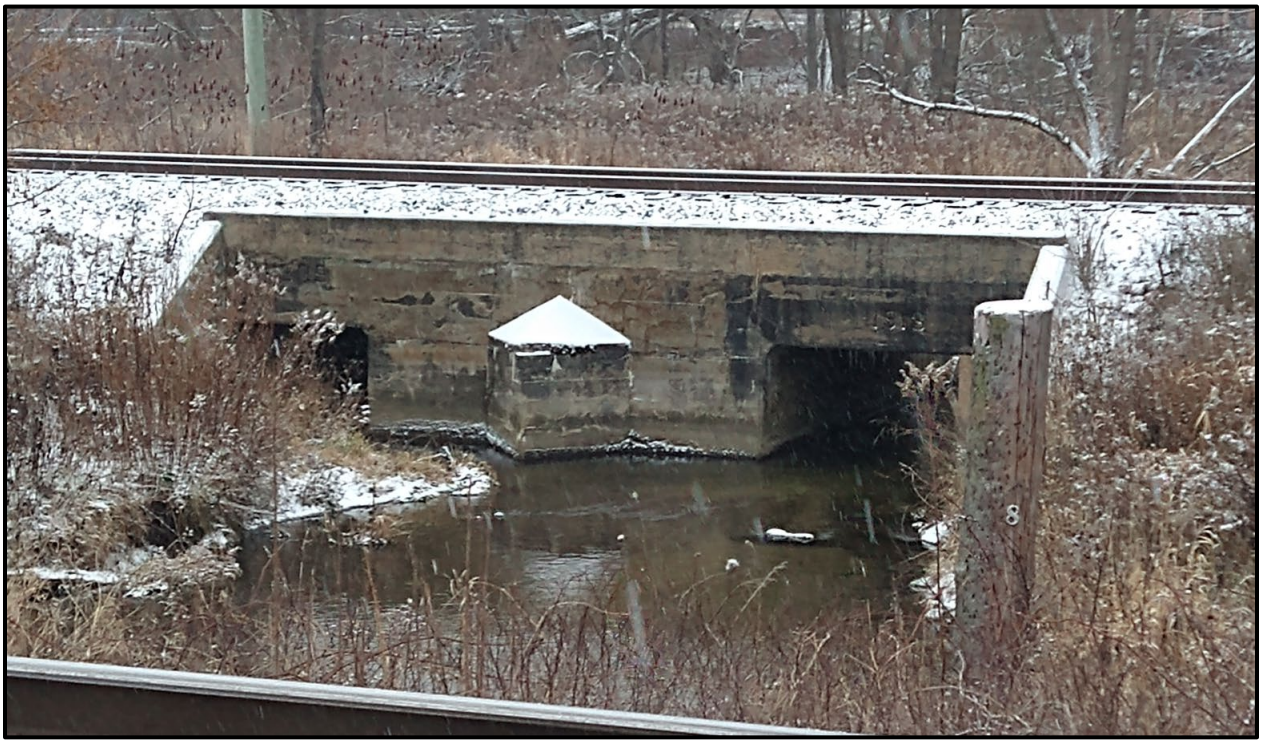

Figure 5-12: Image of Butler Creek South Railway Dual-Opening Concrete Culvert Crossing

Figure 5-13: Image of Opening #1 for Butler Creek South Railway Crossing

Figure 5-14: Image of Opening #2 for Butler Creek South Railway Crossing

Table 5-4: South Railway Crossing Summary

Road Name:		South Railway Crossing (W. of Ont. St.)	
Coordinates:		44.034693, -77.745103	
East Opening:			
Span (m) =	1.8	[1]Soffit (m) =	90.2
[2]Upstream Invert (m)		Downstream Invert (m)	
88.80		88.60	
West Opening:			
Span (m) =	3.0	[1]Soffit (m) =	90.4
[2]Upstream Invert (m)		Downstream Invert (m)	
88.80		88.60	
Low Point of Road =		91.80	m
[3]Timmins WSEL =		92.30	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.50		x	
Depth*Velocity Calculated (m^2/s)		Recommended Limit = 0.8 (m^2/s)	
0.34		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL measured at immediate upstream side of bridge.

5.3.5 Crossing #5: Ontario Street Crossing

The Ontario Street crossing (see Figure 5-15) has an effective span of 4.3m after adjustment for its 45-degree skew. The backwater from this crossing results in a spill over Ontario Street for the portion of road south of the railway tracks, in addition to the potential spill routes towards Butler St West as discussed further in Section 5.4.3 of this draft report.

A summary of the Ontario Street crossing is provided in Table 5-6. The stage and discharge hydrographs for this crossing are provided in Appendix I. After the spill north of the tracks and the spill towards Butler Street West, this crossing receives a peak of 37.6 m^3/s in the Timmins event with a culvert capacity up to 29.5 m^3/s. The chart in Appendix I provides the stage and flow hydrographs for Crossing #5.

In field observations there was noted to be a beaver dam and fallen tree downstream of the Ontario Street culvert. This blockage contributes to some ponding on the upstream side of the crossing that would limits its hydraulic capacity relative to free-flowing conditions. The beaver dam and debris blockage has been removed from the model.

While this has the potential to underestimate the WSEL on the upstream side of the crossing, it will be muted by the greater influence of the crossing. It is noted that the area of innundation is not significantly increased in the climate change simulation and this suggests that the crossing and location of the beaver dam are submerged.

Figure 5-15: Ontario Street Opening Footing Box Culvert with 45 Degree Skew

Table 5-5: Ontario Street Crossing Summary

Road Name:		Ontario St	
Coordinates:		44.034304, -77.744183	
Span (m) =	4.3	[1]Soffit (m) =	90.2
[2]Upstream Invert (m)		Downstream Invert (m)	
88.40		88.30	
Low Point of Road =		91.38	m
[3]Timmins WSEL =		91.69	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.31		x	
Depth*Velocity (m^3/s)		Recommended Limit = 0.8 (m^3/s)	
0.21		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL measured at immediate upstream side of bridge.

Figures 5-16 and 5-17 illustrate the extents of the Timmins floodplain with satellite and terrain background imagery.

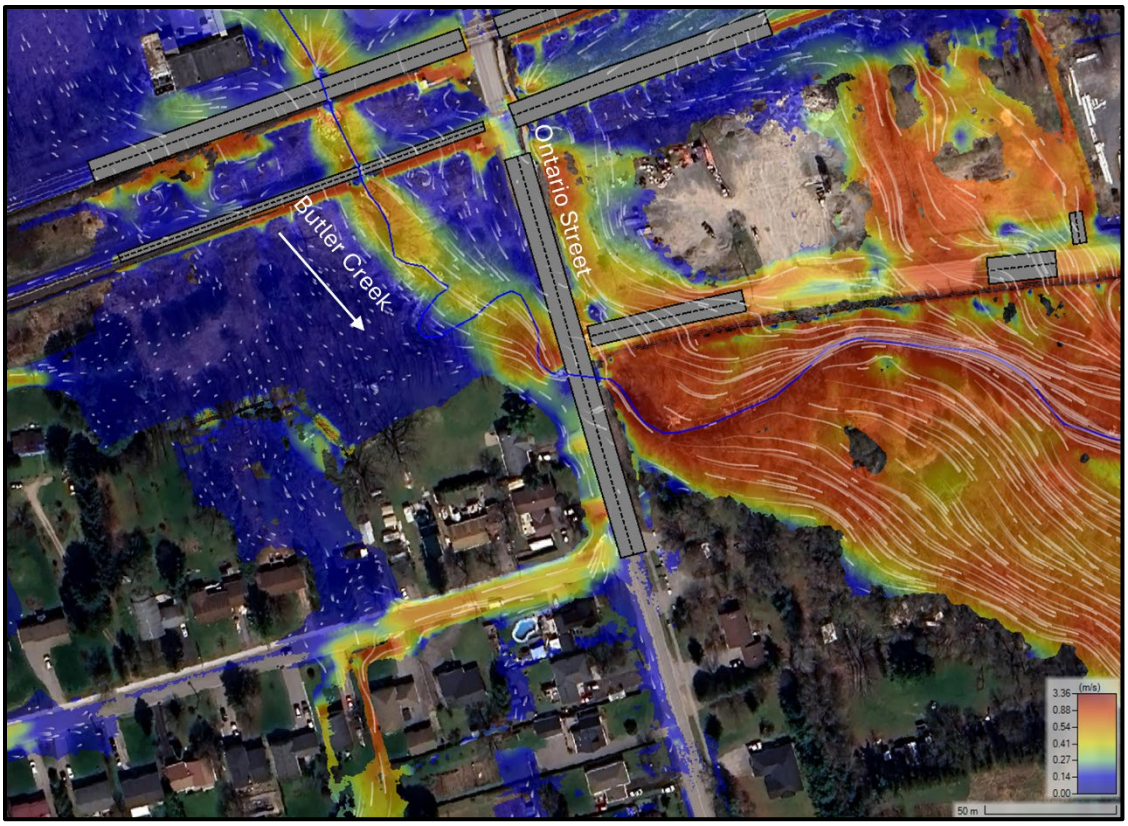

Figure 5-16: Schematic of Timmins Floodplain at Ontario Street – Satellite Background

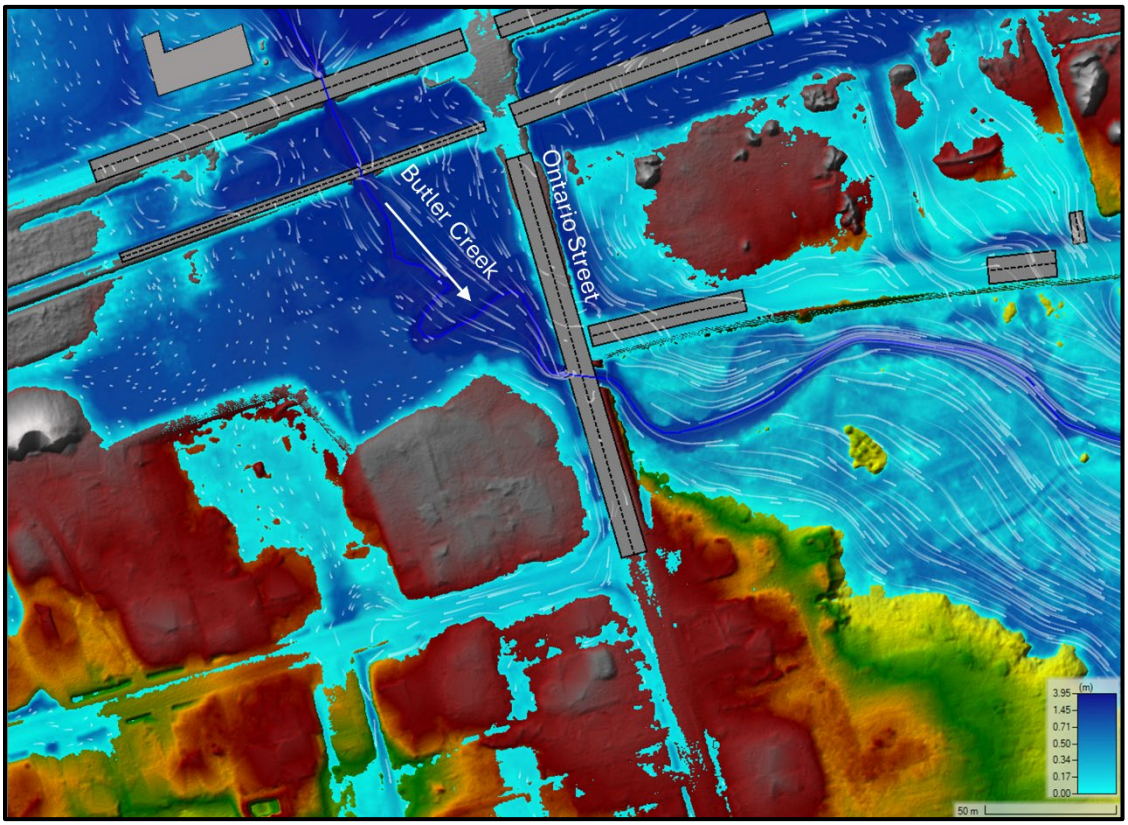

Figure 5-17: Schematic of Timmins Floodplain at Ontario Street – Terrain Background

5.3.6 Crossing #6: Cedar Street

The Cedar Street crossing is a 6.1m span open footing concrete box culvert (see Figure 5-18). The hydraulic impacts of this crossing have some affect the houses north of the culvert in addition to the spill area north of the creek that is discussed in detail in Section5.4.4.

A summary of the Cedar Street crossing is provided in Table 5-7. The stage and discharge hydrographs are provided in Appendix I. Majority of the flow at this crossing occurs as weir flow with 16.1 m^3/s of hydraulic capacity through the culvert opening in the Timmins event. Note that after the spill towards Butler Street West upstream of Ontario Street, the flow contributing to Cedar Street is 82.3 m^3/s.

Figures 5-19 and 5-20 illustrate the extents of the Timmins floodplain in the vicinity of Cedar Street with satellite and terrain background imagery. The width of the floodplain is reasonably consistent upstream and downstream of the crossing; the difference between peak WSELs on the HW and TW side of the crossing is 0.27m.

Figure 5-18: Elevation View of Cedar Street Open Footing Box Culvert

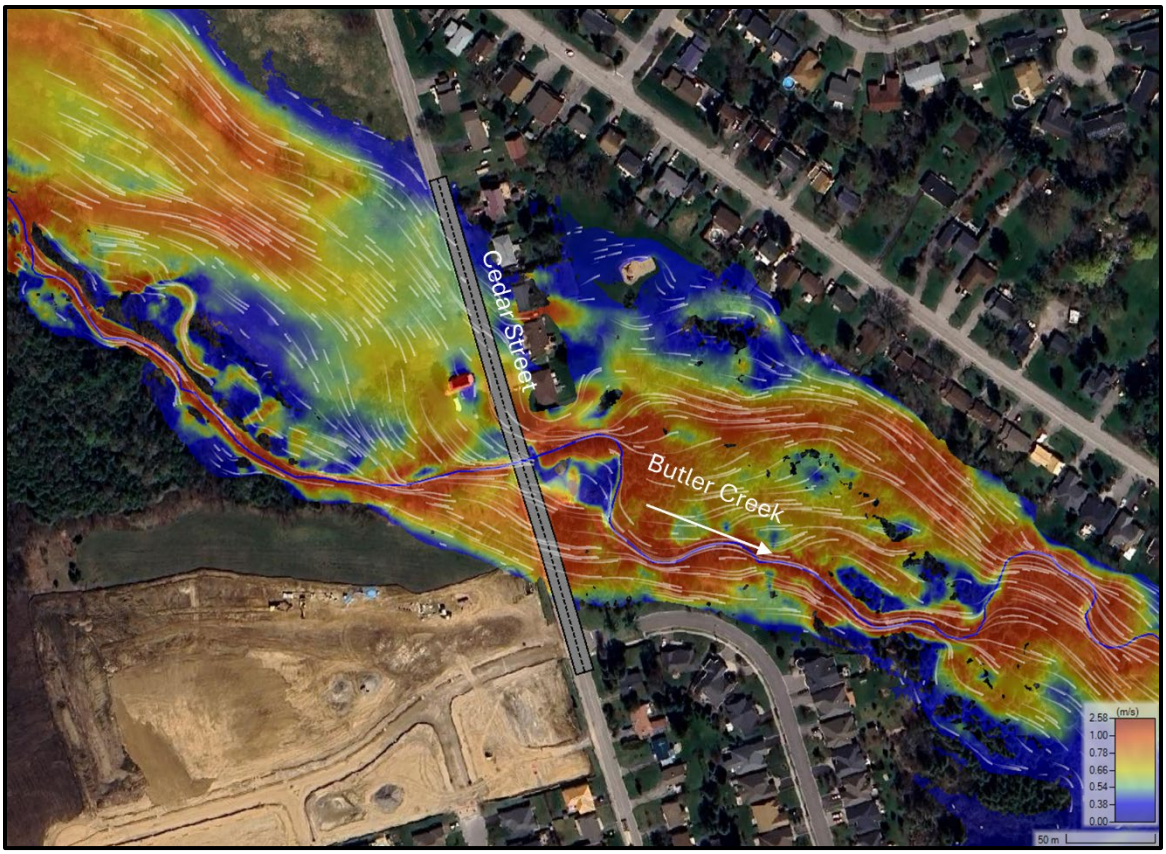

Table 5-6: Cedar Street Crossing Summary

Road Name:		Cedar St	
Coordinates:		44.030232, -77.731468	
Span (m) =	6.1	[1]Soffit (m) =	80.88
[2]Upstream Invert (m)		Downstream Invert (m)	
79.38		79.38	
Low Point of Road =		81.19	m
[3]Timmins WSEL =		81.74	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.55		x	
Depth*Velocity Calculated (m^3/s)		Recommended Limit = 0.8 (m^3/s)	
0.63		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.
[3]Timmins WSEL varies along Cedar St road profile due to spill flows north of main channel.

Figure 5-19: Schematic of Timmins Floodplain at Cedar Street – Satellite Background

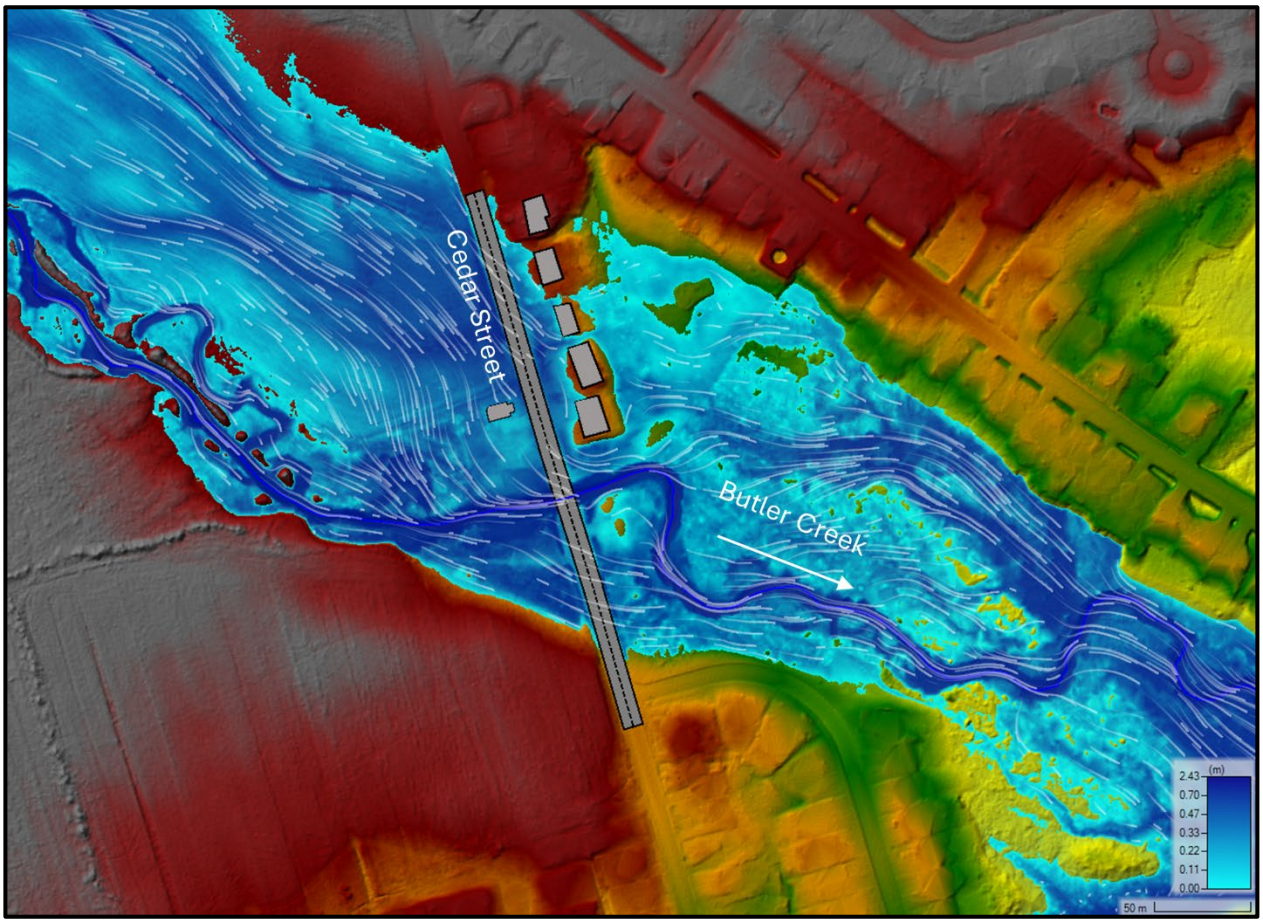

Figure 5-20: Schematic of Timmins Floodplain at Cedar Street – Terrain Background

5.3.7 Crossing #7: Harbour Street (Primary Crossing)

The Harbour Street crossing of Butler Creek is a 6.1m span bridge (see Figure 5-21).

A summary of Crossing #7 is provided in Table 5-8. The stage and discharge hydrographs are provided in Appendix I. This bridge crossing conveys 53.6 m^3/s through its bridge opening and relief flow. The remaining flow spills towards the Harbour Street spill crossing (Crossing #8) as discussed in the next subsection.

Figures 5-22 and 5-23 illustrate the extents of the Timmins floodplain near the Harbour Street primary crossing and spill crossing with satellite and terrain background imagery. There are several buildings within the floodplain in the Timmins event both upstream and downstream of Harbour Street. Further details on the number of buildings within the draft flood limits are provided in Section 7.4.

Figure 5-21: Elevation View of Harbour Street Primary Crossing of Butler Creek

Table 5-7: Harbour Street Main Crossing Summary

Road Name:		Harbour St	
Coordinates:		44.028050, -77.724312	
Span (m) =	6.1	[1]Soffit (m) =	77.3
[2]Upstream Invert (m)		Downstream Invert (m)	
Low Point of Road =		77.62	m
[3]Timmins WSEL =		78.31	m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.69		x	
Depth*Velocity Calculated (m^3/s)		Recommended Limit = 0.8 (m^3/s)	
0.71		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL varies along Habour St Profile.

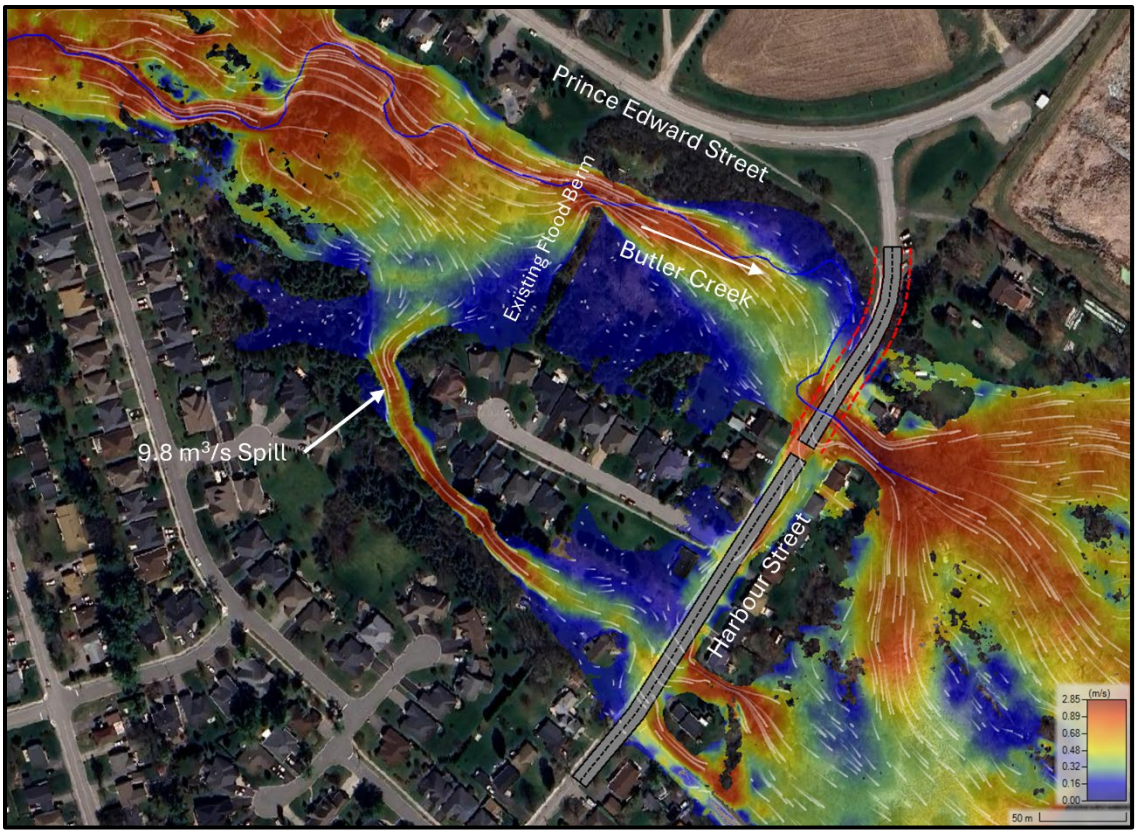

Figure 5-22: Schematic of Timmins Floodplain at Harbour Street Crossings – Satellite Background

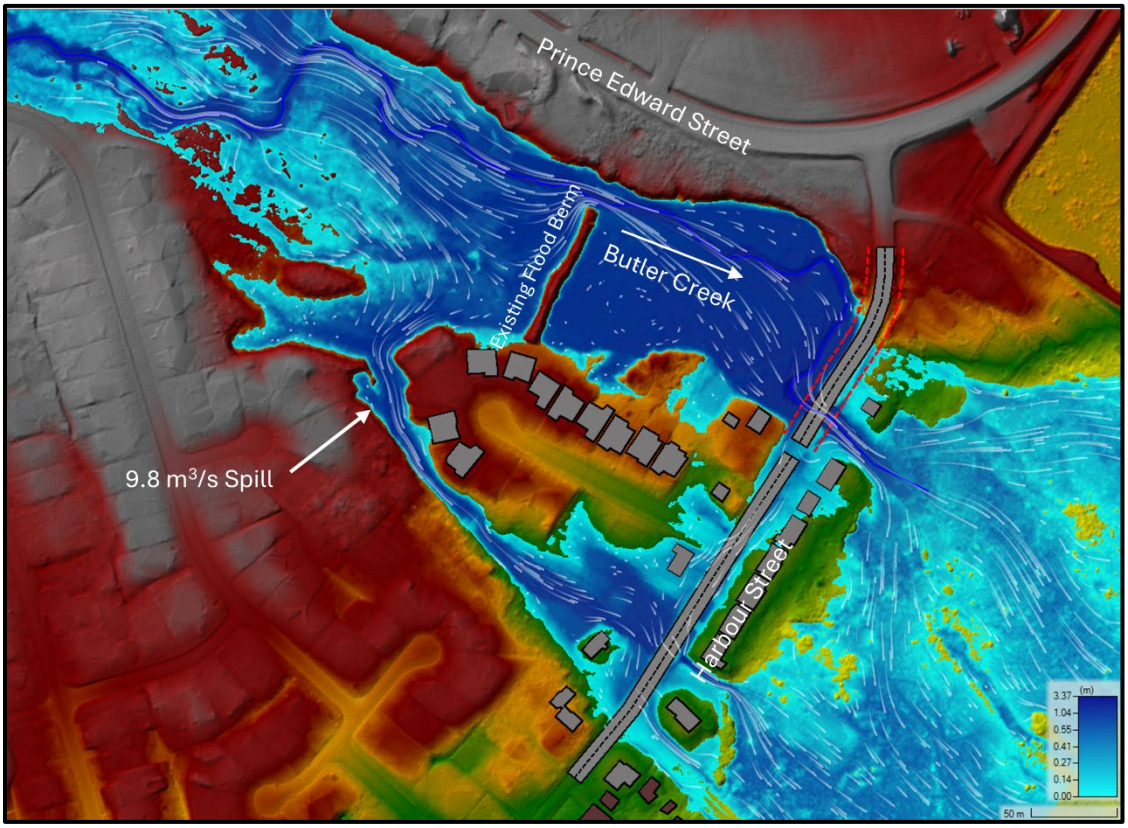

Figure 5-23: Schematic of Timmins Floodplain at Harbour Street Crossings – Terrain Background

5.3.8 Crossing #8: Harbour Street (Spill Crossing)

The backwater from the existing flood berm upstream of Harbour Street results in an 18.8 m^3/s spill towards Crossing #8. The backwater from the Harbour Street crossing of Butler Creek (Crossing #7) results in a further spill towards the 1.2m diameter culvert at Crossing #8.

A summary of Crossing #8 is provided in Table 5-9 with stage and discharge hydrographs provided in Appendix I.

Since this culvert size is relatively small, it only conveys 1.4 m^3/s in the Timmins event. The remaining 24.2 m^3/s that drains to this crossing is conveyed as relief flow over the road, resulting in flood depths beyond the recommended limit for safe access in the regulatory event.

Table 5-8: Harbour Street Spill Crossing Summary

Road Name:		Harbour St (Spill Crossing)	
Coordinates:		44.026801, -77.725335	
Diameter (m) =	1.2	Length (m)	14
[2]Upstream Invert (m)		Downstream Invert (m)	
75.80		75.67	
Low Point of Road =		77.03	m
[3]Timmins WSEL =		77.60	m
Timmins Creek Depth US Side of Bridge =			m
Maximum Relief Flow Depth (m)		Recommended Limit = 0.3m	
0.57		x	
Depth*Velocity Calculated (m^3/s)		Recommended Limit = 0.8 (m^3/s)	
0.48		✓	

[1]Soffit measured as highest point of bridge opening.

[2]Invert taken as creek inverts at upstream and downstream of bridge opening.

[3]Timmins WSEL varies along Habour St Spill Profile

5.3.9 Crossing Summary

The above discussions identify the flood impacts and flow characteristics associated with the Timmins regulatory event at each crossing of interest. With consideration of the two-zone approach, the crossing summary below provides a comparison of receiving flows, relief flow depths, and depth-velocity products at each crossing in both the Timmins and 1% AEP storm events. The relief flow depths and depth-velocity products shown are representative of the peaks that occur along any point of the crossing.

Table 5-9: Summary of Relief Flow Depths and Depth-Velocity Products at Each Crossing for 1% AEP and Timmins Events

#	Name	Type	Span / Diameter	Q_{peak} (m^3/s)		[1]Relief Flow Depth		[2]Depth-Velocity	
				1% AEP	Timmins	1% AEP	Timmins	1% AEP	Timmins
1	County Rd 2 (Main St)	Open footing box culvert	6.2	37.3	95.3	0.08	0.85	0.01	0.83
2	Entrance Off Monck St	Bridge	5.4	28.7	57.9	1.51	1.72	0.31	0.60
3	North Railway Crossing	Open footing box culvert	3.4	25.9	49.8	0.12	0.29	0.02	0.20
4	South Railway Crossing	Open footing box culvert	3.0m (W), 1.8m (E)	25.6	47.9	0.37	0.5	0.09	0.34
5	Ontario Street	Open footing box culvert	4.3	25.6	37.6	0.00	0.31	0.00	0.21
6	Cedar Street	Open footing box culvert	6.1	36.7	82.5	0.33	0.55	0.21	0.71
7	Harbour Street (Main)	Bridge	6.1	28.4	54.7	0.28	0.69	0.18	0.71
8	Harbour Street (Spill)	CSP Culvert	1.2	8.3	26.9	0.28	0.57	0.12	0.48

[1]Red represents value beyond the 0.3m recommended limit based on guidance in the 2008 MTO Highway Drainage Design Standards.

[2]Red represents value beyond the 0.8 m^2/s recommended limit based on guidance in the 2008 MTO Highway Drainage Design Standards.

Crossings #2-5 have reduced flows due to the spill over Ontario Street north of tracks.

Crossing #6 has further reduced flows in Timmins event due to spill towards Butler St W.

Crossings #7-8 have combined slightly less than the flow at Cedar Street in Timmins event due to minor attenuation from storage impacts.

5.4 Spill Areas & Storage Impacts

This subsection discusses the five (5) spill areas within the study area. A review of the contributing flows to each Butler Creek crossing (see Section 5.3.9) confirms that there is minimal flow attenuation from the inundated spill areas. There are no designated storage areas or water control structures (i.e. dams) within the study area.

5.4.1 East of Ontario Street; North of Railway Tracks

An area of concern highlighted in the historical floodplain maps and confirmed in this draft report is the 'dead zone' that occurs in the Timmins event for the location east of Ontario Street and north of the railway tracks. As expected, the 3.4m opening footing box culvert at Crossing #3 cannot convey the entire 100-yr or Timmins peak flow on its own. Therefore, a relief flow path is utilized. The low point in Ontario Street (north of the tracks) is below the low point at the north railway crossing (west of Ontario St) by approximately 0.17m. Therefore, the relief flow imposed by the north railway crossing will occur at Ontario Street before flowing over the railway tracks.

In the Timmins event, the north railway culvert at Crossing #3 conveys up to 24.4 m^3/s. The spill over Ontario Street (north of the railway tracks) is 43.5 m^3/s. This large spill quantity overwhelms the low-lying area shown in Figure 5-24. The result is that this area is particularly susceptible to the flood hazard in the 1% AEP, Timmins, and Timmins plus climate change events. See Section 7.4 for further discussion on the total number of buildings within the flood hazard limits for each of these events.

The 43.5m^3/s drains towards the connection culverts that cross the north and south railway tracks east of Ontario Street. These culverts have been included in the hydraulic model; however, their sizes are not sufficient to convey this magnitude of peak flow. Therefore, the spill over Ontario Street (north of the tracks), results in a secondary spill that occurs over the north and then south railway tracks east of Ontario Street as illustrated in Figure 5-24. This secondary spill contributes to the inundation limits in the vicinity of Butler Street as discussed in the next subsection.

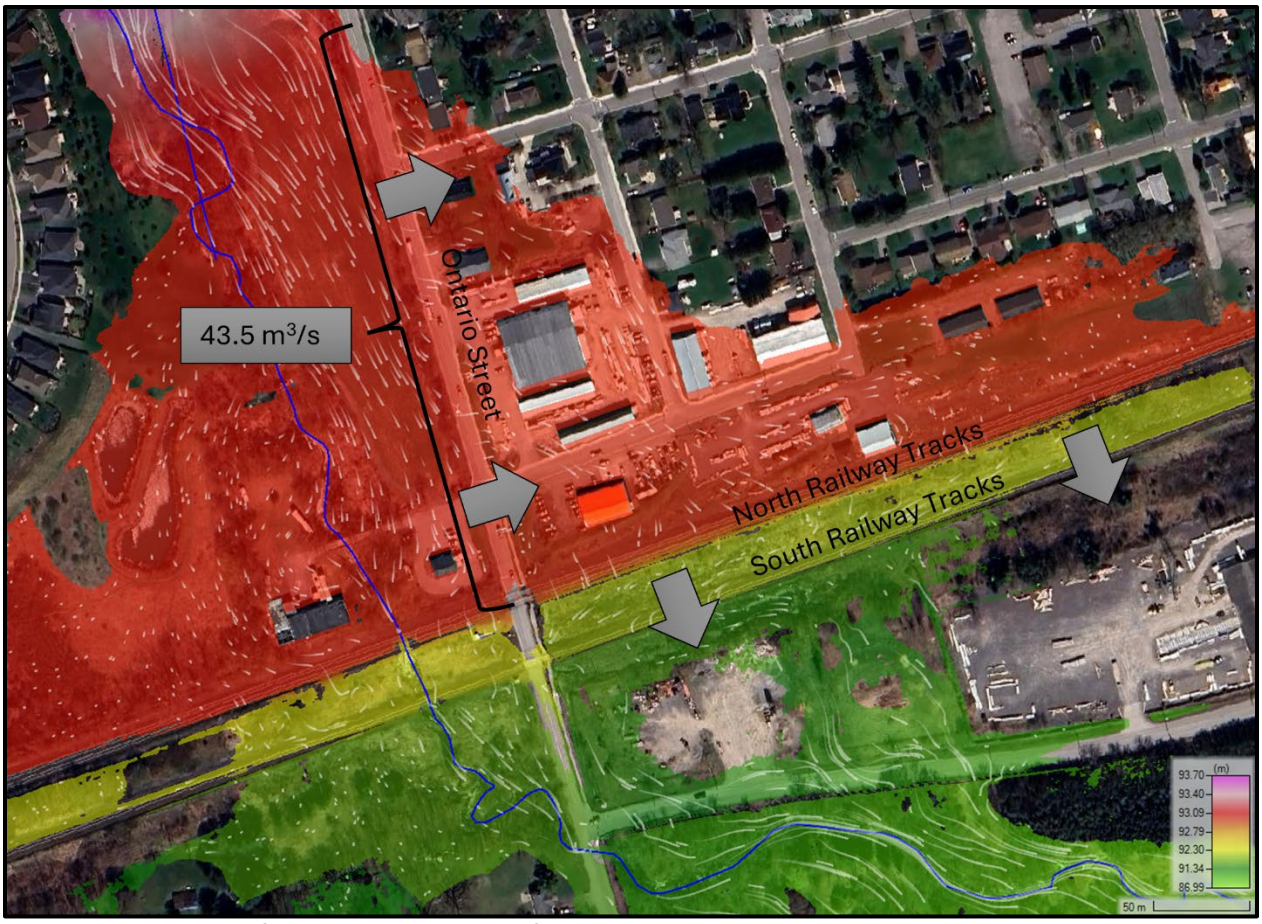

Figure 5-24: Spill East of Ontario Street, North of Railway Tracks; Timmins WSEL Overlay

5.4.2 Butler Street

The spill over Ontario Street (north of the rail tracks) ultimately drains to the inundation areas north of Butler Street as shown in Figure 5-25. Majority of the spill makes its way back to the main channel of Butler Creek with a spill over Butler Street and its two connection culverts. In the Timmins event, a relatively small (1.8 m^3/s) peak flow drains via a low point behind the Home Building Centre and its drainage ditch eastwards in the direction of Lucas Ct and Division St S. Majority (1.5 m^3/s) of this 1.8 m^3/s spill ends up at the drainage channel east of Division St S, where it then splits between the drainage ditch and an overland spill near Grimes St before ultimately draining back into Butler Creek.

The connection culverts identified previously in Figure 5-5 were used to identify the drainage path for the spill in the vicinity of Butler St, Lucas Ct, Division St S, and Grimes St.

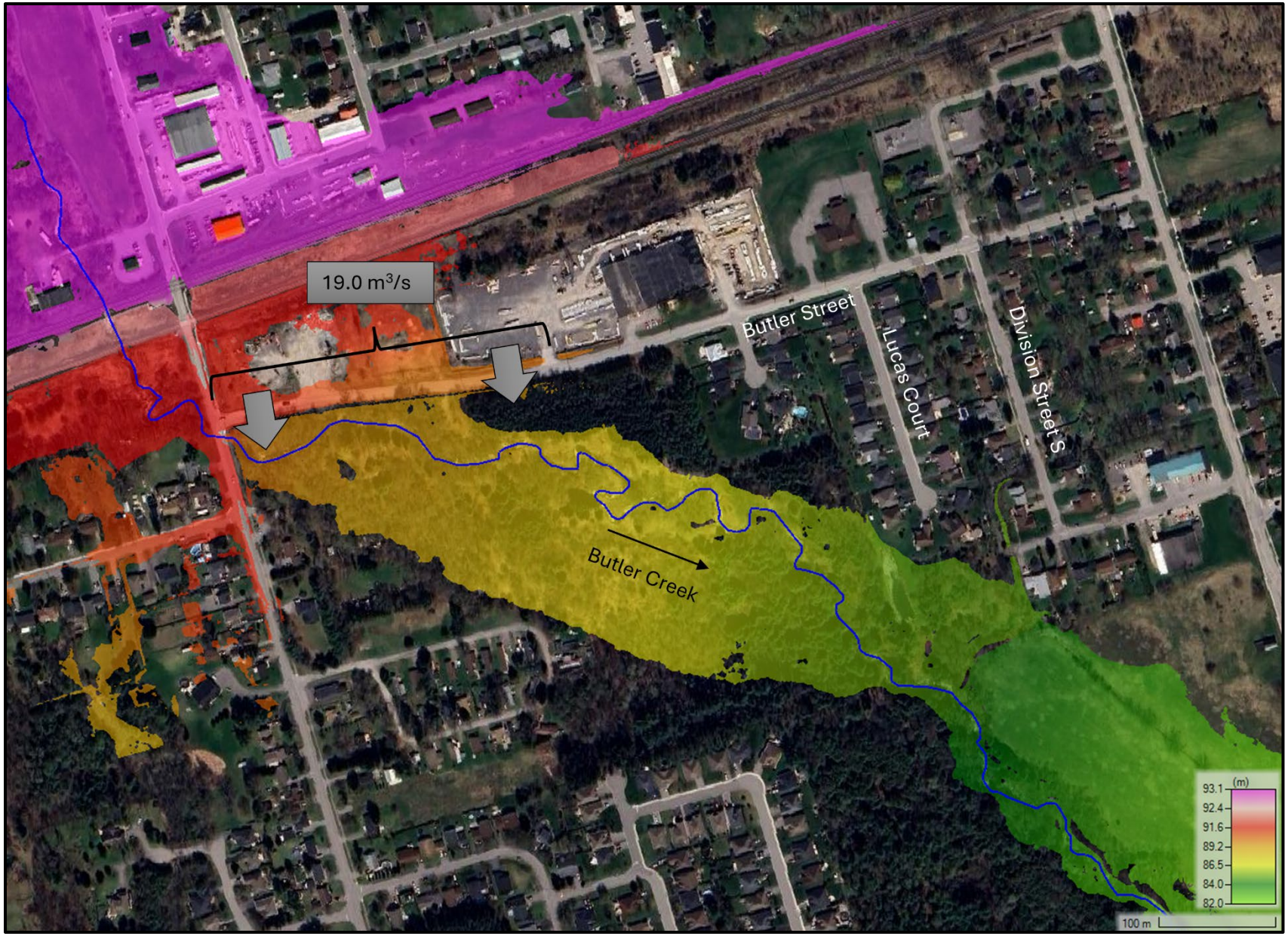

Figure 5-25: Spill Near Butler Street; Timmins WSEL Overlay

5.4.3 West of Ontario Street; South of Railway Tracks

At the beginning of the Butler Creek floodplain mapping update, LTC's Water Resources Manager found an email from 2007 in the LTC archives regarding the history of the Butler Creek spill containment berm located immediately upstream of the Ontario Street culvert crossing. It is noted that the former Town of Brighton constructed the berm in the location identified in the 1988 TSH Flood Reduction Study. The berm was noted to be constructed as of June of 1994.

In a field visit during the spring of 2023, Jewell field staff confirmed the presence of this berm. It is a well-established earth berm that follows the black line shown in Figure 5-26. The berm is also visible in a zoomed in view of the terrain layer.

While the presence of the berm is confirmed, there is still some spill that occurs in the Timmins event based on the peak flows from the Draft Hydrology Report. Aside from the flood berm, there are two other locations that water can follow to spill out of the Butler Creek system towards Butler Street West (see Figure 5-26).

There have been previous flood hazard investigations for the Timmins spill route south of Butler St W that have occurred the original floodplain mapping. Any spill in this area may affect future development applications south of Butler St W. The objective of the Butler Creek floodplain mapping update as it relates to this area is to quantify the spill that drains towards Butler St West. An update of the flood hazard limits for the spill area downstream of Butler Street West may be undertaken by prospective developers after the Butler Creek floodplain mapping update is published in March of 2024.

5.4.4 Cedar St Berm Spill

Section 7.1 provides a comparison of historical flood limits to the draft 2023/24 Butler Creek flood limits. While the flood limits are similar upstream of Cedar St in the Timmins event, there is a noticeable difference between historical and draft flood limits for the 1% AEP storm. This subsection investigates the cause of this observation.

Figure 5-27 shows an existing flood berm and drainage channel upstream of Cedar Street and north of Butler Creek. The historic flood limits suggest the previous modelers expected the berm to fully block the flows in a 1% AEP event. A review of the LiDAR data identifies a low point in the berm at elevation 83.8m (datum CGVD 2013). This low point allows for 5.4 m^3/s of flow in the 100-yr event to breach the berm (see Figure 5-28) and drain towards the existing drainage channel and overbank area north of Butler Creek, ultimately contributing to the wider floodplain extents in this area in the 100-yr event (see Figure 5-29).

Figure 5-30 shows a profile of the top of berm in the vicinity of its low point. This low point is 0.5m lower than the higher portions of the berm that are not breached in the 1% AEP storm event.

Figure 5-26: Ontario Street Spill Towards Butler Street West; Timmins WSEL Overlay

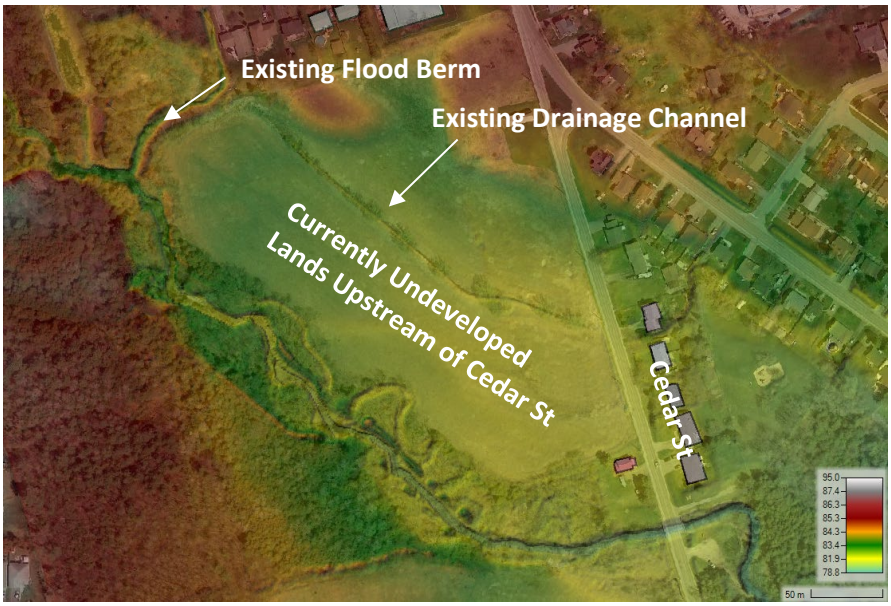

Figure 5-27: Existing Flood Berm and Drainage Channel Upstream of Cedar Street

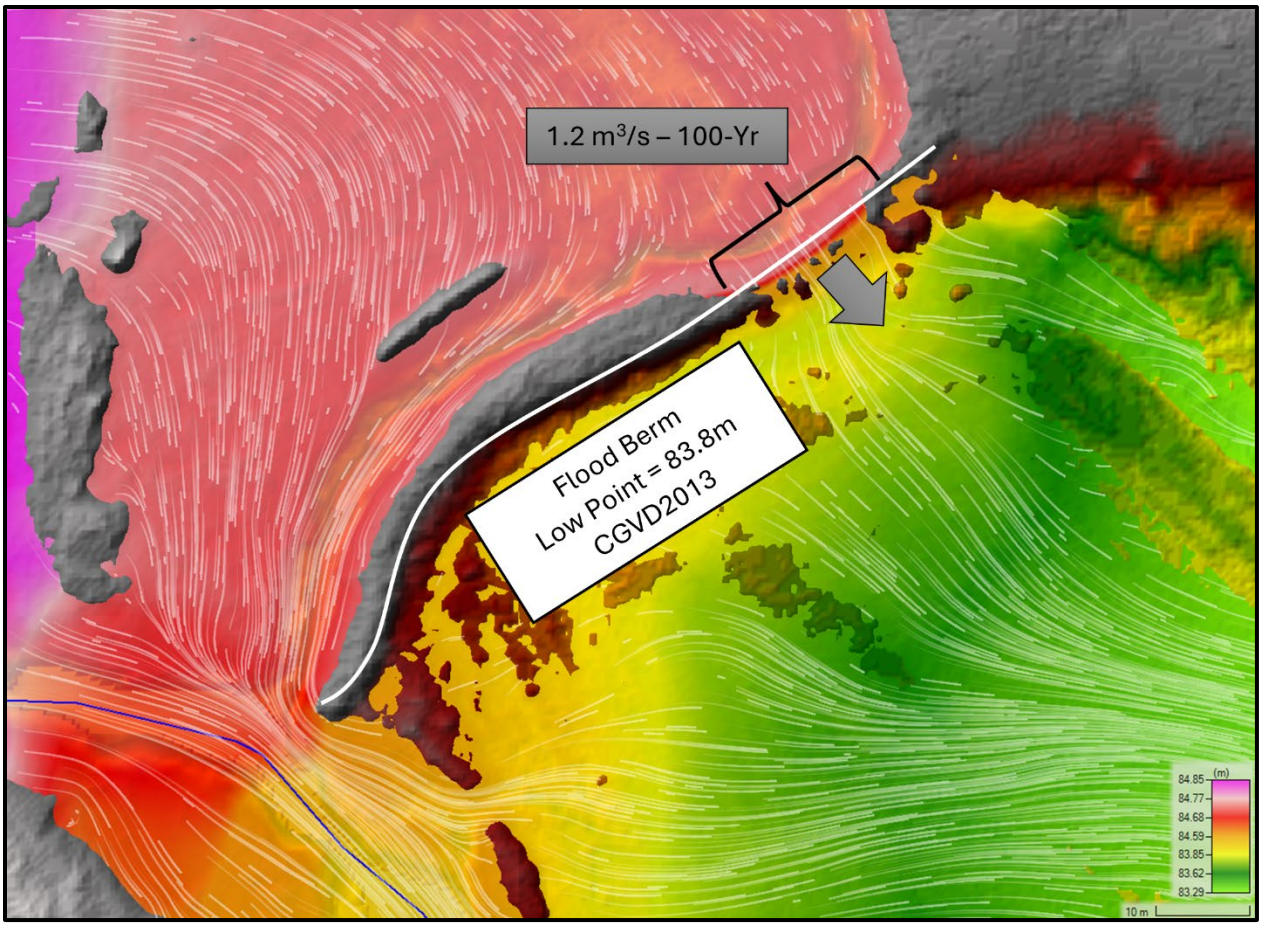

Figure 5-28: Spill at Existing Flood Berm in 100-Yr Upstream of Cedar Street; 100-Yr WSEL Overlay

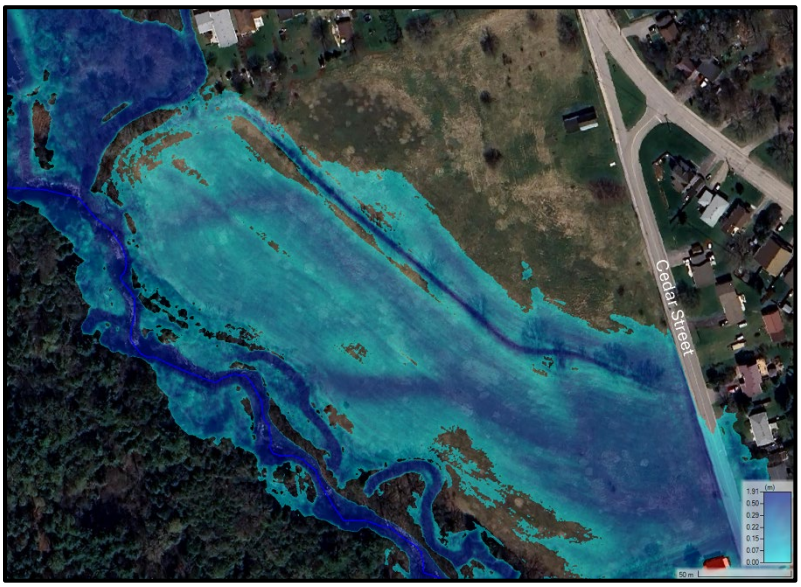

Figure 5-29: 100Yr Inundation Area Upstream of Cedar Street with Spill Over Existing Flood Berm

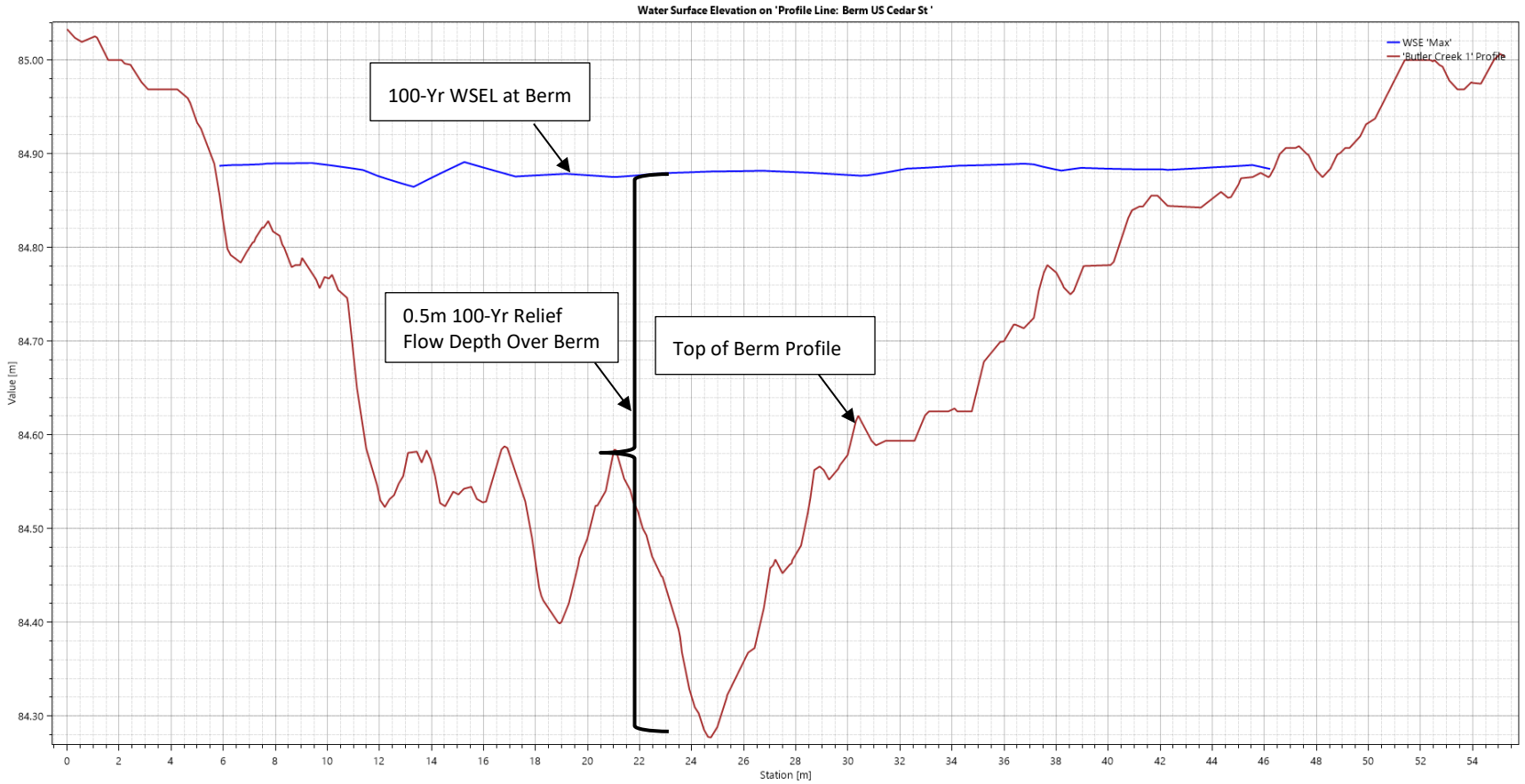

Figure 5-30: 100-Yr Water Surface Elevation Above Low Point in Berm Upstream of Cedar St; Max. 100-Yr Flow Depth Over Berm = 0.5m

5.4.5 Harbour Street Spill

Figures 5-22 and 5-23 from Section 5.3.8 illustrate the existing flood berm and the 18.8 m^3/s spill towards the Harbour Street crossing west of Butler Creek (Crossing #8). The flood berm upstream of Harbour Street, located on the west side of Butler Creek, encourages high flows to backwater and be re-directed towards the spill path that drains towards an overflow channel that drains to the Harbour Street Spill Crossing.

The Harbour Street spill results in a backwater at Crossing #8 that contributes to the wide inundation limits on the upstream side of Harbour Street. While an overflow crossing is good practice to help lengthen the relief flow over the road for the purpose of shallowing relief flow depths and limiting flood extents, a mitigation opportunity may include increasing the culvert size at Crossing #8. It is currently a 1.2m diameter culvert with a flow capacity of 1.4 m^3/s in the Timmins storm.

6 Sensitivity Analysis

Flood hazard limits are derived from the runoff rates supplied to the hydraulic model. It is important to assess the sensitivity of the selected peak flows to their input parameters to understand the potential variance in peak flows due to uncertainties in the modeling input. Uncertainties are inherent in all scientific modeling programs and individual models can be used responsibly when the user understands the limitations and potential factors that can influence the model output.

Sensitivities for CN, lag time, runoff volume, Manning's roughness values, and the Lake Ontario water levels are discussed in this section.

6.1 Curve Number

The sensitivity analysis for the CN was completed to determine the impact this value has on peak flows. Figure 6-1 shows a comparison of CN values to the resulting peak flows from the VO model. As expected, there is a strong correlation between CN and peak flows values. With a 15% increase in CN, there is approximately a 32% increase in peak flow. Similarly, for a 15% decrease in CN, there is approximately a 20% reduction in peak flow.

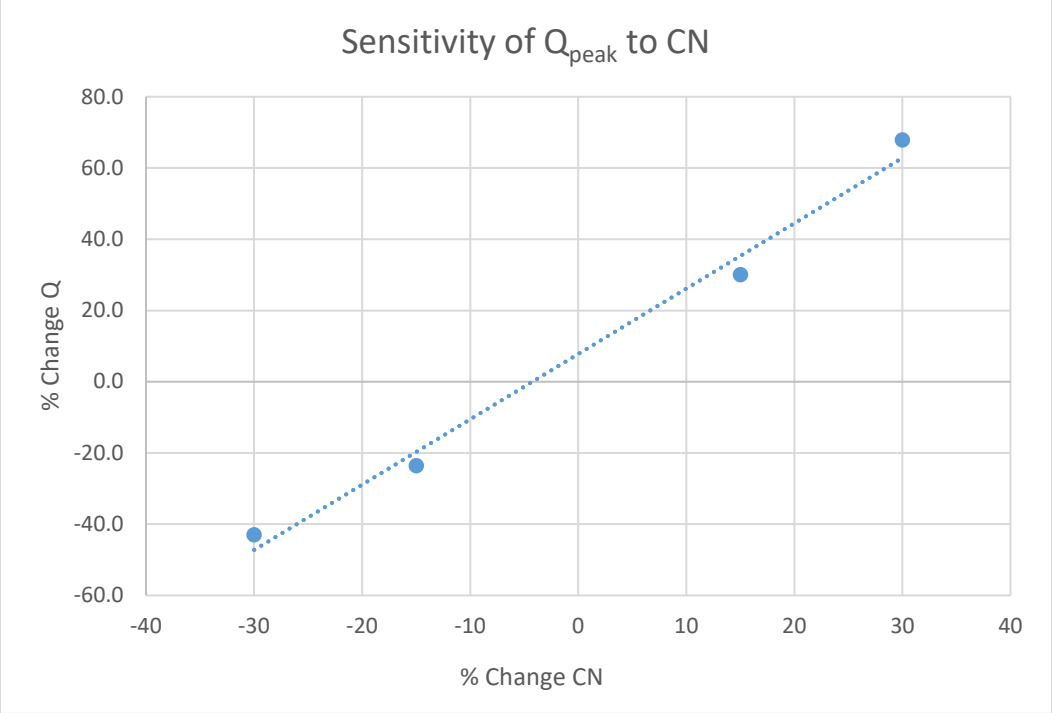

Figure 6-1: Sensitivity of Peak Runoff Rates to CN

6.2 Lag Time

The lag time has the least impact of the three sensitivity tested parameters for the hydrology outputs, but still has moderate sensitivity impacts on the peak flow results. Figure 6-2 shows a comparison of lag

time values to the resulting peak flows in the VO model. With a 25% increase in lag time, there is a 10% decrease in peak flow. Similarly, for a 28% decrease in lag time, there is a 20% increase in peak flow.

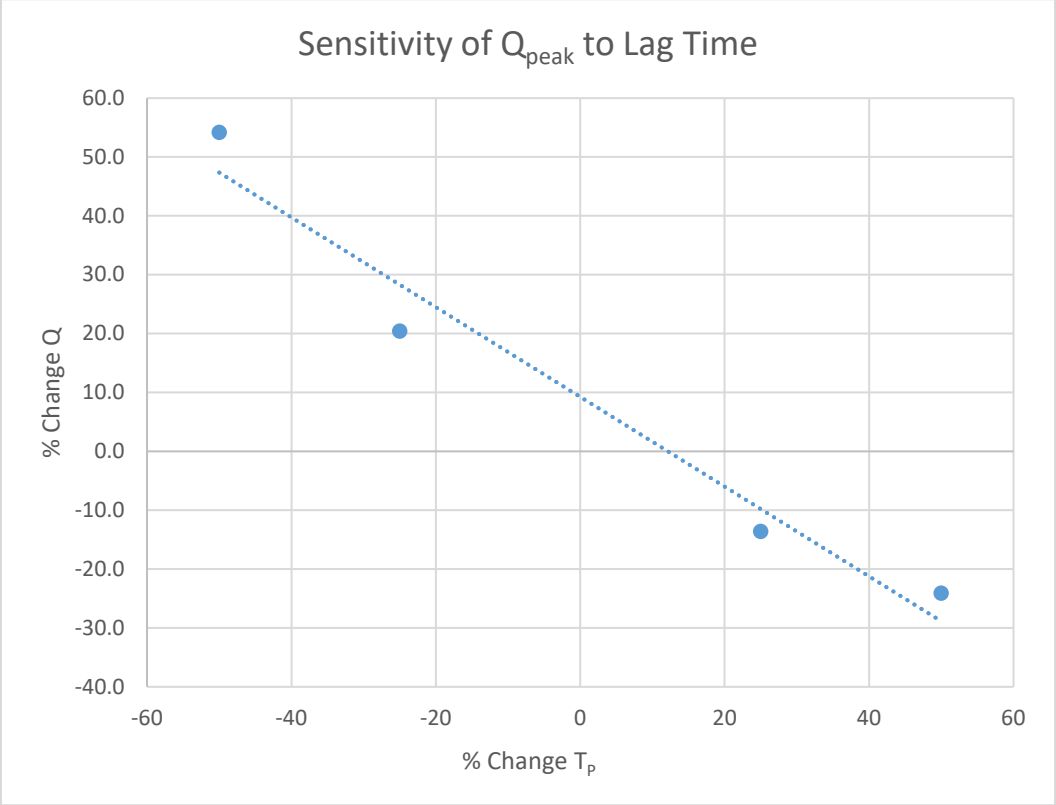

Figure 6-2: Sensitivity of Peak Runoff Rates to Lag Time

6.3 Rainfall Volume

Rainfall volume is of particular interest. It is evident that there is a dramatic increase in peak flows with an increase in the rainfall volume. Since climate change considerations result in increasing the rainfall depth based on a forecast increase in temperature, the consideration of the increase in peak runoff rate is significant. Figure 6-3 shows that a 15% increase in rainfall would yield a 26% increase in peak flow. Similarly, a decrease in rainfall by 15% would yield a lower peak flow by 20%.

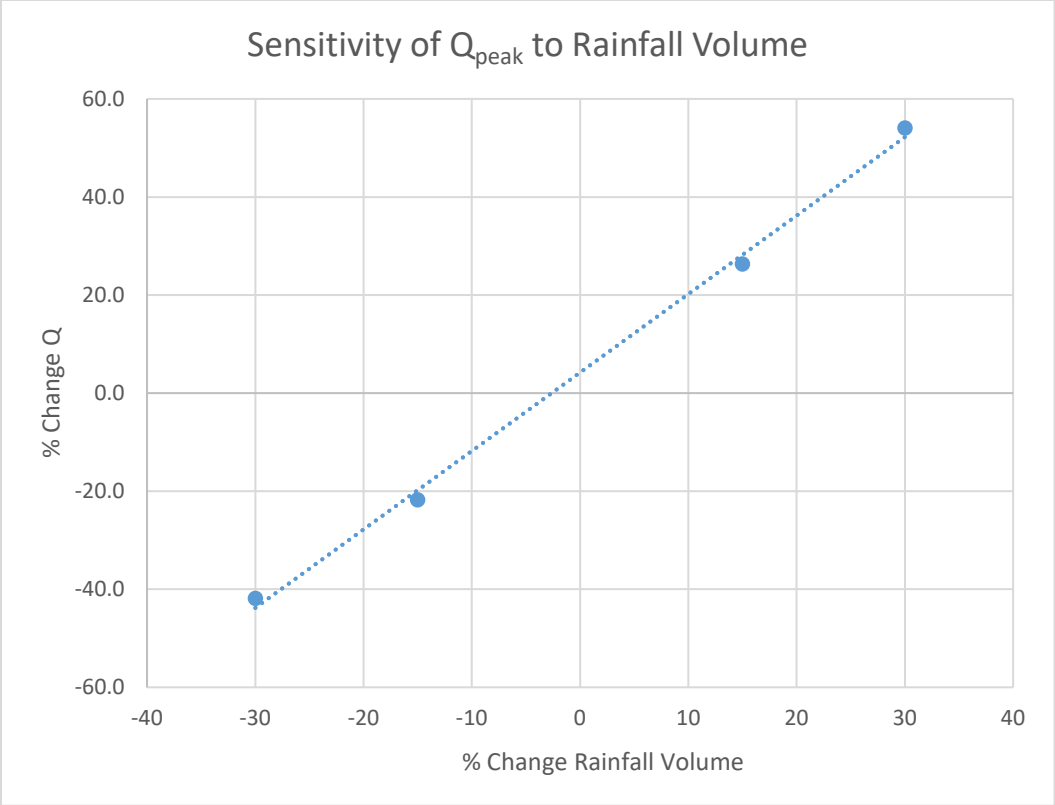

Figure 6-3: Sensitivity of Peak Runoff Rates to Rainfall Volume

6.4 Manning's Roughness Values

The hydraulic model requires inputs for Manning's n values. The *HEC-RAS User's Manual* and *MTO Drainage Management Manual* provide ranges of roughness coefficient values for varying surface cover such as crop overbank areas, treed areas, and channel bottoms for natural watercourses. Mid-range, high, and low Manning's values were tested in different simulations to determine the effect of these values on the floodplain limits. Mid-range values were selected and applied in the regulatory floodplain mapping. A comparison of the flood limits for low, mid, and high-range values is shown in Figure 6-4 for the Timmins event. The model has minor sensitivity to the Manning's n values.

Table 6-1: Manning's n Values Applied in Hydraulic Model Sensitivity Tests

Land Cover	Low	Medium	High
Swamp	0.035	0.045	0.06
Clear open water	0.028	0.032	0.035
Community infrastructure	0.035	0.05	0.12
Tree upland	0.05	0.07	0.09
Marsh	0.035	0.045	0.06
Deciduous treed	0.05	0.07	0.09
Mixed treed	0.05	0.07	0.09
Coniferous treed	0.05	0.07	0.09
Agriculture and undifferentiated rural	0.035	0.05	0.07
Plantations - treed cultivated	0.035	0.05	0.07
Hedge rows	0.04	0.05	0.07
Sand gravel mine tailings extraction	0.017	0.025	0.033

Figure 6-4: Zoomed in Comparison of Timmins Flood Hazard Limits for Low (Cyan), Mid (Red), and High (Green) Manning's n Values Downstream of County Road 2

6.5 Lake Ontario Water Level

The Lake Ontario water level establishes the downstream boundary condition for the hydraulic model. Therefore, the sensitivity of the model to the lake level was investigated.

Two scenarios were selected. The first was a Timmins simulation with the lake level set to a seasonally high-water level of 74.75m CGVD 2013. The second was a repeated simulation with the lake level set to its 100-yr water level of 75.61m CGVD 2013. The 100-yr lake level was provided by LTCs Water Resources Manager in the spring of 2023 and converted to the 2013 datum.

Due to the fall between Harbour Street and Lake Ontario, the flood hazard limit is not sensitive to the Lake Ontario water level, and the flood hazard limits were unchanged in the simulations. The seasonally high average water level was selected for the remaining simulations as it is the most supportable approach in this author's opinion, since the probability of a 1% AEP storm occurring at the same time as a 100-yr Lake Ontario water level is unlikely and would not reflect a true 1% AEP condition.

7 Flood Hazard Limit Delineation

Floodplain maps are provided in the attached deliverables package for the regulatory event. Flood limits for the 50-, 100-, 200-yr, Timmins, and Timmins plus Climate Change events are also included.

A plot of water surface profiles extending the full study area from Proctor Park Conservation Area to Harbour Street outlet is provided in Figure 7-1. There are no significant elevation drops along the main channel within the study area. The steep changes in water surface elevation occur near road crossings; for example, the sharp drop in elevation in the Timmins event near Station 1500 is due to the high backwater depths induced by the railway tracks. Note that draft floodplain maps will include a plan view of the station and water level data that corresponds to the profile plot below in addition to the georeferenced flood hazard limits.

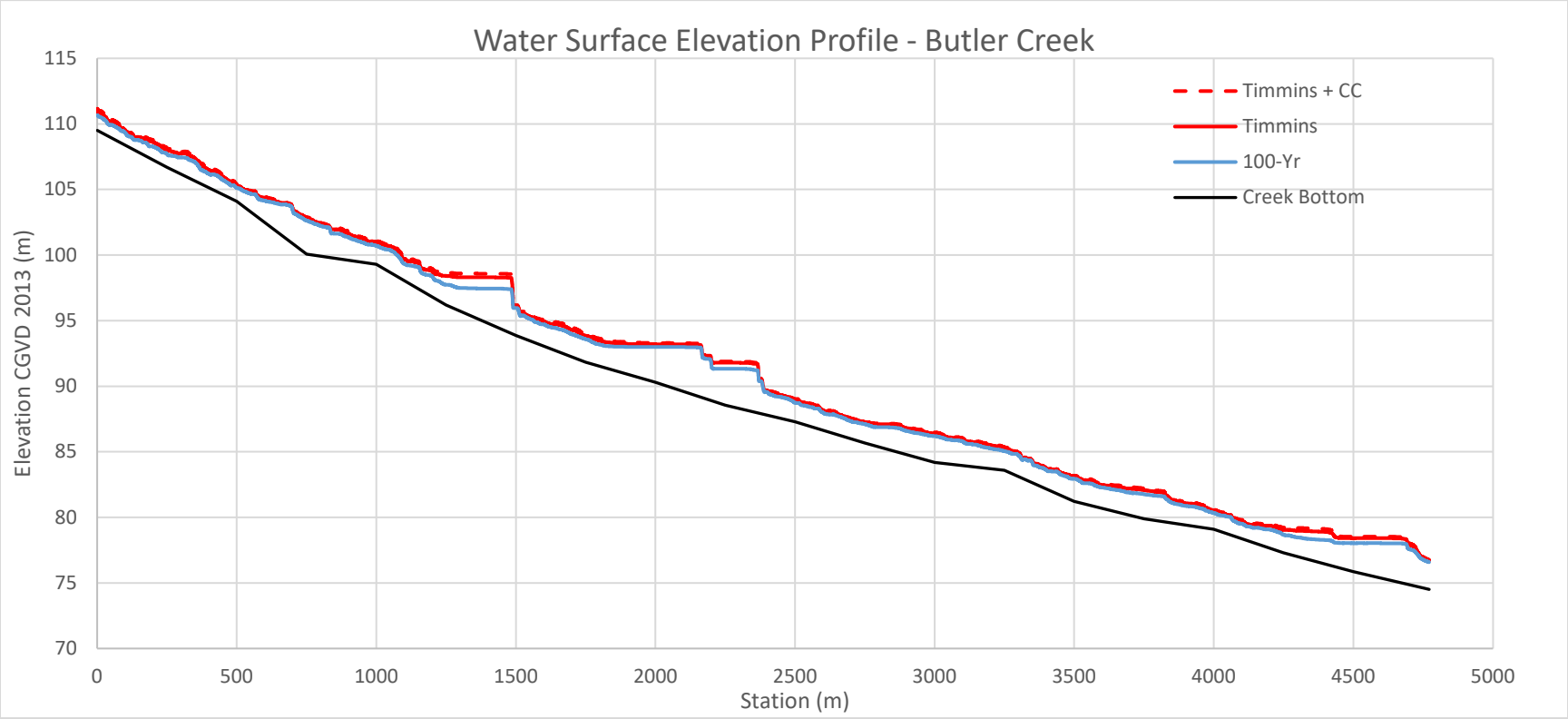

Figure 7-1: Water Surface Profile for 100-Yr, Timmins, and Timmins + Climate Change Events

8 Arena Creek

As a supplemental component of the Butler Creek floodplain mapping update, an assessment of the existing flood hazard limits for Arena Creek was completed.

The hydraulic modeling approach applied to Butler Creek was also applied to Arena Creek, and a 2-dimensional model was applied due to the urban areas within the overbanks of the main channel.

8.1 Bathymetric Survey, Boundary Conditions, & Crossings of Interest

Jewell surveyed 150+ creek sections to identify the channel bathymetry for inclusion in the hydraulic model (see Figures 8-1 and 8-2).

Figure 8-1: Surveyed Creek Bathymetry Upstream of Railway Tracks

Arena Creek has nine (9) crossings of interest that are much smaller in size relative to the Butler Creek crossings due to its much smaller watershed and subsequent peak flow rates. The location of these crossings of interest is shown in Figure 8-3. Also included in Figure 8-3 is the locations of the boundary conditions. The inflow hydrographs corresponding to each inflow boundary condition are obtained from the hydrology model based on their receiving catchments. The receiving catchments and corresponding peak flows for each inflow boundary condition in the 1% AEP and Timmins storms is shown in Table 8-1.

Similar to Butler Creek, an additional thirty-three (33) culverts were measured and included in the Arena Creek hydraulic model (see Figure 8-4). These are considered connection culverts for the purpose of

modeling the drainage path and flow movement of water in the spill areas during the regulatory storm event. These connection culverts are located south of the railway tracks.

Figure 8-2: Surveyed Creek Bathymetry Downstream of Railway Tracks

Table 8-1: Arena Creek Inflow Boundary Conditions

Inflow BC	Receiving Catchments	Peak Flow (m^3/s)	
		1% AEP	Timmins
1	A100, A200	3.67	6.44
2	A101, A300	3.67	6.44
3	A400	1.23	2.16
4	A500	1.45	2.54

Figure 8-3: Arena Creek Crossings of Interest and Boundary Condition Locations

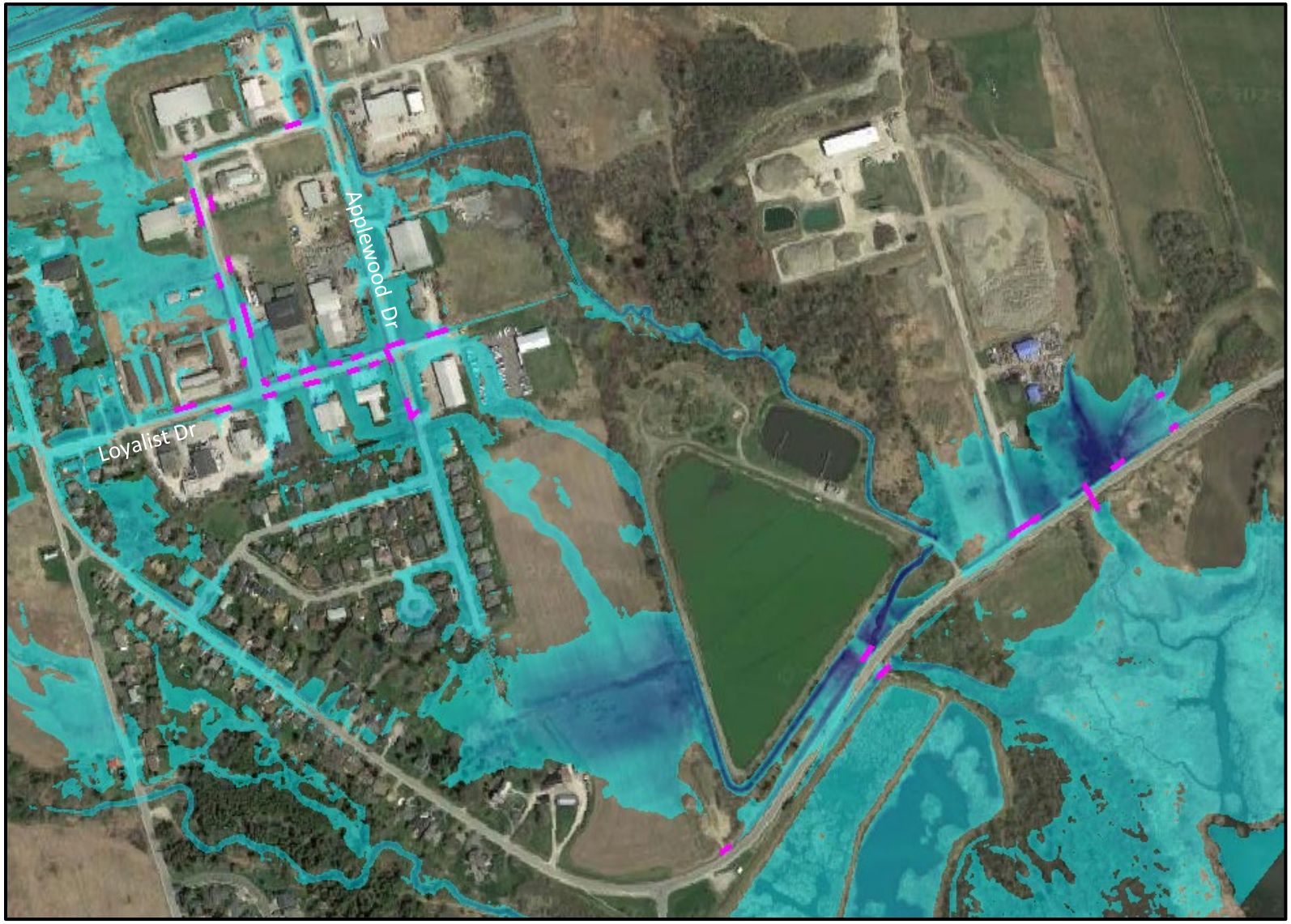

Figure 8-4: Location of Connection Culverts Included in HEC-RAS Model; Timmins Depth Layer Overlay

8.2 Crossing Summaries

The crossing summary below provides a comparison of receiving flows, relief flow depths, and depth-velocity products at each of the nine crossings of interest in both the Timmins and 1% AEP storm events. The relief flow depths and depth-velocity products shown are representative of the peaks that occur along any point of the crossing. The crossing summaries are affected by several spill locations and local drainage paths that occur in a major storm event. These spill locations are further discussed in Section 8.3.

Table 8-2: Arena Creek Crossing Summary Part 1

#	Name	Type	Span / Rise (m)	Diameter (m)	Q_{peak} (m^3/s)		[1]Relief Flow Depth		[2]Depth-Velocity Product	
					1% AEP	Timmins	1% AEP	Timmins	1% AEP	Timmins
1	County Rd 2	Old box culvert	1.0 / 1.0	N/A	3.25	4.99	0.00	0.09	0.00	0.01
2	Park Crossing	Circular CSP	N/A	0.8	5.33	8.12	0.37	0.45	0.07	0.20
3	Access Rd	Circular CSP	N/A	0.9	6.76	11.5	0.37	0.50	0.10	0.39
4	N. Railway Crossing	Circular CSP	N/A	1.7	6.88	4.78	0.18	0.23	0.00	0.07
5	S. Railway Crossing	CSP Arch	1.0 / 1.0	N/A	6.37	3.36	0.19	0.28	0.03	0.10
6	Commercial Entrance	CSP Arch	1.3 / 1.0	N/A	4.35	5.64	0.18	0.22	0.07	0.12
7	Applewood Drive	CSP Arch	1.7 / 1.2	N/A	4.3	5.54	0.02	0.09	0.03	0.01
8	Cty Rd 64 Entrance	Circular CSP	N/A	1.3	3.5	3.65	0.12	0.20	0.01	0.02
9	County Rd 64	Concrete box	2.6 / 1.5	N/A	4.5	8.97	0.07	0.14	0.03	0.08

[1]Red represents value beyond 0.3m recommended limit based on guidance in the 2008 MTO Highway Drainage Design Standards.

[2]Red represents value beyond 0.8 m^2/s recommended limit based on guidance in the 2008 MTO Highway Drainage Design Standards.

Crossings #6-8 have reduced flows due to Spill #2 over Cedar Street towards Butler Creek.

Crossing #9 has reduced flow due to Spills #2 and #5.

Table 8-3 summarizes the culvert capacities and relief flows at each of the nine crossings of interest. The stage and flow hydrographs for the Arena Creek crossings are provided in Appendix I-2.

Table 8-3: Arena Creek Crossing Summary Part 2

#	Name	Q_{peak} (m^3/s)		Q_{culv} (m^3/s)		$Q_{relief\ flow}$ (m^3/s)	
		1% AEP	Timmins	1% AEP	Timmins	1% AEP	Timmins
1	County Rd 2 (Elizabeth St)	3.25	4.99	3.25	3.58	0.00	1.41
2	Park Crossing	5.33	8.12	0.86	0.87	4.47	7.25
3	Access Rd	6.76	11.45	1.58	1.85	5.18	9.60
4	N. Railway Crossing	6.88	12.76	4.74	4.77	2.14	7.99
5	S. Railway Crossing	6.37	10.17	3.25	3.36	3.12	6.81
6	Commercial Entrance	4.35	5.64	2.60	2.76	1.75	2.88
7	Applewood Drive	4.31	5.54	4.31	5.20	0.00	0.34
8	Cty Rd 64 Entrance	3.46	3.65	3.26	3.28	0.20	0.37
9	Cty Rd 64	4.45	8.97	3.87	5.46	0.58	3.51

Crossings #6-8 have reduced flows due to Spill #2 over Cedar Street towards Butler Creek.
Crossing #9 has reduced flow due to Spills #2 and #5.

8.3 Spill Locations

There are five (5) potential spill locations along Arena Creek in the regulatory event. For the purpose of this section, a spill location is defined as a location where runoff has strayed from the Arena Creek channel and its immediate overbanks. The spill locations and their 1% AEP and Timmins peak flows are presented in Table 8-4. The spill locations and peak flows identified in Table 8-4 are also presented in Figure 8-5.

Spill #1 represents the spill over the north and south railway tracks. This spill is located approximately 350m west of the Arena Creek culvert crossing since this is where the low point in the railway tracks is located. Due to this distance from the main channel, the relief flow over the tracks has a flow path that traverses the existing development area south of the tracks in addition to some spill over Cedar Street as described in Spill #2.

Spill #2 represents the spill over Cedar Street that ultimately drains to the Butler Creek drainage system. This spill will be included in the hydraulic model for Butler Creek as a next step in the Butler Creek floodplain mapping update.

Spill #3 represents the quantity of flows that drain back to Arena Creek via the drainage ditch along Loyalist Drive.

Spill #4 represents the remainder of Spill #1 that does not drain over or along Cedar Street and also does not drain via the Loyalist Drive drainage ditch back to Arena Creek. Rather, Spill #4 represents the flows that continue south towards a drainage channel west of Arena Creek that ultimately meets Arena Creek at its outlet crossing at County Road 64 (Crossing #9).

Spill #5 occurs east of Arena Creek immediately upstream of County Road 64. The backwater from the entrance off of County Road 64 (Crossing #8) results in Spill #5 that drains towards a secondary crossing of County Rd 64 that also outlets to Lake Ontario.

Table 8-4: Spill Locations and Their Corresponding 1% AEP and Timmins Peak Flows

#	Location	Q_{peak} (m^3/s)	
		1% AEP	Timmins
1	Spill Over Railway Tracks	3.13	7.98
2	Spill Over Cedar Street to Butler Creek	1.10	3.29
3	Spill Towards Loyalist Drive Ditch	0.42	0.50
4	Spill Towards Cty Rd 64 West Channel	1.40	6.05
5	Spill to Cty Rd 64 Secondary Crossing	1.20	3.01

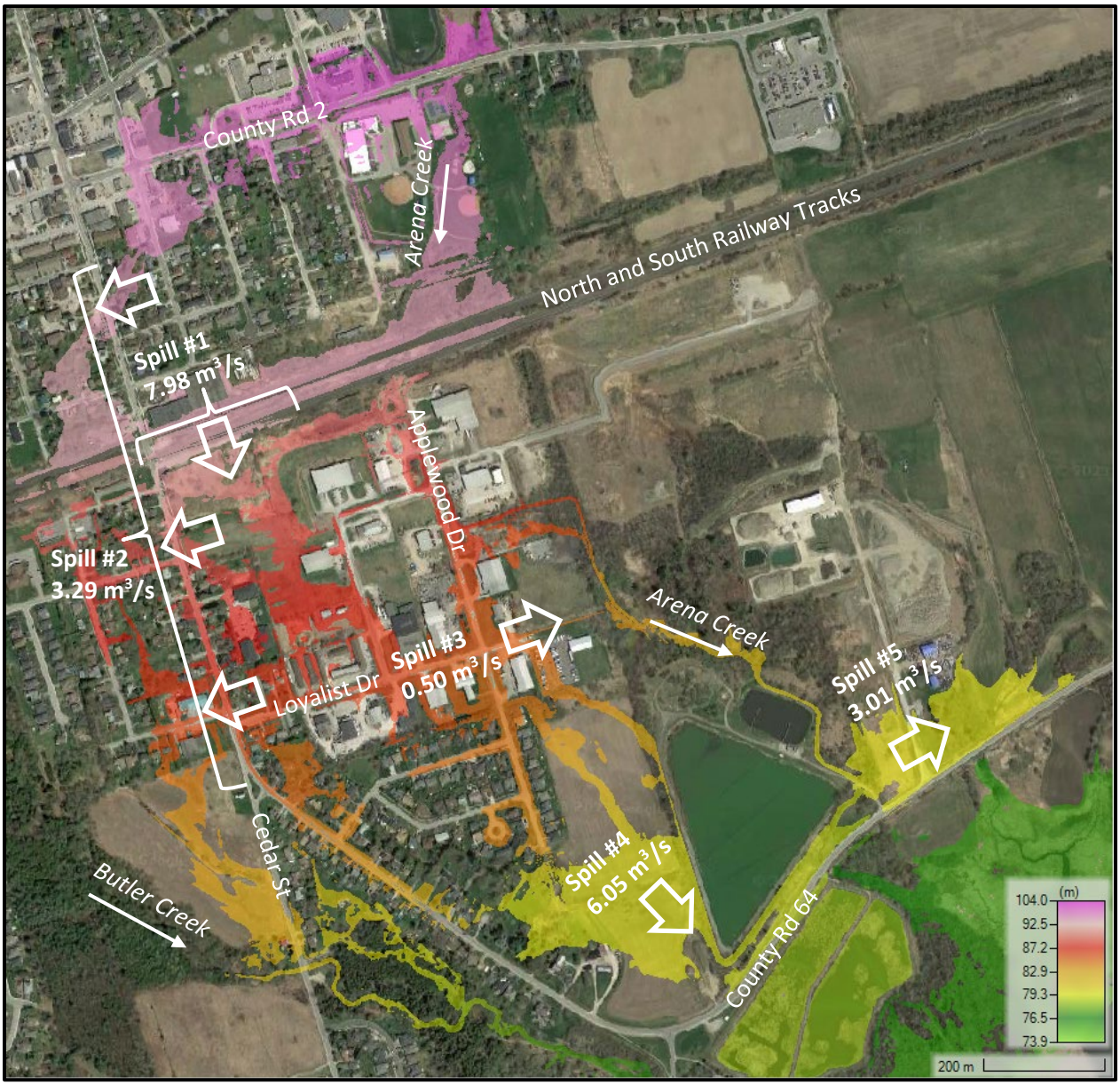

Figure 8-5: Arena Creek Spill Locations and Corresponding Timmins Peak Flow

8.4 Draft Inundation Boundaries – Arena Creek

Draft flood hazard limits for the 1% AEP and Timmins storms are provided in Figures 8-6 and 8-7.

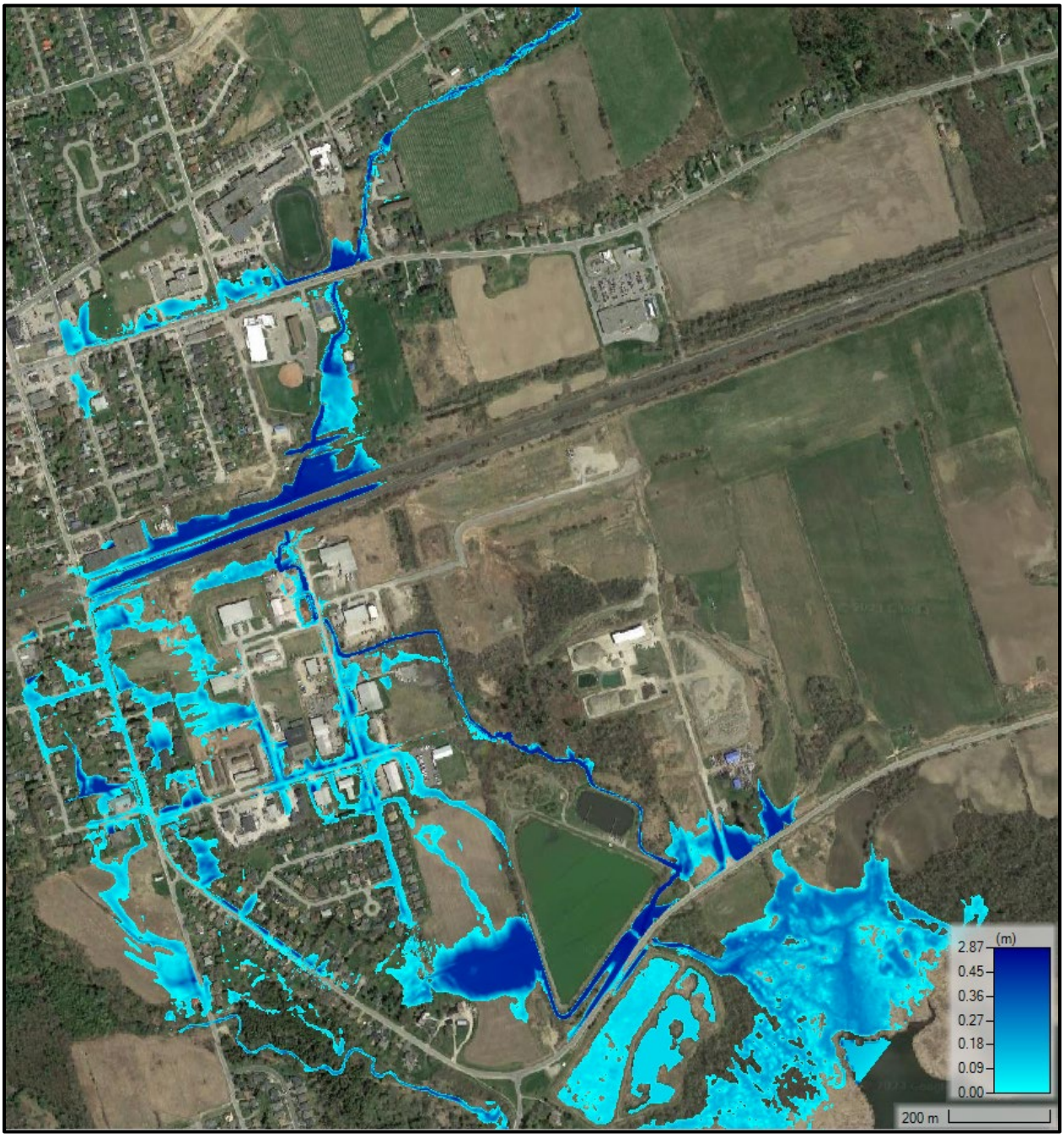

Figure 8-6: Draft Inundation Boundary for Arena Creek in 1% AEP Storm

Figure 8-7: Draft Inundation Boundary for Arena Creek in Timmins Storm

8.5 Buildings within Flood Hazard Limit

Buildings within the flood hazard limit in the 1% AEP or Timmins events are illustrated in Figure 8-8. For the purpose of this estimate, a building is considered within the floodplain if the flood limit touches any point on the perimeter of the building footprint.

The buildings that are within the draft floodplain in the 100-yr storm are illustrated by a yellow node. There are eighteen (18) yellow nodes within the Arena Creek study area (i.e. not including Butler Creek watershed).

The buildings that are within the draft floodplain in the Timmins storm are illustrated by a pink node. There are thirty (30) pink nodes within the Arena Creek study area.

Table 8-5: Number of Buildings within Arena Creek Draft Flood Hazard Limits

Storm Event	No. of Buildings
1% AEP	18
Timmins	48

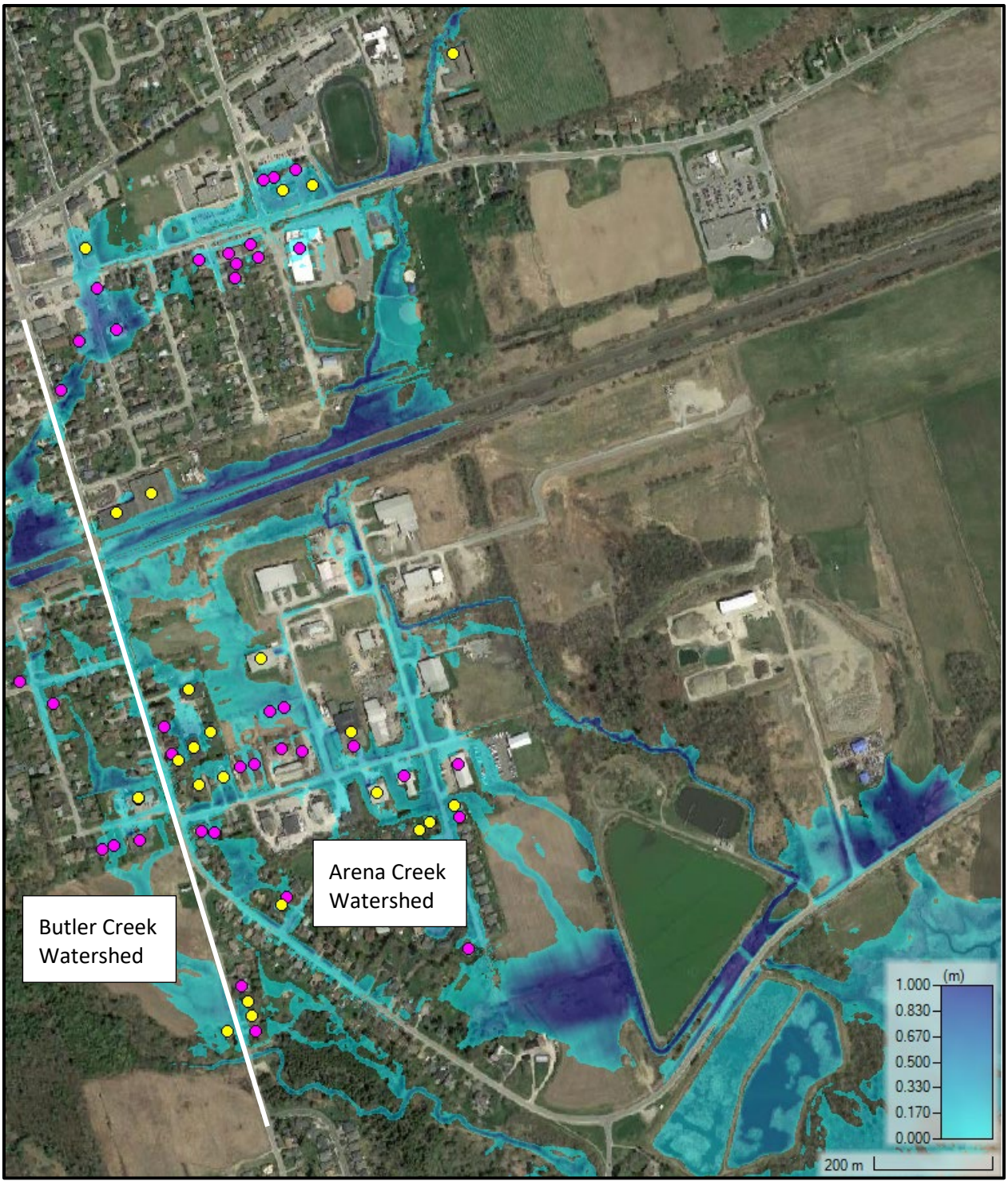

Figure 8-8: Building within 1% AEP Storm (Yellow Nodes) and Timmins Regulatory Storm (Pink Nodes)

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Jewell Engineering Inc.

Bryon Keene, P. Eng.
Jewell Engineering Inc.

9 References

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Appendix A:
Official Plan – Schedule 2

Municipality of Brighton, Ontario
Official Plan
Land Use
Brighton Urban Area
Schedule "A"
Map 2

Special Policy Area #3 4.14.3
Special Development Area 14 4.15.14
Special Policy Area #2 4.14.2
Special Development Area #15 4.15.15
Special Policy Area #1 4.14.1
Special Development Area #13 4.15.13
Special Development Area #2 4.15.2
Special Policy Area #6 4.14.6

Lot 33
Lot 34
Lot 35
Lot 1
Lot 2
Lot 3
Lot 4
Lot 5
Lot 31
Lot 32
Con. A
Con. II
Con. I
Con. B
Con. C B.F.
Con. BF

For Rural Area See Schedule A Map 1

For Presqu'ile Bay Area See Schedule A Map 3

Popham Bay

Presqu'ile Bay

0 0.25 0.5 1 Kilometers

Land Use Designations

- Environmental Protection
- Core Commercial
- Highway Commercial
- Residential
- Shoreline Residential
- Industrial
- Greenfield

Special Policy Area #1 Land Use
- Community Facilities and Open Space

Features

- Special Policy Area
- Special Development Area
- Intensification Boundary
- Urban Settlement Boundary
- Property Boundary
- County Road
- Municipal Road
- Rail Lines
- Watercourse Permanent
- Waterbodies
- Waste Disposal Assessment Area
- Landfill

Schedule A Map 2 i

Schedule A Map 2 ii

0 70 140 280 Meters

Special Policy Area #1 4.14.1
Special Policy Area #2 4.14.2

2020 Created by D.M. Wills Associates Limited In Partnership with Kevin M. Duguay Community Planning and Consulting Inc.

Appendix B:
Butler Creek and Arena Creek Catchment Area Drawings

BUTLER CREEK SUBCATCHMENT AREAS	
NAME	AREA (Ha)
301	450
302	1367
303	192
304	572
305	157
306	16

LEGEND

- HYDROLOGIC NODE
- ONT TRAIL NETWORK
- RAIL ROAD TRACKS

RIVER NETWORK
- PRIMARY TRIBUTARY
- SECONDARY TRIBUTARY
- 5m CONTOURS

ROADS
- MAJOR HIGHWAY
- MINOR HIGHWAY
- COUNTY ROAD
- ROAD
- UTM 5 Km GRID LINE
- BUTLER CREEK SUB CATCHMENTS
- ARENA CREEK SUB CATCHMENTS
- WATER BODIES
- WETLANDS
- URBAN BOUNDARY

CLASS
- PARK / CONSERVATION AREA
- GOLF COURSE

BUTLER & ARENA CREEK CATCHMENT AREA

N W E S

LIDAR PROJECT CONTROL DATUM:
HORIZONTAL DATUM: NAD 83 CSRS (EPOCH 2010.0)
VERTICAL DATUM: CGVD 2013

JEWELL ENGINEERING

LOWER TRENT CONSERVATION

MUNICIPALITY OF BRIGHTON

0.2 0.1 0 0.2 0.4 0.6 0.8 1 Kilometers

CARMAN RD
CTY HWY 30
CHATTEN RD
HWY 21
HWY 26
BUTLER CREEK
302
301
HWY 401
TELEPHONE RD
SCRIVER RD
TIMBER RIDGE GOLF COURSE
PROCTORS CREEK
A
D J WHITES RD
GEORGINA ST
304
LITTLE LAKE RD
SMITH ST
PROCTOR PARK CONSERVATION AREA
303
BRIGHTON
DUNDAS ST
HWY 2
KING EDWARD PARK
HWY 64
305
B
HUFF RD
HWY 66
CEDAR ST
C
306
D
HARBOUR ST
PRESQU'ILE BAY
LAKE ONTARIO

BUTLER CREEK SUBCATCHMENT AREAS		ARENA CREEK SUBCATCHMENT AREAS	
NAME	AREA (Ha)	NAME	AREA (Ha)
301	450	100	61.4
302	1367	101	82.0
303	192	200	24.3
304	572	300	48.3
305	157	400	50.0
306	16	500	61.5

LEGEND

- HYDROLOGIC NODE
- ONT TRAIL NETWORK
- RAIL ROAD TRACKS

RIVER NETWORK
- PRIMARY TRIBUTARY
- SECONDARY TRIBUTARY
- 5m CONTOURS

ROADS
- MAJOR HIGHWAY
- MINOR HIGHWAY
- COUNTY ROAD
- ROAD
- UTM 5 Km GRID LINE
- BUTLER CREEK SUB CATCHMENTS
- ARENA CREEK SUB CATCHMENTS
- WATER BODIES
- WETLANDS
- URBAN BOUNDARY

CLASS
- PARK / CONSERVATION AREA
- GOLF COURSE

BUTLER & ARENA CREEK CATCHMENT AREA

N W E S

LIDAR PROJECT CONTROL DATUM:
HORIZONTAL DATUM: NAD 83 CSRS (EPOCH 2010.0)
VERTICAL DATUM: CGVD 2013

JEWELL ENGINEERING

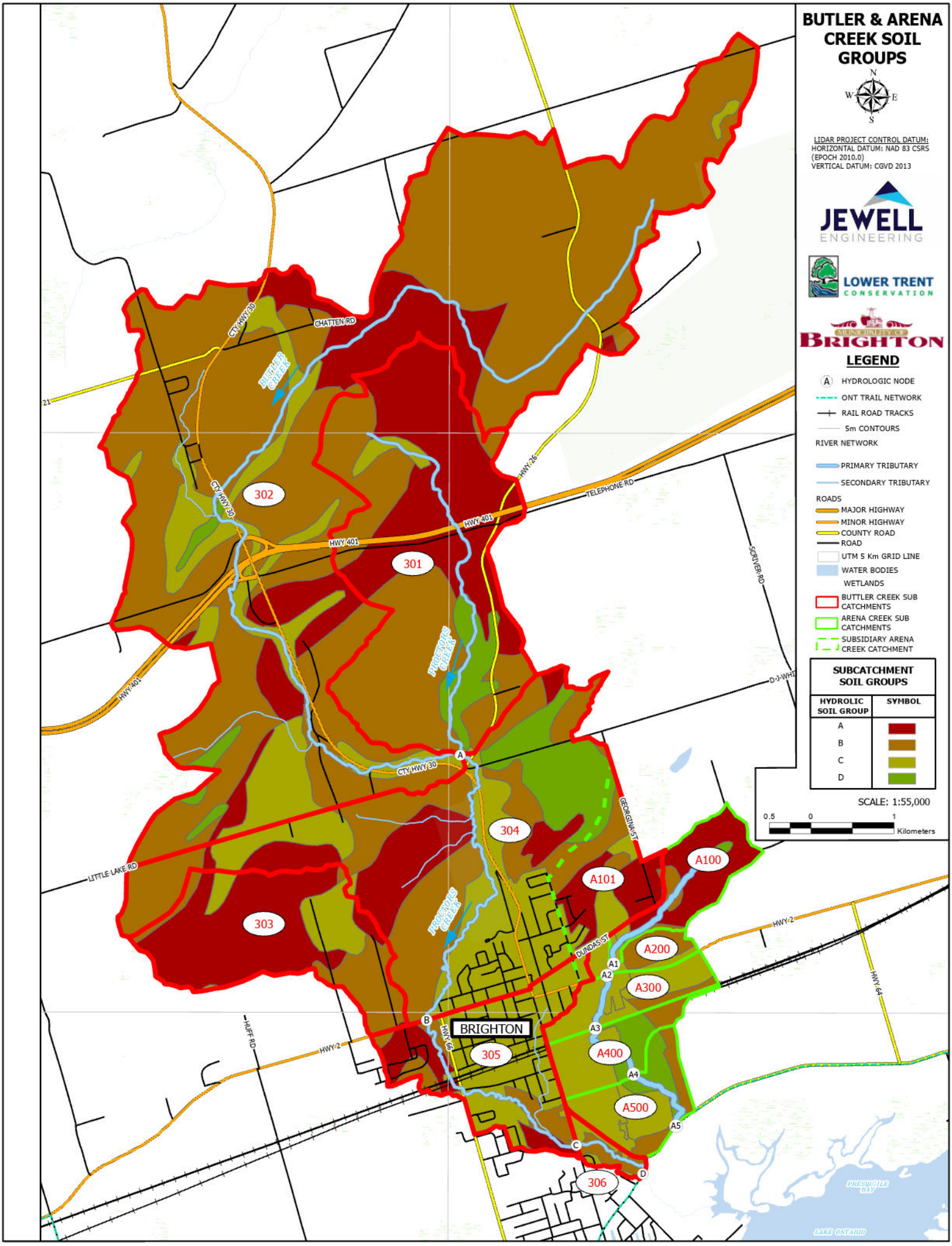
LOWER TRENT CONSERVATION

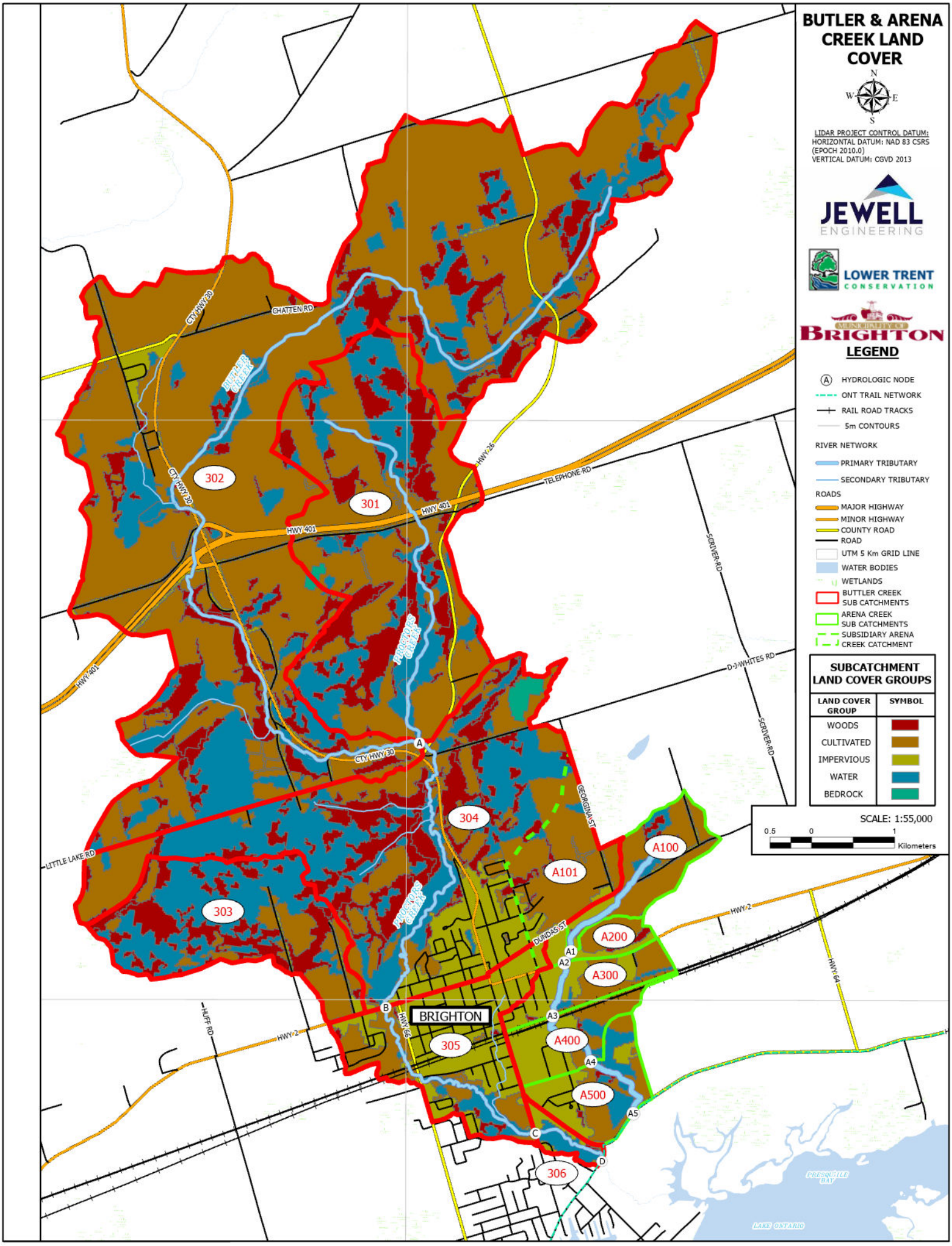
MUNICIPALITY OF BRIGHTON

0.2 0.1 0 0.2 0.4 0.6 0.8 1 Kilometers

CARMAN RD
HWY 30
CHATTEN RD
HWY 21
BUTLER CREEK
HWY 401
TELEPHONE RD
HWY 26
TELEPHONE RD
SCRIVER RD
BRIGHTON PROVINCIAL WILDLIFE AREA
TIMBER RIDGE GOLF COURSE
302
301
304
303
A
D J WHITES RD
GEORGINA ST
SCRIVER RD
A100
SMITH ST
A101
PROCTORS CREEK
PROCTOR PARK CONSERVATION AREA
LITTLE LAKE RD
BRIGHTON
DUNDAS ST
A1
A200
HWY 2
A2
A300
KING EDWARD PARK
B
305
A3
A400
ARENA CREEK
HWY 64
A4
A500
A5
HUFF RD
HWY 66
CEDAR ST
C
306
D
HARBOUR ST
PRESQU'ILE BAY
LAKE ONTARIO

Appendix C:
Soil and Land Cover Maps


BUTLER & ARENA CREEK SOIL GROUPS
N
W
E
S
LIDAR PROJECT CONTROL DATUM:
HORIZONTAL DATUM: NAD 83 CSRS (EPOCH 2010.0)
VERTICAL DATUM: CGVD 2013
JEWELL ENGINEERING
LOWER TRENT CONSERVATION
MUNICIPALITY OF BRIGHTON
LEGEND
A HYDROLOGIC NODE
ONT TRAIL NETWORK
RAIL ROAD TRACKS
5m CONTOURS
RIVER NETWORK
PRIMARY TRIBUTARY
SECONDARY TRIBUTARY
ROADS
MAJOR HIGHWAY
MINOR HIGHWAY
COUNTY ROAD
ROAD
UTM 5 Km GRID LINE
WATER BODIES
WETLANDS
BUTTLER CREEK SUB CATCHMENTS
ARENA CREEK SUB CATCHMENTS
SUBSIDIARY ARENA CREEK CATCHMENT
SUBCATCHMENT SOIL GROUPS
HYDROLIC SOIL GROUP
SYMBOL
A
B
C
D
SCALE: 1:55,000
0.5 0 1
Kilometers
CTY HWY 30
CHATTEN RD
BUTLER CREEK
HWY 26
TELEPHONE RD
HWY 401
302
301
SCRIVER RD
PROCTORS CREEK
304
303
305
306
A
B
C
D
A1
A2
A3
A4
A5
A100
A101
A200
A300
A400
A500
GEORGINA ST
DUNDAS ST
LITTLE LAKE RD
HUFF RD
HWY 2
HWY 64
BRIGHTON
PRESQU'ILE BAY
LAKE ONTARIO


BUTLER & ARENA CREEK LAND COVER
N
W
E
S
LIDAR PROJECT CONTROL DATUM:
HORIZONTAL DATUM: NAD 83 CSRS (EPOCH 2010.0)
VERTICAL DATUM: CGVD 2013
JEWELL ENGINEERING
LOWER TRENT CONSERVATION
MUNICIPALITY OF BRIGHTON
LEGEND
HYDROLOGIC NODE
ONT TRAIL NETWORK
RAIL ROAD TRACKS
5m CONTOURS
RIVER NETWORK
PRIMARY TRIBUTARY
SECONDARY TRIBUTARY
ROADS
MAJOR HIGHWAY
MINOR HIGHWAY
COUNTY ROAD
ROAD
UTM 5 Km GRID LINE
WATER BODIES
WETLANDS
BUTTLER CREEK SUB CATCHMENTS
ARENA CREEK SUB CATCHMENTS
SUBSIDIARY ARENA CREEK CATCHMENT
SUBCATCHMENT LAND COVER GROUPS
LAND COVER GROUP
SYMBOL
WOODS
CULTIVATED
IMPERVIOUS
WATER
BEDROCK
SCALE: 1:55,000
0.5
0
1
Kilometers
CTY HWY 30
GHATTEN RD
BUTLER CREEK
HWY 401
HWY 26
TELEPHONE RD
SCRIVER RD
D-J-WHITES RD
PHOENIX CREEK
LITTLE LAKE RD
GEORGINA ST
DUNDAS ST
HWY 2
HWY 64
HUFF RD
HWY 66
BRIGHTON
PRESQU'ILE BAY
LAKE ONTARIO
302
301
303
304
305
306
A
B
C
D
A1
A2
A3
A4
A5
A100
A101
A200
A300
A400
A500

Appendix D:
Federal Climate Data Portal: ΔT Adjustment

time	rcp26_tg_mean_p10	rcp26_tg_mean_p50	rcp26_tg_mean_p90	rcp45_tg_mean_p10	rcp45_tg_mean_p50	rcp45_tg_mean_p90	rcp85_tg_mean_p10	rcp85_tg_mean_p50	rcp85_tg_mean_p90	rcp26_tg_mean_delta7100_p10	rcp26_tg_mean_delta7100_p50	rcp26_tg_mean_delta7100_p90	rcp45_tg_mean_delta7100_p10	rcp45_tg_mean_delta7100_p50	rcp45_tg_mean_delta7100_p90	rcp85_tg_mean_delta7100_p10	rcp85_tg_mean_delta7100_p50	rcp85_tg_mean_delta7100_p90
1/1/1951	6.9	7	7.2	6.9	7	7.2	6.9	7	7.2	-0.6	-0.3	-0.1	-0.6	-0.3	-0.1	-0.6	-0.3	-0.1
1/1/1961	7	7.1	7.2	7	7.1	7.2	7	7.1	7.2	-0.5	-0.3	-0.1	-0.5	-0.3	-0.1	-0.5	-0.3	-0.1
1/1/1971	7.2	7.3	7.5	7.2	7.3	7.5	7.2	7.3	7.5	0	0	0	0	0	0	0	0	0
1/1/1981	7.5	7.7	7.9	7.5	7.7	7.9	7.5	7.7	7.9	0.2	0.3	0.4	0.2	0.4	0.5	0.2	0.3	0.5
1/1/1991	7.9	8	8.4	7.8	8.1	8.4	7.9	8.2	8.4	0.5	0.7	1	0.5	0.8	1	0.6	0.8	1
1/1/2001	8.2	8.4	9	8.2	8.6	9	8.2	8.7	9	0.8	1.2	1.6	0.7	1.2	1.6	0.9	1.3	1.6
1/1/2011	8.3	8.8	9.5	8.4	9	9.7	8.5	9.2	9.8	1	1.4	2.1	1.1	1.7	2.3	1.3	1.8	2.4
1/1/2021	8.5	9.2	10	8.8	9.3	10.2	8.9	9.6	10.3	1.2	1.8	2.6	1.4	2	2.9	1.7	2.2	3
1/1/2031	8.5	9.4	10.3	9.1	9.7	10.8	9.4	10.2	11.3	1.3	2	2.9	1.7	2.4	3.4	2.2	2.8	3.9
1/1/2041	8.6	9.4	10.6	9.2	10.1	11.3	10.1	10.9	12.2	1.3	2.1	3.3	1.8	2.8	4	2.8	3.5	4.8
1/1/2051	8.6	9.4	10.8	9.3	10.3	11.8	10.8	11.6	13.3	1.2	2.1	3.4	1.9	2.9	4.5	3.4	4.2	6
1/1/2061	8.6	9.4	10.8	9.4	10.4	12.2	11.4	12.4	14.2	1.2	2.1	3.4	2	3.2	4.8	4.1	5	6.8
1/1/2071	8.6	9.4	10.7	9.5	10.6	12.1	11.8	13.1	15.1	1.2	2.1	3.3	2.2	3.3	4.7	4.6	5.7	7.7

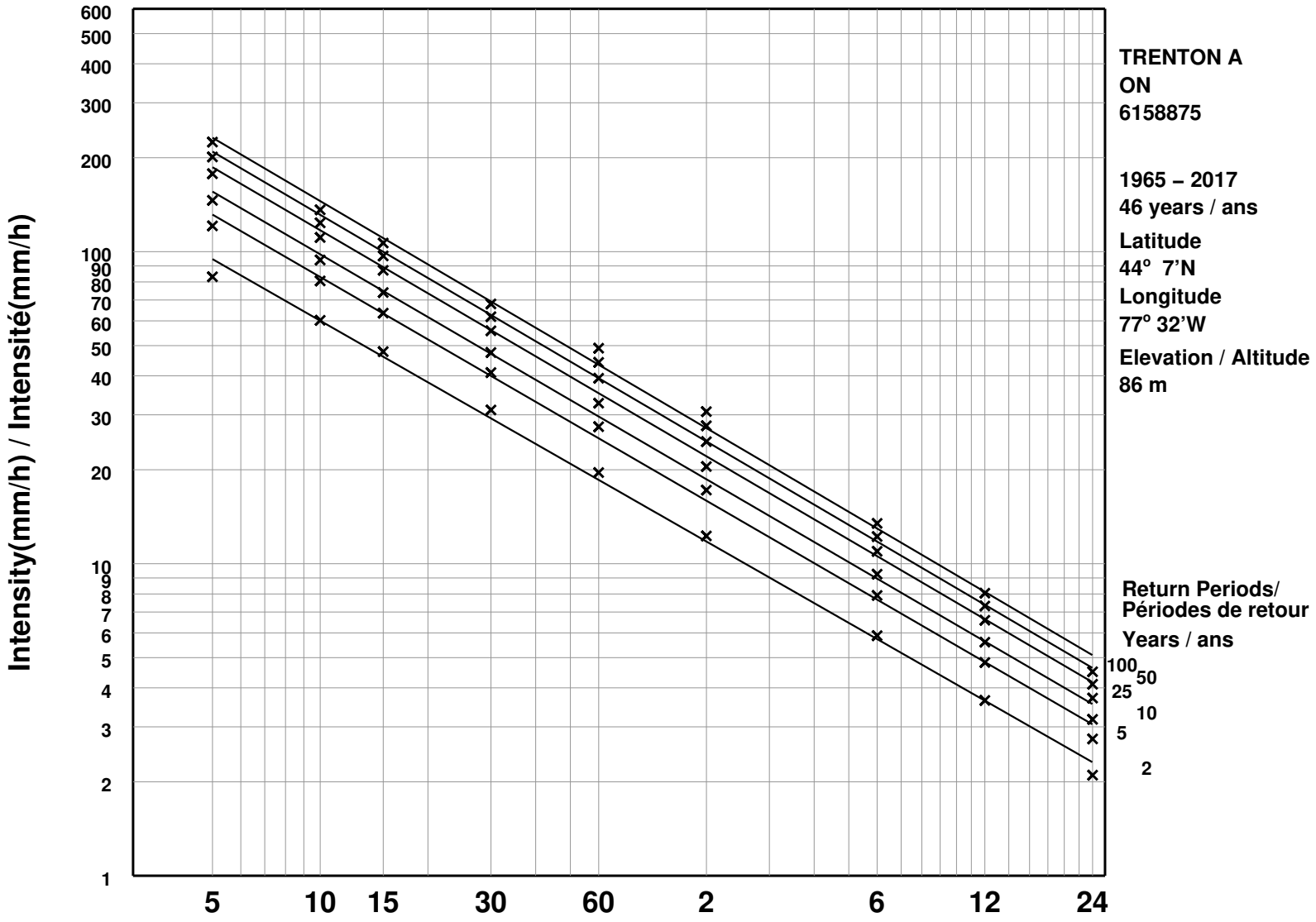
Year	Instantaneous Unit Rate (m3/s/km2)								Butler Creek Instantaneous Peak Flow (m3/s)
	Mayhew	Cold Creek	Rawdon	Shelter Valley	Consecon	Wilton	Butler	Average	
1965						0.12		0.12	3.49
1967				0.18		0.17		0.18	4.54
1968				0.24		0.17		0.21	5.32
1969				0.25		0.26		0.26	6.60
1970					0.19	0.21		0.20	5.96
1971				0.13	0.23	0.20		0.18	4.99
1972				0.19	0.23	0.23		0.22	5.82
1973				0.27	0.18	0.16		0.20	5.46
1974					0.21	0.26		0.24	6.96
1975				0.47	0.18			0.33	8.59
1976				0.29	0.17			0.23	6.02
1977				0.25	0.33			0.29	7.67
1978				0.13	0.31			0.22	5.81
1979				0.25	0.20			0.22	5.92
1981					0.37			0.37	11.34
1982		0.13		0.37	0.30	0.25		0.26	7.75
1983		0.15	0.07	0.47				0.23	6.66
1984		0.12	0.11	0.35	0.30			0.22	6.39
1985		0.12	0.09	0.24	0.15			0.15	4.41
1986				0.35	0.27	0.31		0.31	8.33
1987		0.11	0.10	0.17	0.18	0.21		0.15	4.48
1988		0.18	0.13			0.20		0.17	5.19
1989		0.14			0.16			0.15	5.21
1990		0.25		0.62	0.17			0.35	10.46
1991		0.16	0.05	0.35	0.16	0.11		0.17	4.80
1992		0.18	0.12	0.37	0.21			0.22	6.35
1993		0.16		0.22	0.33	0.28		0.25	7.26
1994	0.12	0.09	0.05		0.15	0.12		0.11	2.97
1995	0.23	0.11		0.16	0.11	0.20		0.16	4.33
1996	0.32				0.18			0.25	6.09
1997	0.15	0.12		0.15		0.17		0.15	3.87
1998	0.23	0.16		0.21	0.15	0.14		0.18	4.80
1999		0.06	0.06	0.11	0.13	0.10		0.09	2.66
2000	0.20	0.10	0.05					0.12	3.12
2001	0.09	0.08	0.06	0.12	0.14	0.10		0.10	2.66
2002	0.19	0.08	0.11	0.13	0.12	0.19		0.14	3.68
2003	0.20	0.18	0.07	0.14	0.37		0.19	0.19	3.26
2004	0.49	0.21	0.08	0.26	0.19	0.20	0.61	0.29	10.20
2005	0.18	0.14	0.08		0.23	0.25	0.27	0.19	4.46
2006	0.25		0.06	0.17	0.13	0.26		0.17	4.35
2007	0.13	0.07	0.04	0.09	0.14	0.12		0.10	2.69
2008	0.20	0.10	0.14	0.10	0.20	0.22	0.24	0.17	4.09
2009	0.31	0.16	0.12	0.17	0.12	0.19	0.30	0.20	5.05
2010						0.34		0.34	9.60
2011	0.30	0.17	0.10		0.20	0.31	0.33	0.23	5.47
2012	0.08	0.07	0.06	0.08	0.05	0.13	0.12	0.08	2.02
2013	0.22	0.10	0.08	0.15	0.22	0.20	0.35	0.19	5.83
2014	0.37	0.17	0.14	0.22	0.28	0.30	0.41	0.27	6.82
2015	0.15	0.14	0.05	0.22	0.11	0.14	0.22	0.15	3.69
2016	0.17	0.11	0.05	0.19	0.09	0.13	0.27	0.14	4.46
2017	0.31	0.15	0.14	0.21	0.22	0.27	0.37	0.24	6.24
2018	0.18	0.12	0.11		0.14	0.26	0.24	0.17	3.99
2019	0.29	0.18	0.11		0.18	0.26	0.39	0.23	6.48
2020	0.28	0.15	0.09	0.22	0.10	0.20	0.35	0.20	5.93
2021	0.16	0.15	0.06	0.16			0.25	0.16	4.24

Appendix E:
Trenton A Environment Canada IDFs

Short Duration Rainfall Intensity–Duration–Frequency Data

2022/10/31

Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée



Environment Canada Environnement Canada

Canada

Calculate Precipitation Frequency Curve using Gumbel

Year	Depth (mm)	Rank	q_i	p_i	T_p est	(x-u)/a	p theor	T_p theor
1988	28	48	0.9884	0.0116	1.0	-1.2771	0.0277	1.0
1976	30.2	47	0.9676	0.0324	1.0	-1.1158	0.0473	1.0
1991	32.8	46	0.9468	0.0532	1.1	-0.9251	0.0803	1.1
1975	34.3	45	0.9260	0.0740	1.1	-0.8151	0.1044	1.1
1989	34.7	44	0.9052	0.0948	1.1	-0.7857	0.1115	1.1
1994	34.8	43	0.8845	0.1155	1.1	-0.7784	0.1133	1.1
1971	35.1	42	0.8637	0.1363	1.2	-0.7564	0.1188	1.1
1978	36.6	41	0.8429	0.1571	1.2	-0.6464	0.1483	1.2
1982	39	40	0.8221	0.1779	1.2	-0.4704	0.2018	1.3
1985	39.7	39	0.8013	0.1987	1.2	-0.4190	0.2186	1.3
2001	40.4	38	0.7805	0.2195	1.3	-0.3677	0.2359	1.3
1968	40.9	37	0.7598	0.2402	1.3	-0.3310	0.2485	1.3
1984	42.2	36	0.7390	0.2610	1.4	-0.2357	0.2820	1.4
1987	42.4	35	0.7182	0.2818	1.4	-0.2210	0.2873	1.4
1992	42.8	32	0.6559	0.3441	1.5	-0.1917	0.2978	1.4
1992	42.8	32	0.6559	0.3441	1.5	-0.1917	0.2978	1.4
1992	42.8	32	0.6559	0.3441	1.5	-0.1917	0.2978	1.4
1965	43.9	31	0.6351	0.3649	1.6	-0.1110	0.3271	1.5
1966	45.7	30	0.6143	0.3857	1.6	0.0210	0.3756	1.6
2016	46.2	29	0.5935	0.4065	1.7	0.0577	0.3891	1.6
1972	47.2	28	0.5727	0.4273	1.7	0.1310	0.4160	1.7
2008	47.6	27	0.5520	0.4480	1.8	0.1604	0.4266	1.7
1970	48	26	0.5312	0.4688	1.9	0.1897	0.4373	1.8
1981	48.2	25	0.5104	0.4896	2.0	0.2044	0.4426	1.8
1990	50	24	0.4896	0.5104	2.0	0.3364	0.4895	2.0
2003	50.2	23	0.4688	0.5312	2.1	0.3511	0.4946	2.0
1973	53.6	22	0.4480	0.5520	2.2	0.6004	0.5778	2.4
1997	53.9	21	0.4273	0.5727	2.3	0.6224	0.5847	2.4
2005	54.1	20	0.4065	0.5935	2.5	0.6371	0.5893	2.4
1969	54.9	19	0.3857	0.6143	2.6	0.6958	0.6073	2.5
1979	55.8	18	0.3649	0.6351	2.7	0.7618	0.6270	2.7
1993	56	17	0.3441	0.6559	2.9	0.7764	0.6313	2.7
2010	59.1	16	0.3234	0.6766	3.1	1.0038	0.6932	3.3
1980	60	15	0.3026	0.6974	3.3	1.0698	0.7096	3.4
2007	62.1	14	0.2818	0.7182	3.5	1.2238	0.7452	3.9
1983	63.3	13	0.2610	0.7390	3.8	1.3118	0.7639	4.2
1995	64.9	12	0.2402	0.7598	4.2	1.4292	0.7870	4.7

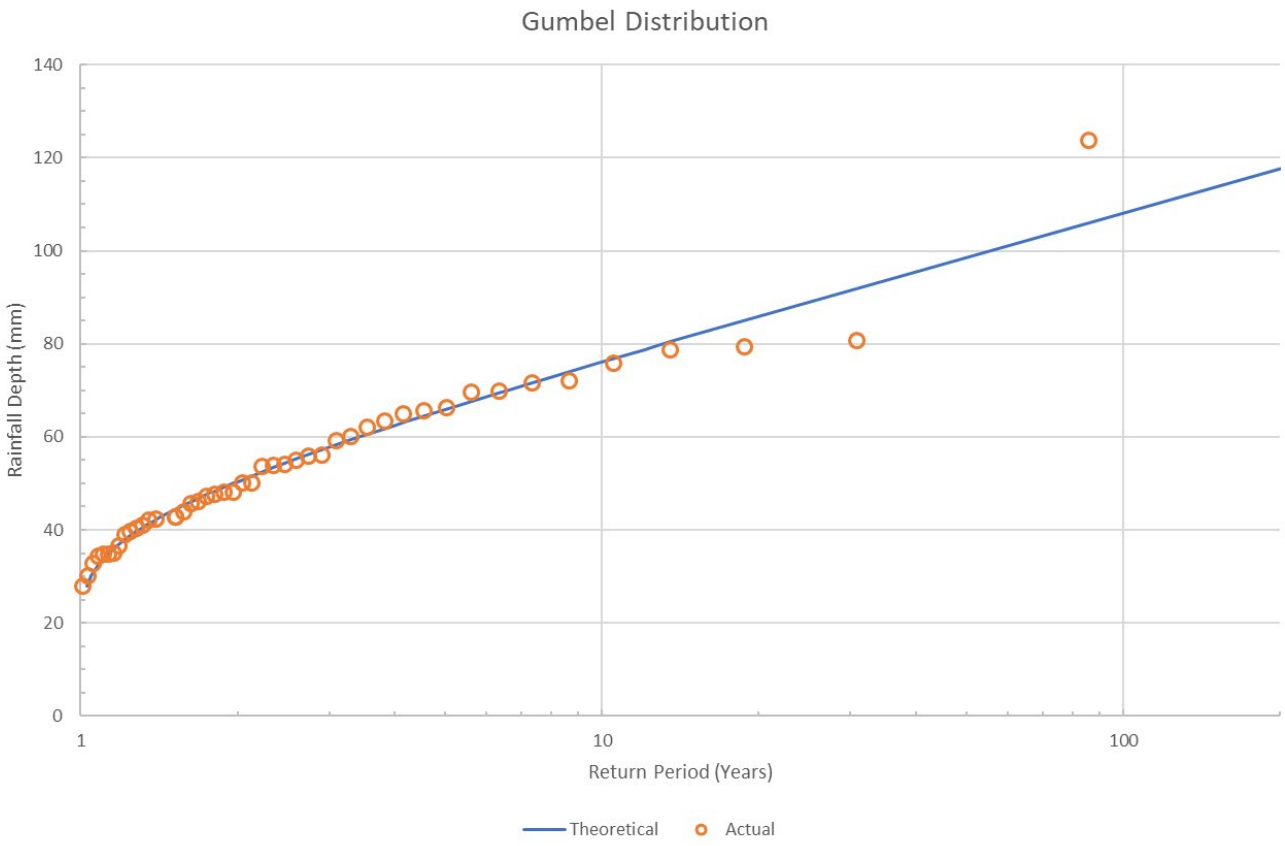
1986	65.6	11	0.2195	0.7805	4.6	1.4805	0.7965	4.9
2017	66.3	10	0.1987	0.8013	5.0	1.5319	0.8056	5.1
1967	69.6	9	0.1779	0.8221	5.6	1.7739	0.8439	6.4
2006	69.9	8	0.1571	0.8429	6.4	1.7959	0.8471	6.5
2000	71.6	7	0.1363	0.8637	7.3	1.9206	0.8637	7.3
1977	72.1	6	0.1155	0.8845	8.7	1.9572	0.8683	7.6
2009	75.8	5	0.0948	0.9052	10.6	2.2286	0.8979	9.8
2002	78.8	4	0.0740	0.9260	13.5	2.4486	0.9172	12.1
2014	79.4	3	0.0532	0.9468	18.8	2.4926	0.9206	12.6
2012	80.6	2	0.0324	0.9676	30.8	2.5806	0.9271	13.7
2004	123.7	1	0.0116	0.9884	85.9	5.7416	0.9968	**312.1**

$$Z\ Score = \frac{x - \mu}{\sigma}$$

			Return Period (Yr)	**Depth (mm)**
		3.9019	0.98	**50**	**98.62**

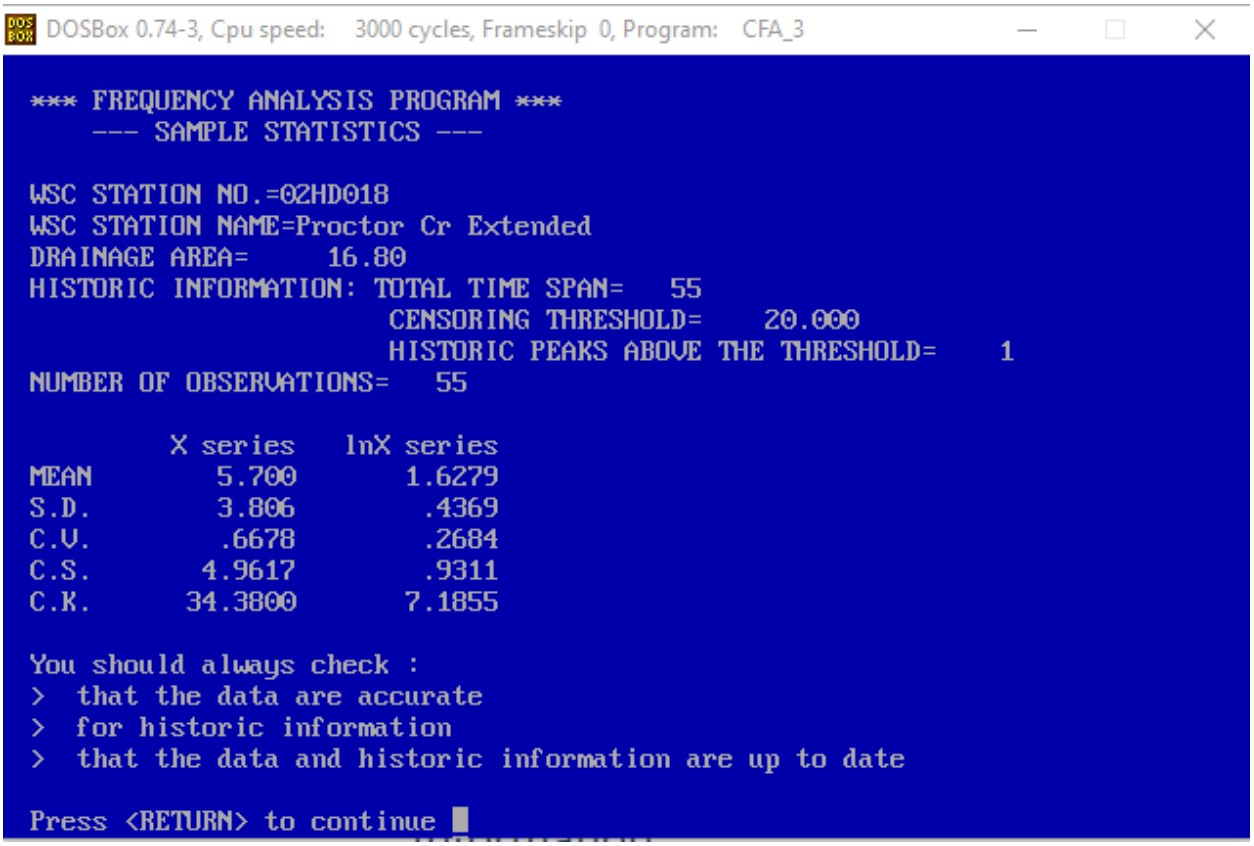
Number of Obs (n) = 48

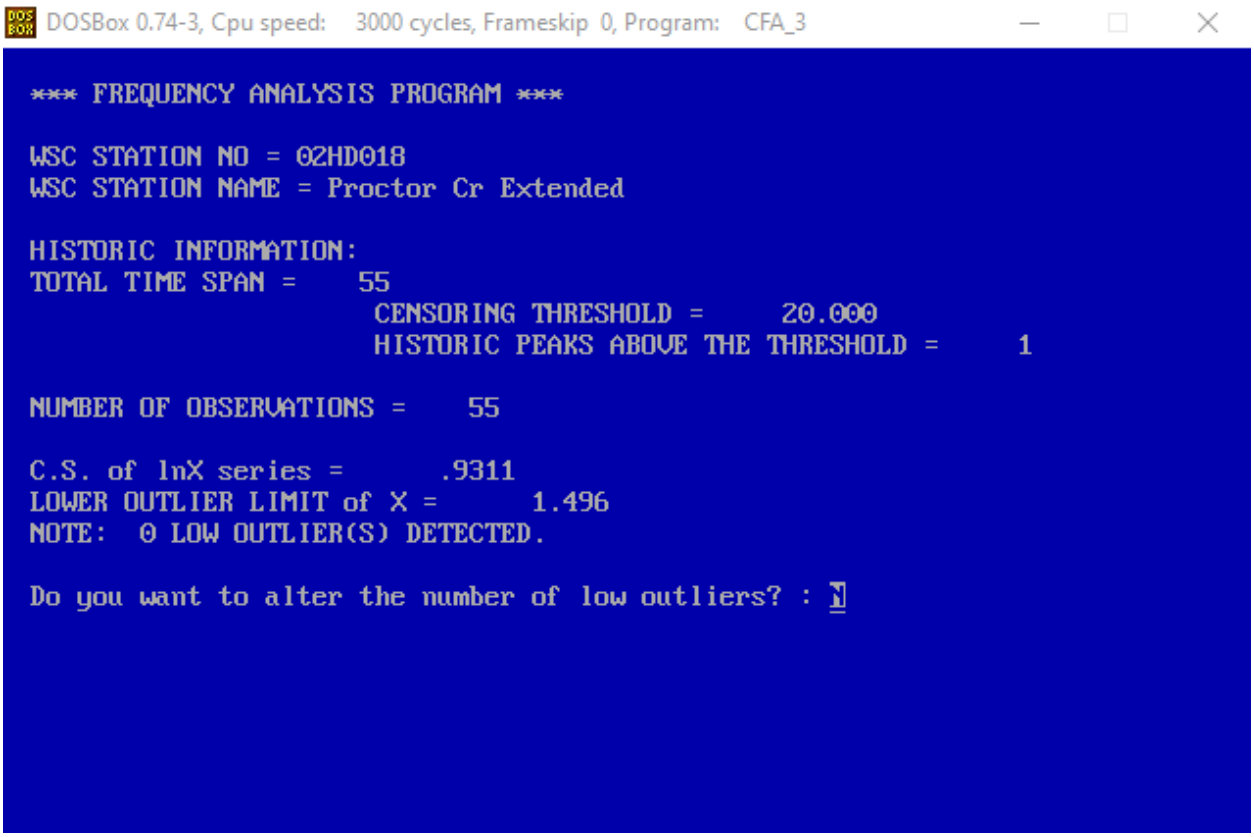
Min	28
Max	123.7
Average	53.2833
Std Dev	17.4875
Alpha	13.6350
mu	45.4132


Gumbel Distribution
140
120
100
80
60
40
20
0
Rainfall Depth (mm)
1
10
100
Return Period (Years)
Theoretical
Actual

Appendix F:
GFA Output - CFA

Butler Creek General Frequency Analysis Results

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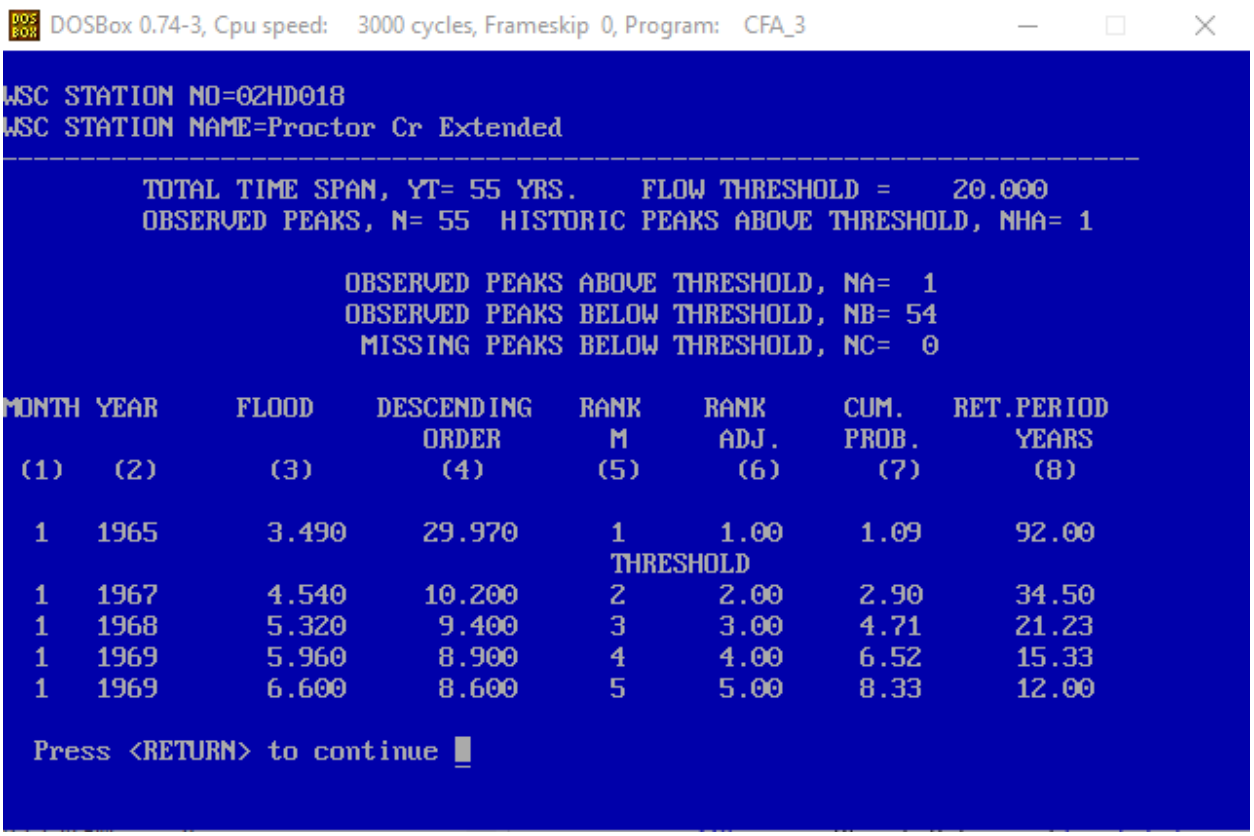
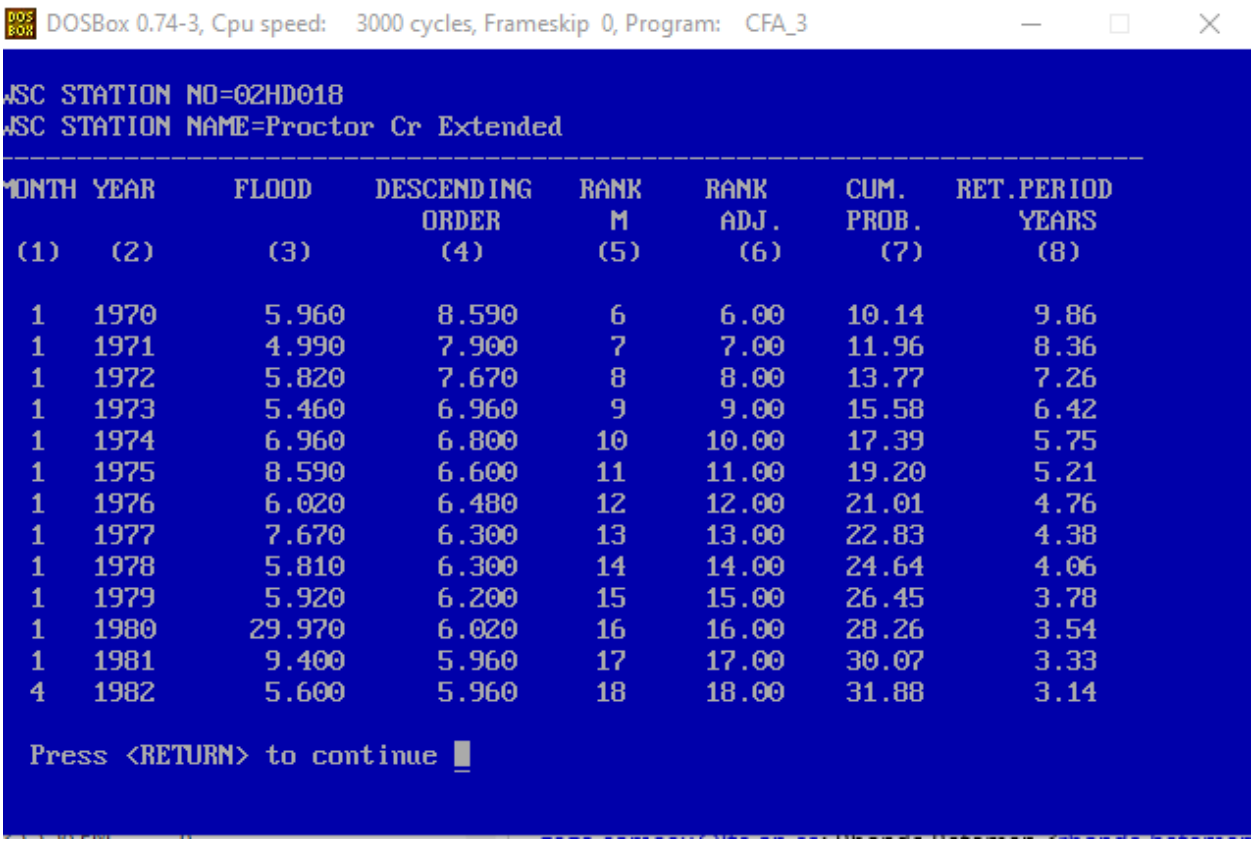
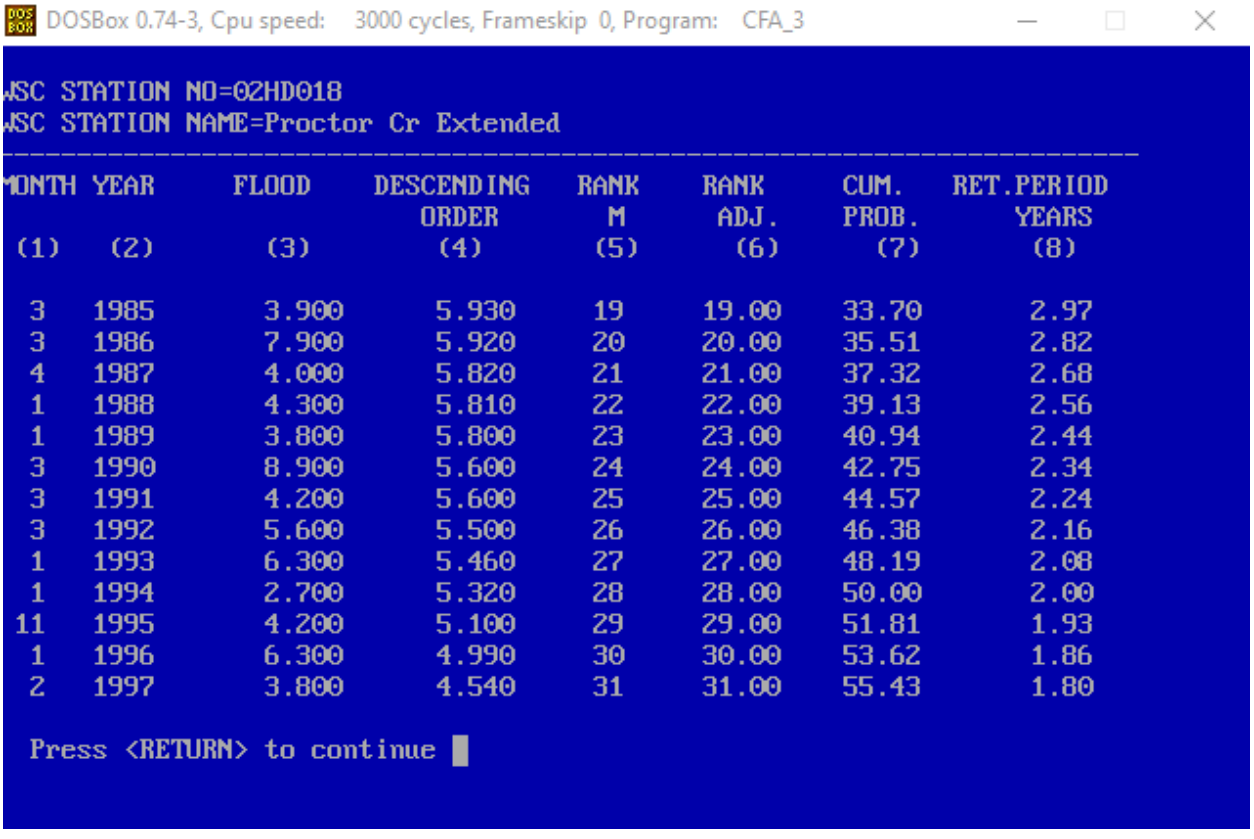
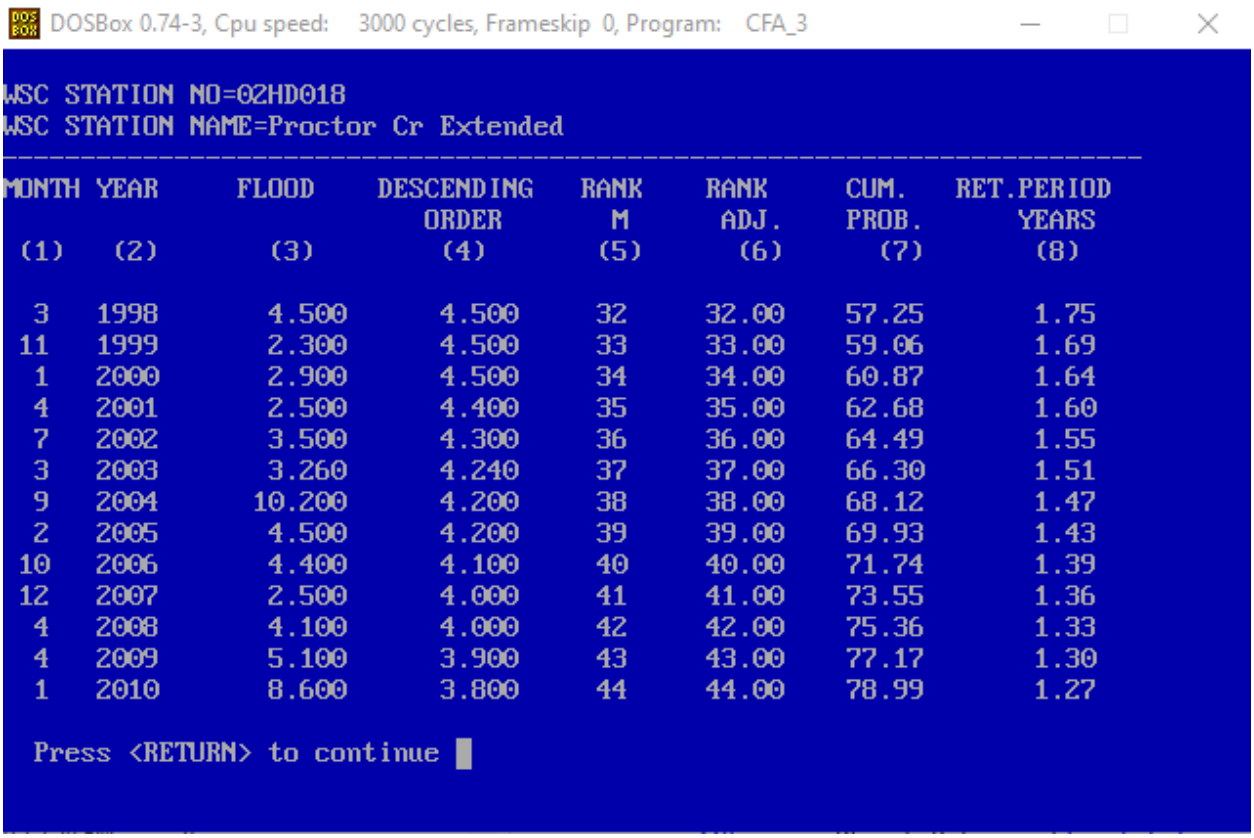
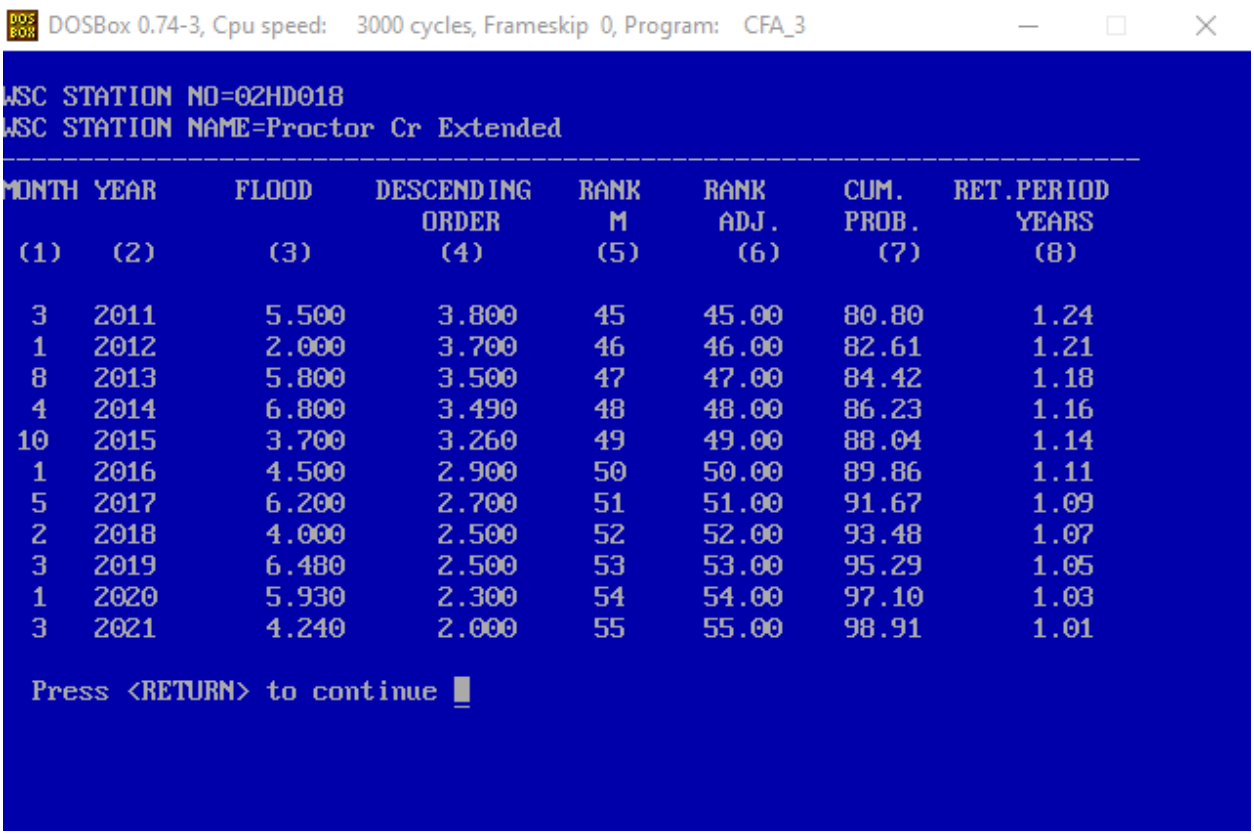
*** FREQUENCY ANALYSIS PROGRAM ***
WSC STATION NO = 02HD018
WSC STATION NAME = Proctor Cr Extended
HISTORIC INFORMATION:
TOTAL TIME SPAN = 55
CENSORING THRESHOLD = 20.000
HISTORIC PEAKS ABOVE THE THRESHOLD = 1
NUMBER OF OBSERVATIONS = 55
C.S. of lnX series = .9311
LOWER OUTLIER LIMIT of X = 1.496
NOTE: 0 LOW OUTLIER(S) DETECTED.
Do you want to alter the number of low outliers? : N

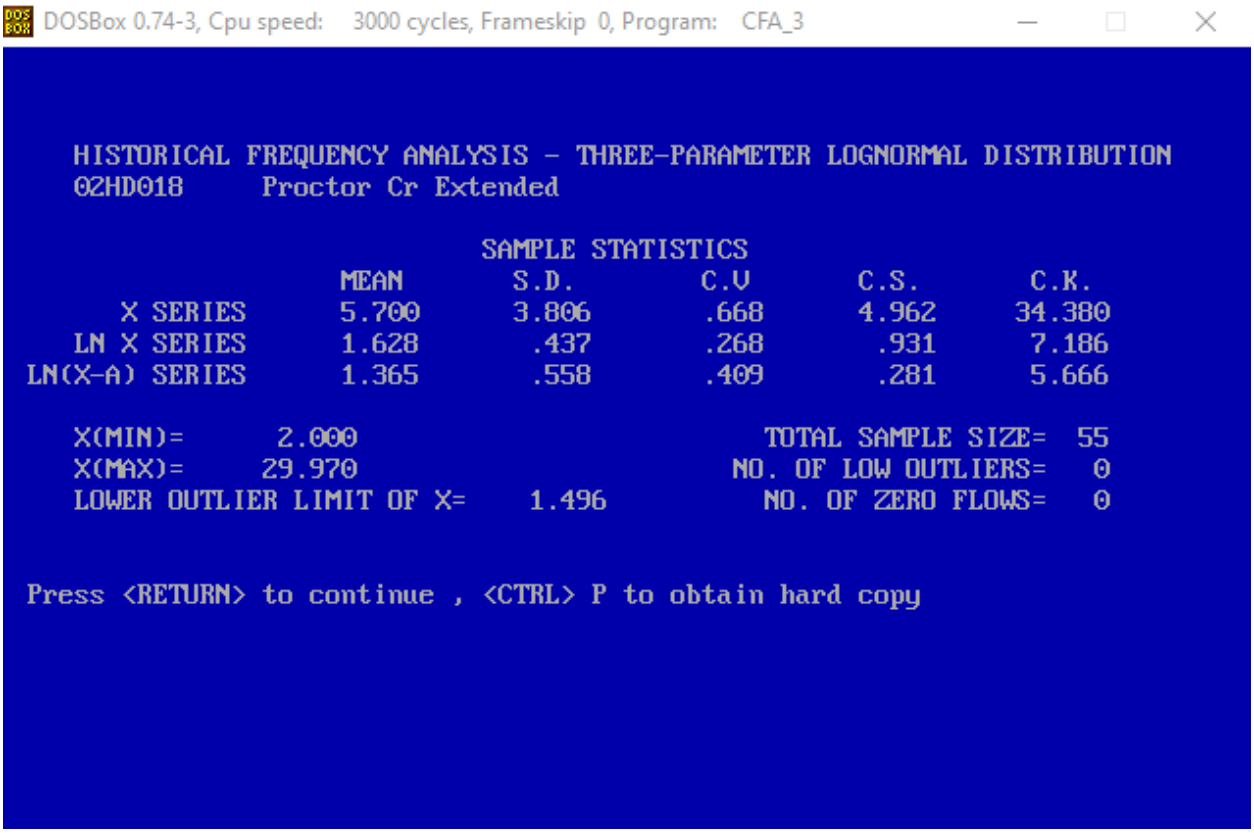

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Cr Extended
TOTAL TIME SPAN, YT= 55 YRS. FLOW THRESHOLD = 20.000
OBSERVED PEAKS, N= 55 HISTORIC PEAKS ABOVE THRESHOLD, NHA= 1
OBSERVED PEAKS ABOVE THRESHOLD, NA= 1
OBSERVED PEAKS BELOW THRESHOLD, NB= 54
MISSING PEAKS BELOW THRESHOLD, NC= 0
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
1 1965 3.490 29.970 1 1.00 1.09 92.00
THRESHOLD
1 1967 4.540 10.200 2 2.00 2.90 34.50
1 1968 5.320 9.400 3 3.00 4.71 21.23
1 1969 5.960 8.900 4 4.00 6.52 15.33
1 1969 6.600 8.600 5 5.00 8.33 12.00
Press <RETURN> to continue

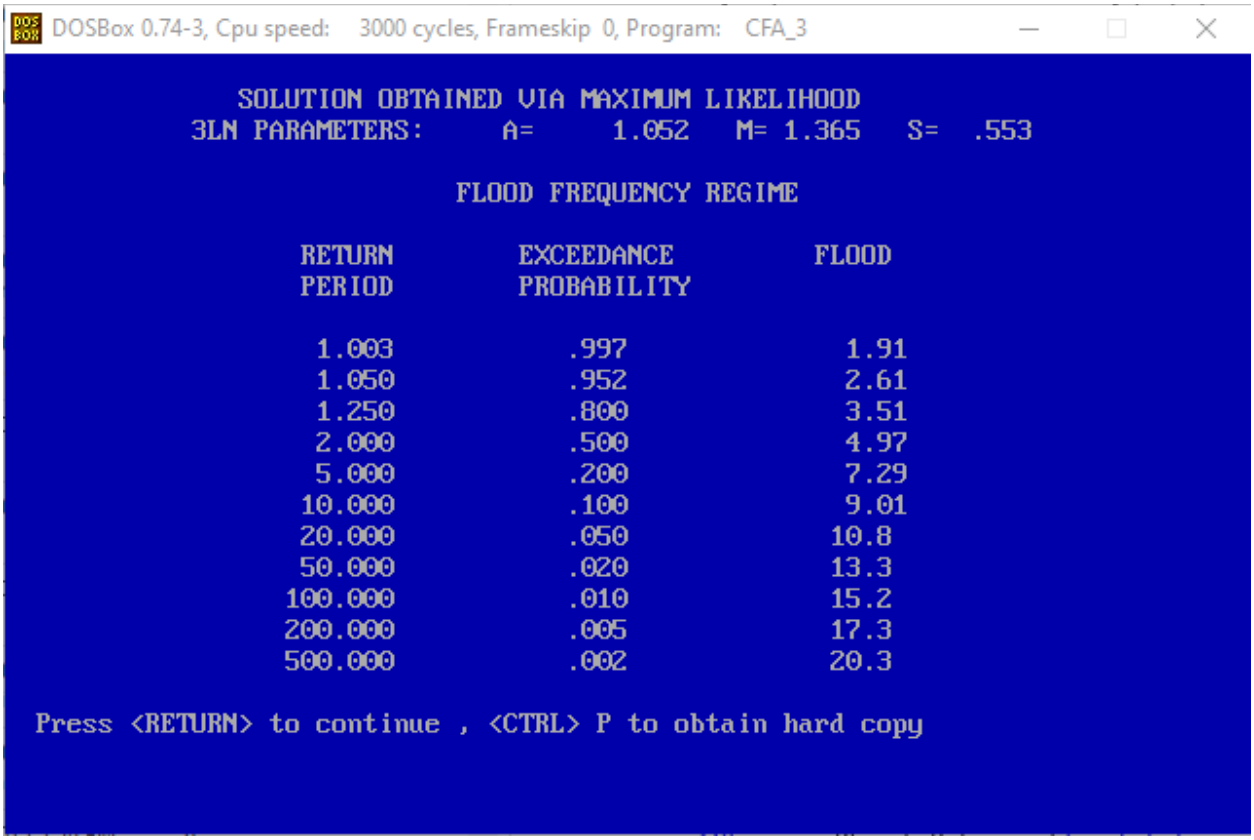

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Cr Extended
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
1 1970 5.960 8.590 6 6.00 10.14 9.86
1 1971 4.990 7.900 7 7.00 11.96 8.36
1 1972 5.820 7.670 8 8.00 13.77 7.26
1 1973 5.460 6.960 9 9.00 15.58 6.42
1 1974 6.960 6.800 10 10.00 17.39 5.75
1 1975 8.590 6.600 11 11.00 19.20 5.21
1 1976 6.020 6.480 12 12.00 21.01 4.76
1 1977 7.670 6.300 13 13.00 22.83 4.38
1 1978 5.810 6.300 14 14.00 24.64 4.06
1 1979 5.920 6.200 15 15.00 26.45 3.78
1 1980 29.970 6.020 16 16.00 28.26 3.54
1 1981 9.400 5.960 17 17.00 30.07 3.33
4 1982 5.600 5.960 18 18.00 31.88 3.14
Press <RETURN> to continue


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Cr Extended
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
3 1985 3.900 5.930 19 19.00 33.70 2.97
3 1986 7.900 5.920 20 20.00 35.51 2.82
4 1987 4.000 5.820 21 21.00 37.32 2.68
1 1988 4.300 5.810 22 22.00 39.13 2.56
1 1989 3.800 5.800 23 23.00 40.94 2.44
3 1990 8.900 5.600 24 24.00 42.75 2.34
3 1991 4.200 5.600 25 25.00 44.57 2.24
3 1992 5.600 5.500 26 26.00 46.38 2.16
1 1993 6.300 5.460 27 27.00 48.19 2.08
1 1994 2.700 5.320 28 28.00 50.00 2.00
11 1995 4.200 5.100 29 29.00 51.81 1.93
1 1996 6.300 4.990 30 30.00 53.62 1.86
2 1997 3.800 4.540 31 31.00 55.43 1.80
Press <RETURN> to continue

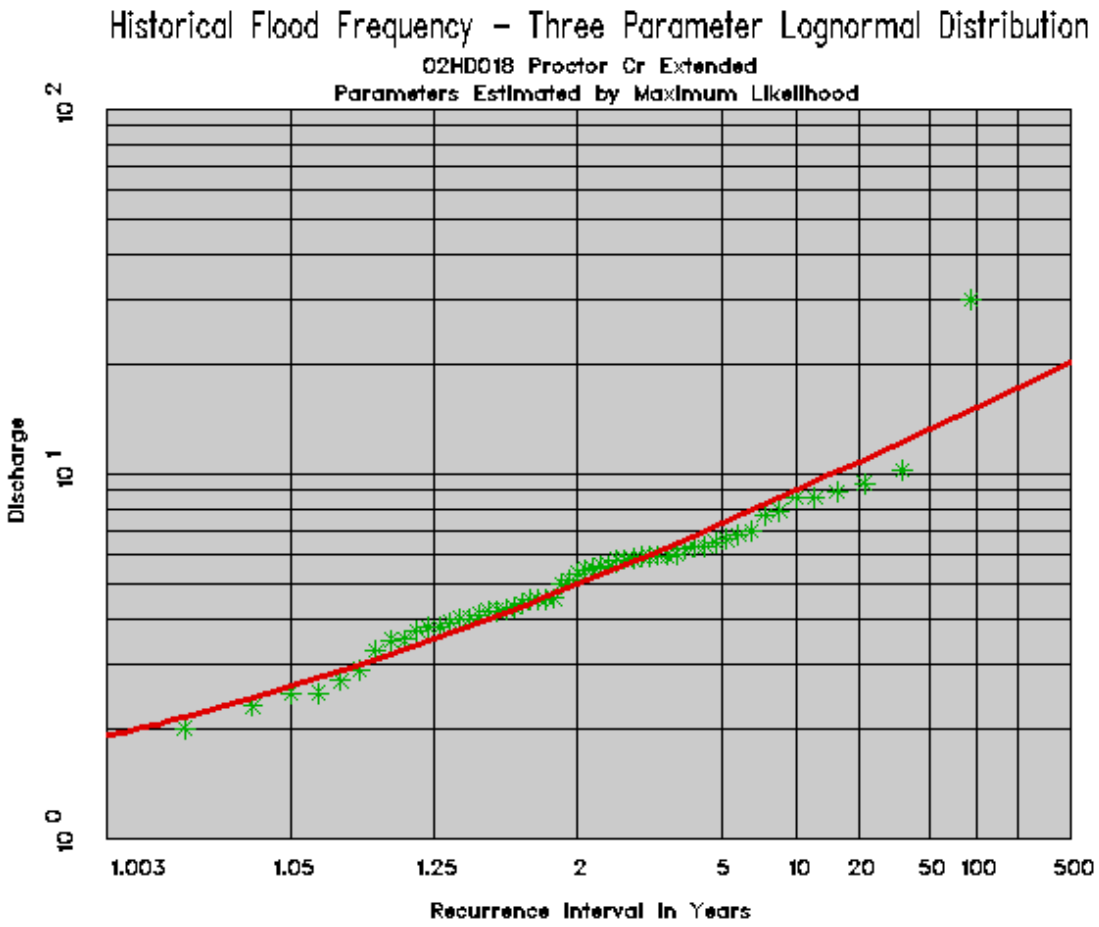

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Cr Extended
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
3 1998 4.500 4.500 32 32.00 57.25 1.75
11 1999 2.300 4.500 33 33.00 59.06 1.69
1 2000 2.900 4.500 34 34.00 60.87 1.64
4 2001 2.500 4.400 35 35.00 62.68 1.60
7 2002 3.500 4.300 36 36.00 64.49 1.55
3 2003 3.260 4.240 37 37.00 66.30 1.51
9 2004 10.200 4.200 38 38.00 68.12 1.47
2 2005 4.500 4.200 39 39.00 69.93 1.43
10 2006 4.400 4.100 40 40.00 71.74 1.39
12 2007 2.500 4.000 41 41.00 73.55 1.36
4 2008 4.100 4.000 42 42.00 75.36 1.33
4 2009 5.100 3.900 43 43.00 77.17 1.30
1 2010 8.600 3.800 44 44.00 78.99 1.27
Press <RETURN> to continue


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Cr Extended
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
3 2011 5.500 3.800 45 45.00 80.80 1.24
1 2012 2.000 3.700 46 46.00 82.61 1.21
8 2013 5.800 3.500 47 47.00 84.42 1.18
4 2014 6.800 3.490 48 48.00 86.23 1.16
10 2015 3.700 3.260 49 49.00 88.04 1.14
1 2016 4.500 2.900 50 50.00 89.86 1.11
5 2017 6.200 2.700 51 51.00 91.67 1.09
2 2018 4.000 2.500 52 52.00 93.48 1.07
3 2019 6.480 2.500 53 53.00 95.29 1.05
1 2020 5.930 2.300 54 54.00 97.10 1.03
3 2021 4.240 2.000 55 55.00 98.91 1.01
Press <RETURN> to continue

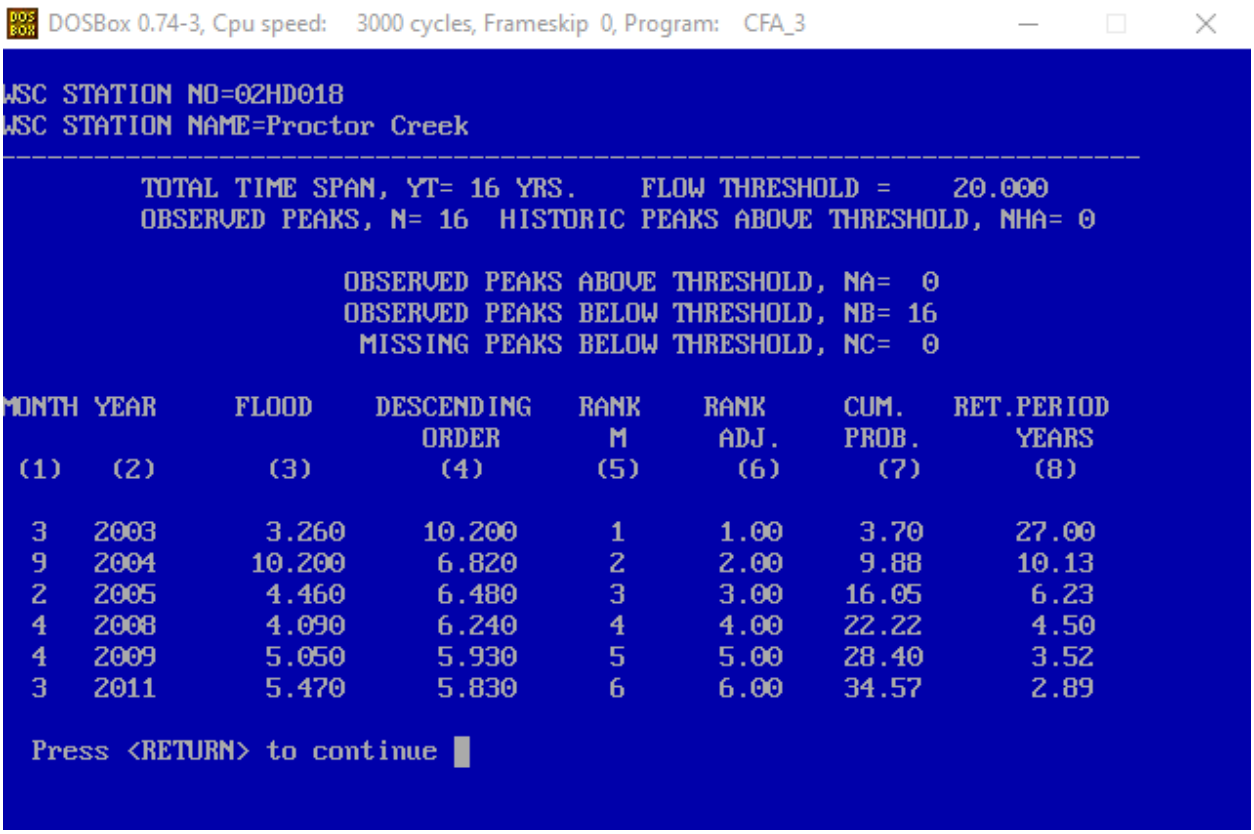

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
HISTORICAL FREQUENCY ANALYSIS - THREE-PARAMETER LOGNORMAL DISTRIBUTION
02HD018 Proctor Cr Extended
SAMPLE STATISTICS
MEAN S.D. C.V C.S. C.K.
X SERIES 5.700 3.806 .668 4.962 34.380
LN X SERIES 1.628 .437 .268 .931 7.186
LN(X-A) SERIES 1.365 .558 .409 .281 5.666
X(MIN)= 2.000
X(MAX)= 29.970
LOWER OUTLIER LIMIT OF X= 1.496
TOTAL SAMPLE SIZE= 55
NO. OF LOW OUTLIERS= 0
NO. OF ZERO FLOWS= 0
Press <RETURN> to continue , <CTRL> P to obtain hard copy

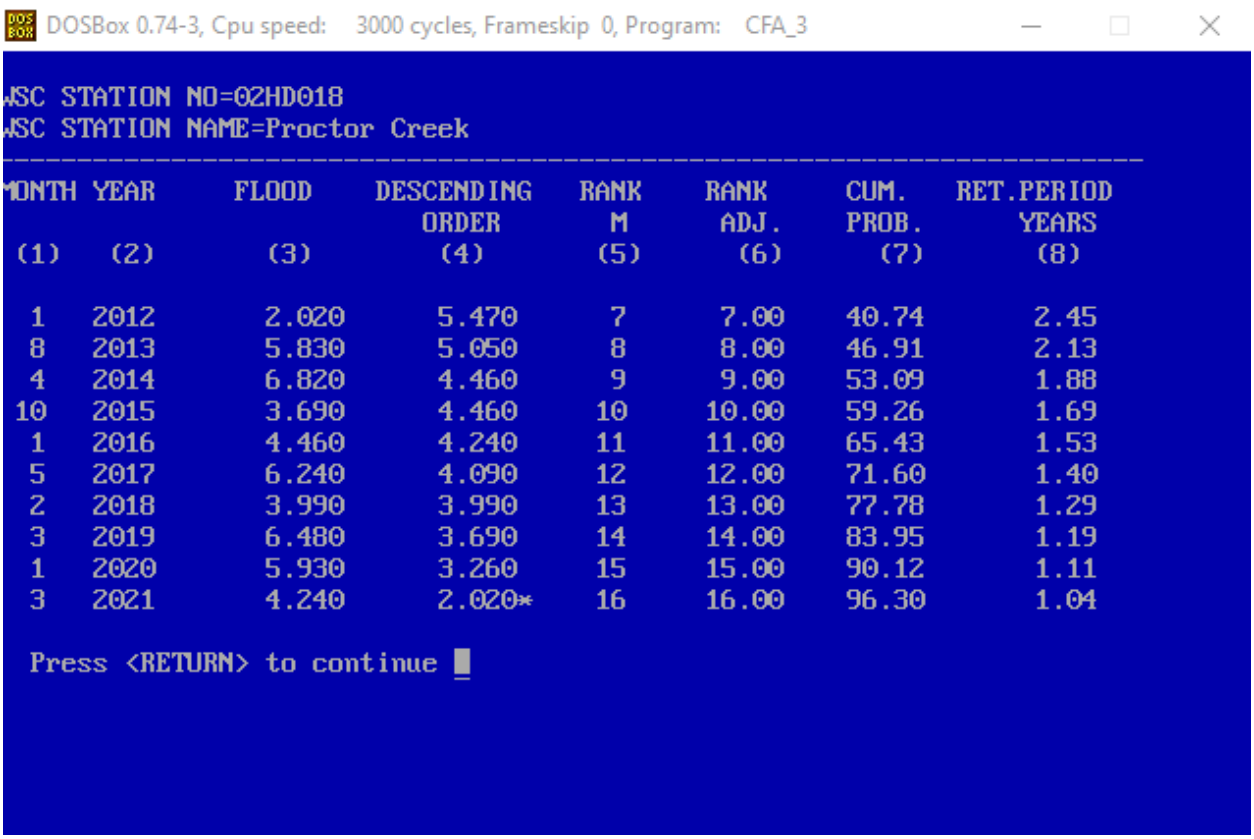

DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
SOLUTION OBTAINED VIA MAXIMUM LIKELIHOOD
3LN PARAMETERS: A= 1.052 M= 1.365 S= .553
FLOOD FREQUENCY REGIME
RETURN PERIOD
EXCEEDANCE PROBABILITY
FLOOD
1.003 .997 1.91
1.050 .952 2.61
1.250 .800 3.51
2.000 .500 4.97
5.000 .200 7.29
10.000 .100 9.01
20.000 .050 10.8
50.000 .020 13.3
100.000 .010 15.2
200.000 .005 17.3
500.000 .002 20.3
Press <RETURN> to continue , <CTRL> P to obtain hard copy

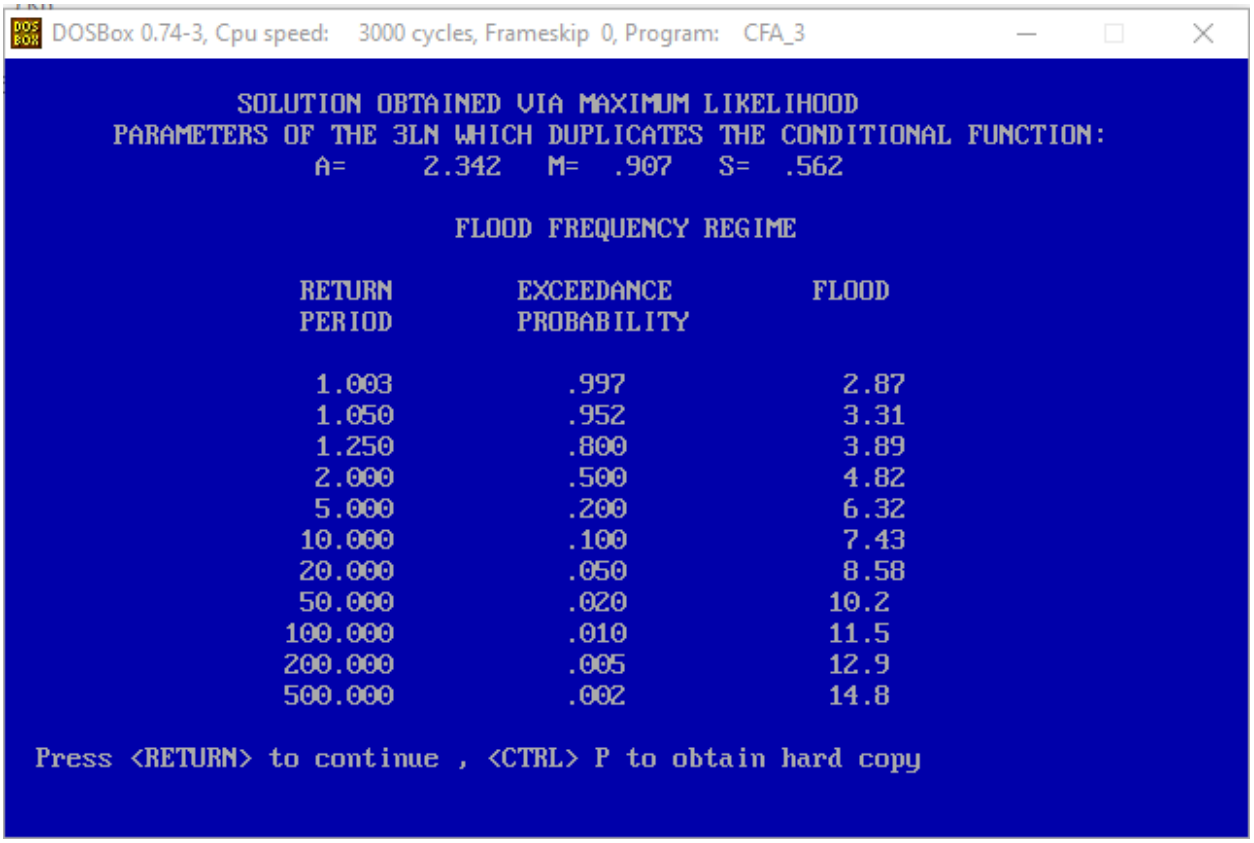
DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3



Proctor Creek Only




DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
WSC STATION NO=02HD018
WSC STATION NAME=Proctor Creek
MONTH YEAR FLOOD DESCENDING ORDER RANK M RANK ADJ. CUM. PROB. RET.PERIOD YEARS
(1) (2) (3) (4) (5) (6) (7) (8)
1 2012 2.020 5.470 7 7.00 40.74 2.45
8 2013 5.830 5.050 8 8.00 46.91 2.13
4 2014 6.820 4.460 9 9.00 53.09 1.88
10 2015 3.690 4.460 10 10.00 59.26 1.69
1 2016 4.460 4.240 11 11.00 65.43 1.53
5 2017 6.240 4.090 12 12.00 71.60 1.40
2 2018 3.990 3.990 13 13.00 77.78 1.29
3 2019 6.480 3.690 14 14.00 83.95 1.19
1 2020 5.930 3.260 15 15.00 90.12 1.11
3 2021 4.240 2.020* 16 16.00 96.30 1.04
Press <RETURN> to continue


DOSBox 0.74-3, Cpu speed: 3000 cycles, Frameskip 0, Program: CFA_3
SOLUTION OBTAINED VIA MAXIMUM LIKELIHOOD
PARAMETERS OF THE 3LN WHICH DUPLICATES THE CONDITIONAL FUNCTION:
A= 2.342 M= .907 S= .562
FLOOD FREQUENCY REGIME
RETURN PERIOD
EXCEEDANCE PROBABILITY
FLOOD
1.003 .997 2.87
1.050 .952 3.31
1.250 .800 3.89
2.000 .500 4.82
5.000 .200 6.32
10.000 .100 7.43
20.000 .050 8.58
50.000 .020 10.2
100.000 .010 11.5
200.000 .005 12.9
500.000 .002 14.8
Press <RETURN> to continue , <CTRL> P to obtain hard copy

Appendix G:
Hydrologic Modelling – Output Files

Digital Only

Butler Creek Visual OTTHYMO – Existing Conditions

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================================================================================================================
=========

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\emma.babbitt\AppData\Local\Civica\VH5\4bc2dd96-d4a0-486c-b0e4-
a0116db3e48f\fb84f8bc-977e-436b-99d9-1ec9dbde99b4
  Summary filename: C:\Users\emma.babbitt\AppData\Local\Civica\VH5\4bc2dd96-d4a0-486c-b0e4-
a0116db3e48f\fb84f8bc-977e-436b-99d9-1ec9dbde99b4


DATE: 08/17/2023                          TIME: 01:00:41

USER:


COMMENTS: _____________________________________________________________


---------------------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : 100-Yr, 24-Hr (Trenton A)     **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\emma.babbitt\AppD
|                  |              ata\Local\Temp\
|                  |              765f090a-d7e6-4a41-8840-9e1acf30c8fa\8333d1a6
| Ptotal= 89.64 mm |    Comments: 100-Yr, 24-Hr (Trenton A)
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  7.00    1.79 | 14.00    4.30 | 21.00    1.08
                1.00    0.99 |  8.00    1.79 | 15.00    2.69 | 22.00    1.08
                2.00    0.99 |  9.00    2.42 | 16.00    2.69 | 23.00    1.08
                3.00    1.17 | 10.00    3.05 | 17.00    1.61 | 24.00    1.08
                4.00    1.17 | 11.00    4.84 | 18.00    1.61 |
                5.00    1.43 | 12.00   38.36 | 19.00    1.61 |
                6.00    1.43 | 13.00    9.77 | 20.00    1.61 |

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

--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)= 450.31   Curve Number   (CN)= 63.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
0.083	0.00	6.333	1.43	12.583	38.36	18.83	1.61
0.167	0.00	6.417	1.43	12.667	38.36	18.92	1.61
0.250	0.00	6.500	1.43	12.750	38.36	19.00	1.61
0.333	0.00	6.583	1.43	12.833	38.36	19.08	1.61
0.417	0.00	6.667	1.43	12.917	38.36	19.17	1.61
0.500	0.00	6.750	1.43	13.000	38.36	19.25	1.61
0.583	0.00	6.833	1.43	13.083	9.77	19.33	1.61
0.667	0.00	6.917	1.43	13.167	9.77	19.42	1.61
0.750	0.00	7.000	1.43	13.250	9.77	19.50	1.61
0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61
1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61
2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08
3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08
4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08

5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Unit Hyd Qpeak (cms)= 14.098

PEAK FLOW (cms)= 8.676 (i)
TIME TO PEAK (hrs)= 14.167
RUNOFF VOLUME (mm)= 31.231
TOTAL RAINFALL (mm)= 89.640
RUNOFF COEFFICIENT = 0.348

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

CALIB
NASHYD (0002)
ID= 1 DT= 5.0 min

Area (ha)=1368.11 Curve Number (CN)= 69.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 2.62

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.43	12.583	38.36	18.83	1.61
0.167	0.00	6.417	1.43	12.667	38.36	18.92	1.61
0.250	0.00	6.500	1.43	12.750	38.36	19.00	1.61
0.333	0.00	6.583	1.43	12.833	38.36	19.08	1.61
0.417	0.00	6.667	1.43	12.917	38.36	19.17	1.61
0.500	0.00	6.750	1.43	13.000	38.36	19.25	1.61
0.583	0.00	6.833	1.43	13.083	9.77	19.33	1.61
0.667	0.00	6.917	1.43	13.167	9.77	19.42	1.61
0.750	0.00	7.000	1.43	13.250	9.77	19.50	1.61
0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61
1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61
2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08

3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08
4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08
5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Unit Hyd Qpeak (cms)= 19.945

PEAK FLOW (cms)= 18.326 (i)
TIME TO PEAK (hrs)= 15.750
RUNOFF VOLUME (mm)= 36.335
TOTAL RAINFALL (mm)= 89.640
RUNOFF COEFFICIENT = 0.405

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

ADD HYD (0006)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):		450.31	8.676	14.17	31.23
+ ID2= 2 (0002):		1368.11	18.326	15.75	36.34
ID = 3 (0006):		1818.42	24.328	15.08	35.07

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0011)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	101.00	0.03	Main Channel
1.0	100.00	0.03	Main Channel
26.0	99.75	0.03/0.05	
27.5	98.25	0.05	
29.5	98.25	0.05	
31.0	99.75	0.05/0.03	Main Channel

56.0	100.00	0.03	Main Channel
57.0	101.00	0.03	Main Channel

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0006)	1818.42	24.33	15.08	35.07	0.0
OUTFLOW: ID=1	(0011)	1818.42	21.89	18.00	35.07	0.0

CALIB NASHYD (0003) ID= 1 DT= 5.0 min

Area (ha)= 192.12 Curve Number (CN)= 57.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 1.22

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.43	12.583	38.36	18.83	1.61
0.167	0.00	6.417	1.43	12.667	38.36	18.92	1.61
0.250	0.00	6.500	1.43	12.750	38.36	19.00	1.61
0.333	0.00	6.583	1.43	12.833	38.36	19.08	1.61
0.417	0.00	6.667	1.43	12.917	38.36	19.17	1.61
0.500	0.00	6.750	1.43	13.000	38.36	19.25	1.61
0.583	0.00	6.833	1.43	13.083	9.77	19.33	1.61
0.667	0.00	6.917	1.43	13.167	9.77	19.42	1.61
0.750	0.00	7.000	1.43	13.250	9.77	19.50	1.61
0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61
1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61
2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08
3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08

4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08
5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Unit Hyd Qpeak (cms)= 6.015

PEAK FLOW (cms)= 3.060 (i)
TIME TO PEAK (hrs)= 14.167
RUNOFF VOLUME (mm)= 26.153
TOTAL RAINFALL (mm)= 89.640
RUNOFF COEFFICIENT = 0.292

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

CALIB NASHYD (0004) ID= 1 DT= 5.0 min	Area (ha)= 572.62 Curve Number (CN)= 67.9 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 1.11

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.43	12.583	38.36	18.83	1.61
0.167	0.00	6.417	1.43	12.667	38.36	18.92	1.61
0.250	0.00	6.500	1.43	12.750	38.36	19.00	1.61
0.333	0.00	6.583	1.43	12.833	38.36	19.08	1.61
0.417	0.00	6.667	1.43	12.917	38.36	19.17	1.61
0.500	0.00	6.750	1.43	13.000	38.36	19.25	1.61
0.583	0.00	6.833	1.43	13.083	9.77	19.33	1.61
0.667	0.00	6.917	1.43	13.167	9.77	19.42	1.61
0.750	0.00	7.000	1.43	13.250	9.77	19.50	1.61
0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61
1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61

2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08
3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08
4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08
5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Unit Hyd Qpeak (cms)= 19.704

PEAK FLOW (cms)= 13.211 (i)
TIME TO PEAK (hrs)= 14.000
RUNOFF VOLUME (mm)= 34.994
TOTAL RAINFALL (mm)= 89.640
RUNOFF COEFFICIENT = 0.390

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

ADD HYD (0007)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0011):	1818.42	21.890	18.00	35.07
	+ ID2= 2 (0003):	192.12	3.060	14.17	26.15
	ID = 3 (0007):	2010.54	22.645	17.92	34.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0007)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0007):	2010.54	22.645	17.92	34.22
	+ ID2= 2 (0004):	572.62	13.211	14.00	34.99
	ID = 1 (0007):	2583.16	25.478	17.67	34.39

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0012)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	101.00	0.03	Main Channel
1.0	100.00	0.03	Main Channel
26.0	99.75	0.03/0.05	
27.5	98.25	0.05	
29.5	98.25	0.05	
31.0	99.75	0.05/0.03	Main Channel
56.0	100.00	0.03	Main Channel
57.0	101.00	0.03	Main Channel

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0007)	2583.16	25.48	17.67	34.39	0.0
OUTFLOW: ID=1	(0012)	2583.16	24.56	19.25	34.39	0.0

CALIB	
STANDHYD (0005)	Area (ha)= 156.99
ID= 1 DT= 5.0 min	Total Imp(%)= 46.00 Dir. Conn.(%)= 31.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	72.22	84.77
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	1023.03	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.43	12.583	38.36	18.83	1.61
0.167	0.00	6.417	1.43	12.667	38.36	18.92	1.61
0.250	0.00	6.500	1.43	12.750	38.36	19.00	1.61
0.333	0.00	6.583	1.43	12.833	38.36	19.08	1.61
0.417	0.00	6.667	1.43	12.917	38.36	19.17	1.61
0.500	0.00	6.750	1.43	13.000	38.36	19.25	1.61
0.583	0.00	6.833	1.43	13.083	9.77	19.33	1.61
0.667	0.00	6.917	1.43	13.167	9.77	19.42	1.61
0.750	0.00	7.000	1.43	13.250	9.77	19.50	1.61
0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61

1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61
2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08
3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08
4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08
5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Max.Eff.Inten.(mm/hr)=	38.36	9.80	
over (min)	15.00	35.00	
Storage Coeff. (min)=	15.13 (ii)	33.00 (ii)	
Unit Hyd. Tpeak (min)=	15.00	35.00	
Unit Hyd. peak (cms)=	0.07	0.03	
			TOTALS
PEAK FLOW (cms)=	5.06	1.81	6.788 (iii)
TIME TO PEAK (hrs)=	13.00	13.17	13.00
RUNOFF VOLUME (mm)=	88.64	17.69	39.69
TOTAL RAINFALL (mm)=	89.64	89.64	89.64
RUNOFF COEFFICIENT =	0.99	0.20	0.44

```
       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0012):  2583.16  24.564    19.25    34.39
      + ID2= 2 (  0005):   156.99   6.788    13.00    39.69
        ================================================
        ID = 3 (  0008):  2740.15  24.880    19.25    34.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               101.00           0.03    Main Channel
    1.0               100.00           0.03    Main Channel
    26.0               99.75           0.03/0.05
    27.5               98.25           0.05
    29.5               98.25           0.05
    31.0               99.75           0.05/0.03    Main Channel
    56.0              100.00            0.03         Main Channel
    57.0              101.00            0.03         Main Channel

                            AREA      QPEAK   TPEAK     R.V.    QBASE
                            (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0008)   2740.15    24.88    19.25     34.70    0.0
   OUTFLOW: ID=1  (0014)   2740.15    24.77    19.75     34.70    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=  15.52
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  15.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.10        12.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     321.66        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
              0.083    0.00 | 6.333    1.43 |12.583   38.36 | 18.83    1.61
              0.167    0.00 | 6.417    1.43 |12.667   38.36 | 18.92    1.61
              0.250    0.00 | 6.500    1.43 |12.750   38.36 | 19.00    1.61
              0.333    0.00 | 6.583    1.43 |12.833   38.36 | 19.08    1.61
              0.417    0.00 | 6.667    1.43 |12.917   38.36 | 19.17    1.61
              0.500    0.00 | 6.750    1.43 |13.000   38.36 | 19.25    1.61
              0.583    0.00 | 6.833    1.43 |13.083    9.77 | 19.33    1.61
              0.667    0.00 | 6.917    1.43 |13.167    9.77 | 19.42    1.61
              0.750    0.00 | 7.000    1.43 |13.250    9.77 | 19.50    1.61
```

0.833	0.00	7.083	1.79	13.333	9.77	19.58	1.61
0.917	0.00	7.167	1.79	13.417	9.77	19.67	1.61
1.000	0.00	7.250	1.79	13.500	9.77	19.75	1.61
1.083	0.99	7.333	1.79	13.583	9.77	19.83	1.61
1.167	0.99	7.417	1.79	13.667	9.77	19.92	1.61
1.250	0.99	7.500	1.79	13.750	9.77	20.00	1.61
1.333	0.99	7.583	1.79	13.833	9.77	20.08	1.61
1.417	0.99	7.667	1.79	13.917	9.77	20.17	1.61
1.500	0.99	7.750	1.79	14.000	9.77	20.25	1.61
1.583	0.99	7.833	1.79	14.083	4.30	20.33	1.61
1.667	0.99	7.917	1.79	14.167	4.30	20.42	1.61
1.750	0.99	8.000	1.79	14.250	4.30	20.50	1.61
1.833	0.99	8.083	1.79	14.333	4.30	20.58	1.61
1.917	0.99	8.167	1.79	14.417	4.30	20.67	1.61
2.000	0.99	8.250	1.79	14.500	4.30	20.75	1.61
2.083	0.99	8.333	1.79	14.583	4.30	20.83	1.61
2.167	0.99	8.417	1.79	14.667	4.30	20.92	1.61
2.250	0.99	8.500	1.79	14.750	4.30	21.00	1.61
2.333	0.99	8.583	1.79	14.833	4.30	21.08	1.08
2.417	0.99	8.667	1.79	14.917	4.30	21.17	1.08
2.500	0.99	8.750	1.79	15.000	4.30	21.25	1.08
2.583	0.99	8.833	1.79	15.083	2.69	21.33	1.08
2.667	0.99	8.917	1.79	15.167	2.69	21.42	1.08
2.750	0.99	9.000	1.79	15.250	2.69	21.50	1.08
2.833	0.99	9.083	2.42	15.333	2.69	21.58	1.08
2.917	0.99	9.167	2.42	15.417	2.69	21.67	1.08
3.000	0.99	9.250	2.42	15.500	2.69	21.75	1.08
3.083	1.17	9.333	2.42	15.583	2.69	21.83	1.08
3.167	1.17	9.417	2.42	15.667	2.69	21.92	1.08
3.250	1.17	9.500	2.42	15.750	2.69	22.00	1.08
3.333	1.17	9.583	2.42	15.833	2.69	22.08	1.08
3.417	1.17	9.667	2.42	15.917	2.69	22.17	1.08
3.500	1.17	9.750	2.42	16.000	2.69	22.25	1.08
3.583	1.17	9.833	2.42	16.083	2.69	22.33	1.08
3.667	1.17	9.917	2.42	16.167	2.69	22.42	1.08
3.750	1.17	10.000	2.42	16.250	2.69	22.50	1.08
3.833	1.17	10.083	3.05	16.333	2.69	22.58	1.08
3.917	1.17	10.167	3.05	16.417	2.69	22.67	1.08
4.000	1.17	10.250	3.05	16.500	2.69	22.75	1.08
4.083	1.17	10.333	3.05	16.583	2.69	22.83	1.08
4.167	1.17	10.417	3.05	16.667	2.69	22.92	1.08
4.250	1.17	10.500	3.05	16.750	2.69	23.00	1.08
4.333	1.17	10.583	3.05	16.833	2.69	23.08	1.08
4.417	1.17	10.667	3.05	16.917	2.69	23.17	1.08
4.500	1.17	10.750	3.05	17.000	2.69	23.25	1.08
4.583	1.17	10.833	3.05	17.083	1.61	23.33	1.08
4.667	1.17	10.917	3.05	17.167	1.61	23.42	1.08
4.750	1.17	11.000	3.05	17.250	1.61	23.50	1.08
4.833	1.17	11.083	4.84	17.333	1.61	23.58	1.08
4.917	1.17	11.167	4.84	17.417	1.61	23.67	1.08
5.000	1.17	11.250	4.84	17.500	1.61	23.75	1.08
5.083	1.43	11.333	4.84	17.583	1.61	23.83	1.08
5.167	1.43	11.417	4.84	17.667	1.61	23.92	1.08
5.250	1.43	11.500	4.84	17.750	1.61	24.00	1.08
5.333	1.43	11.583	4.84	17.833	1.61	24.08	1.08
5.417	1.43	11.667	4.84	17.917	1.61	24.17	1.08
5.500	1.43	11.750	4.84	18.000	1.61	24.25	1.08
5.583	1.43	11.833	4.84	18.083	1.61	24.33	1.08
5.667	1.43	11.917	4.84	18.167	1.61	24.42	1.08
5.750	1.43	12.000	4.84	18.250	1.61	24.50	1.08
5.833	1.43	12.083	38.36	18.333	1.61	24.58	1.08
5.917	1.43	12.167	38.36	18.417	1.61	24.67	1.08
6.000	1.43	12.250	38.36	18.500	1.61	24.75	1.08
6.083	1.43	12.333	38.36	18.583	1.61	24.83	1.08
6.167	1.43	12.417	38.36	18.667	1.61	24.92	1.08
6.250	1.43	12.500	38.36	18.750	1.61	25.00	1.08

Max.Eff.Inten.(mm/hr)=	38.36	8.15
over (min)	10.00	30.00
Storage Coeff. (min)=	7.55 (ii)	26.79 (ii)
Unit Hyd. Tpeak (min)=	10.00	30.00
Unit Hyd. peak (cms)=	0.13	0.04

```
                                                                  *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.24          0.482 (iii)
     TIME TO PEAK    (hrs)=      13.00        13.08          13.00
     RUNOFF VOLUME    (mm)=      88.64        17.65          28.29
     TOTAL RAINFALL   (mm)=      89.64        89.64          89.64
     RUNOFF COEFFICIENT   =       0.99         0.20           0.32

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

       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0015)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    15.52   0.482    13.00    28.29
      + ID2= 2 (  0014):  2740.15  24.767    19.75    34.70
        ================================================
        ID = 3 (  0015):  2755.67  24.789    19.75    34.66

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

Butler Creek Visual OTTHYMO – Full Build-Out

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================================================================================================================
=========

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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: 08/17/2023                          TIME: 01:34:15

USER:


COMMENTS: _____________________________________________________________


-------------------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Timmins 2                     **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\emma.babbitt\AppD
|                  |              ata\Local\Temp\
|                  |              77d600d1-5291-4fc6-9638-ecaecd36058a\1650b8b6
| Ptotal=193.00 mm |    Comments: Timmins 2
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  4.00    3.00 |  8.00   20.00 | 12.00    8.00
                1.00   15.00 |  5.00    5.00 |  9.00   23.00 |
                2.00   20.00 |  6.00   20.00 | 10.00   13.00 |
                3.00   10.00 |  7.00   43.00 | 11.00   13.00 |

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| CALIB            |
| NASHYD   (  0001)|   Area    (ha)= 450.31   Curve Number   (CN)= 63.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 14.098

PEAK FLOW (cms)= 21.095 (i)
TIME TO PEAK (hrs)= 9.417
RUNOFF VOLUME (mm)= 106.220
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.550

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

CALIB NASHYD (0002)	Area (ha)=1368.11	Curve Number (CN)= 69.3
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 2.62	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00

0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 19.945

PEAK FLOW (cms)= 55.810 (i)
TIME TO PEAK (hrs)= 11.667
RUNOFF VOLUME (mm)= 117.608
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.609

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

ADD HYD (0006)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	450.31	21.095	9.42	106.22
+ ID2= 2 (0002):	1368.11	55.810	11.67	117.61
ID = 3 (0006):	1818.42	73.583	11.00	114.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0011)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	101.00	0.03	Main Channel
1.0	100.00	0.03	Main Channel
26.0	99.75	0.03/0.05	
27.5	98.25	0.05	
29.5	98.25	0.05	
31.0	99.75	0.05/0.03	Main Channel
56.0	100.00	0.03	Main Channel
57.0	101.00	0.03	Main Channel

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2 (0006)	1818.42	73.58	11.00	114.79	0.0
OUTFLOW: ID=1 (0011)	1818.42	72.97	11.92	114.79	0.0

CALIB NASHYD (0003) | ID= 1 DT= 5.0 min

Area (ha)= 192.12 Curve Number (CN)= 57.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 1.22

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 6.015

PEAK FLOW (cms)= 7.965 (i)
TIME TO PEAK (hrs)= 10.083
RUNOFF VOLUME (mm)= 93.681
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.485

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

CALIB STANDHYD (0004) | Area (ha)= 242.05

|ID= 1 DT= 5.0 min | Total Imp(%)= 65.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	157.33	84.72
Dep. Storage	(mm)=	5.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	1270.30	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=		43.00	12.29	
over (min)		15.00	35.00	
Storage Coeff. (min)=		16.45 (ii)	32.78 (ii)	
Unit Hyd. Tpeak (min)=		15.00	35.00	
Unit Hyd. peak (cms)=		0.07	0.03	
				TOTALS
PEAK FLOW	(cms)=	14.16	2.47	16.568 (iii)
TIME TO PEAK	(hrs)=	8.00	8.17	8.00
RUNOFF VOLUME	(mm)=	188.00	38.39	113.19
TOTAL RAINFALL	(mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT	=	0.97	0.20	0.59

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

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

CALIB NASHYD (0016) ID= 1 DT= 5.0 min	Area (ha)= 330.30 Curve Number (CN)= 67.9 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.72

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 17.522

PEAK FLOW (cms)= 20.770 (i)
TIME TO PEAK (hrs)= 8.417
RUNOFF VOLUME (mm)= 114.722
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.594

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

ADD HYD (0007) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	1818.42	72.976	11.92	114.79

```
      + ID2= 2 (  0016):   330.30  20.770     8.42   114.72
        ==================================================
        ID = 3 (  0007):  2148.72  83.575    11.67   114.78

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):  2148.72  83.575    11.67   114.78
      + ID2= 2 (  0003):   192.12   7.965    10.08    93.68
        ==================================================
        ID = 1 (  0007):  2340.84  90.131    11.42   113.05

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):  2340.84  90.131    11.42   113.05
      + ID2= 2 (  0004):   242.05  16.568     8.00   113.19
        ==================================================
        ID = 3 (  0007):  2582.89  95.496    11.33   113.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0012)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               101.00           0.03    Main Channel
    1.0               100.00           0.03    Main Channel
    26.0               99.75           0.03/0.05
    27.5               98.25           0.05
    29.5               98.25           0.05
    31.0               99.75           0.05/0.03    Main Channel
    56.0               100.00           0.03         Main Channel
    57.0               101.00           0.03         Main Channel

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0007)   2582.89    95.50    11.33     113.06    0.0
   OUTFLOW: ID=1  (0012)   2582.89    95.38    11.75     113.06    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)= 156.99
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     102.04        54.95
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=    1023.03        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	12.29		
over (min)	15.00	35.00		
Storage Coeff. (min)=	14.45 (ii)	30.78 (ii)		
Unit Hyd. Tpeak (min)=	15.00	35.00		
Unit Hyd. peak (cms)=	0.08	0.04		
			TOTALS	
PEAK FLOW (cms)=	9.25	1.62	10.842 (iii)	
TIME TO PEAK (hrs)=	8.00	8.17	8.00	
RUNOFF VOLUME (mm)=	192.00	38.39	115.19	
TOTAL RAINFALL (mm)=	193.00	193.00	193.00	
RUNOFF COEFFICIENT =	0.99	0.20	0.60	

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0012):		2582.89	95.387	11.75	113.06
+ ID2= 2 (0005):		156.99	10.842	8.00	115.19
ID = 3 (0008):		2739.88	98.817	11.75	113.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ROUTE MC (  0014)|
| IN=2---> OUT=1   |
--------------------

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>
Distance (m)     Elevation (m)     Mannings 'n'
  0.0               101.00           0.03    Main Channel
  1.0               100.00           0.03    Main Channel
  26.0               99.75           0.03/0.05
  27.5               98.25           0.05
  29.5               98.25           0.05
  31.0               99.75           0.05/0.03    Main Channel
  56.0              100.00            0.03         Main Channel
  57.0              101.00            0.03         Main Channel

                          AREA      QPEAK    TPEAK     R.V.    QBASE
                          (ha)      (cms)    (hrs)     (mm)    (cms)
 INFLOW:  ID=2  (0008)   2739.88    98.82    11.75     113.19    0.0
 OUTFLOW: ID=1  (0014)   2739.88    98.79    11.92     113.19    0.0

  ------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=  15.52
|ID= 1 DT= 5.0 min |   Total Imp(%)=  20.00   Dir. Conn.(%)=  15.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.10        12.42
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     321.66        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
 0.083    0.00  | 3.333   10.00  | 6.583   20.00  |  9.83   23.00
 0.167    0.00  | 3.417   10.00  | 6.667   20.00  |  9.92   23.00
 0.250    0.00  | 3.500   10.00  | 6.750   20.00  | 10.00   23.00
 0.333    0.00  | 3.583   10.00  | 6.833   20.00  | 10.08   13.00
 0.417    0.00  | 3.667   10.00  | 6.917   20.00  | 10.17   13.00
 0.500    0.00  | 3.750   10.00  | 7.000   20.00  | 10.25   13.00
 0.583    0.00  | 3.833   10.00  | 7.083   43.00  | 10.33   13.00
 0.667    0.00  | 3.917   10.00  | 7.167   43.00  | 10.42   13.00
 0.750    0.00  | 4.000   10.00  | 7.250   43.00  | 10.50   13.00
 0.833    0.00  | 4.083    3.00  | 7.333   43.00  | 10.58   13.00
 0.917    0.00  | 4.167    3.00  | 7.417   43.00  | 10.67   13.00
 1.000    0.00  | 4.250    3.00  | 7.500   43.00  | 10.75   13.00
 1.083   15.00  | 4.333    3.00  | 7.583   43.00  | 10.83   13.00
 1.167   15.00  | 4.417    3.00  | 7.667   43.00  | 10.92   13.00
 1.250   15.00  | 4.500    3.00  | 7.750   43.00  | 11.00   13.00
 1.333   15.00  | 4.583    3.00  | 7.833   43.00  | 11.08   13.00
 1.417   15.00  | 4.667    3.00  | 7.917   43.00  | 11.17   13.00
 1.500   15.00  | 4.750    3.00  | 8.000   43.00  | 11.25   13.00
 1.583   15.00  | 4.833    3.00  | 8.083   20.00  | 11.33   13.00
 1.667   15.00  | 4.917    3.00  | 8.167   20.00  | 11.42   13.00
 1.750   15.00  | 5.000    3.00  | 8.250   20.00  | 11.50   13.00
 1.833   15.00  | 5.083    5.00  | 8.333   20.00  | 11.58   13.00
 1.917   15.00  | 5.167    5.00  | 8.417   20.00  | 11.67   13.00
 2.000   15.00  | 5.250    5.00  | 8.500   20.00  | 11.75   13.00
 2.083   20.00  | 5.333    5.00  | 8.583   20.00  | 11.83   13.00
 2.167   20.00  | 5.417    5.00  | 8.667   20.00  | 11.92   13.00
 2.250   20.00  | 5.500    5.00  | 8.750   20.00  | 12.00   13.00
 2.333   20.00  | 5.583    5.00  | 8.833   20.00  | 12.08    8.00
 2.417   20.00  | 5.667    5.00  | 8.917   20.00  | 12.17    8.00
 2.500   20.00  | 5.750    5.00  | 9.000   20.00  | 12.25    8.00
```

2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	9.14	
over (min)	5.00	30.00	
Storage Coeff. (min)=	7.22 (ii)	25.60 (ii)	
Unit Hyd. Tpeak (min)=	5.00	30.00	
Unit Hyd. peak (cms)=	0.17	0.04	
			TOTALS
PEAK FLOW (cms)=	0.28	0.29	0.562 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	192.00	38.32	61.37
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.20	0.32

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

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0015)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0013):	15.52	0.562	8.00	61.37
	+ ID2= 2 (0014):	2739.88	98.794	11.92	113.19
	ID = 3 (0015):	2755.40	98.975	11.92	112.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Arena Creek Visual OTTHYMO – Existing Conditions

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================================================================================================================
=========

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
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  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\bb325766-3f6f-4e01-b2f6-8a14f0b517c7\s


DATE: 08/24/2023                          TIME: 08:33:47

USER:


COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Timmins 2                     **
  ***********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\6f8bb196
| Ptotal=193.00 mm |    Comments: Timmins 2
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  4.00    3.00 |  8.00   20.00 | 12.00    8.00
                1.00   15.00 |  5.00    5.00 |  9.00   23.00 |
                2.00   20.00 |  6.00   20.00 | 10.00   13.00 |
                3.00   10.00 |  7.00   43.00 | 11.00   13.00 |

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| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.72

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 3.711 (i)
TIME TO PEAK (hrs)= 8.417
RUNOFF VOLUME (mm)= 110.442
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.572

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

CALIB NASHYD (0008)	Area (ha)= 24.31	Curve Number (CN)= 78.7
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.32	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00

0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 2.902

PEAK FLOW (cms)= 2.318 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 137.643
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.713

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

ADD HYD (0019)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0007):		61.48	3.711	8.42	110.44
+ ID2= 2 (0008):		24.31	2.318	8.00	137.64
ID = 3 (0019):		85.79	5.756	8.17	118.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

	AREA	QPEAK	TPEAK	R.V.	QBASE

		(ha)	(cms)	(hrs)	(mm)	(cms)
INFLOW: ID=2	(0019)	85.79	5.76	8.17	118.15	0.0
OUTFLOW: ID=1	(0013)	85.79	5.63	8.42	118.15	0.0

CALIB NASHYD (0012) ID= 1 DT= 5.0 min	Area (ha)= 48.38	Curve Number (CN)= 87.8	
	Ia (mm)= 1.00	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 0.18		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 5.393 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 161.722
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.838

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

CALIB NASHYD (0021) ID= 1 DT= 5.0 min	Area (ha)= 82.00	Curve Number (CN)= 72.3	
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00	

-------------------- U.H. Tp(hrs)= 0.47

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 6.664

PEAK FLOW (cms)= 6.483 (i)
TIME TO PEAK (hrs)= 8.167
RUNOFF VOLUME (mm)= 123.869
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.642

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

ADD HYD (0018)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0012):	48.38	5.393	8.00	161.72
	+ ID2= 2 (0013):	85.79	5.634	8.42	118.15
	ID = 3 (0018):	134.16	10.211	8.00	133.86

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16  10.211     8.00   133.86
      + ID2= 2 (  0021):    82.00   6.483     8.17   123.87
        ================================================
        ID = 1 (  0018):   216.16  16.518     8.00   130.07

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                          AREA      QPEAK   TPEAK     R.V.    QBASE
                          (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    16.52    8.00     130.07    0.0
   OUTFLOW: ID=1  (0014)   216.16    16.34    8.17     130.07    0.0

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--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.00   Dir. Conn.(%)=  25.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      16.91        32.83
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     575.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.333   10.00 | 6.583   20.00 |  9.83   23.00
               0.167    0.00 | 3.417   10.00 | 6.667   20.00 |  9.92   23.00
               0.250    0.00 | 3.500   10.00 | 6.750   20.00 | 10.00   23.00
               0.333    0.00 | 3.583   10.00 | 6.833   20.00 | 10.08   13.00
               0.417    0.00 | 3.667   10.00 | 6.917   20.00 | 10.17   13.00
               0.500    0.00 | 3.750   10.00 | 7.000   20.00 | 10.25   13.00
               0.583    0.00 | 3.833   10.00 | 7.083   43.00 | 10.33   13.00
               0.667    0.00 | 3.917   10.00 | 7.167   43.00 | 10.42   13.00
               0.750    0.00 | 4.000   10.00 | 7.250   43.00 | 10.50   13.00
               0.833    0.00 | 4.083    3.00 | 7.333   43.00 | 10.58   13.00
               0.917    0.00 | 4.167    3.00 | 7.417   43.00 | 10.67   13.00
               1.000    0.00 | 4.250    3.00 | 7.500   43.00 | 10.75   13.00
               1.083   15.00 | 4.333    3.00 | 7.583   43.00 | 10.83   13.00
               1.167   15.00 | 4.417    3.00 | 7.667   43.00 | 10.92   13.00
               1.250   15.00 | 4.500    3.00 | 7.750   43.00 | 11.00   13.00
               1.333   15.00 | 4.583    3.00 | 7.833   43.00 | 11.08   13.00
               1.417   15.00 | 4.667    3.00 | 7.917   43.00 | 11.17   13.00
               1.500   15.00 | 4.750    3.00 | 8.000   43.00 | 11.25   13.00
               1.583   15.00 | 4.833    3.00 | 8.083   20.00 | 11.33   13.00
               1.667   15.00 | 4.917    3.00 | 8.167   20.00 | 11.42   13.00
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1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	9.77	
over (min)	10.00	30.00	
Storage Coeff. (min)=	10.24 (ii)	28.13 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
			TOTALS
PEAK FLOW (cms)=	1.48	0.79	2.268 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	192.00	38.34	76.75
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.20	0.40

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	49.75	2.268	8.00	76.75
+ ID2= 2 (0014):	216.16	16.339	8.17	130.07
ID = 3 (0017):	265.91	18.319	8.08	120.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0015)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	18.32	8.08	120.10	0.0

OUTFLOW: ID=1 (0015) 265.91 18.14 8.25 120.10 0.0

CALIB					
STANDHYD (0011)	Area (ha)= 61.54				
ID= 1 DT= 5.0 min	Total Imp(%)= 21.00	Dir. Conn.(%)= 15.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.92	48.62
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	9.25		
over (min)	10.00	30.00		
Storage Coeff. (min)=	10.91 (ii)	29.20 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.10	1.10	2.192 (iii)	
TIME TO PEAK (hrs)=	8.00	8.08	8.00	
RUNOFF VOLUME (mm)=	192.00	38.32	61.37	
TOTAL RAINFALL (mm)=	193.00	193.00	193.00	
RUNOFF COEFFICIENT =	0.99	0.20	0.32	

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

       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):    61.54   2.192     8.00    61.37
      + ID2= 2 (  0015):   265.91  18.137     8.25   120.10
        ================================================
        ID = 3 (  0016):   327.45  20.012     8.17   109.07

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\3ed6e633-635a-4f38-ab65-0f2bdec9058e\s
  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\3ed6e633-635a-4f38-ab65-0f2bdec9058e\s


DATE: 08/24/2023                          TIME: 08:33:47

USER:



COMMENTS: _____________________________________________________________


--------------------------------------------------------------------------------------------------
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  **********************************************
  ** SIMULATION : Timmins Climate Change        **
  **********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\f7f1df77
| Ptotal=242.00 mm |    Comments: Timmins Climate Change
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	4.00	4.00	8.00	25.00	12.00	10.00
1.00	19.00	5.00	6.00	9.00	29.00		
2.00	25.00	6.00	25.00	10.00	16.00		
3.00	13.00	7.00	54.00	11.00	16.00		

CALIB
NASHYD (0007)
ID= 1 DT= 5.0 min

Area (ha)= 61.48 Curve Number (CN)= 65.8
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.72

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 5.144 (i)
TIME TO PEAK (hrs)= 8.417
RUNOFF VOLUME (mm)= 152.210
TOTAL RAINFALL (mm)= 242.000
RUNOFF COEFFICIENT = 0.629

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

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--------------------
| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=  24.31   Curve Number   (CN)= 78.7
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.32

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

```
     Unit Hyd Qpeak  (cms)=   2.902

     PEAK FLOW       (cms)=   3.074 (i)
     TIME TO PEAK    (hrs)=   8.000
     RUNOFF VOLUME    (mm)= 183.681
     TOTAL RAINFALL   (mm)= 242.000
     RUNOFF COEFFICIENT   =   0.759

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

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--------------------
| ADD HYD  (  0019)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):    61.48   5.144     8.42   152.21
      + ID2= 2 (  0008):    24.31   3.074     8.00   183.68
        ================================================
```

```
       ID = 3 (  0019):    85.79   7.862     8.17   161.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0013)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0019)   85.79    7.86    8.17     161.13    0.0
   OUTFLOW: ID=1  (0013)   85.79    7.74    8.33     161.13    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=  48.38   Curve Number   (CN)= 87.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   1.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.18

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.333   13.00 | 6.583   25.00 |  9.83   29.00
               0.167    0.00 | 3.417   13.00 | 6.667   25.00 |  9.92   29.00
               0.250    0.00 | 3.500   13.00 | 6.750   25.00 | 10.00   29.00
               0.333    0.00 | 3.583   13.00 | 6.833   25.00 | 10.08   16.00
               0.417    0.00 | 3.667   13.00 | 6.917   25.00 | 10.17   16.00
               0.500    0.00 | 3.750   13.00 | 7.000   25.00 | 10.25   16.00
               0.583    0.00 | 3.833   13.00 | 7.083   54.00 | 10.33   16.00
               0.667    0.00 | 3.917   13.00 | 7.167   54.00 | 10.42   16.00
               0.750    0.00 | 4.000   13.00 | 7.250   54.00 | 10.50   16.00
               0.833    0.00 | 4.083    4.00 | 7.333   54.00 | 10.58   16.00
               0.917    0.00 | 4.167    4.00 | 7.417   54.00 | 10.67   16.00
               1.000    0.00 | 4.250    4.00 | 7.500   54.00 | 10.75   16.00
               1.083   19.00 | 4.333    4.00 | 7.583   54.00 | 10.83   16.00
               1.167   19.00 | 4.417    4.00 | 7.667   54.00 | 10.92   16.00
               1.250   19.00 | 4.500    4.00 | 7.750   54.00 | 11.00   16.00
               1.333   19.00 | 4.583    4.00 | 7.833   54.00 | 11.08   16.00
               1.417   19.00 | 4.667    4.00 | 7.917   54.00 | 11.17   16.00
               1.500   19.00 | 4.750    4.00 | 8.000   54.00 | 11.25   16.00
               1.583   19.00 | 4.833    4.00 | 8.083   25.00 | 11.33   16.00
               1.667   19.00 | 4.917    4.00 | 8.167   25.00 | 11.42   16.00
               1.750   19.00 | 5.000    4.00 | 8.250   25.00 | 11.50   16.00
               1.833   19.00 | 5.083    6.00 | 8.333   25.00 | 11.58   16.00
               1.917   19.00 | 5.167    6.00 | 8.417   25.00 | 11.67   16.00
               2.000   19.00 | 5.250    6.00 | 8.500   25.00 | 11.75   16.00
               2.083   25.00 | 5.333    6.00 | 8.583   25.00 | 11.83   16.00
               2.167   25.00 | 5.417    6.00 | 8.667   25.00 | 11.92   16.00
               2.250   25.00 | 5.500    6.00 | 8.750   25.00 | 12.00   16.00
               2.333   25.00 | 5.583    6.00 | 8.833   25.00 | 12.08   10.00
               2.417   25.00 | 5.667    6.00 | 8.917   25.00 | 12.17   10.00
               2.500   25.00 | 5.750    6.00 | 9.000   25.00 | 12.25   10.00
               2.583   25.00 | 5.833    6.00 | 9.083   29.00 | 12.33   10.00
               2.667   25.00 | 5.917    6.00 | 9.167   29.00 | 12.42   10.00
               2.750   25.00 | 6.000    6.00 | 9.250   29.00 | 12.50   10.00
```

2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 6.911 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 209.612
TOTAL RAINFALL (mm)= 242.000
RUNOFF COEFFICIENT = 0.866

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

CALIB
NASHYD (0021)
ID= 1 DT= 5.0 min

Area (ha)= 82.00 Curve Number (CN)= 72.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.47

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 6.664

```
     PEAK FLOW       (cms)=   8.791 (i)
     TIME TO PEAK    (hrs)=   8.167
     RUNOFF VOLUME    (mm)= 168.002
     TOTAL RAINFALL   (mm)= 242.000
     RUNOFF COEFFICIENT   =   0.694

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

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--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0012):    48.38   6.911     8.00   209.61
      + ID2= 2 (  0013):    85.79   7.741     8.33   161.13
        ================================================
        ID = 3 (  0018):   134.16  13.817     8.00   178.61

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

--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16  13.817     8.00   178.61
      + ID2= 2 (  0021):    82.00   8.791     8.17   168.00
        ================================================
        ID = 1 (  0018):   216.16  22.405     8.00   174.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5               100.00           0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    22.40    8.00     174.59    0.0
   OUTFLOW: ID=1  (0014)   216.16    22.15    8.08     174.59    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.00   Dir. Conn.(%)=  25.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      16.91        32.83
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     575.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Max.Eff.Inten.(mm/hr)=	54.00	12.27		
over (min)	10.00	30.00		
Storage Coeff. (min)=	9.35 (ii)	25.68 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.12	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.86	1.01	2.869 (iii)	
TIME TO PEAK (hrs)=	8.00	8.08	8.00	
RUNOFF VOLUME (mm)=	241.00	48.14	96.35	
TOTAL RAINFALL (mm)=	242.00	242.00	242.00	
RUNOFF COEFFICIENT =	1.00	0.20	0.40	

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0010):	49.75	2.869	8.00	96.35
	+ ID2= 2 (0014):	216.16	22.146	8.08	174.59
	ID = 3 (0017):	265.91	24.852	8.08	159.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0015)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	24.85	8.08	159.96	0.0
OUTFLOW: ID=1	(0015)	265.91	24.62	8.17	159.96	0.0

CALIB
STANDHYD (0011)
ID= 1 DT= 5.0 min

Area (ha)= 61.54
Total Imp(%)= 21.00 Dir. Conn.(%)= 15.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.92	48.62
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00

2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Max.Eff.Inten.(mm/hr)=	54.00	11.62	
over (min)	10.00	30.00	
Storage Coeff. (min)=	9.96 (ii)	26.66 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
			TOTALS
PEAK FLOW (cms)=	1.38	1.41	2.782 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	241.00	48.12	77.05
TOTAL RAINFALL (mm)=	242.00	242.00	242.00
RUNOFF COEFFICIENT =	1.00	0.20	0.32

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

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		61.54	2.782	8.00	77.05
+ ID2= 2 (0015):		265.91	24.619	8.17	159.96
ID = 3 (0016):		327.45	27.052	8.08	144.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\eflederus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-3221e97a2d27\41cbf7e3-173d-41df-a30d-bd398dfd2b3a\s
Summary filename: C:\Users\eflederus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-3221e97a2d27\41cbf7e3-173d-41df-a30d-bd398dfd2b3a\s

DATE: 08/24/2023 TIME: 08:33:47

USER:

COMMENTS: _____

****
** SIMULATION : Trenton A SCS 100-Yr **
****

READ STORM	Filename: C:\Users\eflederus\AppData\Local\Temp\a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\3b52dbf2
Ptotal=108.16 mm	Comments: Trenton A SCS 100-Yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	7.00	2.16	14.00	5.19	21.00	1.30
1.00	1.19	8.00	2.16	15.00	3.24	22.00	1.30
2.00	1.19	9.00	2.92	16.00	3.24	23.00	1.30
3.00	1.41	10.00	3.68	17.00	1.95	24.00	1.30
4.00	1.41	11.00	5.84	18.00	1.95		
5.00	1.73	12.00	46.28	19.00	1.95		
6.00	1.73	13.00	11.79	20.00	1.95		

CALIB NASHYD (0007) ID= 1 DT= 5.0 min	Area (ha)= 61.48	Curve Number (CN)= 65.8
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.72	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95

1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 2.397 (i)
TIME TO PEAK (hrs)= 13.417
RUNOFF VOLUME (mm)= 45.251
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.418

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

CALIB NASHYD (0008) ID= 1 DT= 5.0 min	Area (ha)= 24.31 Curve Number (CN)= 78.7 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30

5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 2.902

PEAK FLOW (cms)= 1.945 (i)
TIME TO PEAK (hrs)= 13.083
RUNOFF VOLUME (mm)= 61.903
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.572

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

ADD HYD (0019)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0007):	61.48	2.397	13.42	45.25
+ ID2= 2 (0008):	24.31	1.945	13.08	61.90
ID = 3 (0019):	85.79	4.026	13.17	49.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0019)	85.79	4.03	13.17	49.97	0.0
OUTFLOW: ID=1	(0013)	85.79	3.81	13.50	49.97	0.0

CALIB
NASHYD (0012)
ID= 1 DT= 5.0 min

Area (ha)= 48.38 Curve Number (CN)= 87.8
Ia (mm)= 1.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95

0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 5.332 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 80.380
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.743

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

CALIB NASHYD (0021) ID= 1 DT= 5.0 min	Area (ha)= 82.00 Curve Number (CN)= 72.3 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.47

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30

4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 6.664

PEAK FLOW (cms)= 4.821 (i)
TIME TO PEAK (hrs)= 13.167
RUNOFF VOLUME (mm)= 53.081
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.491

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

ADD HYD (0018)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	48.38	5.332	13.00	80.38
+ ID2= 2 (0013):	85.79	3.811	13.50	49.97
ID = 3 (0018):	134.16	7.799	13.00	60.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0018)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0018):	134.16	7.799	13.00	60.94
+ ID2= 2 (0021):	82.00	4.821	13.17	53.08
ID = 1 (0018):	216.16	12.272	13.08	57.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0014)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>
Distance (m) Elevation (m) Mannings 'n'

0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0018)	216.16	12.27	13.08	57.96	0.0
OUTFLOW: ID=1	(0014)	216.16	11.83	13.17	57.96	0.0

CALIB
STANDHYD (0010)
ID= 1 DT= 5.0 min

Area (ha)= 49.75
Total Imp(%)= 34.00 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	16.91	32.83
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	575.88	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30

3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Max.Eff.Inten.(mm/hr)=	46.28	10.52	
over (min)	10.00	30.00	
Storage Coeff. (min)=	9.94 (ii)	27.31 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
			TOTALS
PEAK FLOW (cms)=	1.59	0.81	2.388 (iii)
TIME TO PEAK (hrs)=	13.00	13.08	13.00
RUNOFF VOLUME (mm)=	107.16	21.37	42.82
TOTAL RAINFALL (mm)=	108.16	108.16	108.16
RUNOFF COEFFICIENT =	0.99	0.20	0.40

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	49.75	2.388	13.00	42.82
+ ID2= 2 (0014):	216.16	11.834	13.17	57.96
ID = 3 (0017):	265.91	13.644	13.17	55.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0015)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	13.64	13.17	55.12	0.0
OUTFLOW: ID=1	(0015)	265.91	13.38	13.25	55.12	0.0

CALIB
STANDHYD (0011)
ID= 1 DT= 5.0 min

Area (ha)= 61.54
Total Imp(%)= 21.00 Dir. Conn.(%)= 15.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.92	48.62
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30

3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Max.Eff.Inten.(mm/hr)=	46.28	9.96		
over (min)	10.00	30.00		
Storage Coeff. (min)=	10.60 (ii)	28.35 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.18	1.12	2.282 (iii)	
TIME TO PEAK (hrs)=	13.00	13.08	13.00	
RUNOFF VOLUME (mm)=	107.16	21.35	34.22	
TOTAL RAINFALL (mm)=	108.16	108.16	108.16	
RUNOFF COEFFICIENT =	0.99	0.20	0.32	

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

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		61.54	2.282	13.00	34.22
+ ID2= 2 (0015):		265.91	13.379	13.25	55.12
ID = 3 (0016):		327.45	15.055	13.25	51.20

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\b674f478-2a8d-4a27-a4f5-cb61c6d38909\s
  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\b674f478-2a8d-4a27-a4f5-cb61c6d38909\s


DATE: 08/24/2023                          TIME: 08:33:47

USER:



COMMENTS: _____________________________________________________________


---------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Trenton A SCS 200-Yr          **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\3995b4ce
| Ptotal=117.62 mm |    Comments: Trenton A SCS 200-Yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  7.00    2.35 | 14.00    5.65 | 21.00    1.41
                1.00    1.29 |  8.00    2.35 | 15.00    3.53 | 22.00    1.41
                2.00    1.29 |  9.00    3.18 | 16.00    3.53 | 23.00    1.41
                3.00    1.53 | 10.00    4.00 | 17.00    2.12 | 24.00    1.41
                4.00    1.53 | 11.00    6.35 | 18.00    2.12 |
                5.00    1.88 | 12.00   50.34 | 19.00    2.12 |
                6.00    1.88 | 13.00   12.82 | 20.00    2.12 |

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


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| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.72

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
0.083	0.00	6.333	1.88	12.583	50.34	18.83	2.12
0.167	0.00	6.417	1.88	12.667	50.34	18.92	2.12
0.250	0.00	6.500	1.88	12.750	50.34	19.00	2.12
0.333	0.00	6.583	1.88	12.833	50.34	19.08	2.12
0.417	0.00	6.667	1.88	12.917	50.34	19.17	2.12
0.500	0.00	6.750	1.88	13.000	50.34	19.25	2.12
0.583	0.00	6.833	1.88	13.083	12.83	19.33	2.12
0.667	0.00	6.917	1.88	13.167	12.82	19.42	2.12
0.750	0.00	7.000	1.88	13.250	12.82	19.50	2.12
0.833	0.00	7.083	2.35	13.333	12.82	19.58	2.12
0.917	0.00	7.167	2.35	13.417	12.82	19.67	2.12
1.000	0.00	7.250	2.35	13.500	12.82	19.75	2.12
1.083	1.29	7.333	2.35	13.583	12.82	19.83	2.12
1.167	1.29	7.417	2.35	13.667	12.82	19.92	2.12
1.250	1.29	7.500	2.35	13.750	12.82	20.00	2.12
1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12
2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41
3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41
4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41

5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 2.761 (i)
TIME TO PEAK (hrs)= 13.417
RUNOFF VOLUME (mm)= 51.844
TOTAL RAINFALL (mm)= 117.620
RUNOFF COEFFICIENT = 0.441

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

CALIB
NASHYD (0008)
ID= 1 DT= 5.0 min

Area (ha)= 24.31 Curve Number (CN)= 78.7
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.88	12.583	50.34	18.83	2.12
0.167	0.00	6.417	1.88	12.667	50.34	18.92	2.12
0.250	0.00	6.500	1.88	12.750	50.34	19.00	2.12
0.333	0.00	6.583	1.88	12.833	50.34	19.08	2.12
0.417	0.00	6.667	1.88	12.917	50.34	19.17	2.12
0.500	0.00	6.750	1.88	13.000	50.34	19.25	2.12
0.583	0.00	6.833	1.88	13.083	12.83	19.33	2.12
0.667	0.00	6.917	1.88	13.167	12.82	19.42	2.12
0.750	0.00	7.000	1.88	13.250	12.82	19.50	2.12
0.833	0.00	7.083	2.35	13.333	12.82	19.58	2.12
0.917	0.00	7.167	2.35	13.417	12.82	19.67	2.12
1.000	0.00	7.250	2.35	13.500	12.82	19.75	2.12
1.083	1.29	7.333	2.35	13.583	12.82	19.83	2.12
1.167	1.29	7.417	2.35	13.667	12.82	19.92	2.12
1.250	1.29	7.500	2.35	13.750	12.82	20.00	2.12
1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12
2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41

3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41
4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41
5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Unit Hyd Qpeak (cms)= 2.902

PEAK FLOW (cms)= 2.197 (i)
TIME TO PEAK (hrs)= 13.083
RUNOFF VOLUME (mm)= 69.927
TOTAL RAINFALL (mm)= 117.620
RUNOFF COEFFICIENT = 0.595

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

ADD HYD (0019)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0007):	61.48	2.761	13.42	51.84
	+ ID2= 2 (0008):	24.31	2.197	13.08	69.93
	ID = 3 (0019):	85.79	4.601	13.17	56.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel

14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0019)	85.79	4.60	13.17	56.97	0.0
OUTFLOW: ID=1	(0013)	85.79	4.37	13.50	56.97	0.0

CALIB NASHYD (0012) ID= 1 DT= 5.0 min

Area (ha)= 48.38 Curve Number (CN)= 87.8
Ia (mm)= 1.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.88	12.583	50.34	18.83	2.12
0.167	0.00	6.417	1.88	12.667	50.34	18.92	2.12
0.250	0.00	6.500	1.88	12.750	50.34	19.00	2.12
0.333	0.00	6.583	1.88	12.833	50.34	19.08	2.12
0.417	0.00	6.667	1.88	12.917	50.34	19.17	2.12
0.500	0.00	6.750	1.88	13.000	50.34	19.25	2.12
0.583	0.00	6.833	1.88	13.083	12.83	19.33	2.12
0.667	0.00	6.917	1.88	13.167	12.82	19.42	2.12
0.750	0.00	7.000	1.88	13.250	12.82	19.50	2.12
0.833	0.00	7.083	2.35	13.333	12.82	19.58	2.12
0.917	0.00	7.167	2.35	13.417	12.82	19.67	2.12
1.000	0.00	7.250	2.35	13.500	12.82	19.75	2.12
1.083	1.29	7.333	2.35	13.583	12.82	19.83	2.12
1.167	1.29	7.417	2.35	13.667	12.82	19.92	2.12
1.250	1.29	7.500	2.35	13.750	12.82	20.00	2.12
1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12
2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41
3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41

4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41
5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 5.896 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 89.269
TOTAL RAINFALL (mm)= 117.620
RUNOFF COEFFICIENT = 0.759

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

CALIB NASHYD (0021) ID= 1 DT= 5.0 min	Area (ha)= 82.00	Curve Number (CN)= 72.3
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.47	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.88	12.583	50.34	18.83	2.12
0.167	0.00	6.417	1.88	12.667	50.34	18.92	2.12
0.250	0.00	6.500	1.88	12.750	50.34	19.00	2.12
0.333	0.00	6.583	1.88	12.833	50.34	19.08	2.12
0.417	0.00	6.667	1.88	12.917	50.34	19.17	2.12
0.500	0.00	6.750	1.88	13.000	50.34	19.25	2.12
0.583	0.00	6.833	1.88	13.083	12.83	19.33	2.12
0.667	0.00	6.917	1.88	13.167	12.82	19.42	2.12
0.750	0.00	7.000	1.88	13.250	12.82	19.50	2.12
0.833	0.00	7.083	2.35	13.333	12.82	19.58	2.12
0.917	0.00	7.167	2.35	13.417	12.82	19.67	2.12
1.000	0.00	7.250	2.35	13.500	12.82	19.75	2.12
1.083	1.29	7.333	2.35	13.583	12.82	19.83	2.12
1.167	1.29	7.417	2.35	13.667	12.82	19.92	2.12
1.250	1.29	7.500	2.35	13.750	12.82	20.00	2.12
1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12

2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41
3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41
4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41
5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Unit Hyd Qpeak (cms)= 6.664

PEAK FLOW (cms)= 5.507 (i)
TIME TO PEAK (hrs)= 13.167
RUNOFF VOLUME (mm)= 60.411
TOTAL RAINFALL (mm)= 117.620
RUNOFF COEFFICIENT = 0.514

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

ADD HYD (0018)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	48.38	5.896	13.00	89.27
+ ID2= 2 (0013):	85.79	4.371	13.50	56.97
	==========	==========	==========	==========

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        ID = 3 (  0018):   134.16   8.921    13.00    68.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16   8.921    13.00    68.62
      + ID2= 2 (  0021):    82.00   5.507    13.17    60.41
        ================================================
        ID = 1 (  0018):   216.16  14.050    13.08    65.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    14.05    13.08     65.50    0.0
   OUTFLOW: ID=1  (0014)   216.16    13.68    13.17     65.50    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.00   Dir. Conn.(%)=  25.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      16.91        32.83
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     575.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
     0.083     0.00  |  6.333    1.88  |12.583    50.34  | 18.83     2.12
     0.167     0.00  |  6.417    1.88  |12.667    50.34  | 18.92     2.12
     0.250     0.00  |  6.500    1.88  |12.750    50.34  | 19.00     2.12
     0.333     0.00  |  6.583    1.88  |12.833    50.34  | 19.08     2.12
     0.417     0.00  |  6.667    1.88  |12.917    50.34  | 19.17     2.12
     0.500     0.00  |  6.750    1.88  |13.000    50.34  | 19.25     2.12
     0.583     0.00  |  6.833    1.88  |13.083    12.83  | 19.33     2.12
     0.667     0.00  |  6.917    1.88  |13.167    12.82  | 19.42     2.12
     0.750     0.00  |  7.000    1.88  |13.250    12.82  | 19.50     2.12
     0.833     0.00  |  7.083    2.35  |13.333    12.82  | 19.58     2.12
     0.917     0.00  |  7.167    2.35  |13.417    12.82  | 19.67     2.12
     1.000     0.00  |  7.250    2.35  |13.500    12.82  | 19.75     2.12
     1.083     1.29  |  7.333    2.35  |13.583    12.82  | 19.83     2.12
     1.167     1.29  |  7.417    2.35  |13.667    12.82  | 19.92     2.12
     1.250     1.29  |  7.500    2.35  |13.750    12.82  | 20.00     2.12
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1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12
2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41
3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41
4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41
5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Max.Eff.Inten.(mm/hr)=	50.34	11.44	
over (min)	10.00	30.00	
Storage Coeff. (min)=	9.61 (ii)	26.41 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
			TOTALS
PEAK FLOW (cms)=	1.73	0.89	2.608 (iii)
TIME TO PEAK (hrs)=	13.00	13.08	13.00
RUNOFF VOLUME (mm)=	116.62	23.26	46.60
TOTAL RAINFALL (mm)=	117.62	117.62	117.62
RUNOFF COEFFICIENT =	0.99	0.20	0.40

```
       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (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  (  0017)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    49.75   2.608    13.00    46.60
      + ID2= 2 (  0014):   216.16  13.679    13.17    65.50
        ================================================
        ID = 3 (  0017):   265.91  15.711    13.08    61.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0015)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                           AREA      QPEAK    TPEAK     R.V.    QBASE
                           (ha)      (cms)    (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0017)   265.91    15.71     13.08     61.97    0.0
   OUTFLOW: ID=1  (0015)   265.91    15.46     13.25     61.97    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  61.54
|ID= 1 DT= 5.0 min |   Total Imp(%)=  21.00   Dir. Conn.(%)=  15.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.92        48.62
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     640.53        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
  0.083    0.00 | 6.333    1.88 |12.583   50.34 | 18.83    2.12
  0.167    0.00 | 6.417    1.88 |12.667   50.34 | 18.92    2.12
  0.250    0.00 | 6.500    1.88 |12.750   50.34 | 19.00    2.12
  0.333    0.00 | 6.583    1.88 |12.833   50.34 | 19.08    2.12
  0.417    0.00 | 6.667    1.88 |12.917   50.34 | 19.17    2.12
  0.500    0.00 | 6.750    1.88 |13.000   50.34 | 19.25    2.12
  0.583    0.00 | 6.833    1.88 |13.083   12.83 | 19.33    2.12
  0.667    0.00 | 6.917    1.88 |13.167   12.82 | 19.42    2.12
  0.750    0.00 | 7.000    1.88 |13.250   12.82 | 19.50    2.12
  0.833    0.00 | 7.083    2.35 |13.333   12.82 | 19.58    2.12
```

0.917	0.00	7.167	2.35	13.417	12.82	19.67	2.12
1.000	0.00	7.250	2.35	13.500	12.82	19.75	2.12
1.083	1.29	7.333	2.35	13.583	12.82	19.83	2.12
1.167	1.29	7.417	2.35	13.667	12.82	19.92	2.12
1.250	1.29	7.500	2.35	13.750	12.82	20.00	2.12
1.333	1.29	7.583	2.35	13.833	12.82	20.08	2.12
1.417	1.29	7.667	2.35	13.917	12.82	20.17	2.12
1.500	1.29	7.750	2.35	14.000	12.82	20.25	2.12
1.583	1.29	7.833	2.35	14.083	5.65	20.33	2.12
1.667	1.29	7.917	2.35	14.167	5.65	20.42	2.12
1.750	1.29	8.000	2.35	14.250	5.65	20.50	2.12
1.833	1.29	8.083	2.35	14.333	5.65	20.58	2.12
1.917	1.29	8.167	2.35	14.417	5.65	20.67	2.12
2.000	1.29	8.250	2.35	14.500	5.65	20.75	2.12
2.083	1.29	8.333	2.35	14.583	5.65	20.83	2.12
2.167	1.29	8.417	2.35	14.667	5.65	20.92	2.12
2.250	1.29	8.500	2.35	14.750	5.65	21.00	2.12
2.333	1.29	8.583	2.35	14.833	5.65	21.08	1.41
2.417	1.29	8.667	2.35	14.917	5.65	21.17	1.41
2.500	1.29	8.750	2.35	15.000	5.65	21.25	1.41
2.583	1.29	8.833	2.35	15.083	3.53	21.33	1.41
2.667	1.29	8.917	2.35	15.167	3.53	21.42	1.41
2.750	1.29	9.000	2.35	15.250	3.53	21.50	1.41
2.833	1.29	9.083	3.18	15.333	3.53	21.58	1.41
2.917	1.29	9.167	3.18	15.417	3.53	21.67	1.41
3.000	1.29	9.250	3.18	15.500	3.53	21.75	1.41
3.083	1.53	9.333	3.18	15.583	3.53	21.83	1.41
3.167	1.53	9.417	3.18	15.667	3.53	21.92	1.41
3.250	1.53	9.500	3.18	15.750	3.53	22.00	1.41
3.333	1.53	9.583	3.18	15.833	3.53	22.08	1.41
3.417	1.53	9.667	3.18	15.917	3.53	22.17	1.41
3.500	1.53	9.750	3.18	16.000	3.53	22.25	1.41
3.583	1.53	9.833	3.18	16.083	3.53	22.33	1.41
3.667	1.53	9.917	3.18	16.167	3.53	22.42	1.41
3.750	1.53	10.000	3.18	16.250	3.53	22.50	1.41
3.833	1.53	10.083	4.00	16.333	3.53	22.58	1.41
3.917	1.53	10.167	4.00	16.417	3.53	22.67	1.41
4.000	1.53	10.250	4.00	16.500	3.53	22.75	1.41
4.083	1.53	10.333	4.00	16.583	3.53	22.83	1.41
4.167	1.53	10.417	4.00	16.667	3.53	22.92	1.41
4.250	1.53	10.500	4.00	16.750	3.53	23.00	1.41
4.333	1.53	10.583	4.00	16.833	3.53	23.08	1.41
4.417	1.53	10.667	4.00	16.917	3.53	23.17	1.41
4.500	1.53	10.750	4.00	17.000	3.53	23.25	1.41
4.583	1.53	10.833	4.00	17.083	2.12	23.33	1.41
4.667	1.53	10.917	4.00	17.167	2.12	23.42	1.41
4.750	1.53	11.000	4.00	17.250	2.12	23.50	1.41
4.833	1.53	11.083	6.35	17.333	2.12	23.58	1.41
4.917	1.53	11.167	6.35	17.417	2.12	23.67	1.41
5.000	1.53	11.250	6.35	17.500	2.12	23.75	1.41
5.083	1.88	11.333	6.35	17.583	2.12	23.83	1.41
5.167	1.88	11.417	6.35	17.667	2.12	23.92	1.41
5.250	1.88	11.500	6.35	17.750	2.12	24.00	1.41
5.333	1.88	11.583	6.35	17.833	2.12	24.08	1.41
5.417	1.88	11.667	6.35	17.917	2.12	24.17	1.41
5.500	1.88	11.750	6.35	18.000	2.12	24.25	1.41
5.583	1.88	11.833	6.35	18.083	2.12	24.33	1.41
5.667	1.88	11.917	6.35	18.167	2.12	24.42	1.41
5.750	1.88	12.000	6.35	18.250	2.12	24.50	1.41
5.833	1.88	12.083	50.33	18.333	2.12	24.58	1.41
5.917	1.88	12.167	50.34	18.417	2.12	24.67	1.41
6.000	1.88	12.250	50.34	18.500	2.12	24.75	1.41
6.083	1.88	12.333	50.34	18.583	2.12	24.83	1.41
6.167	1.88	12.417	50.34	18.667	2.12	24.92	1.41
6.250	1.88	12.500	50.34	18.750	2.12	25.00	1.41

Max.Eff.Inten.(mm/hr)=	50.34	10.83
over (min)	10.00	30.00
Storage Coeff. (min)=	10.24 (ii)	27.41 (ii)
Unit Hyd. Tpeak (min)=	10.00	30.00
Unit Hyd. peak (cms)=	0.11	0.04

TOTALS

```
     PEAK FLOW      (cms)=       1.29         1.23          2.496 (iii)
     TIME TO PEAK   (hrs)=      13.00        13.08          13.00
     RUNOFF VOLUME   (mm)=     116.62        23.24          37.25
     TOTAL RAINFALL  (mm)=     117.62       117.62         117.62
     RUNOFF COEFFICIENT  =       0.99         0.20           0.32

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

       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (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  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):    61.54   2.496    13.00    37.25
      + ID2= 2 (  0015):   265.91  15.463    13.25    61.97
        ================================================
        ID = 3 (  0016):   327.45  17.282    13.25    57.32

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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: 08/24/2023                          TIME: 08:33:47

USER:



COMMENTS: _____________________________________________________________


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  ********************************************
  ** SIMULATION : Trenton A SCS 500-Yr          **
  ********************************************
```

READ STORM	Filename: C:\Users\efledderus\AppData\Local\Temp\a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\9a8ba48c
Ptotal=130.10 mm	Comments: Trenton A SCS 500-Yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	7.00	2.60	14.00	6.25	21.00	1.56
1.00	1.43	8.00	2.60	15.00	3.90	22.00	1.56
2.00	1.43	9.00	3.51	16.00	3.90	23.00	1.56
3.00	1.69	10.00	4.42	17.00	2.34	24.00	1.56
4.00	1.69	11.00	7.03	18.00	2.34		
5.00	2.08	12.00	55.70	19.00	2.34		
6.00	2.08	13.00	14.19	20.00	2.34		

CALIB NASHYD (0007) ID= 1 DT= 5.0 min	Area (ha)= 61.48	Curve Number (CN)= 65.8
	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.72	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	2.08	12.583	55.70	18.83	2.34
0.167	0.00	6.417	2.08	12.667	55.70	18.92	2.34
0.250	0.00	6.500	2.08	12.750	55.70	19.00	2.34
0.333	0.00	6.583	2.08	12.833	55.70	19.08	2.34
0.417	0.00	6.667	2.08	12.917	55.70	19.17	2.34
0.500	0.00	6.750	2.08	13.000	55.70	19.25	2.34
0.583	0.00	6.833	2.08	13.083	14.20	19.33	2.34
0.667	0.00	6.917	2.08	13.167	14.19	19.42	2.34
0.750	0.00	7.000	2.08	13.250	14.19	19.50	2.34
0.833	0.00	7.083	2.60	13.333	14.19	19.58	2.34
0.917	0.00	7.167	2.60	13.417	14.19	19.67	2.34
1.000	0.00	7.250	2.60	13.500	14.19	19.75	2.34
1.083	1.43	7.333	2.60	13.583	14.19	19.83	2.34
1.167	1.43	7.417	2.60	13.667	14.19	19.92	2.34
1.250	1.43	7.500	2.60	13.750	14.19	20.00	2.34
1.333	1.43	7.583	2.60	13.833	14.19	20.08	2.34
1.417	1.43	7.667	2.60	13.917	14.19	20.17	2.34
1.500	1.43	7.750	2.60	14.000	14.19	20.25	2.34
1.583	1.43	7.833	2.60	14.083	6.25	20.33	2.34
1.667	1.43	7.917	2.60	14.167	6.25	20.42	2.34
1.750	1.43	8.000	2.60	14.250	6.25	20.50	2.34
1.833	1.43	8.083	2.60	14.333	6.25	20.58	2.34
1.917	1.43	8.167	2.60	14.417	6.25	20.67	2.34
2.000	1.43	8.250	2.60	14.500	6.25	20.75	2.34
2.083	1.43	8.333	2.60	14.583	6.25	20.83	2.34
2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56

3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56
4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56
5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56
5.917	2.08	12.167	55.70	18.417	2.34	24.67	1.56
6.000	2.08	12.250	55.70	18.500	2.34	24.75	1.56
6.083	2.08	12.333	55.70	18.583	2.34	24.83	1.56
6.167	2.08	12.417	55.70	18.667	2.34	24.92	1.56
6.250	2.08	12.500	55.70	18.750	2.34	25.00	1.56

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 3.261 (i)
TIME TO PEAK (hrs)= 13.417
RUNOFF VOLUME (mm)= 60.866
TOTAL RAINFALL (mm)= 130.100
RUNOFF COEFFICIENT = 0.468

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

CALIB NASHYD (0008)	Area (ha)= 24.31	Curve Number (CN)= 78.7
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.32	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	2.08	12.583	55.70	18.83	2.34
0.167	0.00	6.417	2.08	12.667	55.70	18.92	2.34
0.250	0.00	6.500	2.08	12.750	55.70	19.00	2.34
0.333	0.00	6.583	2.08	12.833	55.70	19.08	2.34
0.417	0.00	6.667	2.08	12.917	55.70	19.17	2.34
0.500	0.00	6.750	2.08	13.000	55.70	19.25	2.34
0.583	0.00	6.833	2.08	13.083	14.20	19.33	2.34
0.667	0.00	6.917	2.08	13.167	14.19	19.42	2.34
0.750	0.00	7.000	2.08	13.250	14.19	19.50	2.34
0.833	0.00	7.083	2.60	13.333	14.19	19.58	2.34
0.917	0.00	7.167	2.60	13.417	14.19	19.67	2.34
1.000	0.00	7.250	2.60	13.500	14.19	19.75	2.34
1.083	1.43	7.333	2.60	13.583	14.19	19.83	2.34
1.167	1.43	7.417	2.60	13.667	14.19	19.92	2.34
1.250	1.43	7.500	2.60	13.750	14.19	20.00	2.34

1.333	1.43	7.583	2.60	13.833	14.19	20.08	2.34
1.417	1.43	7.667	2.60	13.917	14.19	20.17	2.34
1.500	1.43	7.750	2.60	14.000	14.19	20.25	2.34
1.583	1.43	7.833	2.60	14.083	6.25	20.33	2.34
1.667	1.43	7.917	2.60	14.167	6.25	20.42	2.34
1.750	1.43	8.000	2.60	14.250	6.25	20.50	2.34
1.833	1.43	8.083	2.60	14.333	6.25	20.58	2.34
1.917	1.43	8.167	2.60	14.417	6.25	20.67	2.34
2.000	1.43	8.250	2.60	14.500	6.25	20.75	2.34
2.083	1.43	8.333	2.60	14.583	6.25	20.83	2.34
2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56
3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56
4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56
5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56
5.917	2.08	12.167	55.70	18.417	2.34	24.67	1.56
6.000	2.08	12.250	55.70	18.500	2.34	24.75	1.56
6.083	2.08	12.333	55.70	18.583	2.34	24.83	1.56
6.167	2.08	12.417	55.70	18.667	2.34	24.92	1.56
6.250	2.08	12.500	55.70	18.750	2.34	25.00	1.56

Unit Hyd Qpeak (cms)= 2.902

PEAK FLOW (cms)= 2.534 (i)
TIME TO PEAK (hrs)= 13.083
RUNOFF VOLUME (mm)= 80.728
TOTAL RAINFALL (mm)= 130.100
RUNOFF COEFFICIENT = 0.621

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

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--------------------
| ADD HYD  (  0019)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):    61.48   3.261    13.42    60.87
      + ID2= 2 (  0008):    24.31   2.534    13.08    80.73
        ================================================
        ID = 3 (  0019):    85.79   5.384    13.17    66.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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  --------------------
  | ROUTE MC (  0013)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0              100.00           0.05
    10.0              99.00           0.05/0.03    Main Channel
    11.5              98.00           0.03         Main Channel
    12.8              97.85           0.03         Main Channel
    14.0              98.00           0.03         Main Channel
    16.5              99.00           0.03/0.05    Main Channel
    26.5             100.00            0.05

                          AREA      QPEAK   TPEAK     R.V.    QBASE
                          (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0019)  85.79    5.38    13.17     66.49    0.0
   OUTFLOW: ID=1  (0013)  85.79    5.18    13.42     66.49    0.0

  --------------------------------------------------------------------------------
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| CALIB            |
| NASHYD   (  0012)|   Area    (ha)=  48.38   Curve Number   (CN)= 87.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   1.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.18

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
 0.083    0.00  | 6.333    2.08  |12.583   55.70  | 18.83    2.34
 0.167    0.00  | 6.417    2.08  |12.667   55.70  | 18.92    2.34
 0.250    0.00  | 6.500    2.08  |12.750   55.70  | 19.00    2.34
 0.333    0.00  | 6.583    2.08  |12.833   55.70  | 19.08    2.34
 0.417    0.00  | 6.667    2.08  |12.917   55.70  | 19.17    2.34
 0.500    0.00  | 6.750    2.08  |13.000   55.70  | 19.25    2.34
 0.583    0.00  | 6.833    2.08  |13.083   14.20  | 19.33    2.34
 0.667    0.00  | 6.917    2.08  |13.167   14.19  | 19.42    2.34
 0.750    0.00  | 7.000    2.08  |13.250   14.19  | 19.50    2.34
 0.833    0.00  | 7.083    2.60  |13.333   14.19  | 19.58    2.34
 0.917    0.00  | 7.167    2.60  |13.417   14.19  | 19.67    2.34
 1.000    0.00  | 7.250    2.60  |13.500   14.19  | 19.75    2.34
 1.083    1.43  | 7.333    2.60  |13.583   14.19  | 19.83    2.34
 1.167    1.43  | 7.417    2.60  |13.667   14.19  | 19.92    2.34
 1.250    1.43  | 7.500    2.60  |13.750   14.19  | 20.00    2.34
 1.333    1.43  | 7.583    2.60  |13.833   14.19  | 20.08    2.34
 1.417    1.43  | 7.667    2.60  |13.917   14.19  | 20.17    2.34
 1.500    1.43  | 7.750    2.60  |14.000   14.19  | 20.25    2.34
 1.583    1.43  | 7.833    2.60  |14.083    6.25  | 20.33    2.34
 1.667    1.43  | 7.917    2.60  |14.167    6.25  | 20.42    2.34
 1.750    1.43  | 8.000    2.60  |14.250    6.25  | 20.50    2.34
 1.833    1.43  | 8.083    2.60  |14.333    6.25  | 20.58    2.34
 1.917    1.43  | 8.167    2.60  |14.417    6.25  | 20.67    2.34
 2.000    1.43  | 8.250    2.60  |14.500    6.25  | 20.75    2.34
 2.083    1.43  | 8.333    2.60  |14.583    6.25  | 20.83    2.34
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2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56
3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56
4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56
5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56
5.917	2.08	12.167	55.70	18.417	2.34	24.67	1.56
6.000	2.08	12.250	55.70	18.500	2.34	24.75	1.56
6.083	2.08	12.333	55.70	18.583	2.34	24.83	1.56
6.167	2.08	12.417	55.70	18.667	2.34	24.92	1.56
6.250	2.08	12.500	55.70	18.750	2.34	25.00	1.56

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 6.641 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 101.093
TOTAL RAINFALL (mm)= 130.100
RUNOFF COEFFICIENT = 0.777

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

CALIB NASHYD (0021) ID= 1 DT= 5.0 min	Area (ha)= 82.00 Curve Number (CN)= 72.3 Ia (mm)= 5.00 # of Linear Res.(N)= 3.00 U.H. Tp(hrs)= 0.47

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	2.08	12.583	55.70	18.83	2.34
0.167	0.00	6.417	2.08	12.667	55.70	18.92	2.34
0.250	0.00	6.500	2.08	12.750	55.70	19.00	2.34
0.333	0.00	6.583	2.08	12.833	55.70	19.08	2.34
0.417	0.00	6.667	2.08	12.917	55.70	19.17	2.34
0.500	0.00	6.750	2.08	13.000	55.70	19.25	2.34
0.583	0.00	6.833	2.08	13.083	14.20	19.33	2.34
0.667	0.00	6.917	2.08	13.167	14.19	19.42	2.34
0.750	0.00	7.000	2.08	13.250	14.19	19.50	2.34
0.833	0.00	7.083	2.60	13.333	14.19	19.58	2.34
0.917	0.00	7.167	2.60	13.417	14.19	19.67	2.34
1.000	0.00	7.250	2.60	13.500	14.19	19.75	2.34
1.083	1.43	7.333	2.60	13.583	14.19	19.83	2.34
1.167	1.43	7.417	2.60	13.667	14.19	19.92	2.34
1.250	1.43	7.500	2.60	13.750	14.19	20.00	2.34
1.333	1.43	7.583	2.60	13.833	14.19	20.08	2.34
1.417	1.43	7.667	2.60	13.917	14.19	20.17	2.34
1.500	1.43	7.750	2.60	14.000	14.19	20.25	2.34
1.583	1.43	7.833	2.60	14.083	6.25	20.33	2.34
1.667	1.43	7.917	2.60	14.167	6.25	20.42	2.34
1.750	1.43	8.000	2.60	14.250	6.25	20.50	2.34
1.833	1.43	8.083	2.60	14.333	6.25	20.58	2.34
1.917	1.43	8.167	2.60	14.417	6.25	20.67	2.34
2.000	1.43	8.250	2.60	14.500	6.25	20.75	2.34
2.083	1.43	8.333	2.60	14.583	6.25	20.83	2.34
2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56
3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56
4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56
5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56

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                5.917    2.08 |12.167   55.70 |18.417    2.34 | 24.67    1.56
                6.000    2.08 |12.250   55.70 |18.500    2.34 | 24.75    1.56
                6.083    2.08 |12.333   55.70 |18.583    2.34 | 24.83    1.56
                6.167    2.08 |12.417   55.70 |18.667    2.34 | 24.92    1.56
                6.250    2.08 |12.500   55.70 |18.750    2.34 | 25.00    1.56

     Unit Hyd Qpeak  (cms)=   6.664

     PEAK FLOW       (cms)=   6.440 (i)
     TIME TO PEAK    (hrs)=  13.167
     RUNOFF VOLUME    (mm)=  70.360
     TOTAL RAINFALL   (mm)= 130.100
     RUNOFF COEFFICIENT   =   0.541

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

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--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0012):    48.38   6.641    13.00   101.09
      + ID2= 2 (  0013):    85.79   5.177    13.42    66.49
        ================================================
        ID = 3 (  0018):   134.16  10.432    13.00    78.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16  10.432    13.00    78.97
      + ID2= 2 (  0021):    82.00   6.440    13.17    70.36
        ================================================
        ID = 1 (  0018):   216.16  16.454    13.08    75.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5               100.00           0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    16.45    13.08     75.70    0.0
   OUTFLOW: ID=1  (0014)   216.16    16.15    13.17     75.70    0.0

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--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  34.00   Dir. Conn.(%)=  25.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      16.91        32.83
     Dep. Storage     (mm)=       1.00         1.50
```

Average Slope	(%)=	1.00	2.00
Length	(m)=	575.88	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	2.08	12.583	55.70	18.83	2.34
0.167	0.00	6.417	2.08	12.667	55.70	18.92	2.34
0.250	0.00	6.500	2.08	12.750	55.70	19.00	2.34
0.333	0.00	6.583	2.08	12.833	55.70	19.08	2.34
0.417	0.00	6.667	2.08	12.917	55.70	19.17	2.34
0.500	0.00	6.750	2.08	13.000	55.70	19.25	2.34
0.583	0.00	6.833	2.08	13.083	14.20	19.33	2.34
0.667	0.00	6.917	2.08	13.167	14.19	19.42	2.34
0.750	0.00	7.000	2.08	13.250	14.19	19.50	2.34
0.833	0.00	7.083	2.60	13.333	14.19	19.58	2.34
0.917	0.00	7.167	2.60	13.417	14.19	19.67	2.34
1.000	0.00	7.250	2.60	13.500	14.19	19.75	2.34
1.083	1.43	7.333	2.60	13.583	14.19	19.83	2.34
1.167	1.43	7.417	2.60	13.667	14.19	19.92	2.34
1.250	1.43	7.500	2.60	13.750	14.19	20.00	2.34
1.333	1.43	7.583	2.60	13.833	14.19	20.08	2.34
1.417	1.43	7.667	2.60	13.917	14.19	20.17	2.34
1.500	1.43	7.750	2.60	14.000	14.19	20.25	2.34
1.583	1.43	7.833	2.60	14.083	6.25	20.33	2.34
1.667	1.43	7.917	2.60	14.167	6.25	20.42	2.34
1.750	1.43	8.000	2.60	14.250	6.25	20.50	2.34
1.833	1.43	8.083	2.60	14.333	6.25	20.58	2.34
1.917	1.43	8.167	2.60	14.417	6.25	20.67	2.34
2.000	1.43	8.250	2.60	14.500	6.25	20.75	2.34
2.083	1.43	8.333	2.60	14.583	6.25	20.83	2.34
2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56
3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56
4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56

5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56
5.917	2.08	12.167	55.70	18.417	2.34	24.67	1.56
6.000	2.08	12.250	55.70	18.500	2.34	24.75	1.56
6.083	2.08	12.333	55.70	18.583	2.34	24.83	1.56
6.167	2.08	12.417	55.70	18.667	2.34	24.92	1.56
6.250	2.08	12.500	55.70	18.750	2.34	25.00	1.56

Max.Eff.Inten.(mm/hr)=	55.70	12.66	
over (min)	10.00	30.00	
Storage Coeff. (min)=	9.23 (ii)	25.36 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.12	0.04	
			TOTALS
PEAK FLOW (cms)=	1.92	0.99	2.899 (iii)
TIME TO PEAK (hrs)=	13.00	13.08	13.00
RUNOFF VOLUME (mm)=	129.10	25.76	51.59
TOTAL RAINFALL (mm)=	130.10	130.10	130.10
RUNOFF COEFFICIENT =	0.99	0.20	0.40

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	49.75	2.899	13.00	51.59
+ ID2= 2 (0014):	216.16	16.150	13.17	75.70
ID = 3 (0017):	265.91	18.495	13.08	71.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0015)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	18.49	13.08	71.20	0.0
OUTFLOW: ID=1	(0015)	265.91	18.18	13.25	71.20	0.0

CALIB
STANDHYD (0011) Area (ha)= 61.54

|ID= 1 DT= 5.0 min | Total Imp(%)= 21.00 Dir. Conn.(%)= 15.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.92	48.62
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	2.08	12.583	55.70	18.83	2.34
0.167	0.00	6.417	2.08	12.667	55.70	18.92	2.34
0.250	0.00	6.500	2.08	12.750	55.70	19.00	2.34
0.333	0.00	6.583	2.08	12.833	55.70	19.08	2.34
0.417	0.00	6.667	2.08	12.917	55.70	19.17	2.34
0.500	0.00	6.750	2.08	13.000	55.70	19.25	2.34
0.583	0.00	6.833	2.08	13.083	14.20	19.33	2.34
0.667	0.00	6.917	2.08	13.167	14.19	19.42	2.34
0.750	0.00	7.000	2.08	13.250	14.19	19.50	2.34
0.833	0.00	7.083	2.60	13.333	14.19	19.58	2.34
0.917	0.00	7.167	2.60	13.417	14.19	19.67	2.34
1.000	0.00	7.250	2.60	13.500	14.19	19.75	2.34
1.083	1.43	7.333	2.60	13.583	14.19	19.83	2.34
1.167	1.43	7.417	2.60	13.667	14.19	19.92	2.34
1.250	1.43	7.500	2.60	13.750	14.19	20.00	2.34
1.333	1.43	7.583	2.60	13.833	14.19	20.08	2.34
1.417	1.43	7.667	2.60	13.917	14.19	20.17	2.34
1.500	1.43	7.750	2.60	14.000	14.19	20.25	2.34
1.583	1.43	7.833	2.60	14.083	6.25	20.33	2.34
1.667	1.43	7.917	2.60	14.167	6.25	20.42	2.34
1.750	1.43	8.000	2.60	14.250	6.25	20.50	2.34
1.833	1.43	8.083	2.60	14.333	6.25	20.58	2.34
1.917	1.43	8.167	2.60	14.417	6.25	20.67	2.34
2.000	1.43	8.250	2.60	14.500	6.25	20.75	2.34
2.083	1.43	8.333	2.60	14.583	6.25	20.83	2.34
2.167	1.43	8.417	2.60	14.667	6.25	20.92	2.34
2.250	1.43	8.500	2.60	14.750	6.25	21.00	2.34
2.333	1.43	8.583	2.60	14.833	6.25	21.08	1.56
2.417	1.43	8.667	2.60	14.917	6.25	21.17	1.56
2.500	1.43	8.750	2.60	15.000	6.25	21.25	1.56
2.583	1.43	8.833	2.60	15.083	3.90	21.33	1.56
2.667	1.43	8.917	2.60	15.167	3.90	21.42	1.56
2.750	1.43	9.000	2.60	15.250	3.90	21.50	1.56
2.833	1.43	9.083	3.51	15.333	3.90	21.58	1.56
2.917	1.43	9.167	3.51	15.417	3.90	21.67	1.56
3.000	1.43	9.250	3.51	15.500	3.90	21.75	1.56
3.083	1.69	9.333	3.51	15.583	3.90	21.83	1.56
3.167	1.69	9.417	3.51	15.667	3.90	21.92	1.56
3.250	1.69	9.500	3.51	15.750	3.90	22.00	1.56
3.333	1.69	9.583	3.51	15.833	3.90	22.08	1.56
3.417	1.69	9.667	3.51	15.917	3.90	22.17	1.56
3.500	1.69	9.750	3.51	16.000	3.90	22.25	1.56
3.583	1.69	9.833	3.51	16.083	3.90	22.33	1.56
3.667	1.69	9.917	3.51	16.167	3.90	22.42	1.56
3.750	1.69	10.000	3.51	16.250	3.90	22.50	1.56
3.833	1.69	10.083	4.42	16.333	3.90	22.58	1.56
3.917	1.69	10.167	4.42	16.417	3.90	22.67	1.56
4.000	1.69	10.250	4.42	16.500	3.90	22.75	1.56
4.083	1.69	10.333	4.42	16.583	3.90	22.83	1.56
4.167	1.69	10.417	4.42	16.667	3.90	22.92	1.56
4.250	1.69	10.500	4.42	16.750	3.90	23.00	1.56
4.333	1.69	10.583	4.42	16.833	3.90	23.08	1.56
4.417	1.69	10.667	4.42	16.917	3.90	23.17	1.56
4.500	1.69	10.750	4.42	17.000	3.90	23.25	1.56
4.583	1.69	10.833	4.42	17.083	2.34	23.33	1.56
4.667	1.69	10.917	4.42	17.167	2.34	23.42	1.56
4.750	1.69	11.000	4.42	17.250	2.34	23.50	1.56

4.833	1.69	11.083	7.03	17.333	2.34	23.58	1.56
4.917	1.69	11.167	7.03	17.417	2.34	23.67	1.56
5.000	1.69	11.250	7.03	17.500	2.34	23.75	1.56
5.083	2.08	11.333	7.03	17.583	2.34	23.83	1.56
5.167	2.08	11.417	7.03	17.667	2.34	23.92	1.56
5.250	2.08	11.500	7.03	17.750	2.34	24.00	1.56
5.333	2.08	11.583	7.03	17.833	2.34	24.08	1.56
5.417	2.08	11.667	7.03	17.917	2.34	24.17	1.56
5.500	2.08	11.750	7.03	18.000	2.34	24.25	1.56
5.583	2.08	11.833	7.03	18.083	2.34	24.33	1.56
5.667	2.08	11.917	7.03	18.167	2.34	24.42	1.56
5.750	2.08	12.000	7.03	18.250	2.34	24.50	1.56
5.833	2.08	12.083	55.69	18.333	2.34	24.58	1.56
5.917	2.08	12.167	55.70	18.417	2.34	24.67	1.56
6.000	2.08	12.250	55.70	18.500	2.34	24.75	1.56
6.083	2.08	12.333	55.70	18.583	2.34	24.83	1.56
6.167	2.08	12.417	55.70	18.667	2.34	24.92	1.56
6.250	2.08	12.500	55.70	18.750	2.34	25.00	1.56

Max.Eff.Inten.(mm/hr)=	55.70	11.99		
over (min)	10.00	30.00		
Storage Coeff. (min)=	9.84 (ii)	26.33 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.42	1.38	2.780 (iii)	
TIME TO PEAK (hrs)=	13.00	13.08	13.00	
RUNOFF VOLUME (mm)=	129.10	25.74	41.24	
TOTAL RAINFALL (mm)=	130.10	130.10	130.10	
RUNOFF COEFFICIENT =	0.99	0.20	0.32	

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

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0011):	61.54	2.780	13.00	41.24
+	ID2= 2 (0015):	265.91	18.176	13.25	71.20
	ID = 3 (0016):	327.45	20.371	13.17	65.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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
```


***** 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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\44ef4761-0332-4ffd-b317-d01741063892\s
  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\44ef4761-0332-4ffd-b317-d01741063892\s


DATE: 08/24/2023                          TIME: 08:33:47

USER:


COMMENTS: _____________________________________________________________

-------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Trenton A SCS 50-Yr           **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              a75a4ca9-43f3-43d5-a86f-a3dc193d5ba0\c4bf1718
| Ptotal= 98.61 mm |    Comments: Trenton A SCS 50-Yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  7.00    1.97 | 14.00    4.73 | 21.00    1.18
                1.00    1.08 |  8.00    1.97 | 15.00    2.96 | 22.00    1.18
                2.00    1.08 |  9.00    2.66 | 16.00    2.96 | 23.00    1.18
                3.00    1.28 | 10.00    3.35 | 17.00    1.78 | 24.00    1.18
                4.00    1.28 | 11.00    5.33 | 18.00    1.78 |
                5.00    1.58 | 12.00   42.21 | 19.00    1.78 |
                6.00    1.58 | 13.00   10.75 | 20.00    1.78 |

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

--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 65.8
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.72

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 6.333    1.58 |12.583   42.21 | 18.83    1.78
                0.167    0.00 | 6.417    1.58 |12.667   42.21 | 18.92    1.78
                0.250    0.00 | 6.500    1.58 |12.750   42.21 | 19.00    1.78
                0.333    0.00 | 6.583    1.58 |12.833   42.21 | 19.08    1.78
                0.417    0.00 | 6.667    1.58 |12.917   42.21 | 19.17    1.78
                0.500    0.00 | 6.750    1.58 |13.000   42.21 | 19.25    1.78
                0.583    0.00 | 6.833    1.58 |13.083   10.76 | 19.33    1.78
                0.667    0.00 | 6.917    1.58 |13.167   10.75 | 19.42    1.78
                0.750    0.00 | 7.000    1.58 |13.250   10.75 | 19.50    1.78
                0.833    0.00 | 7.083    1.97 |13.333   10.75 | 19.58    1.78
                0.917    0.00 | 7.167    1.97 |13.417   10.75 | 19.67    1.78
                1.000    0.00 | 7.250    1.97 |13.500   10.75 | 19.75    1.78
                1.083    1.08 | 7.333    1.97 |13.583   10.75 | 19.83    1.78
                1.167    1.08 | 7.417    1.97 |13.667   10.75 | 19.92    1.78
                1.250    1.08 | 7.500    1.97 |13.750   10.75 | 20.00    1.78
                1.333    1.08 | 7.583    1.97 |13.833   10.75 | 20.08    1.78
                1.417    1.08 | 7.667    1.97 |13.917   10.75 | 20.17    1.78
```

1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18
2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18
3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18
3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18
5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18
6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Unit Hyd Qpeak (cms)= 3.261

PEAK FLOW (cms)= 2.046 (i)
TIME TO PEAK (hrs)= 13.417
RUNOFF VOLUME (mm)= 38.837
TOTAL RAINFALL (mm)= 98.610
RUNOFF COEFFICIENT = 0.394

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

CALIB

| NASHYD (0008)| Area (ha)= 24.31 Curve Number (CN)= 78.7
|ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
--- U.H. Tp(hrs)= 0.32

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.58	12.583	42.21	18.83	1.78
0.167	0.00	6.417	1.58	12.667	42.21	18.92	1.78
0.250	0.00	6.500	1.58	12.750	42.21	19.00	1.78
0.333	0.00	6.583	1.58	12.833	42.21	19.08	1.78
0.417	0.00	6.667	1.58	12.917	42.21	19.17	1.78
0.500	0.00	6.750	1.58	13.000	42.21	19.25	1.78
0.583	0.00	6.833	1.58	13.083	10.76	19.33	1.78
0.667	0.00	6.917	1.58	13.167	10.75	19.42	1.78
0.750	0.00	7.000	1.58	13.250	10.75	19.50	1.78
0.833	0.00	7.083	1.97	13.333	10.75	19.58	1.78
0.917	0.00	7.167	1.97	13.417	10.75	19.67	1.78
1.000	0.00	7.250	1.97	13.500	10.75	19.75	1.78
1.083	1.08	7.333	1.97	13.583	10.75	19.83	1.78
1.167	1.08	7.417	1.97	13.667	10.75	19.92	1.78
1.250	1.08	7.500	1.97	13.750	10.75	20.00	1.78
1.333	1.08	7.583	1.97	13.833	10.75	20.08	1.78
1.417	1.08	7.667	1.97	13.917	10.75	20.17	1.78
1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18
2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18
3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18
3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18

5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18
6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Unit Hyd Qpeak (cms)= 2.902

PEAK FLOW (cms)= 1.696 (i)
TIME TO PEAK (hrs)= 13.083
RUNOFF VOLUME (mm)= 53.971
TOTAL RAINFALL (mm)= 98.610
RUNOFF COEFFICIENT = 0.547

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

ADD HYD (0019)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0007):	61.48	2.046	13.42	38.84
+ ID2= 2 (0008):	24.31	1.696	13.08	53.97
ID = 3 (0019):	85.79	3.467	13.17	43.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0019)	85.79	3.47	13.17	43.13	0.0
OUTFLOW: ID=1	(0013)	85.79	3.24	13.58	43.13	0.0

CALIB
NASHYD (0012)
ID= 1 DT= 5.0 min

Area (ha)= 48.38 Curve Number (CN)= 87.8
Ia (mm)= 1.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.18

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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

0.083	0.00	6.333	1.58	12.583	42.21	18.83	1.78
0.167	0.00	6.417	1.58	12.667	42.21	18.92	1.78
0.250	0.00	6.500	1.58	12.750	42.21	19.00	1.78
0.333	0.00	6.583	1.58	12.833	42.21	19.08	1.78
0.417	0.00	6.667	1.58	12.917	42.21	19.17	1.78
0.500	0.00	6.750	1.58	13.000	42.21	19.25	1.78
0.583	0.00	6.833	1.58	13.083	10.76	19.33	1.78
0.667	0.00	6.917	1.58	13.167	10.75	19.42	1.78
0.750	0.00	7.000	1.58	13.250	10.75	19.50	1.78
0.833	0.00	7.083	1.97	13.333	10.75	19.58	1.78
0.917	0.00	7.167	1.97	13.417	10.75	19.67	1.78
1.000	0.00	7.250	1.97	13.500	10.75	19.75	1.78
1.083	1.08	7.333	1.97	13.583	10.75	19.83	1.78
1.167	1.08	7.417	1.97	13.667	10.75	19.92	1.78
1.250	1.08	7.500	1.97	13.750	10.75	20.00	1.78
1.333	1.08	7.583	1.97	13.833	10.75	20.08	1.78
1.417	1.08	7.667	1.97	13.917	10.75	20.17	1.78
1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18
2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18
3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18
3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18
5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18

6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Unit Hyd Qpeak (cms)= 10.265

PEAK FLOW (cms)= 4.767 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 71.484
TOTAL RAINFALL (mm)= 98.610
RUNOFF COEFFICIENT = 0.725

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

CALIB
NASHYD (0021)
ID= 1 DT= 5.0 min

Area (ha)= 82.00 Curve Number (CN)= 72.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.47

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.58	12.583	42.21	18.83	1.78
0.167	0.00	6.417	1.58	12.667	42.21	18.92	1.78
0.250	0.00	6.500	1.58	12.750	42.21	19.00	1.78
0.333	0.00	6.583	1.58	12.833	42.21	19.08	1.78
0.417	0.00	6.667	1.58	12.917	42.21	19.17	1.78
0.500	0.00	6.750	1.58	13.000	42.21	19.25	1.78
0.583	0.00	6.833	1.58	13.083	10.76	19.33	1.78
0.667	0.00	6.917	1.58	13.167	10.75	19.42	1.78
0.750	0.00	7.000	1.58	13.250	10.75	19.50	1.78
0.833	0.00	7.083	1.97	13.333	10.75	19.58	1.78
0.917	0.00	7.167	1.97	13.417	10.75	19.67	1.78
1.000	0.00	7.250	1.97	13.500	10.75	19.75	1.78
1.083	1.08	7.333	1.97	13.583	10.75	19.83	1.78
1.167	1.08	7.417	1.97	13.667	10.75	19.92	1.78
1.250	1.08	7.500	1.97	13.750	10.75	20.00	1.78
1.333	1.08	7.583	1.97	13.833	10.75	20.08	1.78
1.417	1.08	7.667	1.97	13.917	10.75	20.17	1.78
1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18
2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18
3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18

3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18
5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18
6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Unit Hyd Qpeak (cms)= 6.664

PEAK FLOW (cms)= 4.152 (i)
TIME TO PEAK (hrs)= 13.167
RUNOFF VOLUME (mm)= 45.894
TOTAL RAINFALL (mm)= 98.610
RUNOFF COEFFICIENT = 0.465

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

ADD HYD (0018)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0012):	48.38	4.767	13.00	71.48
+ ID2= 2 (0013):	85.79	3.236	13.58	43.13
ID = 3 (0018):	134.16	6.694	13.00	53.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0018)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0018):	134.16	6.694	13.00	53.35
+ ID2= 2 (0021):	82.00	4.152	13.17	45.89
ID = 1 (0018):	216.16	10.525	13.08	50.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0014)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<-----------------DATA FOR SECTION (1.1)----------------->

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0018)	216.16	10.52	13.08	50.52	0.0
OUTFLOW: ID=1	(0014)	216.16	10.06	13.25	50.52	0.0

CALIB
STANDHYD (0010)
ID= 1 DT= 5.0 min

Area (ha)= 49.75
Total Imp(%)= 34.00 Dir. Conn.(%)= 25.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	16.91	32.83
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	575.88	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.58	12.583	42.21	18.83	1.78
0.167	0.00	6.417	1.58	12.667	42.21	18.92	1.78
0.250	0.00	6.500	1.58	12.750	42.21	19.00	1.78
0.333	0.00	6.583	1.58	12.833	42.21	19.08	1.78
0.417	0.00	6.667	1.58	12.917	42.21	19.17	1.78
0.500	0.00	6.750	1.58	13.000	42.21	19.25	1.78
0.583	0.00	6.833	1.58	13.083	10.76	19.33	1.78
0.667	0.00	6.917	1.58	13.167	10.75	19.42	1.78
0.750	0.00	7.000	1.58	13.250	10.75	19.50	1.78
0.833	0.00	7.083	1.97	13.333	10.75	19.58	1.78
0.917	0.00	7.167	1.97	13.417	10.75	19.67	1.78
1.000	0.00	7.250	1.97	13.500	10.75	19.75	1.78
1.083	1.08	7.333	1.97	13.583	10.75	19.83	1.78
1.167	1.08	7.417	1.97	13.667	10.75	19.92	1.78
1.250	1.08	7.500	1.97	13.750	10.75	20.00	1.78
1.333	1.08	7.583	1.97	13.833	10.75	20.08	1.78
1.417	1.08	7.667	1.97	13.917	10.75	20.17	1.78
1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18
2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18

3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18
3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18
5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18
6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Max.Eff.Inten.(mm/hr)=	42.21	9.59		
over (min)	10.00	30.00		
Storage Coeff. (min)=	10.31 (ii)	28.34 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.45	0.73	2.169 (iii)	
TIME TO PEAK (hrs)=	13.00	13.08	13.00	
RUNOFF VOLUME (mm)=	97.61	19.46	39.00	
TOTAL RAINFALL (mm)=	98.61	98.61	98.61	
RUNOFF COEFFICIENT =	0.99	0.20	0.40	

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0010):	49.75	2.169	13.00	39.00
	+ ID2= 2 (0014):	216.16	10.061	13.25	50.52
	ID = 3 (0017):	265.91	11.650	13.17	48.37

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ROUTE MC (0015)|
| IN=2---> OUT=1 |

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	11.65	13.17	48.37	0.0
OUTFLOW: ID=1	(0015)	265.91	11.40	13.33	48.37	0.0

CALIB STANDHYD (0011) ID= 1 DT= 5.0 min	Area (ha)= 61.54	Total Imp(%)= 21.00	Dir. Conn.(%)= 15.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.92	48.62
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.58	12.583	42.21	18.83	1.78
0.167	0.00	6.417	1.58	12.667	42.21	18.92	1.78
0.250	0.00	6.500	1.58	12.750	42.21	19.00	1.78
0.333	0.00	6.583	1.58	12.833	42.21	19.08	1.78
0.417	0.00	6.667	1.58	12.917	42.21	19.17	1.78
0.500	0.00	6.750	1.58	13.000	42.21	19.25	1.78
0.583	0.00	6.833	1.58	13.083	10.76	19.33	1.78
0.667	0.00	6.917	1.58	13.167	10.75	19.42	1.78
0.750	0.00	7.000	1.58	13.250	10.75	19.50	1.78
0.833	0.00	7.083	1.97	13.333	10.75	19.58	1.78
0.917	0.00	7.167	1.97	13.417	10.75	19.67	1.78
1.000	0.00	7.250	1.97	13.500	10.75	19.75	1.78
1.083	1.08	7.333	1.97	13.583	10.75	19.83	1.78
1.167	1.08	7.417	1.97	13.667	10.75	19.92	1.78
1.250	1.08	7.500	1.97	13.750	10.75	20.00	1.78
1.333	1.08	7.583	1.97	13.833	10.75	20.08	1.78
1.417	1.08	7.667	1.97	13.917	10.75	20.17	1.78
1.500	1.08	7.750	1.97	14.000	10.75	20.25	1.78
1.583	1.08	7.833	1.97	14.083	4.73	20.33	1.78
1.667	1.08	7.917	1.97	14.167	4.73	20.42	1.78
1.750	1.08	8.000	1.97	14.250	4.73	20.50	1.78
1.833	1.08	8.083	1.97	14.333	4.73	20.58	1.78
1.917	1.08	8.167	1.97	14.417	4.73	20.67	1.78
2.000	1.08	8.250	1.97	14.500	4.73	20.75	1.78
2.083	1.08	8.333	1.97	14.583	4.73	20.83	1.78
2.167	1.08	8.417	1.97	14.667	4.73	20.92	1.78
2.250	1.08	8.500	1.97	14.750	4.73	21.00	1.78
2.333	1.08	8.583	1.97	14.833	4.73	21.08	1.18
2.417	1.08	8.667	1.97	14.917	4.73	21.17	1.18
2.500	1.08	8.750	1.97	15.000	4.73	21.25	1.18
2.583	1.08	8.833	1.97	15.083	2.96	21.33	1.18
2.667	1.08	8.917	1.97	15.167	2.96	21.42	1.18

2.750	1.08	9.000	1.97	15.250	2.96	21.50	1.18
2.833	1.08	9.083	2.66	15.333	2.96	21.58	1.18
2.917	1.08	9.167	2.66	15.417	2.96	21.67	1.18
3.000	1.08	9.250	2.66	15.500	2.96	21.75	1.18
3.083	1.28	9.333	2.66	15.583	2.96	21.83	1.18
3.167	1.28	9.417	2.66	15.667	2.96	21.92	1.18
3.250	1.28	9.500	2.66	15.750	2.96	22.00	1.18
3.333	1.28	9.583	2.66	15.833	2.96	22.08	1.18
3.417	1.28	9.667	2.66	15.917	2.96	22.17	1.18
3.500	1.28	9.750	2.66	16.000	2.96	22.25	1.18
3.583	1.28	9.833	2.66	16.083	2.96	22.33	1.18
3.667	1.28	9.917	2.66	16.167	2.96	22.42	1.18
3.750	1.28	10.000	2.66	16.250	2.96	22.50	1.18
3.833	1.28	10.083	3.35	16.333	2.96	22.58	1.18
3.917	1.28	10.167	3.35	16.417	2.96	22.67	1.18
4.000	1.28	10.250	3.35	16.500	2.96	22.75	1.18
4.083	1.28	10.333	3.35	16.583	2.96	22.83	1.18
4.167	1.28	10.417	3.35	16.667	2.96	22.92	1.18
4.250	1.28	10.500	3.35	16.750	2.96	23.00	1.18
4.333	1.28	10.583	3.35	16.833	2.96	23.08	1.18
4.417	1.28	10.667	3.35	16.917	2.96	23.17	1.18
4.500	1.28	10.750	3.35	17.000	2.96	23.25	1.18
4.583	1.28	10.833	3.35	17.083	1.78	23.33	1.18
4.667	1.28	10.917	3.35	17.167	1.78	23.42	1.18
4.750	1.28	11.000	3.35	17.250	1.78	23.50	1.18
4.833	1.28	11.083	5.33	17.333	1.78	23.58	1.18
4.917	1.28	11.167	5.33	17.417	1.78	23.67	1.18
5.000	1.28	11.250	5.33	17.500	1.78	23.75	1.18
5.083	1.58	11.333	5.33	17.583	1.78	23.83	1.18
5.167	1.58	11.417	5.33	17.667	1.78	23.92	1.18
5.250	1.58	11.500	5.33	17.750	1.78	24.00	1.18
5.333	1.58	11.583	5.33	17.833	1.78	24.08	1.18
5.417	1.58	11.667	5.33	17.917	1.78	24.17	1.18
5.500	1.58	11.750	5.33	18.000	1.78	24.25	1.18
5.583	1.58	11.833	5.33	18.083	1.78	24.33	1.18
5.667	1.58	11.917	5.33	18.167	1.78	24.42	1.18
5.750	1.58	12.000	5.33	18.250	1.78	24.50	1.18
5.833	1.58	12.083	42.21	18.333	1.78	24.58	1.18
5.917	1.58	12.167	42.21	18.417	1.78	24.67	1.18
6.000	1.58	12.250	42.21	18.500	1.78	24.75	1.18
6.083	1.58	12.333	42.21	18.583	1.78	24.83	1.18
6.167	1.58	12.417	42.21	18.667	1.78	24.92	1.18
6.250	1.58	12.500	42.21	18.750	1.78	25.00	1.18

Max.Eff.Inten.(mm/hr)=	42.21	9.08	
over (min)	10.00	30.00	
Storage Coeff. (min)=	10.99 (ii)	29.42 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
			TOTALS
PEAK FLOW (cms)=	1.08	1.01	2.067 (iii)
TIME TO PEAK (hrs)=	13.00	13.08	13.00
RUNOFF VOLUME (mm)=	97.61	19.44	31.17
TOTAL RAINFALL (mm)=	98.61	98.61	98.61
RUNOFF COEFFICIENT =	0.99	0.20	0.32

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

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		61.54	2.067	13.00	31.17

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      + ID2= 2 (  0015):   265.91  11.396    13.33    48.37
        ====================================================
        ID = 3 (  0016):   327.45  12.809    13.25    45.14

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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Arena Creek Visual OTTHYMO – Full Build-Out

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================================================================================================================
=========

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
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  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\9629f214-3db5-4b4d-a6a6-8e56bc14e2bf\s


DATE: 08/24/2023                          TIME: 08:47:12

USER:


COMMENTS: _____________________________________________________________


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  ***********************************************
  ** SIMULATION : Timmins 2                     **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              db0b6c63-91a8-432d-b10e-747dd965c313\6f8bb196
| Ptotal=193.00 mm |    Comments: Timmins 2
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  4.00    3.00 |  8.00   20.00 | 12.00    8.00
                1.00   15.00 |  5.00    5.00 |  9.00   23.00 |
                2.00   20.00 |  6.00   20.00 | 10.00   13.00 |
                3.00   10.00 |  7.00   43.00 | 11.00   13.00 |

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--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.68

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
```

0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 3.453

PEAK FLOW (cms)= 3.970 (i)
TIME TO PEAK (hrs)= 8.333
RUNOFF VOLUME (mm)= 115.132
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.597

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

CALIB NASHYD (0008)	Area (ha)= 24.31	Curve Number (CN)= 83.3
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.28	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00

0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 3.316

PEAK FLOW (cms)= 2.516 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 147.856
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.766

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

ADD HYD (0019)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0007):	61.48	3.970	8.33	115.13
+ ID2= 2 (0008):	24.31	2.516	8.00	147.86
ID = 3 (0019):	85.79	6.189	8.08	124.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

	AREA	QPEAK	TPEAK	R.V.	QBASE

		(ha)	(cms)	(hrs)	(mm)	(cms)
INFLOW: ID=2	(0019)	85.79	6.19	8.08	124.40	0.0
OUTFLOW: ID=1	(0013)	85.79	6.06	8.33	124.40	0.0

CALIB
STANDHYD (0024)
ID= 1 DT= 5.0 min

Area (ha)= 48.38
Total Imp(%)= 54.00 Dir. Conn.(%)= 39.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	26.12	22.25
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	567.89	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=		43.00	11.40	
over	(min)	10.00	30.00	
Storage Coeff.	(min)=	10.15 (ii)	26.97 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	30.00	
Unit Hyd. peak	(cms)=	0.11	0.04	
				TOTALS
PEAK FLOW	(cms)=	2.25	0.63	2.876 (iii)
TIME TO PEAK	(hrs)=	8.00	8.08	8.00
RUNOFF VOLUME	(mm)=	192.00	38.37	98.29

TOTAL RAINFALL (mm)= 193.00 193.00 193.00
RUNOFF COEFFICIENT = 0.99 0.20 0.51

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0025)	Area (ha)= 82.00	Curve Number (CN)= 87.2
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.29	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Unit Hyd Qpeak (cms)= 10.800

PEAK FLOW (cms)= 8.870 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 156.817
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.813

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

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--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    85.79   6.060     8.33   124.40
      + ID2= 2 (  0024):    48.38   2.876     8.00    98.29
        ================================================
        ID = 3 (  0018):   134.16   8.340     8.08   114.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16   8.340     8.08   114.99
      + ID2= 2 (  0025):    82.00   8.870     8.00   156.82
        ================================================
        ID = 1 (  0018):   216.16  17.132     8.00   130.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    17.13    8.00     130.86    0.0
   OUTFLOW: ID=1  (0014)   216.16    16.88    8.17     130.86    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      32.33        17.41
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     575.88        40.00
     Mannings n             =     0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
               0.083    0.00 | 3.333   10.00 | 6.583   20.00 |  9.83   23.00
               0.167    0.00 | 3.417   10.00 | 6.667   20.00 |  9.92   23.00
               0.250    0.00 | 3.500   10.00 | 6.750   20.00 | 10.00   23.00
               0.333    0.00 | 3.583   10.00 | 6.833   20.00 | 10.08   13.00
               0.417    0.00 | 3.667   10.00 | 6.917   20.00 | 10.17   13.00
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0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00
3.083	10.00	6.333	20.00	9.583	23.00	12.83	8.00
3.167	10.00	6.417	20.00	9.667	23.00	12.92	8.00
3.250	10.00	6.500	20.00	9.750	23.00	13.00	8.00

Max.Eff.Inten.(mm/hr)=	43.00	12.29		
over (min)	10.00	30.00		
Storage Coeff. (min)=	10.24 (ii)	26.56 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	2.96	0.54	3.495 (iii)	
TIME TO PEAK (hrs)=	8.00	8.08	8.00	
RUNOFF VOLUME (mm)=	192.00	38.39	115.19	
TOTAL RAINFALL (mm)=	193.00	193.00	193.00	
RUNOFF COEFFICIENT =	0.99	0.20	0.60	

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0017)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	49.75	3.495	8.00	115.19
+ ID2= 2 (0014):	216.16	16.878	8.17	130.86
ID = 3 (0017):	265.91	20.115	8.08	127.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0015)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0017)	265.91	20.11	8.08	127.93	0.0
OUTFLOW: ID=1	(0015)	265.91	19.93	8.17	127.93	0.0

CALIB
STANDHYD (0011)
ID= 1 DT= 5.0 min

Area (ha)= 61.54
Total Imp(%)= 65.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	40.00	21.54
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	640.53	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	10.00	6.583	20.00	9.83	23.00
0.167	0.00	3.417	10.00	6.667	20.00	9.92	23.00
0.250	0.00	3.500	10.00	6.750	20.00	10.00	23.00
0.333	0.00	3.583	10.00	6.833	20.00	10.08	13.00
0.417	0.00	3.667	10.00	6.917	20.00	10.17	13.00
0.500	0.00	3.750	10.00	7.000	20.00	10.25	13.00
0.583	0.00	3.833	10.00	7.083	43.00	10.33	13.00
0.667	0.00	3.917	10.00	7.167	43.00	10.42	13.00
0.750	0.00	4.000	10.00	7.250	43.00	10.50	13.00
0.833	0.00	4.083	3.00	7.333	43.00	10.58	13.00
0.917	0.00	4.167	3.00	7.417	43.00	10.67	13.00
1.000	0.00	4.250	3.00	7.500	43.00	10.75	13.00
1.083	15.00	4.333	3.00	7.583	43.00	10.83	13.00
1.167	15.00	4.417	3.00	7.667	43.00	10.92	13.00
1.250	15.00	4.500	3.00	7.750	43.00	11.00	13.00
1.333	15.00	4.583	3.00	7.833	43.00	11.08	13.00
1.417	15.00	4.667	3.00	7.917	43.00	11.17	13.00
1.500	15.00	4.750	3.00	8.000	43.00	11.25	13.00
1.583	15.00	4.833	3.00	8.083	20.00	11.33	13.00
1.667	15.00	4.917	3.00	8.167	20.00	11.42	13.00
1.750	15.00	5.000	3.00	8.250	20.00	11.50	13.00
1.833	15.00	5.083	5.00	8.333	20.00	11.58	13.00
1.917	15.00	5.167	5.00	8.417	20.00	11.67	13.00
2.000	15.00	5.250	5.00	8.500	20.00	11.75	13.00
2.083	20.00	5.333	5.00	8.583	20.00	11.83	13.00
2.167	20.00	5.417	5.00	8.667	20.00	11.92	13.00
2.250	20.00	5.500	5.00	8.750	20.00	12.00	13.00
2.333	20.00	5.583	5.00	8.833	20.00	12.08	8.00
2.417	20.00	5.667	5.00	8.917	20.00	12.17	8.00
2.500	20.00	5.750	5.00	9.000	20.00	12.25	8.00
2.583	20.00	5.833	5.00	9.083	23.00	12.33	8.00
2.667	20.00	5.917	5.00	9.167	23.00	12.42	8.00
2.750	20.00	6.000	5.00	9.250	23.00	12.50	8.00
2.833	20.00	6.083	20.00	9.333	23.00	12.58	8.00
2.917	20.00	6.167	20.00	9.417	23.00	12.67	8.00
3.000	20.00	6.250	20.00	9.500	23.00	12.75	8.00

```
               3.083   10.00 | 6.333   20.00 | 9.583   23.00 | 12.83    8.00
               3.167   10.00 | 6.417   20.00 | 9.667   23.00 | 12.92    8.00
               3.250   10.00 | 6.500   20.00 | 9.750   23.00 | 13.00    8.00

     Max.Eff.Inten.(mm/hr)=      43.00        12.29
               over (min)        10.00        30.00
     Storage Coeff.  (min)=      10.91 (ii)   27.24 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.11         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       3.66         0.66          4.317 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.08           8.00
     RUNOFF VOLUME    (mm)=     192.00        38.39         115.19
     TOTAL RAINFALL   (mm)=     193.00       193.00         193.00
     RUNOFF COEFFICIENT   =       0.99         0.20           0.60


       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):    61.54   4.317     8.00   115.19
      + ID2= 2 (  0015):   265.91  19.934     8.17   127.93
        ================================================
        ID = 3 (  0016):   327.45  23.839     8.08   125.54

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       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\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\3a6a0f82-7911-417f-bb6d-00100bbc4512\s
  Summary filename: C:\Users\efledderus\AppData\Local\Civica\VH5\1eeeb8d3-ddba-4a9f-a8e4-
3221e97a2d27\3a6a0f82-7911-417f-bb6d-00100bbc4512\s


DATE: 08/24/2023                          TIME: 08:47:12

USER:


COMMENTS: _____________________________________________________________
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  **********************************************
  ** SIMULATION : Timmins Climate Change        **
  **********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              db0b6c63-91a8-432d-b10e-747dd965c313\f7f1df77
| Ptotal=242.00 mm |    Comments: Timmins Climate Change
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  4.00    4.00 |   8.00   25.00 | 12.00   10.00
                1.00   19.00 |  5.00    6.00 |   9.00   29.00 |
                2.00   25.00 |  6.00   25.00 |  10.00   16.00 |
                3.00   13.00 |  7.00   54.00 |  11.00   16.00 |

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--------------------
| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.68

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
                0.083    0.00 | 3.333   13.00 | 6.583   25.00 |  9.83   29.00
                0.167    0.00 | 3.417   13.00 | 6.667   25.00 |  9.92   29.00
                0.250    0.00 | 3.500   13.00 | 6.750   25.00 | 10.00   29.00
                0.333    0.00 | 3.583   13.00 | 6.833   25.00 | 10.08   16.00
                0.417    0.00 | 3.667   13.00 | 6.917   25.00 | 10.17   16.00
                0.500    0.00 | 3.750   13.00 | 7.000   25.00 | 10.25   16.00
                0.583    0.00 | 3.833   13.00 | 7.083   54.00 | 10.33   16.00
                0.667    0.00 | 3.917   13.00 | 7.167   54.00 | 10.42   16.00
                0.750    0.00 | 4.000   13.00 | 7.250   54.00 | 10.50   16.00
                0.833    0.00 | 4.083    4.00 | 7.333   54.00 | 10.58   16.00
                0.917    0.00 | 4.167    4.00 | 7.417   54.00 | 10.67   16.00
                1.000    0.00 | 4.250    4.00 | 7.500   54.00 | 10.75   16.00
                1.083   19.00 | 4.333    4.00 | 7.583   54.00 | 10.83   16.00
                1.167   19.00 | 4.417    4.00 | 7.667   54.00 | 10.92   16.00
                1.250   19.00 | 4.500    4.00 | 7.750   54.00 | 11.00   16.00
                1.333   19.00 | 4.583    4.00 | 7.833   54.00 | 11.08   16.00
                1.417   19.00 | 4.667    4.00 | 7.917   54.00 | 11.17   16.00
                1.500   19.00 | 4.750    4.00 | 8.000   54.00 | 11.25   16.00
                1.583   19.00 | 4.833    4.00 | 8.083   25.00 | 11.33   16.00
                1.667   19.00 | 4.917    4.00 | 8.167   25.00 | 11.42   16.00
                1.750   19.00 | 5.000    4.00 | 8.250   25.00 | 11.50   16.00
                1.833   19.00 | 5.083    6.00 | 8.333   25.00 | 11.58   16.00
                1.917   19.00 | 5.167    6.00 | 8.417   25.00 | 11.67   16.00
                2.000   19.00 | 5.250    6.00 | 8.500   25.00 | 11.75   16.00
                2.083   25.00 | 5.333    6.00 | 8.583   25.00 | 11.83   16.00
                2.167   25.00 | 5.417    6.00 | 8.667   25.00 | 11.92   16.00
                2.250   25.00 | 5.500    6.00 | 8.750   25.00 | 12.00   16.00
                2.333   25.00 | 5.583    6.00 | 8.833   25.00 | 12.08   10.00
                2.417   25.00 | 5.667    6.00 | 8.917   25.00 | 12.17   10.00
                2.500   25.00 | 5.750    6.00 | 9.000   25.00 | 12.25   10.00
                2.583   25.00 | 5.833    6.00 | 9.083   29.00 | 12.33   10.00
                2.667   25.00 | 5.917    6.00 | 9.167   29.00 | 12.42   10.00
                2.750   25.00 | 6.000    6.00 | 9.250   29.00 | 12.50   10.00
                2.833   25.00 | 6.083   25.00 | 9.333   29.00 | 12.58   10.00
                2.917   25.00 | 6.167   25.00 | 9.417   29.00 | 12.67   10.00
                3.000   25.00 | 6.250   25.00 | 9.500   29.00 | 12.75   10.00
                3.083   13.00 | 6.333   25.00 | 9.583   29.00 | 12.83   10.00
```

3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 3.453

PEAK FLOW (cms)= 5.468 (i)
TIME TO PEAK (hrs)= 8.333
RUNOFF VOLUME (mm)= 157.784
TOTAL RAINFALL (mm)= 242.000
RUNOFF COEFFICIENT = 0.652

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

CALIB
NASHYD (0008)
ID= 1 DT= 5.0 min

Area (ha)= 24.31 Curve Number (CN)= 83.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.28

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 3.316

PEAK FLOW (cms)= 3.282 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 194.985
TOTAL RAINFALL (mm)= 242.000

RUNOFF COEFFICIENT = 0.806

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

ADD HYD (0019)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0007):	61.48	5.468	8.33	157.78
	+ ID2= 2 (0008):	24.31	3.282	8.00	194.98
	ID = 3 (0019):	85.79	8.368	8.08	168.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0019)	85.79	8.37	8.08	168.32	0.0
OUTFLOW: ID=1	(0013)	85.79	8.23	8.25	168.32	0.0

CALIB
STANDHYD (0024)
ID= 1 DT= 5.0 min

Area (ha)= 48.38
Total Imp(%)= 54.00 Dir. Conn.(%)= 39.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	26.12	22.25
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	567.89	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00

1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Max.Eff.Inten.(mm/hr)=	54.00	14.32	
over (min)	10.00	25.00	
Storage Coeff. (min)=	9.27 (ii)	24.62 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.12	0.05	
			TOTALS
PEAK FLOW (cms)=	2.83	0.81	3.639 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	241.00	48.17	123.38
TOTAL RAINFALL (mm)=	242.00	242.00	242.00
RUNOFF COEFFICIENT =	1.00	0.20	0.51

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
NASHYD (0025)
ID= 1 DT= 5.0 min

Area (ha)= 82.00 Curve Number (CN)= 87.2
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.29

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00

1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Unit Hyd Qpeak (cms)= 10.800

PEAK FLOW (cms)= 11.433 (i)
TIME TO PEAK (hrs)= 8.000
RUNOFF VOLUME (mm)= 204.693
TOTAL RAINFALL (mm)= 242.000
RUNOFF COEFFICIENT = 0.846

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

ADD HYD (0018)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0013):	85.79	8.232	8.25	168.32
+ ID2= 2 (0024):	48.38	3.639	8.00	123.38
ID = 3 (0018):	134.16	11.268	8.08	152.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0018)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0018):	134.16	11.268	8.08	152.12
+ ID2= 2 (0025):	82.00	11.433	8.00	204.69
ID = 1 (0018):	216.16	22.637	8.00	172.06

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0014)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel

11.5	98.00	0.03	Main Channel
12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0018)	216.16	22.64	8.00	172.06	0.0
OUTFLOW: ID=1	(0014)	216.16	22.41	8.08	172.06	0.0

CALIB
STANDHYD (0010)
ID= 1 DT= 5.0 min

Area (ha)= 49.75
Total Imp(%)= 65.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	32.33	17.41
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	575.88	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	3.333	13.00	6.583	25.00	9.83	29.00
0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Max.Eff.Inten.(mm/hr)=		54.00	15.43
	over (min)	10.00	25.00

```
     Storage Coeff.  (min)=       9.35 (ii)   24.25 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=       0.12         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.73         0.69          4.413 (iii)
     TIME TO PEAK    (hrs)=       8.00         8.08           8.00
     RUNOFF VOLUME    (mm)=     241.00        48.19         144.59
     TOTAL RAINFALL   (mm)=     242.00       242.00         242.00
     RUNOFF COEFFICIENT   =       1.00         0.20           0.60


       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (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  (  0017)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    49.75   4.413     8.00   144.59
      + ID2= 2 (  0014):   216.16  22.410     8.08   172.06
        ================================================
        ID = 3 (  0017):   265.91  26.485     8.00   166.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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  --------------------
  | ROUTE MC (  0015)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5              100.00            0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0017)   265.91    26.48    8.00     166.93    0.0
   OUTFLOW: ID=1  (0015)   265.91    26.34    8.08     166.93    0.0

  --------------------------------------------------------------------------------
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| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  61.54
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      40.00        21.54
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     640.53        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
              0.083    0.00 | 3.333   13.00 | 6.583   25.00 |  9.83   29.00
```

0.167	0.00	3.417	13.00	6.667	25.00	9.92	29.00
0.250	0.00	3.500	13.00	6.750	25.00	10.00	29.00
0.333	0.00	3.583	13.00	6.833	25.00	10.08	16.00
0.417	0.00	3.667	13.00	6.917	25.00	10.17	16.00
0.500	0.00	3.750	13.00	7.000	25.00	10.25	16.00
0.583	0.00	3.833	13.00	7.083	54.00	10.33	16.00
0.667	0.00	3.917	13.00	7.167	54.00	10.42	16.00
0.750	0.00	4.000	13.00	7.250	54.00	10.50	16.00
0.833	0.00	4.083	4.00	7.333	54.00	10.58	16.00
0.917	0.00	4.167	4.00	7.417	54.00	10.67	16.00
1.000	0.00	4.250	4.00	7.500	54.00	10.75	16.00
1.083	19.00	4.333	4.00	7.583	54.00	10.83	16.00
1.167	19.00	4.417	4.00	7.667	54.00	10.92	16.00
1.250	19.00	4.500	4.00	7.750	54.00	11.00	16.00
1.333	19.00	4.583	4.00	7.833	54.00	11.08	16.00
1.417	19.00	4.667	4.00	7.917	54.00	11.17	16.00
1.500	19.00	4.750	4.00	8.000	54.00	11.25	16.00
1.583	19.00	4.833	4.00	8.083	25.00	11.33	16.00
1.667	19.00	4.917	4.00	8.167	25.00	11.42	16.00
1.750	19.00	5.000	4.00	8.250	25.00	11.50	16.00
1.833	19.00	5.083	6.00	8.333	25.00	11.58	16.00
1.917	19.00	5.167	6.00	8.417	25.00	11.67	16.00
2.000	19.00	5.250	6.00	8.500	25.00	11.75	16.00
2.083	25.00	5.333	6.00	8.583	25.00	11.83	16.00
2.167	25.00	5.417	6.00	8.667	25.00	11.92	16.00
2.250	25.00	5.500	6.00	8.750	25.00	12.00	16.00
2.333	25.00	5.583	6.00	8.833	25.00	12.08	10.00
2.417	25.00	5.667	6.00	8.917	25.00	12.17	10.00
2.500	25.00	5.750	6.00	9.000	25.00	12.25	10.00
2.583	25.00	5.833	6.00	9.083	29.00	12.33	10.00
2.667	25.00	5.917	6.00	9.167	29.00	12.42	10.00
2.750	25.00	6.000	6.00	9.250	29.00	12.50	10.00
2.833	25.00	6.083	25.00	9.333	29.00	12.58	10.00
2.917	25.00	6.167	25.00	9.417	29.00	12.67	10.00
3.000	25.00	6.250	25.00	9.500	29.00	12.75	10.00
3.083	13.00	6.333	25.00	9.583	29.00	12.83	10.00
3.167	13.00	6.417	25.00	9.667	29.00	12.92	10.00
3.250	13.00	6.500	25.00	9.750	29.00	13.00	10.00

Max.Eff.Inten.(mm/hr)=	54.00	15.43	
over (min)	10.00	25.00	
Storage Coeff. (min)=	9.96 (ii)	24.87 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.11	0.05	
			TOTALS
PEAK FLOW (cms)=	4.61	0.85	5.453 (iii)
TIME TO PEAK (hrs)=	8.00	8.08	8.00
RUNOFF VOLUME (mm)=	241.00	48.19	144.59
TOTAL RAINFALL (mm)=	242.00	242.00	242.00
RUNOFF COEFFICIENT =	1.00	0.20	0.60

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0011):	61.54	5.453	8.00	144.59
+	ID2= 2 (0015):	265.91	26.340	8.08	166.93
	ID = 3 (0016):	327.45	31.389	8.08	162.74

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 6.2.2015)
       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: 08/24/2023                          TIME: 08:47:12

USER:



COMMENTS: _____________________________________________________________


-------------------------------------------------------------------------------------------------
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  ***********************************************
  ** SIMULATION : Trenton A SCS 100-Yr          **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\efledderus\AppD
|                  |              ata\Local\Temp\
|                  |              db0b6c63-91a8-432d-b10e-747dd965c313\3b52dbf2
| Ptotal=108.16 mm |    Comments: Trenton A SCS 100-Yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    0.00 |  7.00    2.16 | 14.00    5.19 | 21.00    1.30
                1.00    1.19 |  8.00    2.16 | 15.00    3.24 | 22.00    1.30
                2.00    1.19 |  9.00    2.92 | 16.00    3.24 | 23.00    1.30
                3.00    1.41 | 10.00    3.68 | 17.00    1.95 | 24.00    1.30
                4.00    1.41 | 11.00    5.84 | 18.00    1.95 |
                5.00    1.73 | 12.00   46.28 | 19.00    1.95 |
                6.00    1.73 | 13.00   11.79 | 20.00    1.95 |

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| CALIB            |
| NASHYD   (  0007)|   Area    (ha)=  61.48   Curve Number   (CN)= 68.1
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.68
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30

5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 3.453

PEAK FLOW (cms)= 2.642 (i)
TIME TO PEAK (hrs)= 13.417
RUNOFF VOLUME (mm)= 47.906
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.443

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

CALIB
NASHYD (0008)
ID= 1 DT= 5.0 min

Area (ha)= 24.31 Curve Number (CN)= 83.3
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.28

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30

3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 3.316

PEAK FLOW (cms)= 2.257 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 69.032
TOTAL RAINFALL (mm)= 108.160
RUNOFF COEFFICIENT = 0.638

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

ADD HYD (0019)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0007):	61.48	2.642	13.42	47.91
	+ ID2= 2 (0008):	24.31	2.257	13.00	69.03
	ID = 3 (0019):	85.79	4.518	13.08	53.89

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ROUTE MC (0013)
IN=2---> OUT=1

ROUTING TIME STEP = 5.0 min.

<------------------DATA FOR SECTION (1.1)------------------>

Distance (m)	Elevation (m)	Mannings 'n'	
0.0	100.00	0.05	
10.0	99.00	0.05/0.03	Main Channel
11.5	98.00	0.03	Main Channel

12.8	97.85	0.03	Main Channel
14.0	98.00	0.03	Main Channel
16.5	99.00	0.03/0.05	Main Channel
26.5	100.00	0.05	

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	QBASE (cms)
INFLOW: ID=2	(0019)	85.79	4.52	13.08	53.89	0.0
OUTFLOW: ID=1	(0013)	85.79	4.30	13.42	53.89	0.0

CALIB
STANDHYD (0024)
ID= 1 DT= 5.0 min

Area (ha)= 48.38
Total Imp(%)= 54.00 Dir. Conn.(%)= 39.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	26.12	22.25
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	1.00	2.00
Length	(m)=	567.89	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30

3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

			TOTALS
Max.Eff.Inten.(mm/hr)=	46.28	12.27	
over (min)	10.00	30.00	
Storage Coeff. (min)=	9.86 (ii)	26.19 (ii)	
Unit Hyd. Tpeak (min)=	10.00	30.00	
Unit Hyd. peak (cms)=	0.11	0.04	
PEAK FLOW (cms)=	2.42	0.65	3.055 (iii)
TIME TO PEAK (hrs)=	13.00	13.08	13.00
RUNOFF VOLUME (mm)=	107.16	21.41	54.85
TOTAL RAINFALL (mm)=	108.16	108.16	108.16
RUNOFF COEFFICIENT =	0.99	0.20	0.51

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB
NASHYD (0025)
ID= 1 DT= 5.0 min

Area (ha)= 82.00 Curve Number (CN)= 87.2
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.29

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95

0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Unit Hyd Qpeak (cms)= 10.800

PEAK FLOW (cms)= 8.299 (i)

```
     TIME TO PEAK    (hrs)=  13.000
     RUNOFF VOLUME    (mm)=  75.741
     TOTAL RAINFALL   (mm)= 108.160
     RUNOFF COEFFICIENT   =   0.700

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

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--------------------
| ADD HYD  (  0018)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0013):    85.79   4.297    13.42    53.89
      + ID2= 2 (  0024):    48.38   3.055    13.00    54.85
        ================================================
        ID = 3 (  0018):   134.16   6.258    13.08    54.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0018)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0018):   134.16   6.258    13.08    54.24
      + ID2= 2 (  0025):    82.00   8.299    13.00    75.74
        ================================================
        ID = 1 (  0018):   216.16  14.495    13.00    62.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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  --------------------
  | ROUTE MC (  0014)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5               100.00           0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0018)   216.16    14.49    13.00     62.40    0.0
   OUTFLOW: ID=1  (0014)   216.16    14.13    13.17     62.40    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|   Area    (ha)=  49.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      32.33        17.41
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     575.88        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30
5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30

```
               6.000    1.73 |12.250   46.28 |18.500    1.95 | 24.75    1.30
               6.083    1.73 |12.333   46.28 |18.583    1.95 | 24.83    1.30
               6.167    1.73 |12.417   46.28 |18.667    1.95 | 24.92    1.30
               6.250    1.73 |12.500   46.28 |18.750    1.95 | 25.00    1.30

     Max.Eff.Inten.(mm/hr)=      46.28        13.22
               over (min)        10.00        30.00
     Storage Coeff.  (min)=       9.94 (ii)   25.79 (ii)
     Unit Hyd. Tpeak (min)=      10.00        30.00
     Unit Hyd. peak  (cms)=       0.11         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.19         0.55          3.727 (iii)
     TIME TO PEAK    (hrs)=      13.00        13.08          13.00
     RUNOFF VOLUME    (mm)=     107.16        21.42          64.29
     TOTAL RAINFALL   (mm)=     108.16       108.16         108.16
     RUNOFF COEFFICIENT   =       0.99         0.20           0.59


       (i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
            CIMP = 1.00    CPER = 0.20
      (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  (  0017)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    49.75   3.727    13.00    64.29
      + ID2= 2 (  0014):   216.16  14.128    13.17    62.40
        ================================================
        ID = 3 (  0017):   265.91  17.291    13.08    62.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
  --------------------
  | ROUTE MC (  0015)|
  | IN=2---> OUT=1   |
  --------------------

  ROUTING TIME STEP = 5.0 min.

  <------------------DATA FOR SECTION (1.1)------------------>
  Distance (m)     Elevation (m)     Mannings 'n'
    0.0               100.00           0.05
    10.0               99.00           0.05/0.03    Main Channel
    11.5               98.00           0.03         Main Channel
    12.8               97.85           0.03         Main Channel
    14.0               98.00           0.03         Main Channel
    16.5               99.00           0.03/0.05    Main Channel
    26.5               100.00           0.05

                           AREA      QPEAK   TPEAK     R.V.    QBASE
                           (ha)      (cms)   (hrs)     (mm)    (cms)
   INFLOW:  ID=2  (0017)   265.91    17.29    13.08     62.75    0.0
   OUTFLOW: ID=1  (0015)   265.91    16.96    13.17     62.75    0.0

  --------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0011)|   Area    (ha)=  61.54
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.00   Dir. Conn.(%)=  50.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      40.00        21.54
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     640.53        40.00
     Mannings n           =      0.013        0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 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
0.083	0.00	6.333	1.73	12.583	46.28	18.83	1.95
0.167	0.00	6.417	1.73	12.667	46.28	18.92	1.95
0.250	0.00	6.500	1.73	12.750	46.28	19.00	1.95
0.333	0.00	6.583	1.73	12.833	46.28	19.08	1.95
0.417	0.00	6.667	1.73	12.917	46.28	19.17	1.95
0.500	0.00	6.750	1.73	13.000	46.28	19.25	1.95
0.583	0.00	6.833	1.73	13.083	11.80	19.33	1.95
0.667	0.00	6.917	1.73	13.167	11.79	19.42	1.95
0.750	0.00	7.000	1.73	13.250	11.79	19.50	1.95
0.833	0.00	7.083	2.16	13.333	11.79	19.58	1.95
0.917	0.00	7.167	2.16	13.417	11.79	19.67	1.95
1.000	0.00	7.250	2.16	13.500	11.79	19.75	1.95
1.083	1.19	7.333	2.16	13.583	11.79	19.83	1.95
1.167	1.19	7.417	2.16	13.667	11.79	19.92	1.95
1.250	1.19	7.500	2.16	13.750	11.79	20.00	1.95
1.333	1.19	7.583	2.16	13.833	11.79	20.08	1.95
1.417	1.19	7.667	2.16	13.917	11.79	20.17	1.95
1.500	1.19	7.750	2.16	14.000	11.79	20.25	1.95
1.583	1.19	7.833	2.16	14.083	5.19	20.33	1.95
1.667	1.19	7.917	2.16	14.167	5.19	20.42	1.95
1.750	1.19	8.000	2.16	14.250	5.19	20.50	1.95
1.833	1.19	8.083	2.16	14.333	5.19	20.58	1.95
1.917	1.19	8.167	2.16	14.417	5.19	20.67	1.95
2.000	1.19	8.250	2.16	14.500	5.19	20.75	1.95
2.083	1.19	8.333	2.16	14.583	5.19	20.83	1.95
2.167	1.19	8.417	2.16	14.667	5.19	20.92	1.95
2.250	1.19	8.500	2.16	14.750	5.19	21.00	1.95
2.333	1.19	8.583	2.16	14.833	5.19	21.08	1.30
2.417	1.19	8.667	2.16	14.917	5.19	21.17	1.30
2.500	1.19	8.750	2.16	15.000	5.19	21.25	1.30
2.583	1.19	8.833	2.16	15.083	3.24	21.33	1.30
2.667	1.19	8.917	2.16	15.167	3.24	21.42	1.30
2.750	1.19	9.000	2.16	15.250	3.24	21.50	1.30
2.833	1.19	9.083	2.92	15.333	3.24	21.58	1.30
2.917	1.19	9.167	2.92	15.417	3.24	21.67	1.30
3.000	1.19	9.250	2.92	15.500	3.24	21.75	1.30
3.083	1.41	9.333	2.92	15.583	3.24	21.83	1.30
3.167	1.41	9.417	2.92	15.667	3.24	21.92	1.30
3.250	1.41	9.500	2.92	15.750	3.24	22.00	1.30
3.333	1.41	9.583	2.92	15.833	3.24	22.08	1.30
3.417	1.41	9.667	2.92	15.917	3.24	22.17	1.30
3.500	1.41	9.750	2.92	16.000	3.24	22.25	1.30
3.583	1.41	9.833	2.92	16.083	3.24	22.33	1.30
3.667	1.41	9.917	2.92	16.167	3.24	22.42	1.30
3.750	1.41	10.000	2.92	16.250	3.24	22.50	1.30
3.833	1.41	10.083	3.68	16.333	3.24	22.58	1.30
3.917	1.41	10.167	3.68	16.417	3.24	22.67	1.30
4.000	1.41	10.250	3.68	16.500	3.24	22.75	1.30
4.083	1.41	10.333	3.68	16.583	3.24	22.83	1.30
4.167	1.41	10.417	3.68	16.667	3.24	22.92	1.30
4.250	1.41	10.500	3.68	16.750	3.24	23.00	1.30
4.333	1.41	10.583	3.68	16.833	3.24	23.08	1.30
4.417	1.41	10.667	3.68	16.917	3.24	23.17	1.30
4.500	1.41	10.750	3.68	17.000	3.24	23.25	1.30
4.583	1.41	10.833	3.68	17.083	1.95	23.33	1.30
4.667	1.41	10.917	3.68	17.167	1.95	23.42	1.30
4.750	1.41	11.000	3.68	17.250	1.95	23.50	1.30
4.833	1.41	11.083	5.84	17.333	1.95	23.58	1.30
4.917	1.41	11.167	5.84	17.417	1.95	23.67	1.30
5.000	1.41	11.250	5.84	17.500	1.95	23.75	1.30
5.083	1.73	11.333	5.84	17.583	1.95	23.83	1.30
5.167	1.73	11.417	5.84	17.667	1.95	23.92	1.30
5.250	1.73	11.500	5.84	17.750	1.95	24.00	1.30
5.333	1.73	11.583	5.84	17.833	1.95	24.08	1.30
5.417	1.73	11.667	5.84	17.917	1.95	24.17	1.30
5.500	1.73	11.750	5.84	18.000	1.95	24.25	1.30

5.583	1.73	11.833	5.84	18.083	1.95	24.33	1.30
5.667	1.73	11.917	5.84	18.167	1.95	24.42	1.30
5.750	1.73	12.000	5.84	18.250	1.95	24.50	1.30
5.833	1.73	12.083	46.28	18.333	1.95	24.58	1.30
5.917	1.73	12.167	46.28	18.417	1.95	24.67	1.30
6.000	1.73	12.250	46.28	18.500	1.95	24.75	1.30
6.083	1.73	12.333	46.28	18.583	1.95	24.83	1.30
6.167	1.73	12.417	46.28	18.667	1.95	24.92	1.30
6.250	1.73	12.500	46.28	18.750	1.95	25.00	1.30

Max.Eff.Inten.(mm/hr)=	46.28	13.22		
over (min)	10.00	30.00		
Storage Coeff. (min)=	10.60 (ii)	26.45 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.11	0.04		
			TOTALS	
PEAK FLOW (cms)=	3.94	0.67	4.601 (iii)	
TIME TO PEAK (hrs)=	13.00	13.08	13.00	
RUNOFF VOLUME (mm)=	107.16	21.42	64.29	
TOTAL RAINFALL (mm)=	108.16	108.16	108.16	
RUNOFF COEFFICIENT =	0.99	0.20	0.59	

(i) PROPORTIONAL LOSS FACTOR APPLIED TO RAINFALL:
CIMP = 1.00 CPER = 0.20
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0016)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	61.54	4.601	13.00	64.29
+ ID2= 2 (0015):	265.91	16.961	13.17	62.75
ID = 3 (0016):	327.45	20.782	13.08	63.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Arena Creek Visual OTTHYMO – Full Build-Out

General Frequency Analysis
16 Aug 2023 10:43 AM

--- Input Data ---

Analysis Name: Butler Creek
Description: With Data Infill

Data Set Name: Butler Creek Merged Instantaneous-Gauge-Flow
Input DSS File Name: C:\Users\bkeene\Documents\HEC\Butler_Creek_Merged\Butler_Creek_Merged.dss
DSS Pathname: /Butler Creek/Gauge/Flow//IR-CENTURY/Excel/
Output DSS File Name:
C:/Users/bkeene/Documents/HEC/Butler_Creek_Merged/GeneralFrequencyResults/Butler_Creek/Butler_Cree
k.dss

Start Date:
End Date:

Project Path: C:\Users\bkeene\Documents\HEC\Butler_Creek_Merged
Report File Name:
C:\Users\bkeene\Documents\HEC\Butler_Creek_Merged\GeneralFrequencyResults\Butler_Creek\Butler_Cree
k.rpt
Result File Name:
C:\Users\bkeene\Documents\HEC\Butler_Creek_Merged\GeneralFrequencyResults\Butler_Creek\Butler_Cree
k.xml

Plotting Position Type: Median

Probability Distribution Type: Pearson Type III 17B

Use Log Transform

Compute Expected Probability Curve using B17B Procedure

Upper Confidence Level: 0.05
Lower Confidence Level: 0.95

Skew Option: Use Station Skew
Regional Skew: ---
Regional Skew MSE: ---

User-Specified Frequencies
Frequency: 0.01
Frequency: 0.1
Frequency: 0.2
Frequency: 0.5
Frequency: 1.0
Frequency: 2.0
Frequency: 5.0
Frequency: 10.0
Frequency: 20.0
Frequency: 50.0

Display ordinate values using 1 digits in fraction part of value

--- End of Input Data ---

--- Preliminary Results ---

<< Plotting Positions >>
Butler Creek Merged Instantaneous-Gauge-Flow

Events Analyzed		Ordered Events			
Day Mon Year	Flow m3/s	Rank	Water Year	Flow m3/s	Median Plot Pos
27 Nov 1965	3.5	1	1980	27.2*	1.24

02 Apr 1967	4.5	2	1981	11.3	3.01
01 Feb 1968	5.3	3	1990	10.5	4.79
23 Mar 1969	6.6	4	2004	10.2	6.56
01 Jan 1970	6.0	5	2010	9.6	8.33
12 Apr 1971	5.0	6	1975	8.6	10.11
13 Apr 1972	5.8	7	1986	8.3	11.88
16 Mar 1973	5.5	8	1982	7.8	13.65
01 Jan 1974	7.0	9	1977	7.7	15.43
19 Mar 1975	8.6	10	1993	7.3	17.20
20 Mar 1976	6.0	11	1974	7.0	18.97
12 Mar 1977	7.7	12	2014	6.8	20.74
20 Apr 1978	5.8	13	1983	6.7	22.52
13 Mar 1979	5.9	14	1969	6.6	24.29
20 Mar 1980	27.2	15	2019	6.5	26.06
01 Jan 1981	11.3	16	1984	6.4	27.84
02 Apr 1982	7.8	17	1992	6.3	29.61
02 Feb 1983	6.7	18	2017	6.2	31.38
04 Apr 1984	6.4	19	1996	6.1	33.16
11 Mar 1985	4.4	20	1976	6.0	34.93
18 Mar 1986	8.3	21	1970	6.0	36.70
03 Apr 1987	4.5	22	2020	5.9	38.48
01 Jan 1988	5.2	23	1979	5.9	40.25
10 Jan 1989	5.2	24	2013	5.8	42.02
11 Mar 1990	10.5	25	1972	5.8	43.79
06 Mar 1991	4.8	26	1978	5.8	45.57
09 Mar 1992	6.3	27	2011	5.5	47.34
04 Jan 1993	7.3	28	1973	5.5	49.11
10 Jan 1994	3.0	29	1968	5.3	50.89
10 Nov 1995	4.3	30	1989	5.2	52.66
10 Jan 1996	6.1	31	1988	5.2	54.43
21 Feb 1997	3.9	32	2009	5.1	56.21
08 Mar 1998	4.8	33	1971	5.0	57.98
01 Nov 1999	2.7	34	1998	4.8	59.75
01 Jan 2000	3.1	35	1991	4.8	61.52
07 Apr 2001	2.7	36	1967	4.5	63.30
21 Jul 2002	3.7	37	1987	4.5	65.07
21 Mar 2003	3.3	38	2016	4.5	66.84
08 Sep 2004	10.2	39	2005	4.5	68.62
15 Feb 2005	4.5	40	1985	4.4	70.39
16 Oct 2006	4.3	41	2006	4.3	72.16
22 Dec 2007	2.7	42	1995	4.3	73.94
31 Mar 2008	4.1	43	2021	4.2	75.71
02 Apr 2009	5.1	44	2008	4.1	77.48
01 Jan 2010	9.6	45	2018	4.0	79.26
10 Mar 2011	5.5	46	1997	3.9	81.03
16 Jan 2012	2.0	47	2015	3.7	82.80
06 Aug 2013	5.8	48	2002	3.7	84.57
07 Apr 2014	6.8	49	1965	3.5	86.35
27 Oct 2015	3.7	50	2003	3.3	88.12
09 Jan 2016	4.5	51	2000	3.1	89.89
30 Apr 2017	6.2	52	1994	3.0	91.67
19 Feb 2018	4.0	53	2007	2.7	93.44
14 Mar 2019	6.5	54	2001	2.7	95.21
10 Jan 2020	5.9	55	1999	2.7	96.99
10 Mar 2021	4.2	56	2012	2.0	98.76

* Outlier

<< Skew Weighting >>

Based on 56 events, mean-square error of station skew = 0.151
Mean-square error of regional skew = -?

<< Frequency Curve >>
Butler Creek Merged Instantaneous-Gauge-Flow

Computed Curve	Expected Probability	Percent Chance	Confidence Limits 0.05	0.95

Flow, m3/s	Exceedance	Flow, m3/s	
54.1	---	0.01	84.1	39.0
32.0	---	0.1	45.3	24.7
27.1	---	0.2	37.3	21.4
21.7	---	0.5	28.6	17.6
18.2	---	1.0	23.3	15.1
15.1	---	2.0	18.8	12.8
11.7	---	5.0	13.9	10.2
9.4	---	10.0	10.9	8.4
7.5	---	20.0	8.4	6.8
5.1	---	50.0	5.6	4.6

<< Systematic Statistics >>
Butler Creek Merged Instantaneous-Gauge-Flow

Log Transform: Flow, m3/s		Number of Events	
Mean	0.728	Historic Events	0
Standard Dev	0.185	High Outliers	0
Station Skew	0.770	Low Outliers	0
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	0.770	Systematic Events	56

--- End of Preliminary Results ---

<< Low Outlier Test >>

Based on 56 events, 10 percent outlier test deviate K(N) = 2.811
Computed low outlier test value = 1.62

0 low outlier(s) identified below test value of 1.62

--- Final Results ---

<< Plotting Positions >>
Butler Creek Merged Instantaneous-Gauge-Flow

Events Analyzed		Ordered Events			
Day Mon Year	Flow m3/s	Rank	Water Year	Flow m3/s	Median Plot Pos
27 Nov 1965	3.5	1	1980	27.2	1.24
02 Apr 1967	4.5	2	1981	11.3	3.01
01 Feb 1968	5.3	3	1990	10.5	4.79
23 Mar 1969	6.6	4	2004	10.2	6.56
01 Jan 1970	6.0	5	2010	9.6	8.33
12 Apr 1971	5.0	6	1975	8.6	10.11
13 Apr 1972	5.8	7	1986	8.3	11.88
16 Mar 1973	5.5	8	1982	7.8	13.65
01 Jan 1974	7.0	9	1977	7.7	15.43
19 Mar 1975	8.6	10	1993	7.3	17.20
20 Mar 1976	6.0	11	1974	7.0	18.97
12 Mar 1977	7.7	12	2014	6.8	20.74
20 Apr 1978	5.8	13	1983	6.7	22.52
13 Mar 1979	5.9	14	1969	6.6	24.29
20 Mar 1980	27.2	15	2019	6.5	26.06
01 Jan 1981	11.3	16	1984	6.4	27.84
02 Apr 1982	7.8	17	1992	6.3	29.61
02 Feb 1983	6.7	18	2017	6.2	31.38

04 Apr 1984	6.4	19	1996	6.1	33.16
11 Mar 1985	4.4	20	1976	6.0	34.93
18 Mar 1986	8.3	21	1970	6.0	36.70
03 Apr 1987	4.5	22	2020	5.9	38.48
01 Jan 1988	5.2	23	1979	5.9	40.25
10 Jan 1989	5.2	24	2013	5.8	42.02
11 Mar 1990	10.5	25	1972	5.8	43.79
06 Mar 1991	4.8	26	1978	5.8	45.57
09 Mar 1992	6.3	27	2011	5.5	47.34
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10 Jan 1994	3.0	29	1968	5.3	50.89
10 Nov 1995	4.3	30	1989	5.2	52.66
10 Jan 1996	6.1	31	1988	5.2	54.43
21 Feb 1997	3.9	32	2009	5.1	56.21
08 Mar 1998	4.8	33	1971	5.0	57.98
01 Nov 1999	2.7	34	1998	4.8	59.75
01 Jan 2000	3.1	35	1991	4.8	61.52
07 Apr 2001	2.7	36	1967	4.5	63.30
21 Jul 2002	3.7	37	1987	4.5	65.07
21 Mar 2003	3.3	38	2016	4.5	66.84
08 Sep 2004	10.2	39	2005	4.5	68.62
15 Feb 2005	4.5	40	1985	4.4	70.39
16 Oct 2006	4.3	41	2006	4.3	72.16
22 Dec 2007	2.7	42	1995	4.3	73.94
31 Mar 2008	4.1	43	2021	4.2	75.71
02 Apr 2009	5.1	44	2008	4.1	77.48
01 Jan 2010	9.6	45	2018	4.0	79.26
10 Mar 2011	5.5	46	1997	3.9	81.03
16 Jan 2012	2.0	47	2015	3.7	82.80
06 Aug 2013	5.8	48	2002	3.7	84.57
07 Apr 2014	6.8	49	1965	3.5	86.35
27 Oct 2015	3.7	50	2003	3.3	88.12
09 Jan 2016	4.5	51	2000	3.1	89.89
30 Apr 2017	6.2	52	1994	3.0	91.67
19 Feb 2018	4.0	53	2007	2.7	93.44
14 Mar 2019	6.5	54	2001	2.7	95.21
10 Jan 2020	5.9	55	1999	2.7	96.99
10 Mar 2021	4.2	56	2012	2.0	98.76

<< Skew Weighting >>

Based on 56 events, mean-square error of station skew = 0.151
Mean-square error of regional skew = -?

<< Frequency Curve >>
Butler Creek Merged Instantaneous-Gauge-Flow

Computed Curve Flow, m3/s	Expected Probability	Percent Chance Exceedance	Confidence Limits 0.05 Flow, m3/s	0.95
54.1	69.8	0.01	84.1	39.0
32.0	37.1	0.1	45.3	24.7
27.1	30.6	0.2	37.3	21.4
21.7	23.6	0.5	28.6	17.6
18.2	19.4	1.0	23.3	15.1
15.1	15.8	2.0	18.8	12.8
11.7	12.0	5.0	13.9	10.2
9.4	9.6	10.0	10.9	8.4
7.5	7.5	20.0	8.4	6.8
5.1	5.1	50.0	5.6	4.6

<< Systematic Statistics >>
Butler Creek Merged Instantaneous-Gauge-Flow

Log Transform: Flow, m3/s		Number of Events	
Mean	0.728	Historic Events	0
Standard Dev	0.185	High Outliers	0
Station Skew	0.770	Low Outliers	0
Regional Skew	---	Zero Events	0
Weighted Skew	---	Missing Events	0
Adopted Skew	0.770	Systematic Events	56

--- End of Analytical Frequency Curve ---

Appendix H:
LTC Memo – September 2021 Storm Event

Quick Event Summary - September 22-23, 2021

Janet Noyes <janet.noyes@ltc.on.ca>

Fri 9/24/2021 10:24 AM

To: Gage Comeau <gage.comeau@ltc.on.ca>; Rhonda Bateman <rhonda.bateman@ltc.on.ca>

The rainfall totals for this two-day event can be seen in the attached clip from our Daily Planning Cycle spreadsheet. Of note:

- two rain gauges are not working (Rawdon & Shelter Valley Creek)
- Butler (Proctor) Creek gauge appears to be double what it should - calculation factor entered wrong in logger perhaps?
- LTC manual rain gauge - read at 8:30 am each day: 26.8 (Sept 22); 94.4 (Sept 23); 16.6 (Sept 24) for a total of 137.8 mm
- Trenton data indicates 85.2 mm over Sept 22-23 - still waiting for Sept 24 to be included.

I think I'm comfortable saying that we saw between **75 mm and 120 mm** of rain (3 to 5 inches) across our watershed over the 48-hour period.

Regarding streamflows:

- Only 2 local streams reached the 2-yr (bankfull) flow - just over - not close to 5-yr flow:
  - Cold Creek peaked at 24.265 m3/s (2-yr is 24 m3/s)
  - Salt Creek peaked at 15.667 m3/s (2-yr is 14 m3/s)
- 5 of our streams reached half of the 2-year:
  - Shelter Valley Creek peaked at 9.802 m3/s (2-yr is 19 m3/s)
  - Butler Creek peaked at 3.556 m3/s (2-yr is 5.4 m3/s)
  - Mayhew Creek peaked at 5.26 m3/s (2-yr is 6.7 m3/s)
  - Burnley Creek peaked at 9.952 m3/s (2-yr is 14 m3/s)
  - Trout Creek peaked at 4.683 m3/s (2-yr is 7 m3/s)
- 2 of our creeks did not even reach half of the 2-yr - in northeast area with lots of wetland storage and exhibits more drought conditions:
  - Rawdon Creek peaked at 3.528 m3/s (2-yr is 12 m3/s)
  - Hoards/Squires Creek peaked at 3.553 m3/s (2-yr is 17 m3/s)

Lower Trent CA		Watershed Risk Assessment				
Date: Sept 24, 2021		Time: 09:00		Prepared By: JKN		
Flow (cms)	Current	24 hrs ago	2 Yr Flow(OFAT)	10 yr Flow (OFAT)	Trend	CONCERN
Cold	21.958	24.265	24	37	Down	CONCERN
Mill	7.815	9.344	14	22	Down	CONCERN
Rawdon	2.594	3.528	12	19	Down	
Butler	0.404	3.556	6.8	12	Down	
Mayhew	2.448	5.26	7	10	Down	
Shelter Valley	1.791	9.802	19	36	Down	
Salt	5.402	15.667	14	21	Down	
Squires	3.515	2.206	17	28	Up	
Trout	4.022	4.683	7	11	Down	CONCERN
Healey Falls	137	142	300 cms concern		Down	

Stage (m)	Current	24 Hrs ago	48 hrs ago	Trend	Last 24 hours Rise/Fall cm		
Upper Ross	113.606	113.565	113.474	Up	4.1		
Lower Ross	110.771	110.667	110.507	Up	10.4	111.6 concern	
P-Boom		113.674	113.602	#VALUE!	#VALUE!	114.2 concern	#VALUE!
Harwood		186.838	186.751	#VALUE!	#VALUE!	186.9 concern	#VALUE!

Precipitation (mm)	This 24 hrs	last 24 hrs	last 48 hrs	Total for 48 hours
Trenton		41	44.2	85.2
Butler		101.1	121.9	223
Mill		41.8	34.6	76.4
Rawdon		0	0	0
Cold		52.6	58.8	111.4
Trout		71	48.8	119.8
Squires		37	39.2	76.2
Salt		65.6	40.8	106.4
Shelter Valley		0	0	0

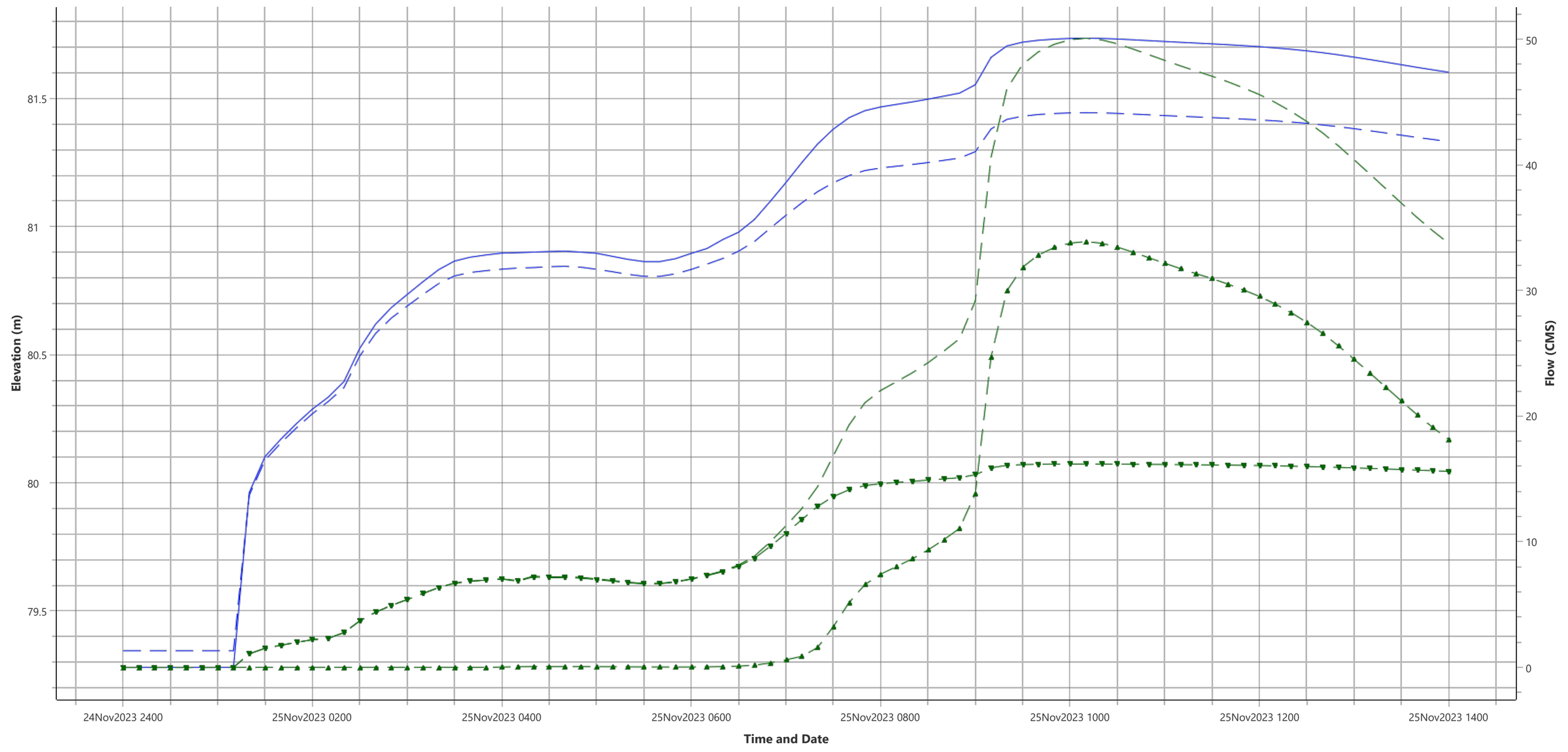
Janet

Janet Noyes, P.Eng.
Manager, Development Services & Water Resources
Lower Trent Conservation
613.394.3915 x211
janet.noyes@ltc.on.ca

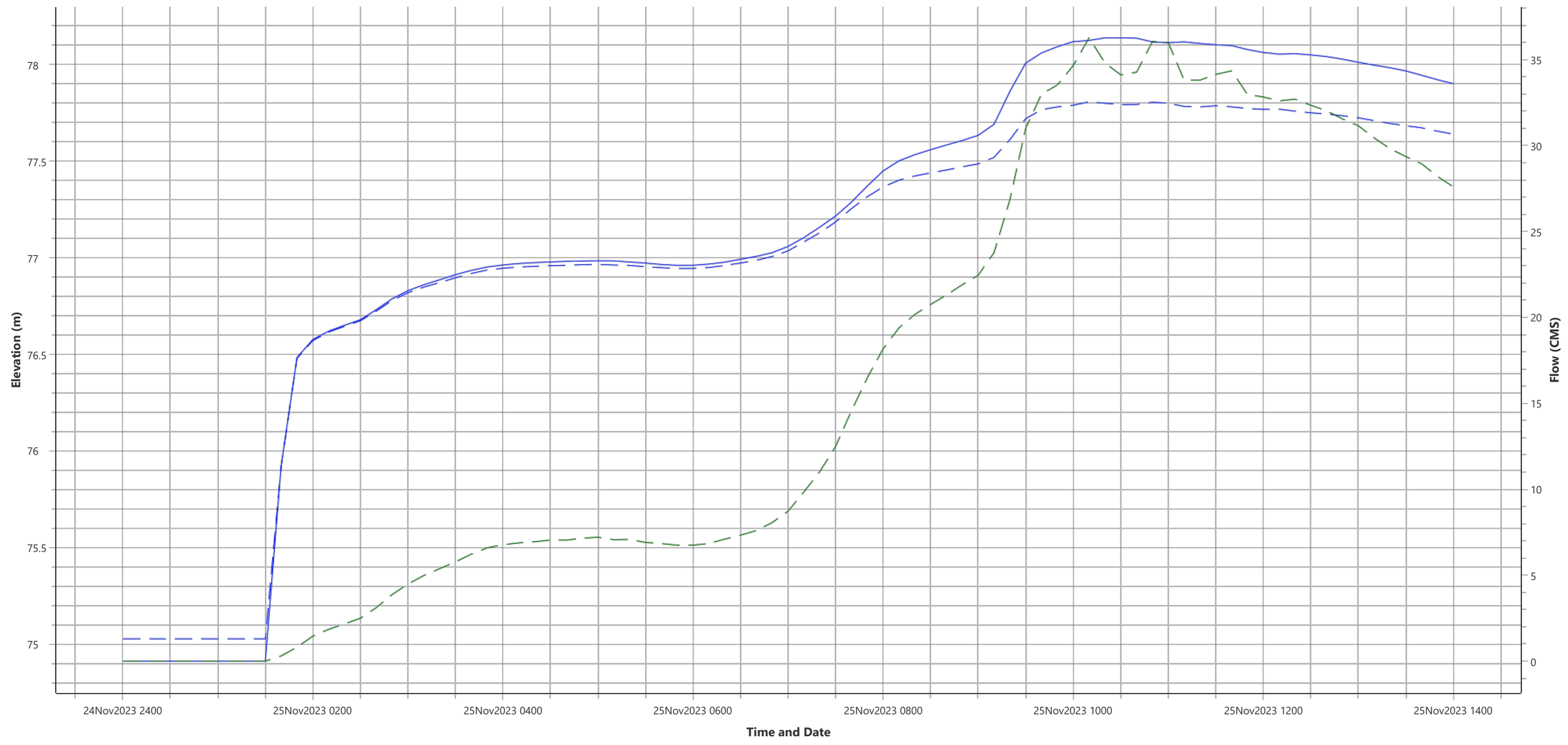
**COVID-19 Notice: Lower Trent Conservation staff remain available to serve you virtually or by phone. To ensure your continued safety, our office is not open to the public at this time.

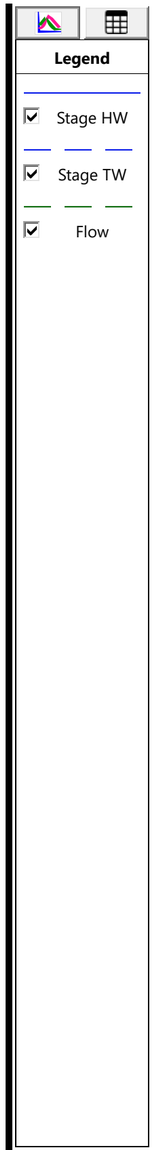
Appendix I-1:
Butler Creek - Bridge/Culvert Crossing Stage and Flow Hydrographs

Plan: 5 - Butler - Timmins Conn: Cedar St

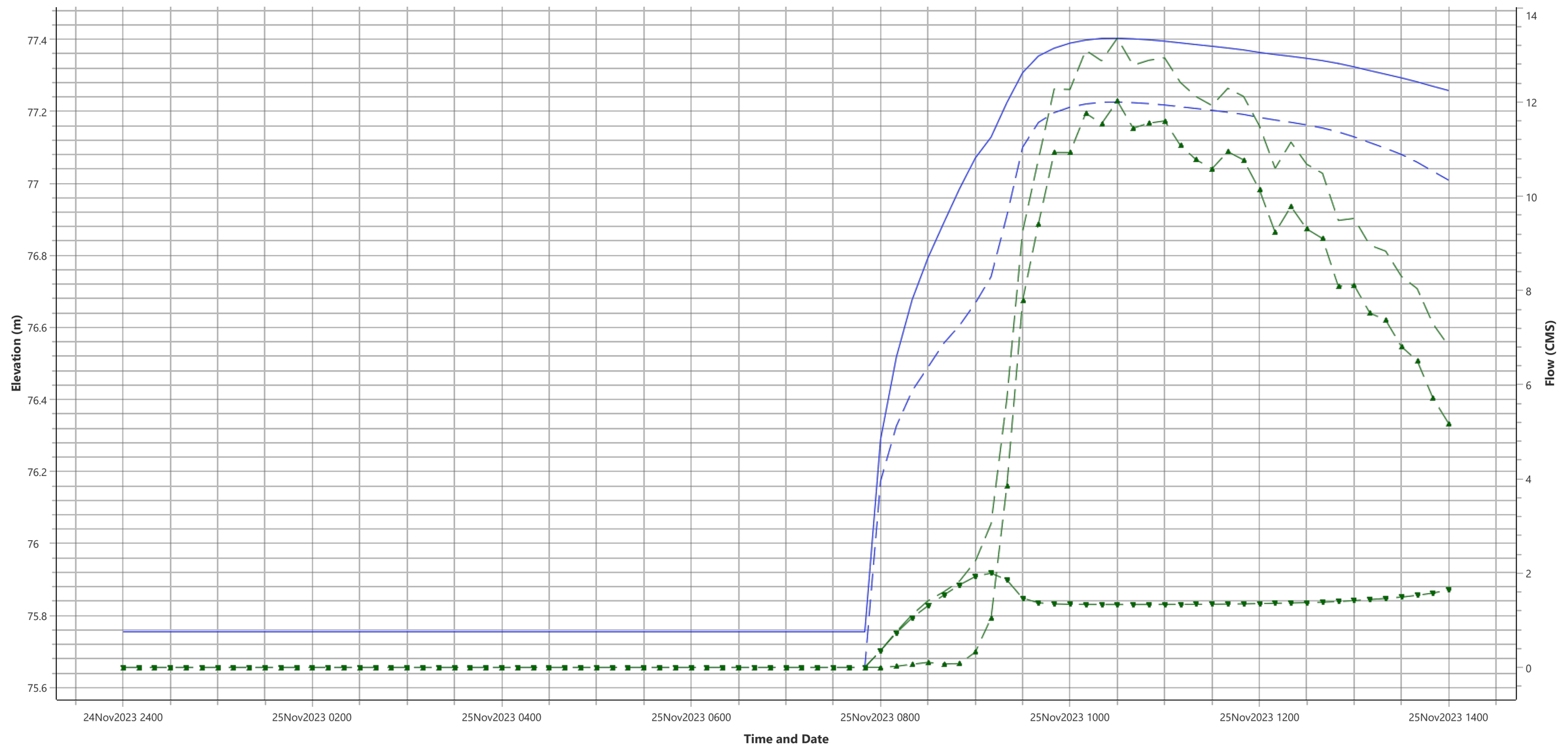


Plan: 5 - Butler - Timmins Conn: Harbour St (A)

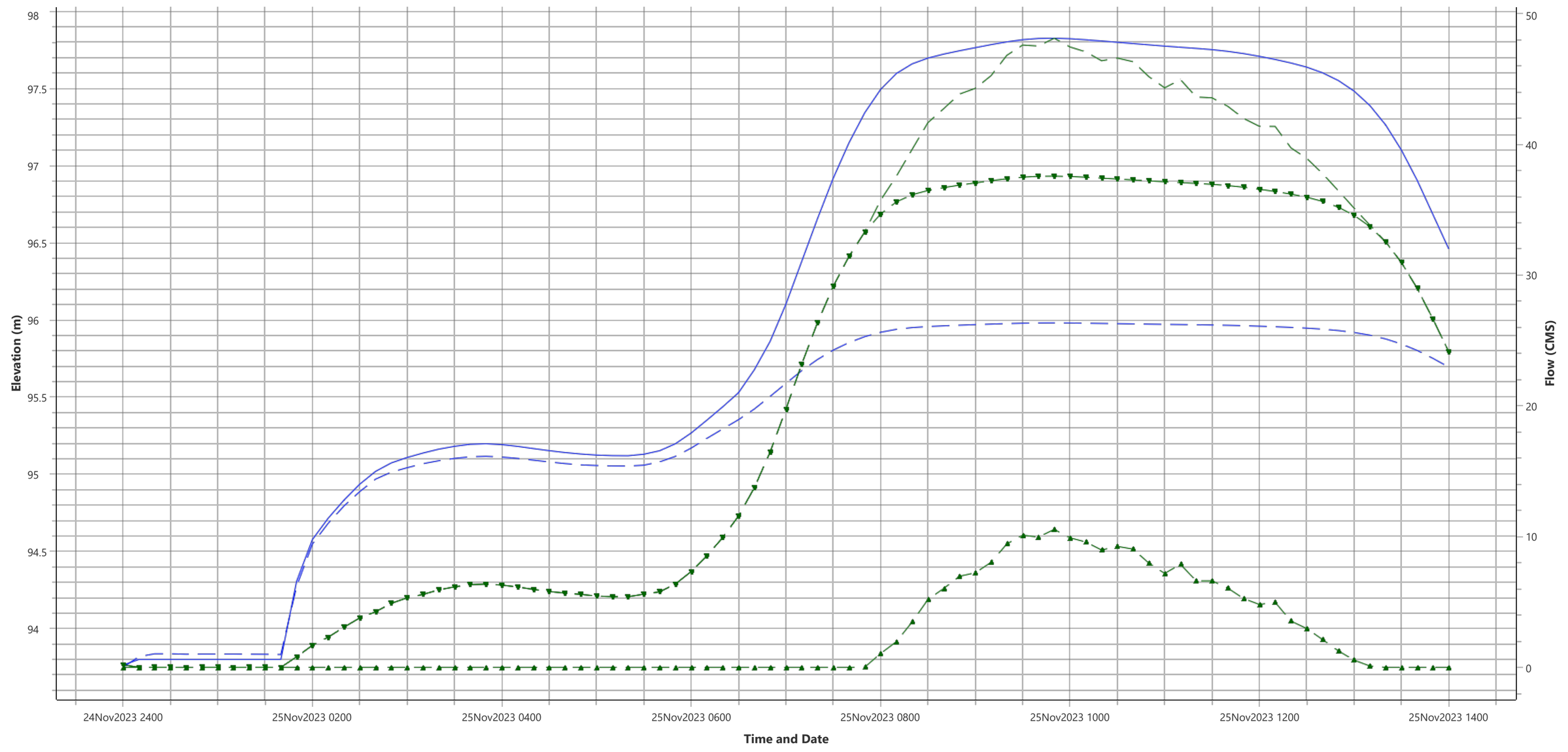




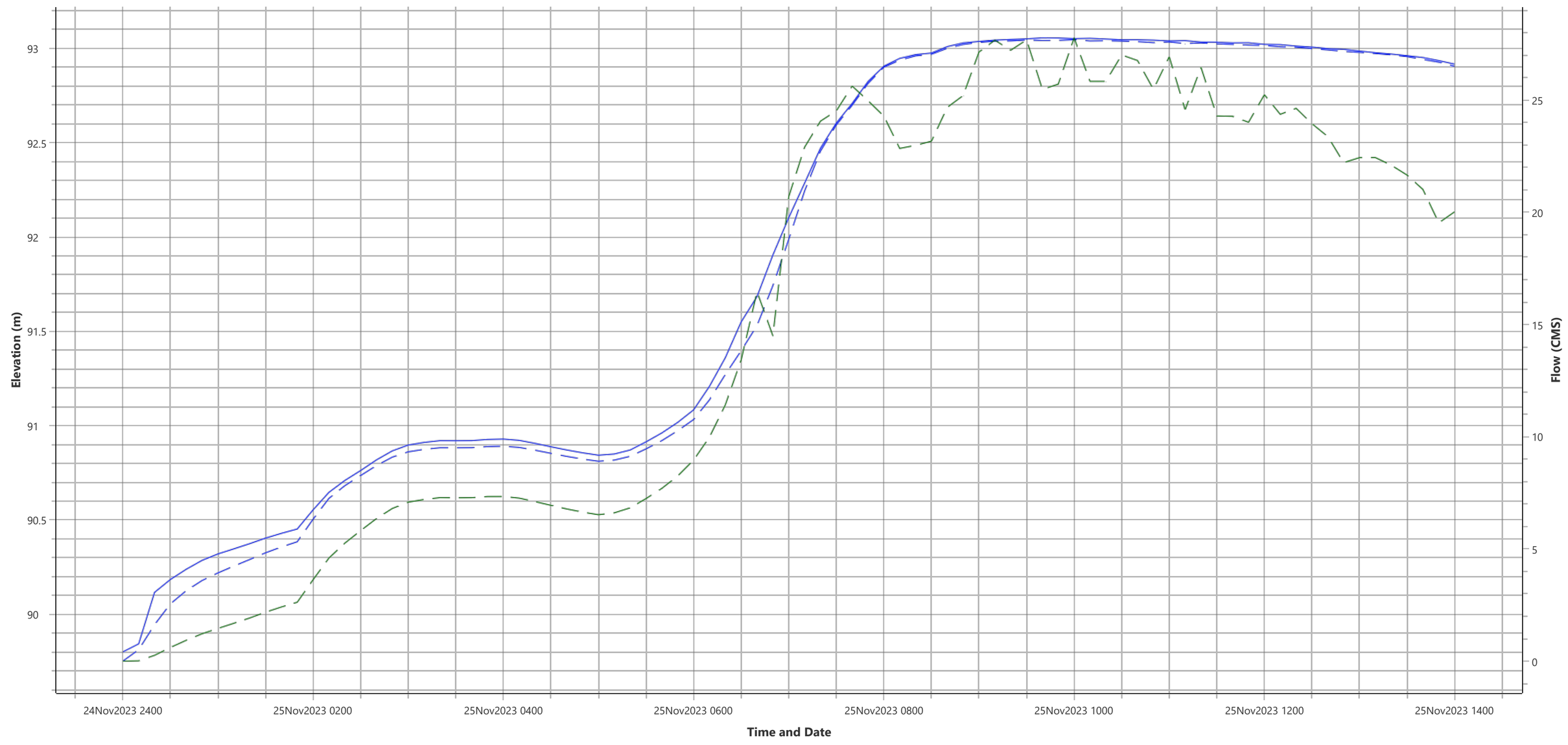
Plan: 5 - Butler - Timmins Conn: Harbour St (B)



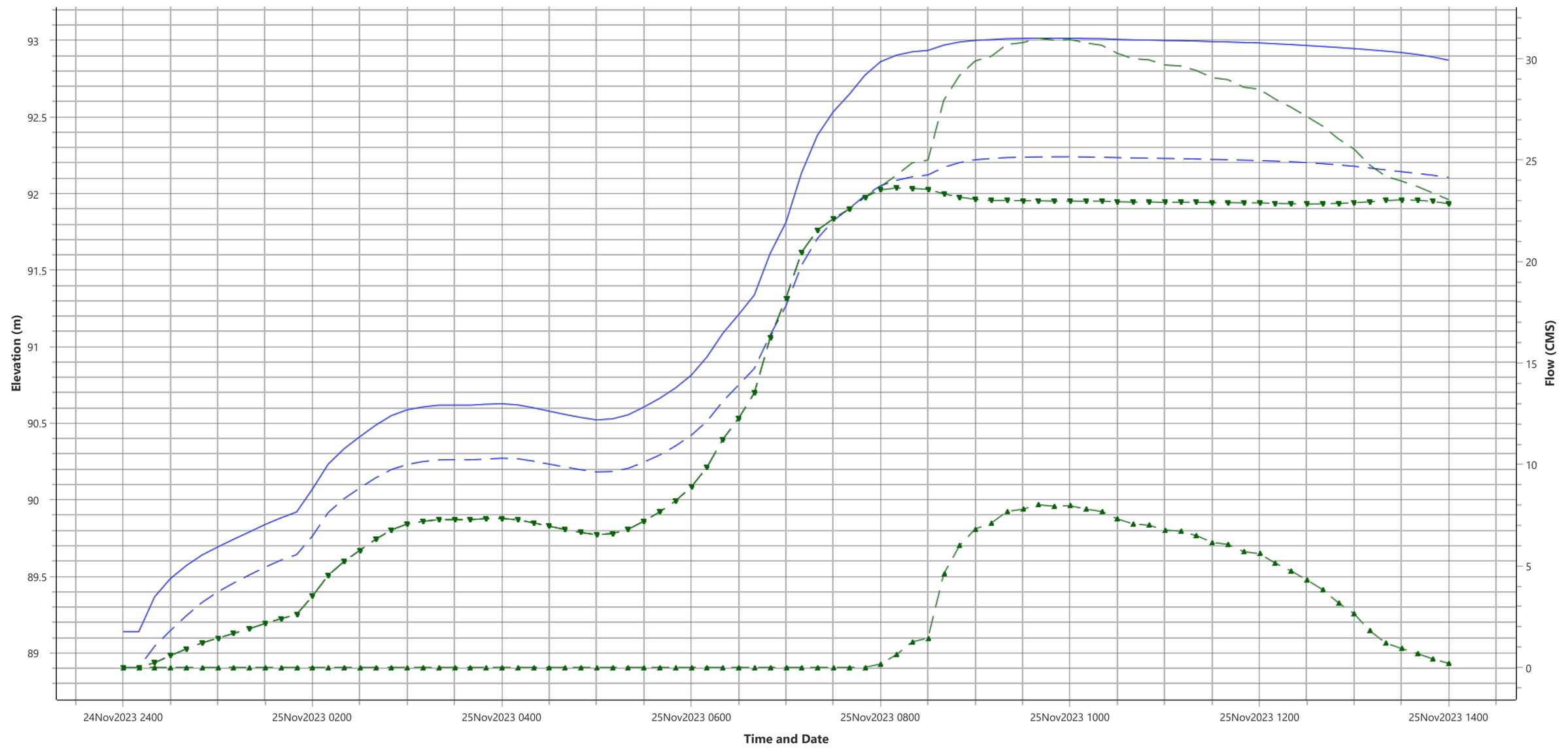
Plan: 5 - Butler - Timmins Conn: Hwy 2



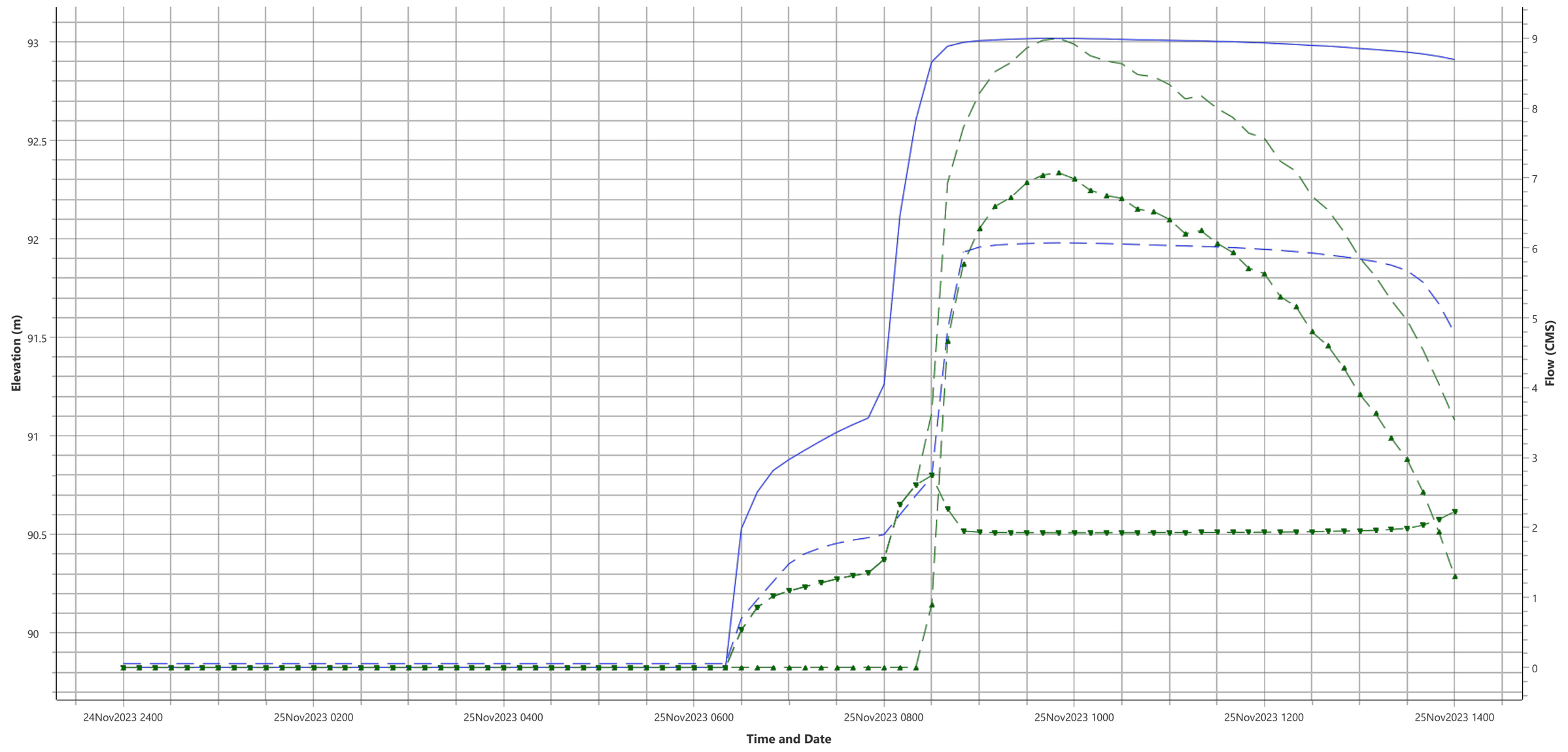
Plan: 5 - Butler - Timmins Conn: Monck St



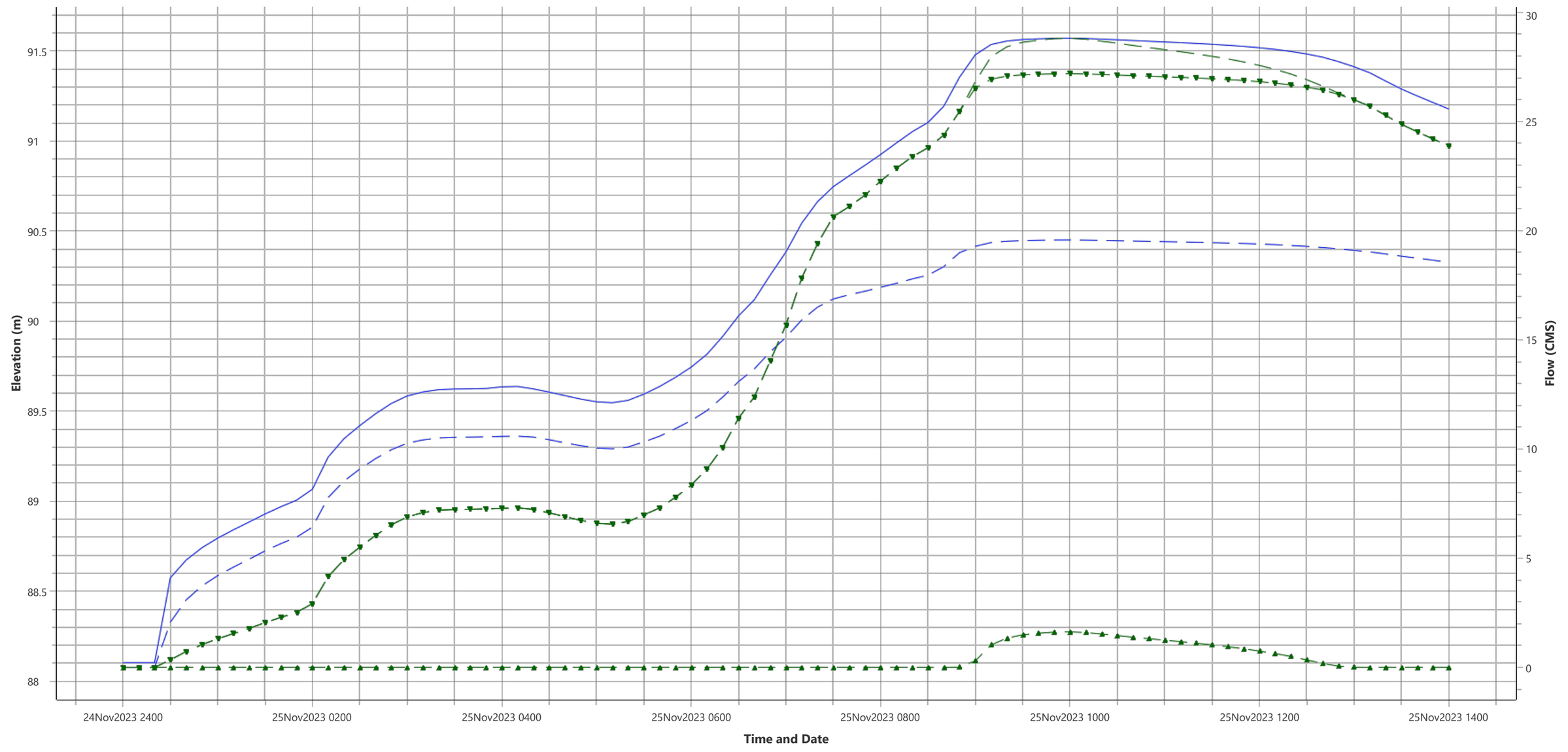
Plan: 5 - Butler - Timmins Conn: N. Railway (A)



Plan: 5 - Butler - Timmins Conn: N. Railway (B)

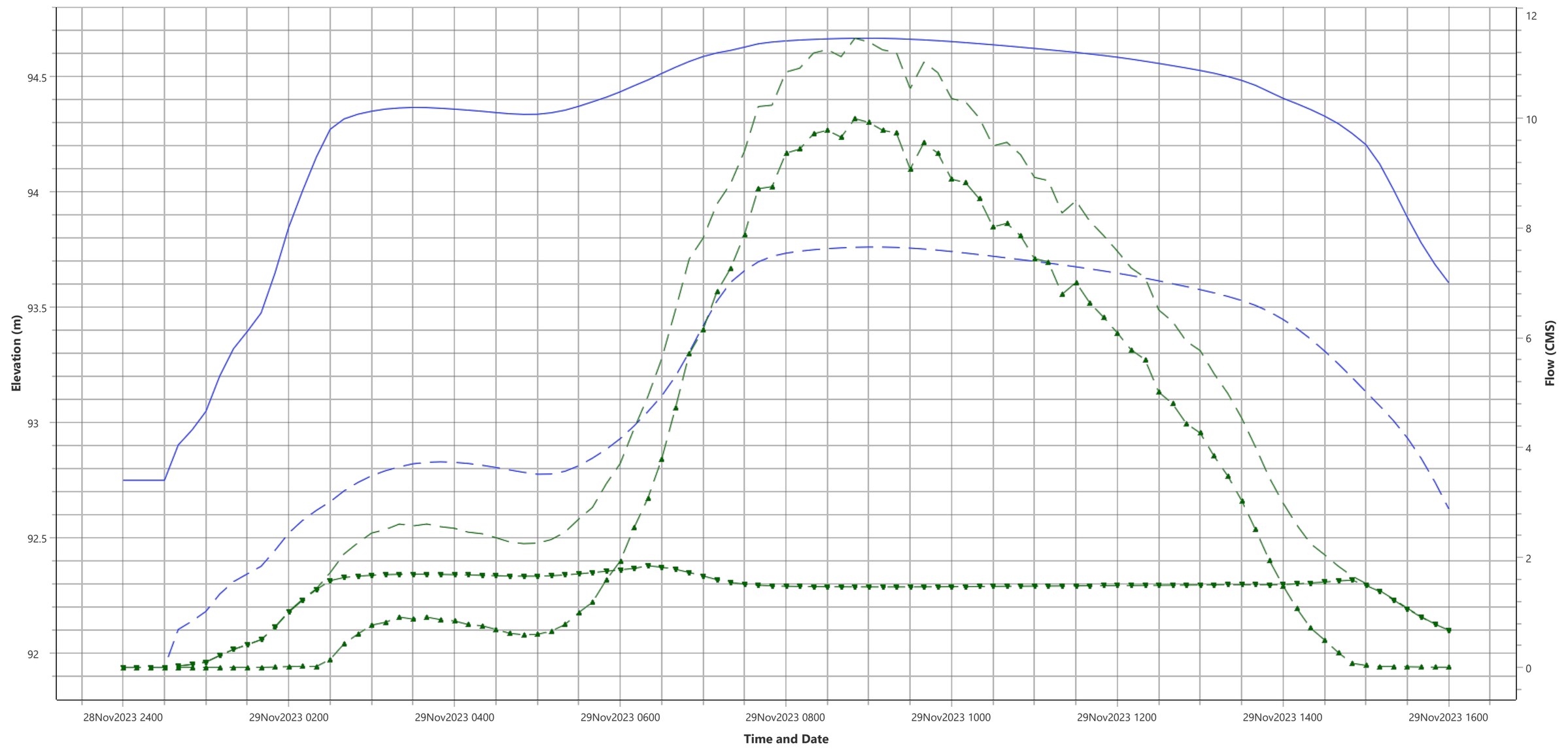


Plan: 5 - Butler - Timmins Conn: Ontario St (A)

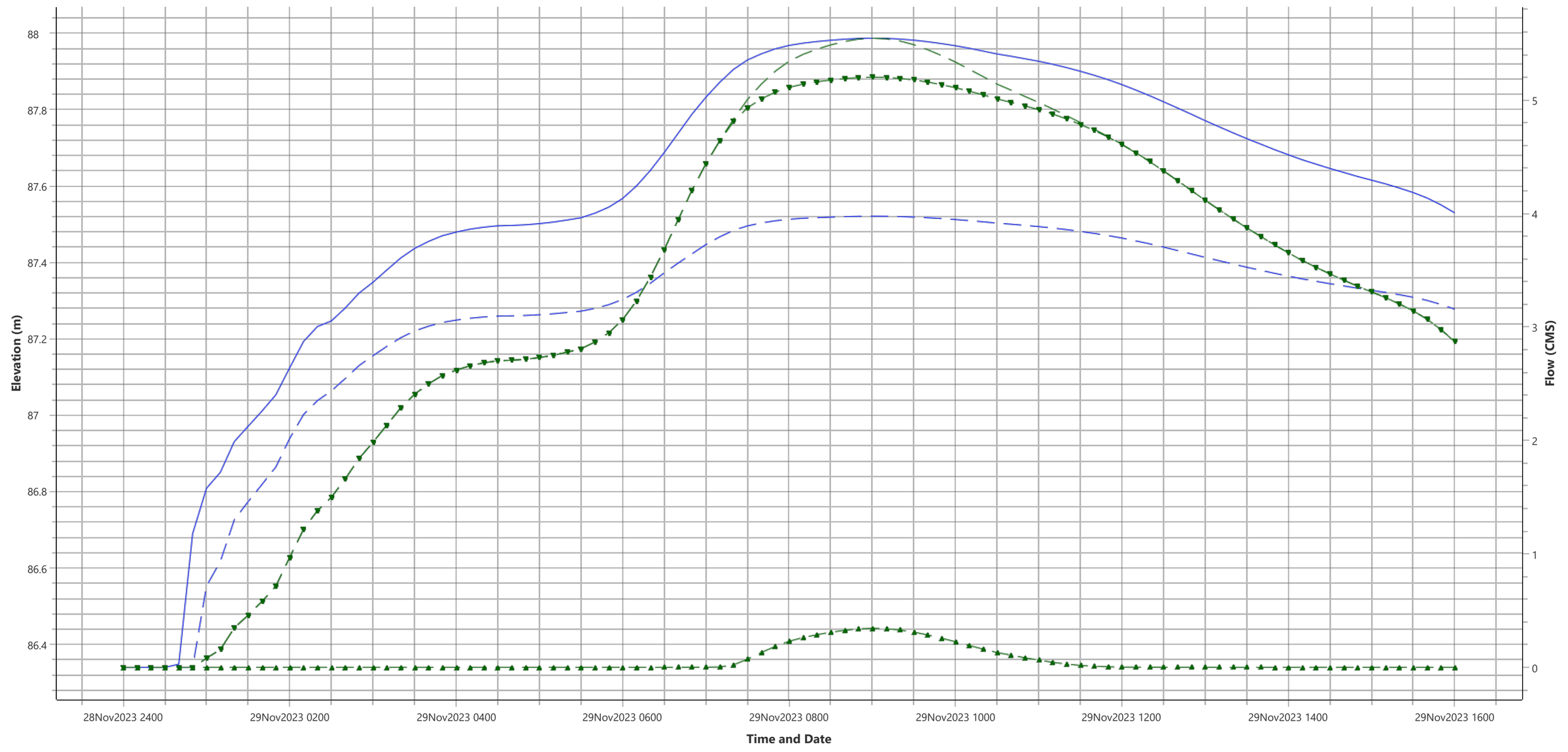


Appendix I-2:
Arena Creek - Culvert Crossing Stage and Flow Hydrographs

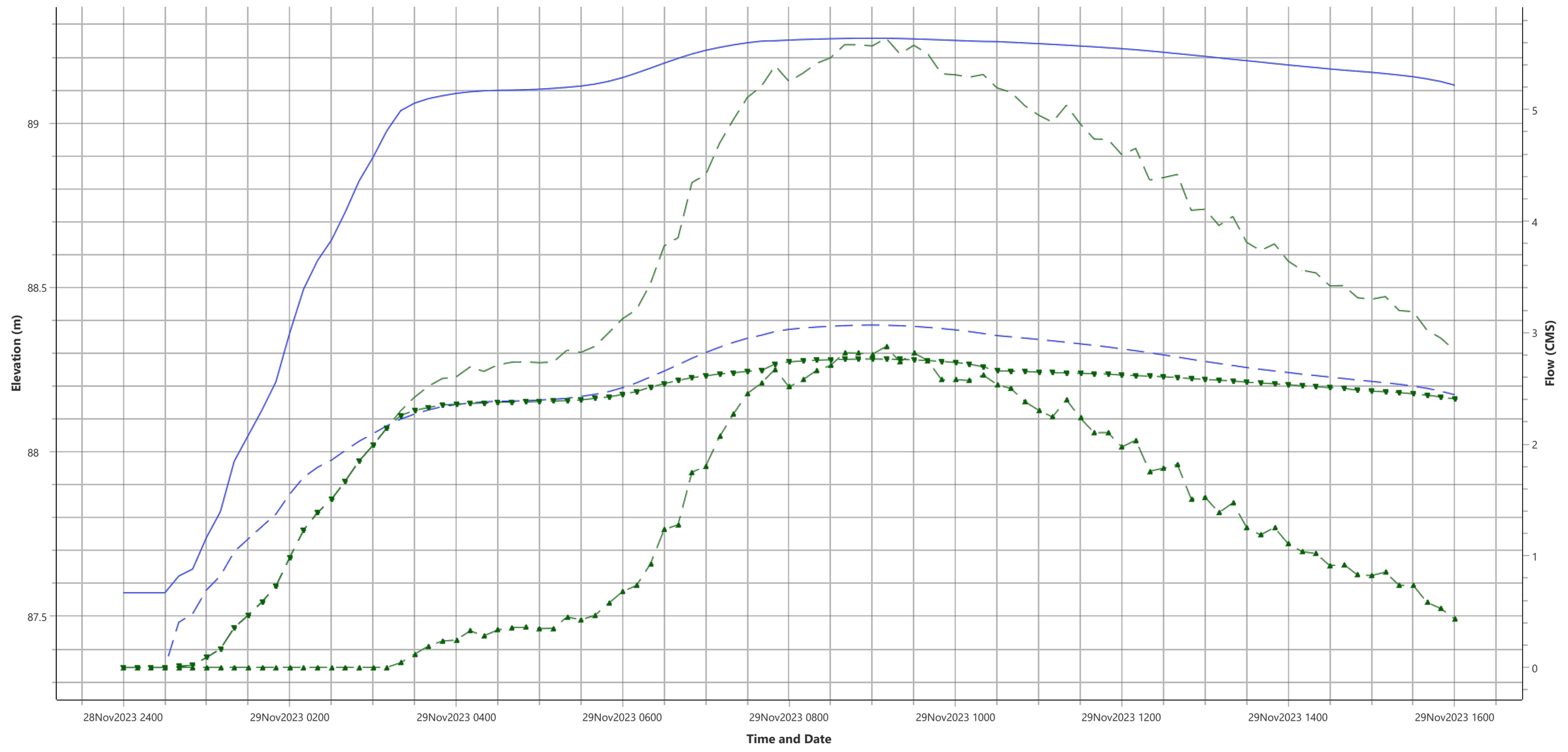
Plan: 4 - Arena Creek - Timmins Conn: Access Rd



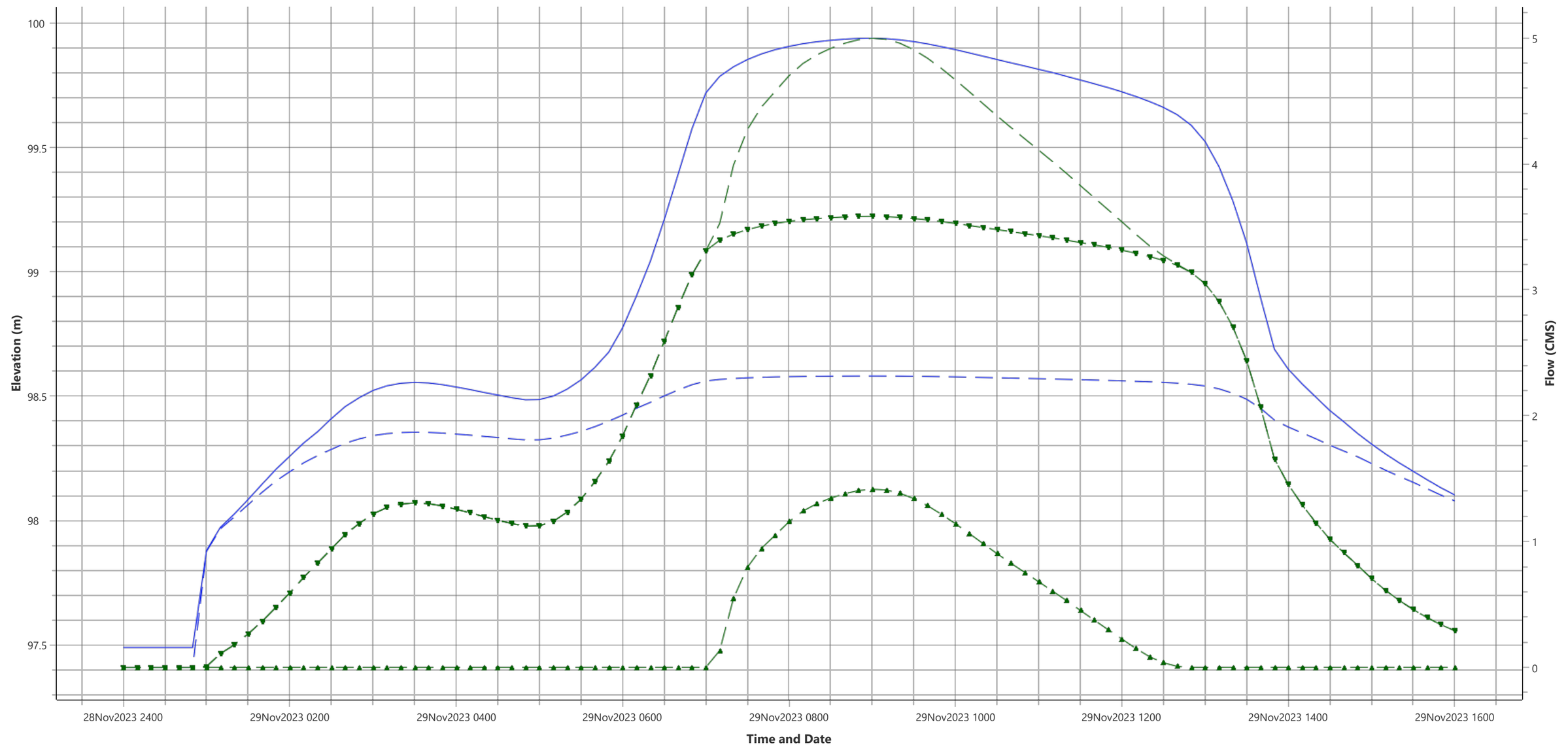
Plan: 4 - Arena Creek - Timmins Conn: Applewood Dr



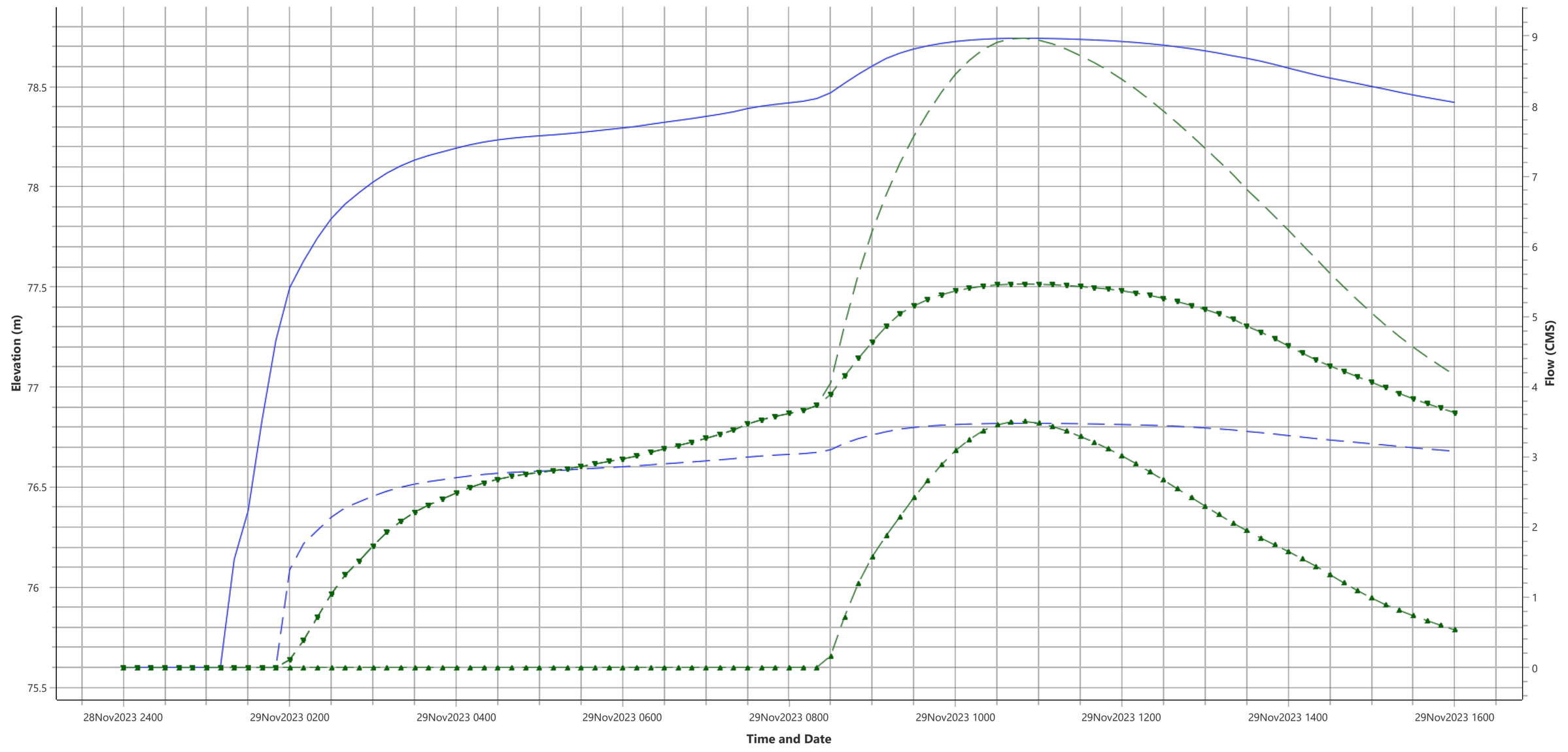
Plan: 4 - Arena Creek - Timmins Conn: Comm. Entrance



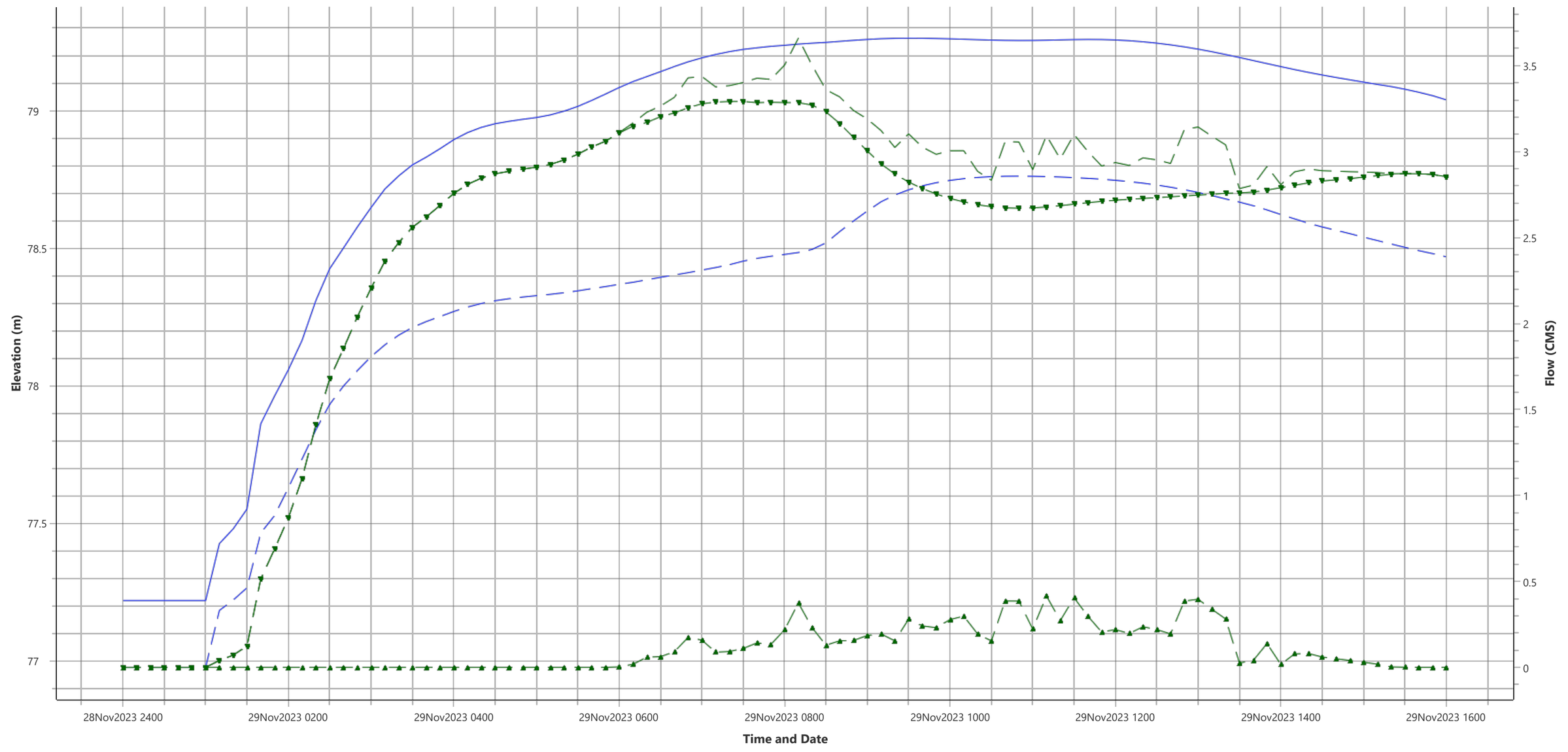
Plan: 4 - Arena Creek - Timmins Conn: Main St



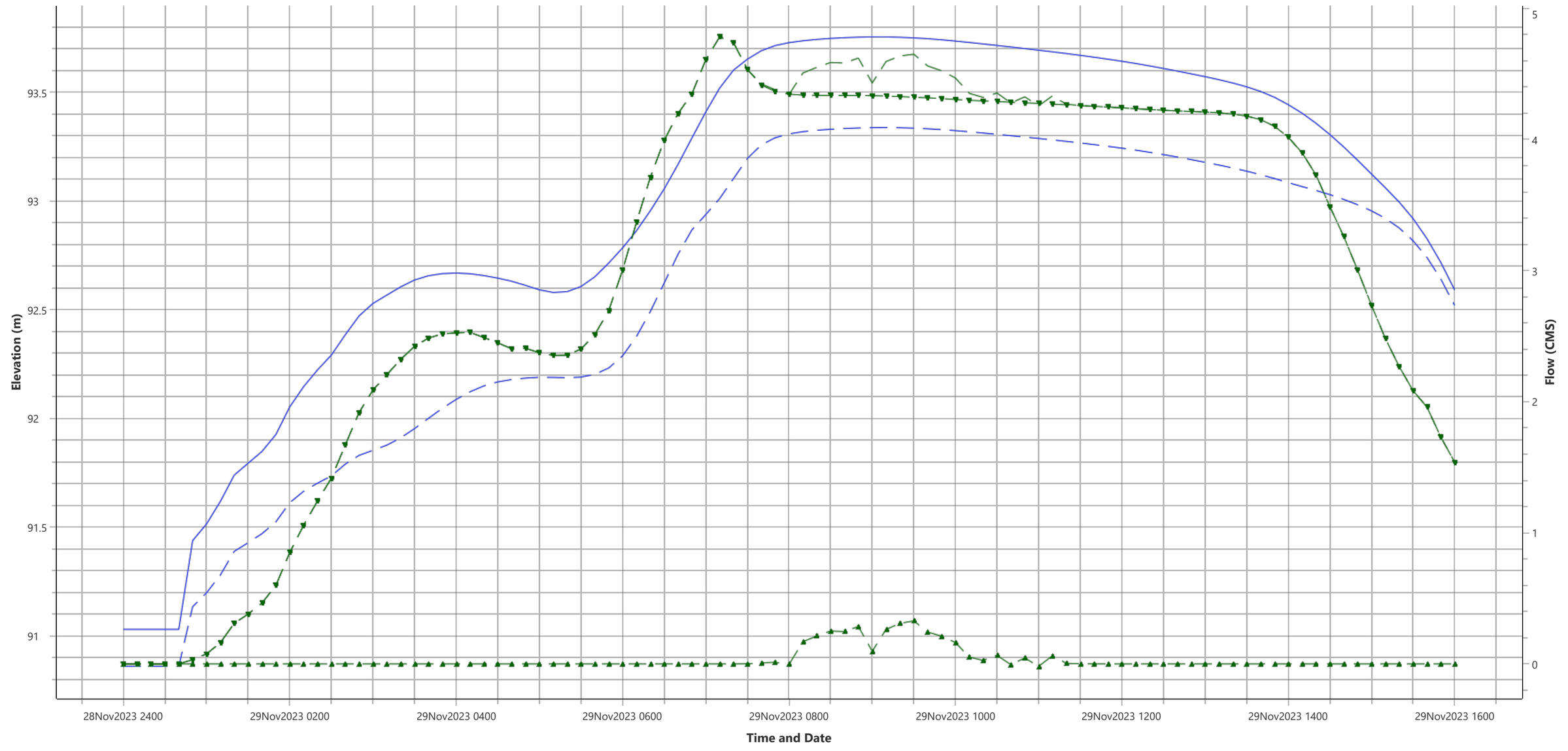
Plan: 4 - Arena Creek - Timmins Conn: SA2D Conn 1



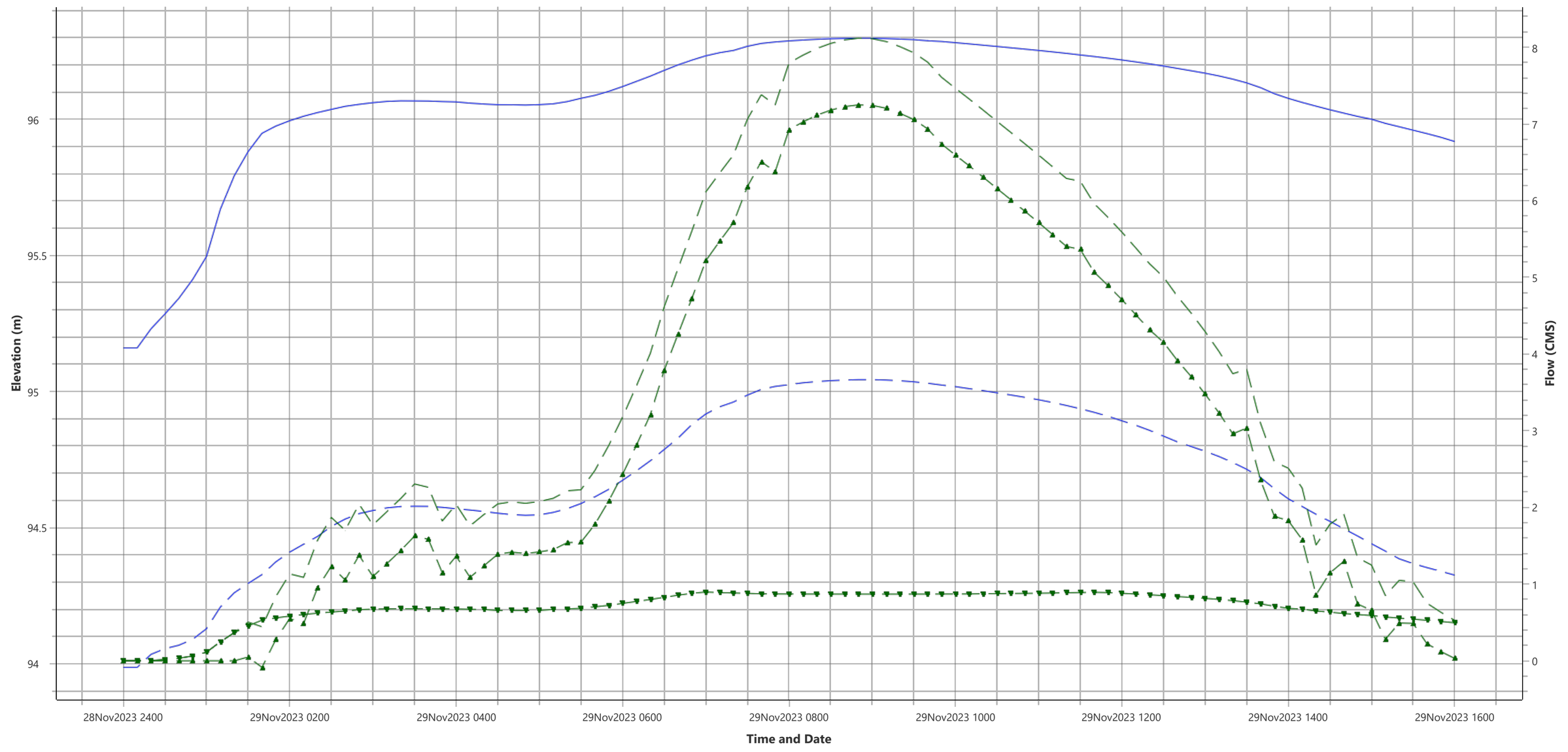
Plan: 4 - Arena Creek - Timmins Conn: Cty Rd 64 Ent.



Plan: 4 - Arena Creek - Timmins Conn: Arna N. Rlwy



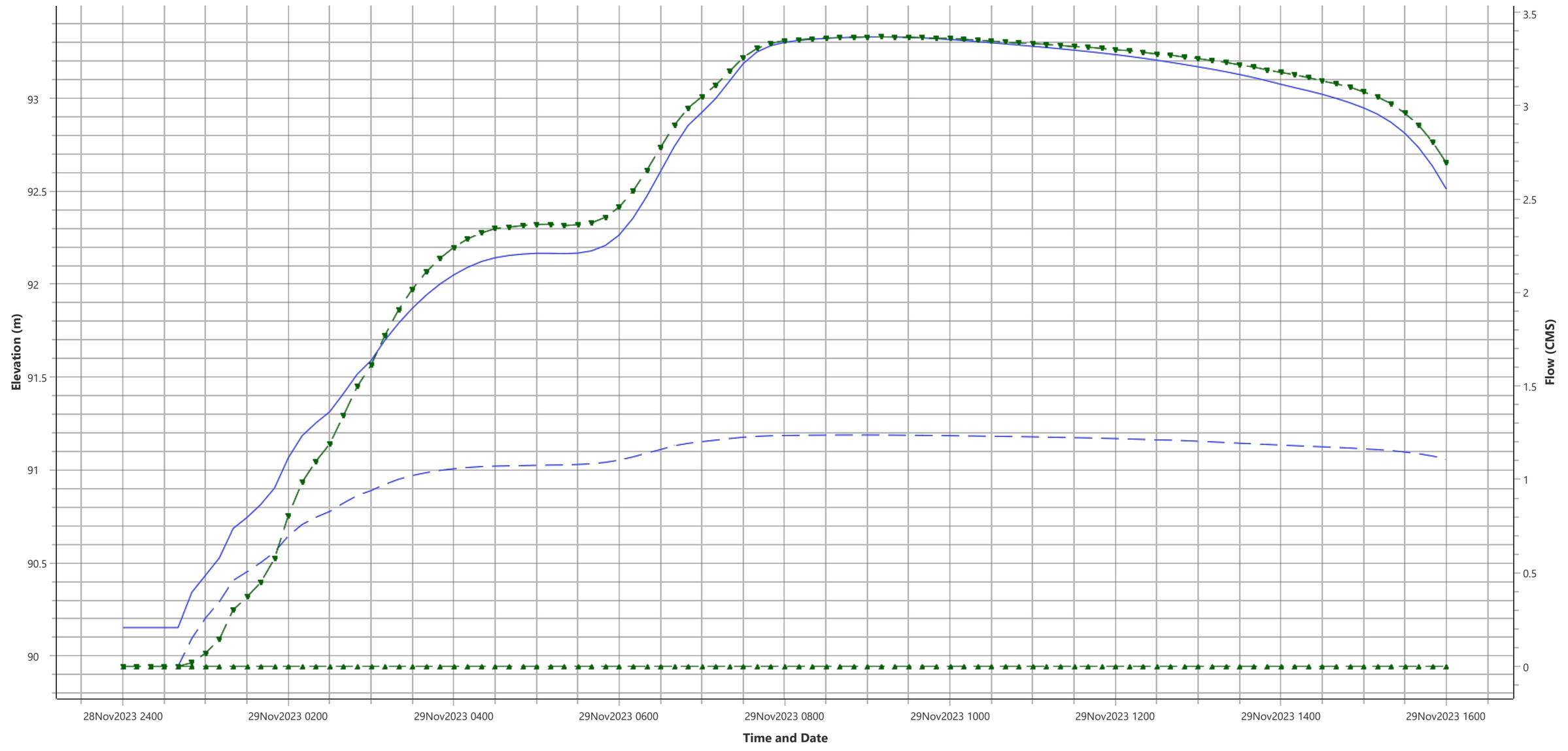
Plan: 4 - Arena Creek - Timmins Conn: Parkland Crsng



Legend

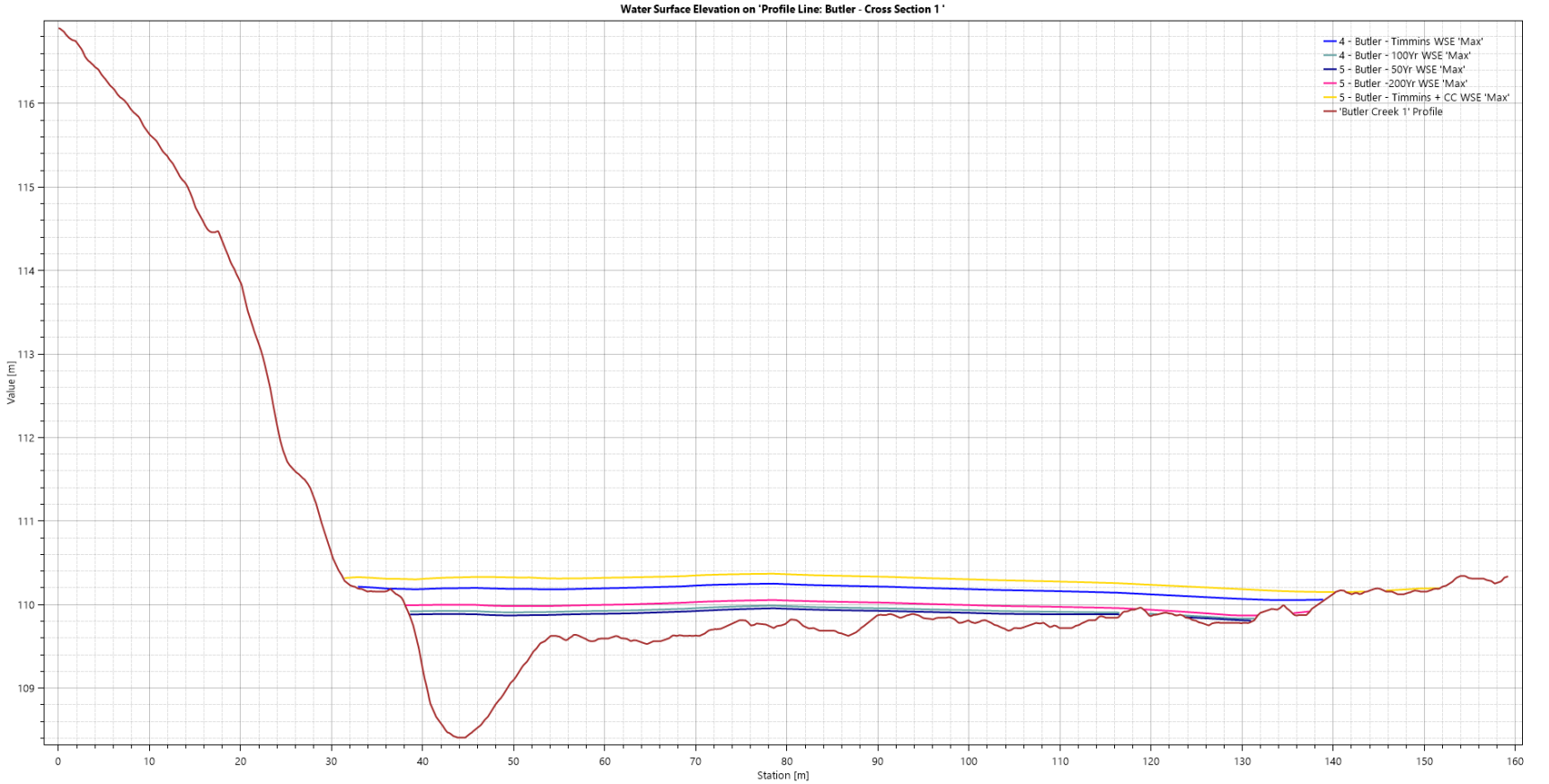
- Stage HW
- Stage TW
- Total Flow
- Weir Flow
- Total Culvert Flow

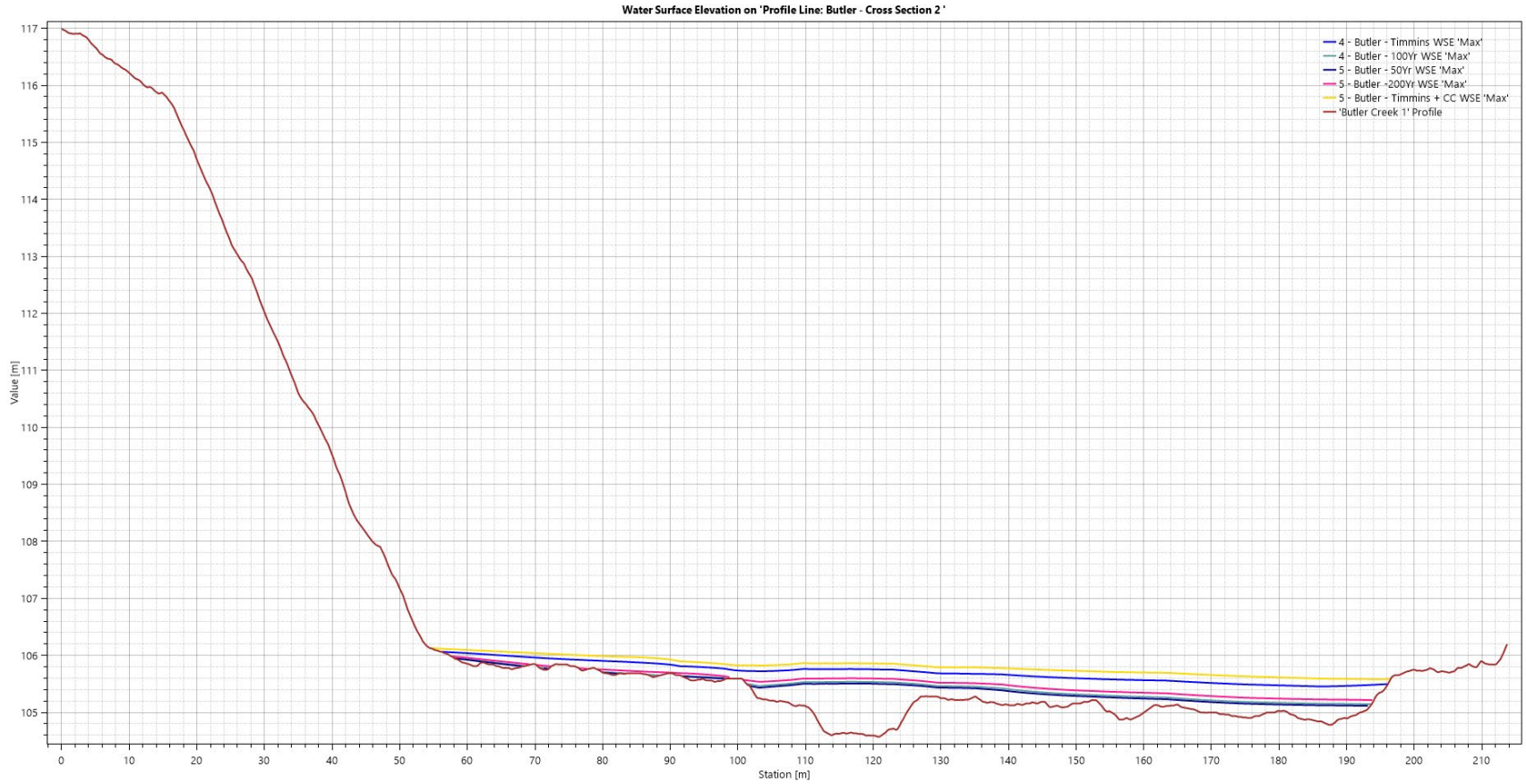
Plan: 4 - Arena Creek - Timmins Conn: Arena - S. Rlwy

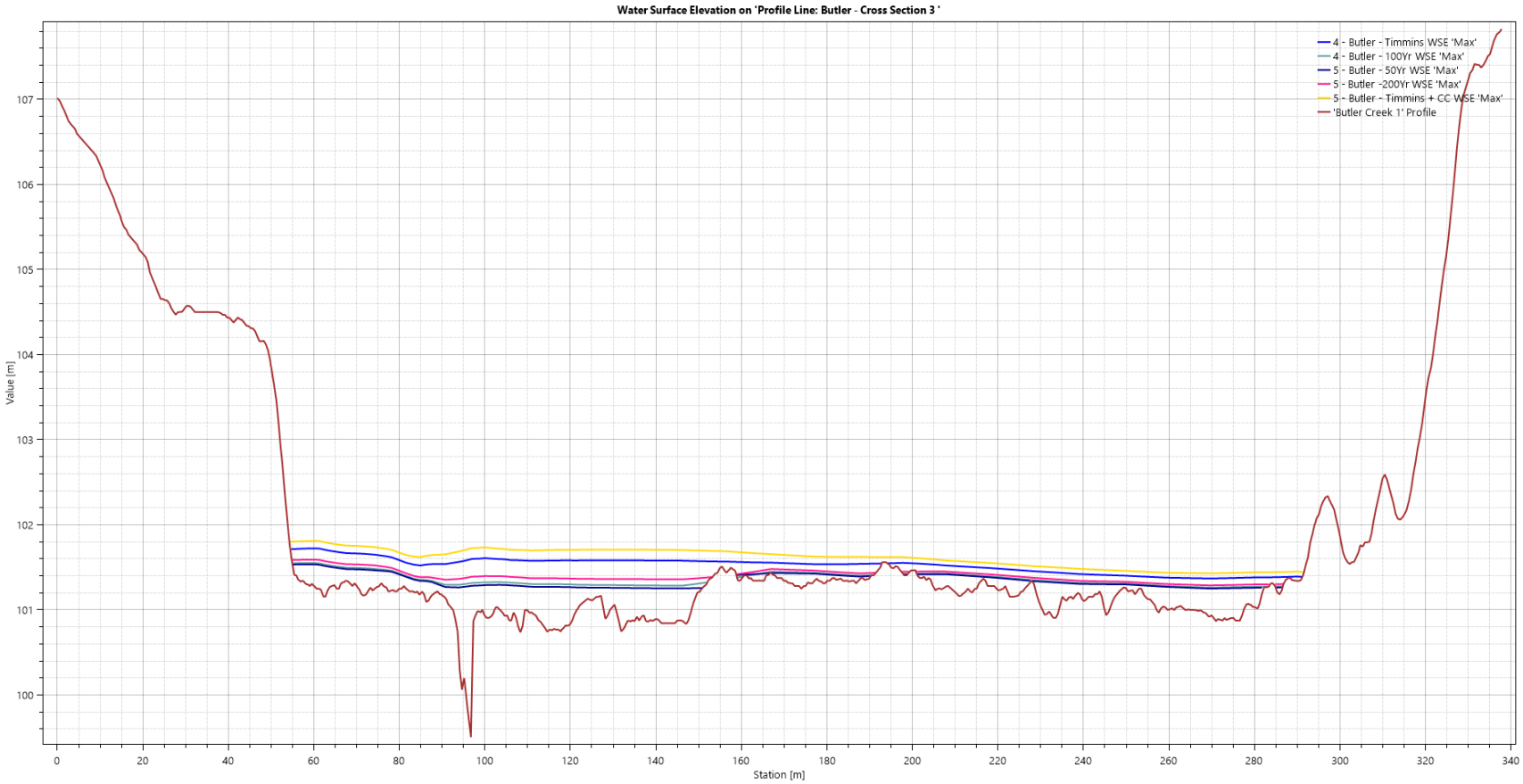


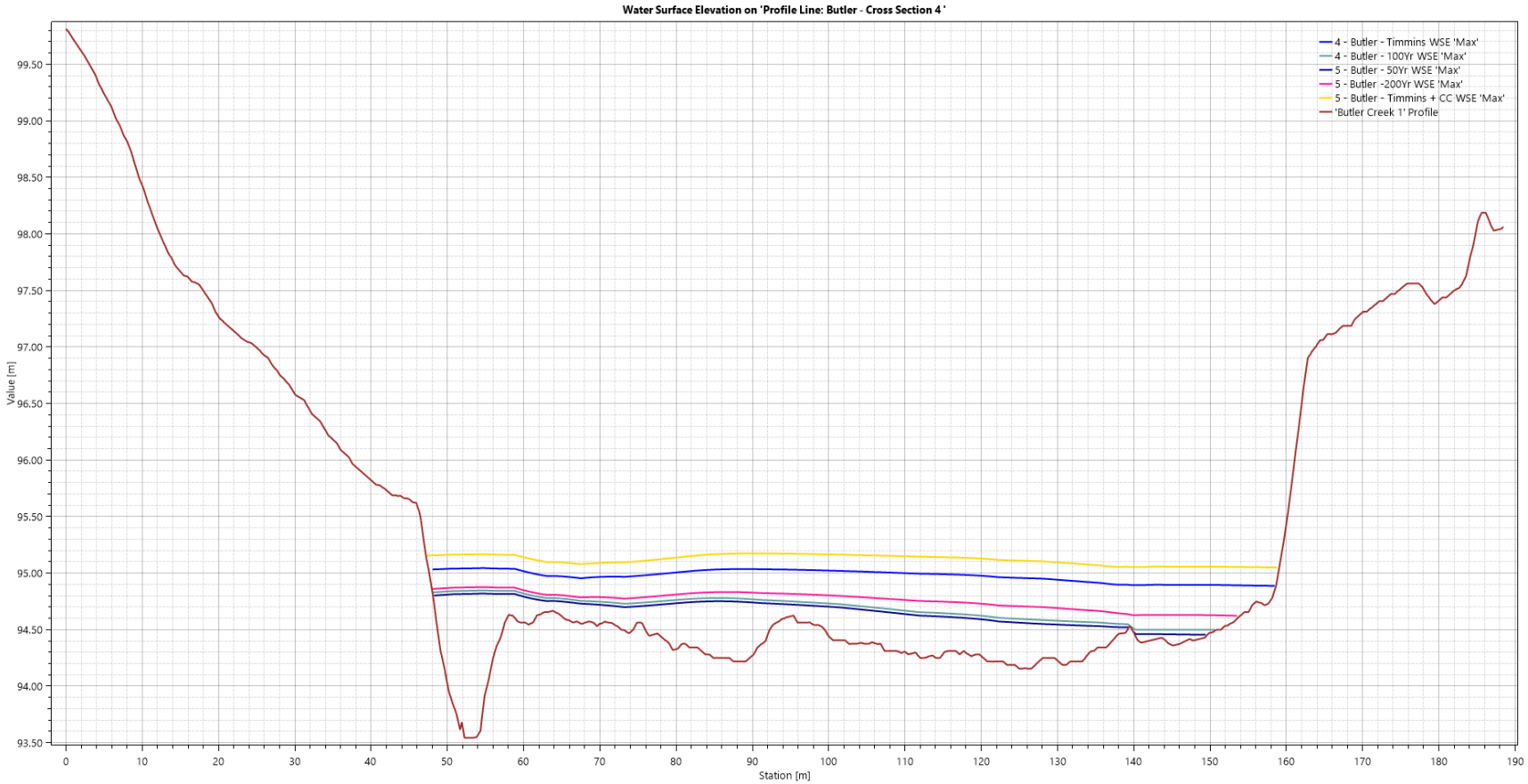
Appendix J:
Cross Section WSEL Plots for 50-, 100-, 200-Yr, Timmins & Timmins + Climate Change

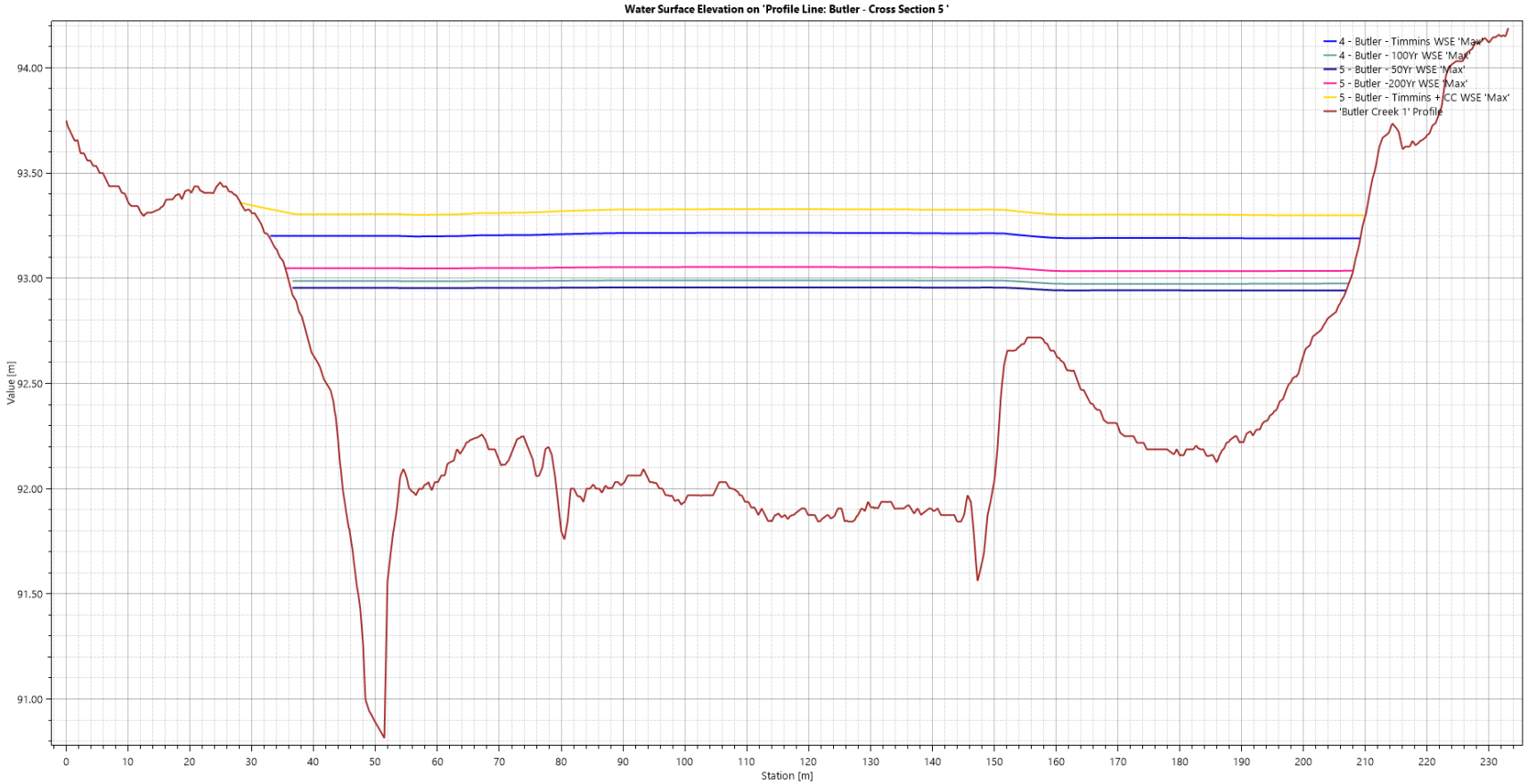
Locations of Cross Section Profile Plots:

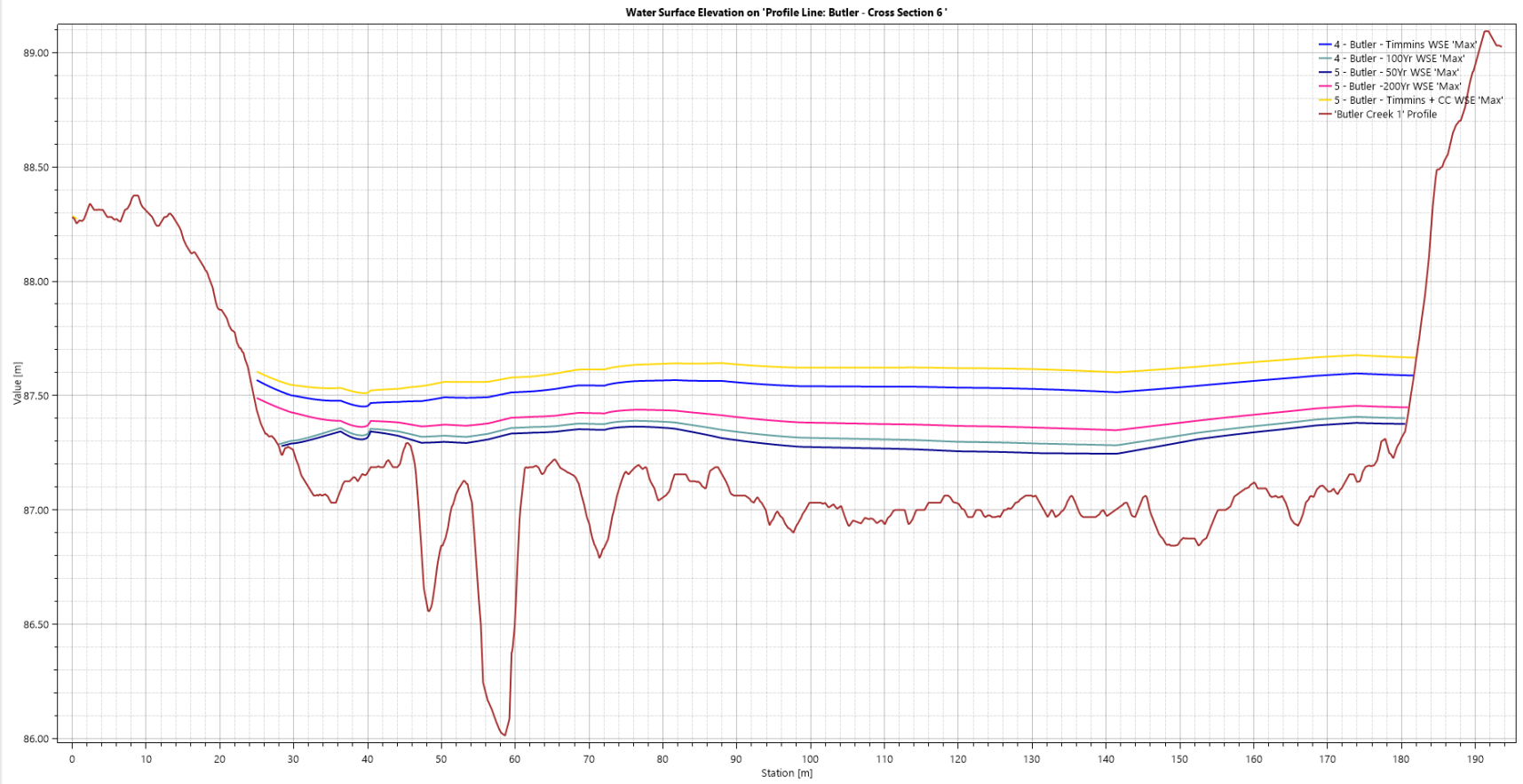

Water Surface Elevation on 'Profile Line: Butler - Cross Section 1 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
Station [m]
116
115
114
113
112
111
110
109
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160

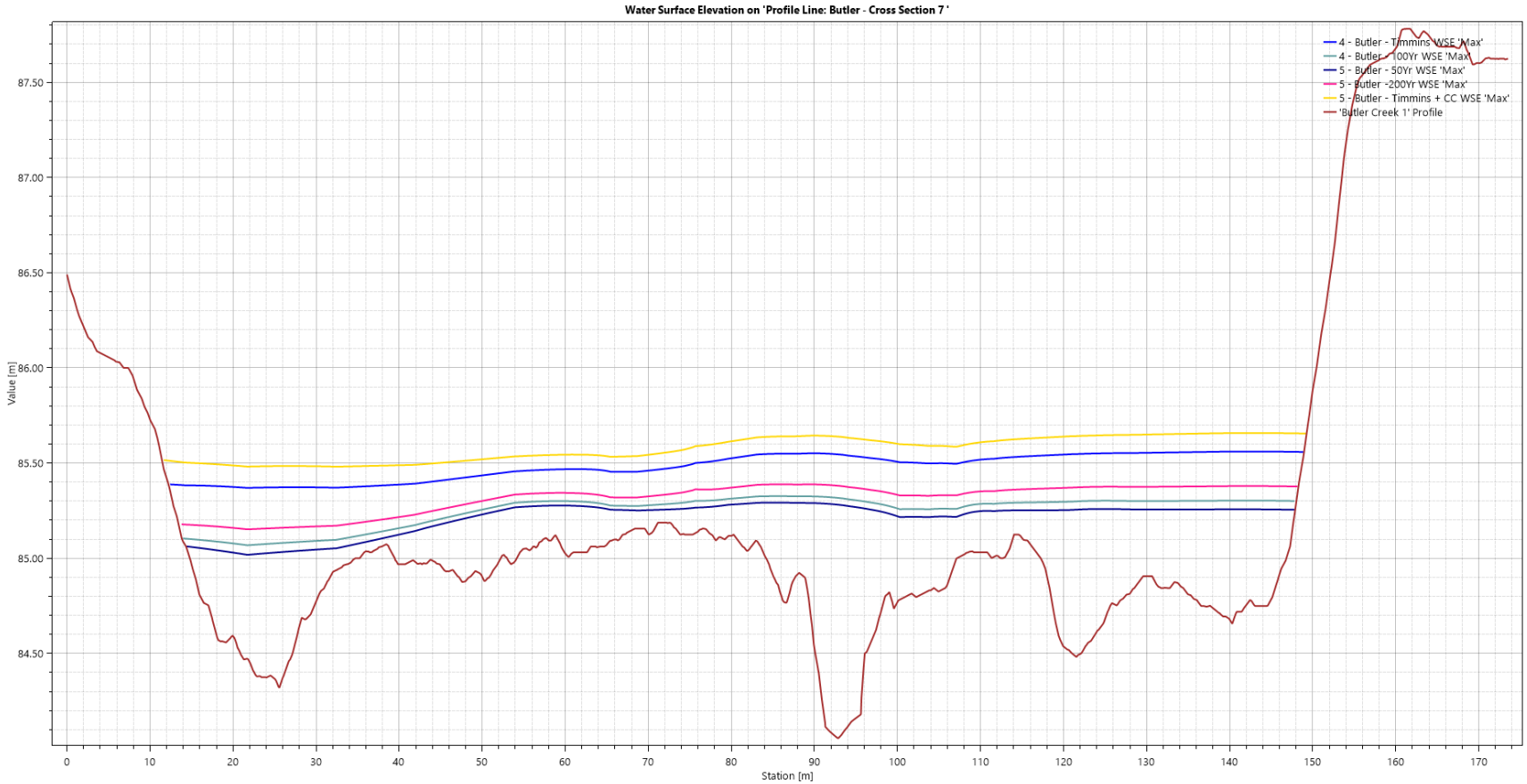

Water Surface Elevation on 'Profile Line: Butler - Cross Section 2 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
Station [m]
117
116
115
114
113
112
111
110
109
108
107
106
105
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210

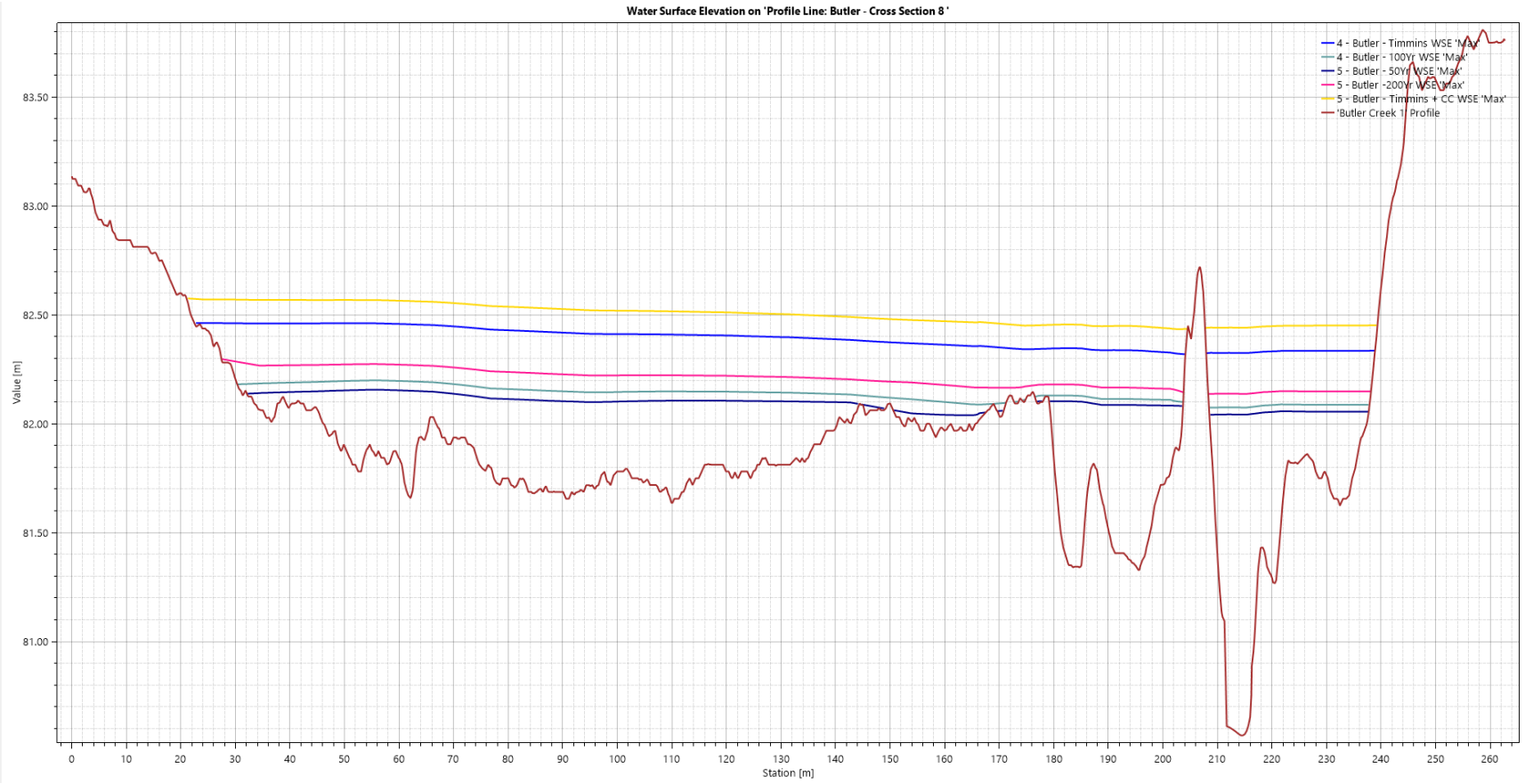

Water Surface Elevation on 'Profile Line: Butler - Cross Section 3 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
Station [m]
107
106
105
104
103
102
101
100
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340

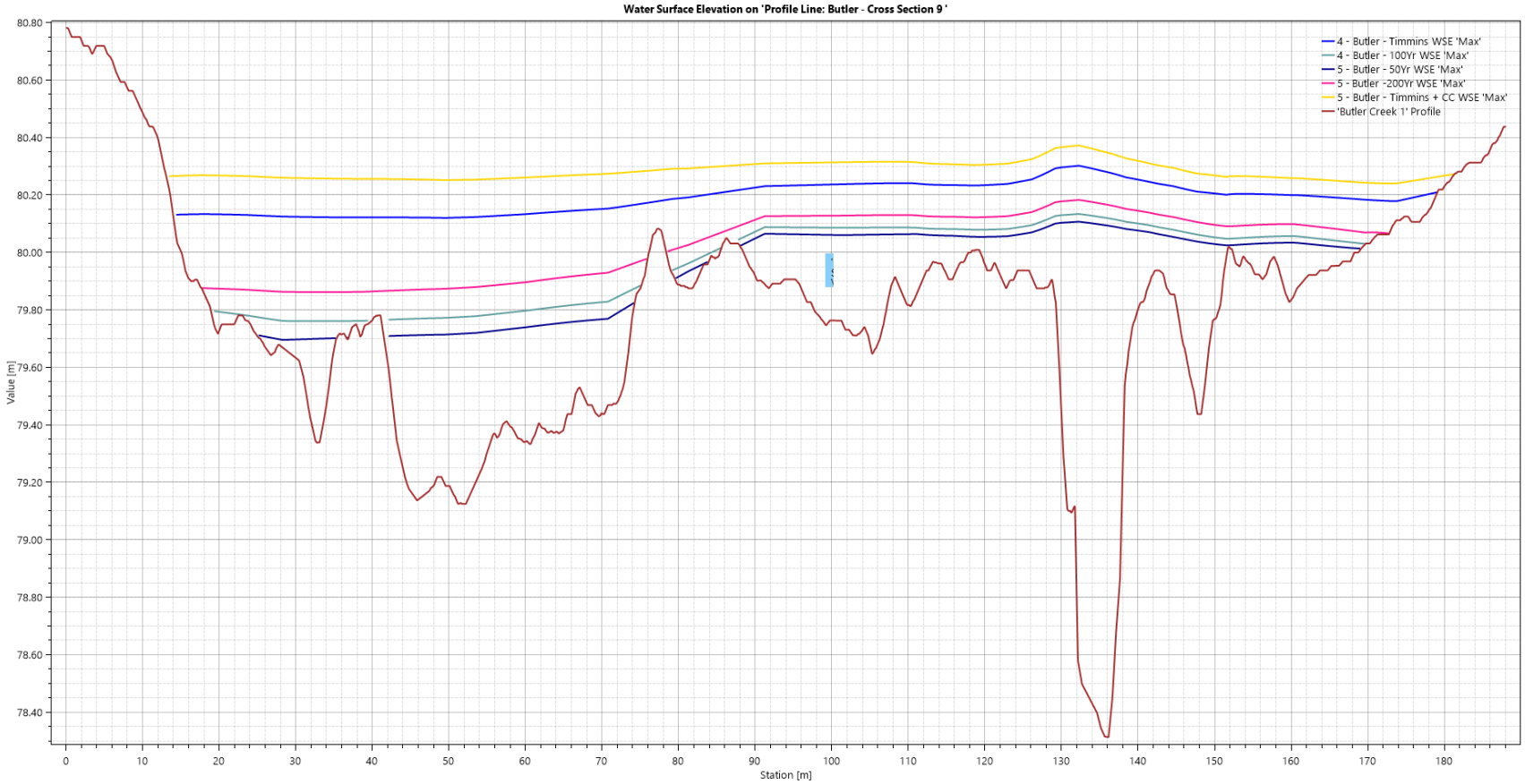

Water Surface Elevation on 'Profile Line: Butler - Cross Section 4 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
99.50
99.00
98.50
98.00
97.50
97.00
96.50
96.00
95.50
95.00
94.50
94.00
93.50
Station [m]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190

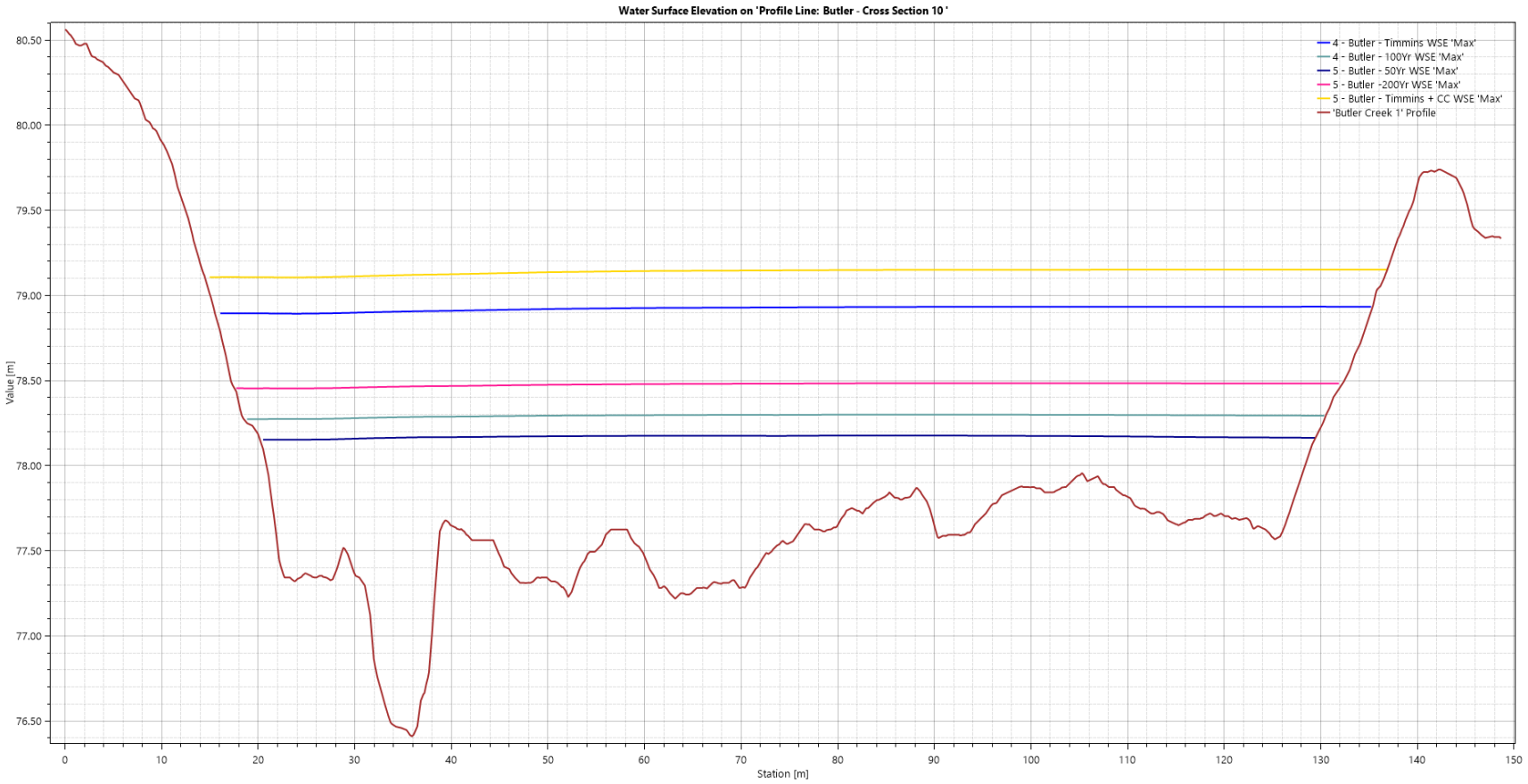

Water Surface Elevation on 'Profile Line: Butler - Cross Section 5 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
94.00
93.50
93.00
92.50
92.00
91.50
91.00
Station [m]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230


Water Surface Elevation on 'Profile Line: Butler - Cross Section 6 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
89.00
88.50
88.00
87.50
87.00
86.50
86.00
Station [m]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190


Water Surface Elevation on 'Profile Line: Butler - Cross Section 7 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
87.50
87.00
86.50
86.00
85.50
85.00
84.50
Station [m]
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170


Water Surface Elevation on 'Profile Line: Butler - Cross Section 8 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
83.50
83.00
82.50
82.00
81.50
81.00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
Station [m]


Water Surface Elevation on 'Profile Line: Butler - Cross Section 9 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
Station [m]
80.80
80.60
80.40
80.20
80.00
79.80
79.60
79.40
79.20
79.00
78.80
78.60
78.40
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180


Water Surface Elevation on 'Profile Line: Butler - Cross Section 10 '
4 - Butler - Timmins WSE 'Max'
4 - Butler - 100Yr WSE 'Max'
5 - Butler - 50Yr WSE 'Max'
5 - Butler -200Yr WSE 'Max'
5 - Butler - Timmins + CC WSE 'Max'
'Butler Creek 1' Profile
Value [m]
Station [m]
80.50
80.00
79.50
79.00
78.50
78.00
77.50
77.00
76.50
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150