CITY OF VAUGHAN INTEGRATED URBAN WATER PLAN

FUNCTIONAL SERVICING STRATEGY REPORT

Vaughan Metropolitan Centre (VMC)

Consolidated Final Report
June 2024

STATEMENT OF QUALIFICATIONS AND LIMITATIONS

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June, 2024 **VAU19-0018**

City of Vaughan
2141 Major Mackenzie Dr W
Maple, ON L6A 1T1

Attention: Michael Frieri

RE: City of Vaughan Integrated Urban Water Plan- Vaughan Metropolitan Centre(VMC) Consolidated FSSR Report

Civica Infrastructure Inc. is pleased to submit the following report. The Integrated Urban Water Plan is comprised of the main Environmental Assessment Report and a series of Functional Servicing Strategy Reports of which this is one. These reports focus on specific development areas and provide information to facilitate more comprehensive servicing planning direction for redevelopment projects in these designated community growth areas.

This report contains the following four volumes being Background Information (Vol. 1), Water Servicing (Vol. 2), Wastewater Servicing (Vol. 3), and Stormwater Servicing (Vol. 4).

Sincerely,

CIVICA INFRASTRUCTURE INC.

Ilmar Simanovskis, P.Eng, MBA
Project Manager

Civica Infrastructure Inc. • 330 Rodinea Road, Unit 3, Vaughan, Ontario, Canada, L6A 4P5 • 905-417-9792 | www.civi.ca | info@civi.ca

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FUNCTIONAL SERVICING STRATEGY REPORT

Vaughan Metropolitan Centre (VMC)

Volume 1 – Background
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Vol 1 Background Report

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CIVICA INFRASTRUCTURE INC.

Ilmar Simanovskis, P.Eng, MBA
Project Manager

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1.0 Introduction

1.1 Background

Volume I Background Report for the Vaughan Metropolitan Centre (VMC) Functional Servicing Strategy Report (FSSR) provides the background information of the study area. It characterizes the existing and proposed land uses and developments identified in the documentation review that included relevant information such as technical documents, studies, guidelines and Master Plans prepared by the municipality, conservation authority and private agencies.

1.2 Study Area

The Vaughan Metropolitan Centre (VMC) study area is comprised of mixed-use development and vacant lands centred on the Hwy 7 corridor and designated with the goal of becoming a mid-rise, mixed use, vibrant community that is transit oriented, and pedestrian friendly. The study area has the following characteristics:

1.2.1 Secondary Planning Area

The VMC Plan is the secondary plan for the Vaughan Metropolitan Centre with the most recent version being the May 2021 consolidation that has been partially approved by the Ontario Municipal Board. The core area is approximately 190 ha. This document establishes the context, planning framework and policies that will guide development in this are for the next 25 years. The secondary plan identifies policies for green initiatives including naturalization of stormwater facilities, local hydrological system will be designed to minimize waste and run-off and maximize positive impacts on the natural environment, and Low Impact Development measures will be encouraged for all future developments.

1.2.2 Expanded VMC Boundary Areas

Two additional areas have been identified that increase the area of the VMC secondary plan. The first is the North Expanded Area bounded by Portage Way and extending from the Western boundary limit to just East of Jane Street and consists of 31.34 ha. The second is the Southeast Expanded Area and it completes the southeast corner up to Creditstone Road and includes 56.12 ha.

1.2.3 Major Transit Station Areas

The VMC study area include three priority transit areas which are:

- PMTSA 54-This is Commerce BRT Station which has a gross area of 71.40 ha and a density target of 350 people and jobs per ha.
- PMTAS 67- Vaughan Metropolitan Centre Subway Station which has a gross area of 110.76 ha and a density target of 400 people and jobs per ha.
- PMTSA 56- Creditstone BRT Station which has a gross area of 52.08 ha and a density target of 300 people and jobs per ha.

The areas designated for intensification will be analyzed for the capacity needs for water, wastewater, and stormwater infrastructure and is presented in **Error! Reference source not found.**.

1.3 Objective of Volume 1- Background Report

The objective of this Volume 1 background report is to provide the background planning and area information, and the assumptions used to develop the water, wastewater, and stormwater models. In this report the basic assumptions and parameters used under the existing conditions used in the Visual Otthymo (VO), InfoWater and InfoWorks models will be outlined. Also, population growth for the existing, 2028, 2036, 2041, and 2051 time horizon will be assessed in comparison to land use changes in the study area. Overall, this report will provide the background understanding of this area and how it will be applied to propose the future servicing conditions.

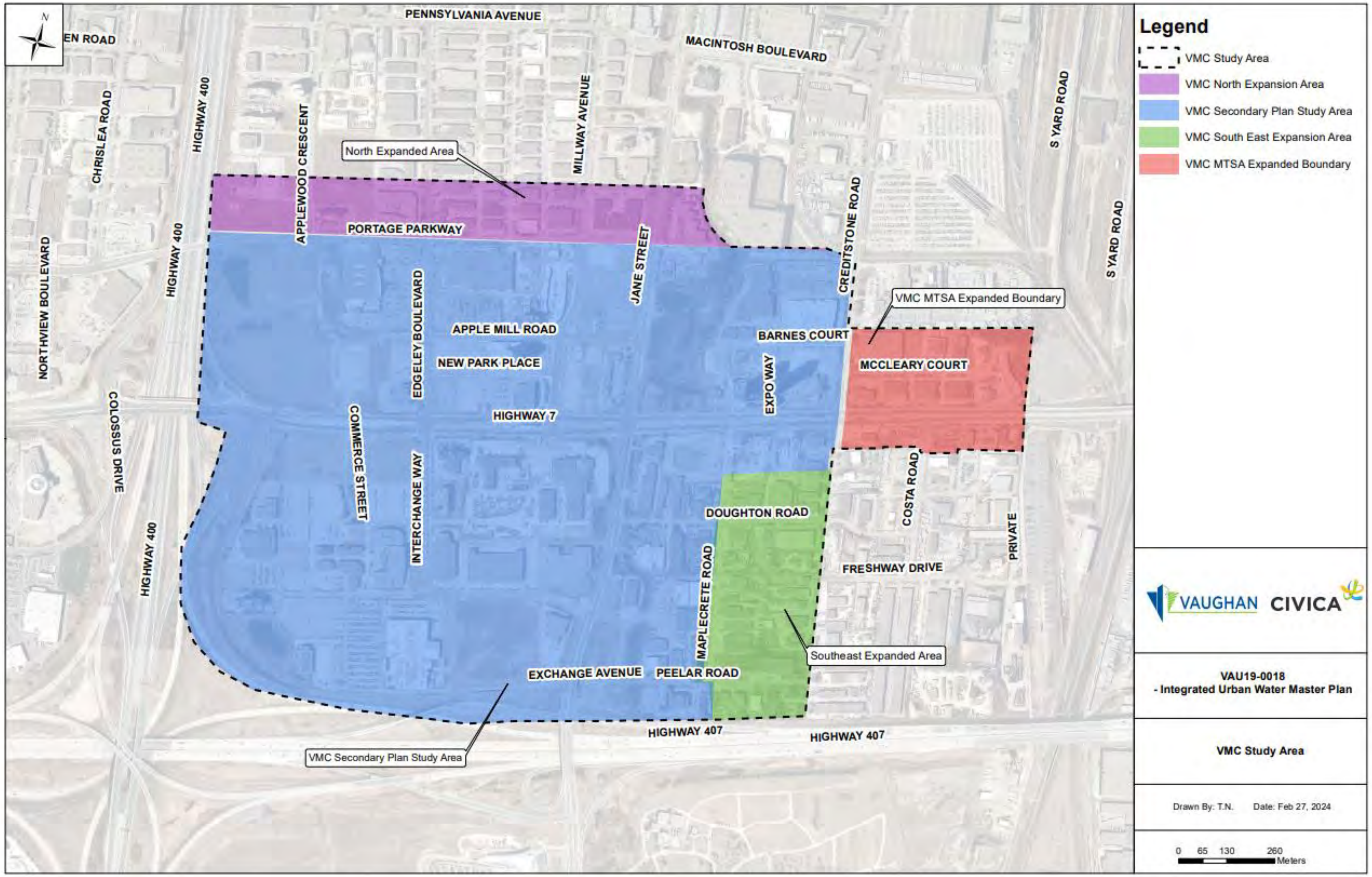

Figure 1-1: Study Area

2.0 Background Review

2.1 General Documents

The background review completed as part of this FSSR includes the review of the following documents:

- 2014 Provincial Policy Statement, Under the *Planning Act* (MMAH)
- A Place to Grow – Growth Plan for the Greater Golden Horseshoe (Province of Ontario, 2019)
- Black Creek Stormwater Optimization Study – Municipal Class Environmental Assessment Master Plan Report (Phases 1 & 2), (AECOM, 2012)
- City of Vaughan Design Criteria – Water, Sanitary, Stormwater (City of Vaughan, 2018)
- City of Vaughan Official Plan (City of Vaughan, 2010)
- Green Directions Vaughan | 2019 Community Sustainability Plan (City of Vaughan, 2019)
- MOE Stormwater Management Practices Planning and Design Manual (Ministry of Environment, 2003)
- Stormwater Management Criteria (Toronto and Region Conservation Authority, 2012)
- Stormwater Management Report – 2748355 Canada Inc. – Buetel Goodman Real Estate Inc. – The Interchange – Phase 1 (WHY 400/407), (GM Sernas and Associates, 1997)
- Stormwater Management Report -Edgeley Pond and Park (City of Vaughan, 2019)
- York Region Long Term Water Conservation Strategy (York Region, 2016)
- York Region One Water Action Plan (York Region, 2017)
- York Region Water and Wastewater Master Plan (York Region, 2016)
- Vaughan Metropolitan Centre – Black Creek Renewal Class EA -Environmental Study Report (Municipal Infrastructure Group, 2018)
- Vaughan Metropolitan Centre Municipal Servicing Class Environmental Assessment Master Plan (City of Vaughan, 2012)

2.2 Site Specific Documents

The following background data for the VMC study area was also collected and reviewed as a part of this study:

- Existing and approved development applications since the 2012 VMC Municipal Servicing
- First Vaughan Development Limited – VMC West, Functional Servicing Report (SCS Consulting Group, 2018)
- Functional Servicing Reports (FSRs), Architectural Plans, Plan and Profile Drawings, etc. for the development applications since 2012 (where available and required)
- Sanitary Storage Capacity Report (Schaeffers Consulting Engineering, 2019)
- Stormwater Management Report – Edgeley Pond and Park – Vaughan Metropolitan Centre (WSP, 2019)
- Stormwater Retention Guideline-Vaughan Metropolitan Centre Southeast Quadrant (City of Vaughan, 2020)
- Topographic Surveys
- VMC Utility Servicing Report Version 5 (City of Vaughan, 2017)
- VMC Secondary Plan (City of Vaughan, 2020 Office Consolidation)
- VMC SW Quadrant-SWM Strategy (Stantec, 2020)

2.3 *VMC Infrastructure*

The information on the existing VMC study area infrastructure was provided by the City in GIS format which was used to model the existing water, wastewater, and stormwater service system. The City has provided Civica with the City-Wide water and wastewater models in InfoWater and InfoWorks ICM. The model has undergone a rigorous quality assurance and quality control (QA/QC) process to ensure accuracy and to reflect the current conditions of all newly serviced developments since June 2018. The level of service of the existing infrastructure is documented in further detail in each of the corresponding water, wastewater, and stormwater FSSR reports.

3.0 Description of the Project Area

3.1 Planning Goals

The VMC study area planning, and development is governed by the Provincial Policy Statement (PPS), the Growth Plan for the Greater Golden Horseshoe (Places to Grow), the York Region Official Plan and the City of Vaughan Official Plan (2010). The growth plan anticipates an increase of 25,000 residents and 11,500 jobs. The VMC Secondary Plan is currently undergoing a review and update. At the request of the City, an area of 80 m^2 was assumed for the typical unit size, 2.5 persons per unit was assumed, and a trend ratio of 1.61 was used for calculating the future VMC study area population to accommodate the potential changes to the VMC Secondary Plan. Height and density assumptions were taken from the VMC Secondary Plan and servicing reports for existing development applications in the study area.

3.2 Existing and Approved Development Applications Since 2012

The City tracks its active and archived planning documents online through their Vaughan Planit portal at https://maps.vaughan.ca/planit/. As planning information is constantly changing, viewing this data portal is recommended to gain understanding of the status of any planning documents related to this report.

Relevant information and status of various planning documents have been referenced and incorporating in the analysis and alternatives solution evaluations and where relevant have been identified in the various FSSR Reports.

3.3 Existing Land Use

Existing land use in the VMC study area combines mix-use classifications ranging from residential, commercial, and office land use. This existing land use mapping was used to determine population and runoff coefficient assumptions for each parcel within the study area. Land use mapping in the VMC study area is shown in Figure 3-1.

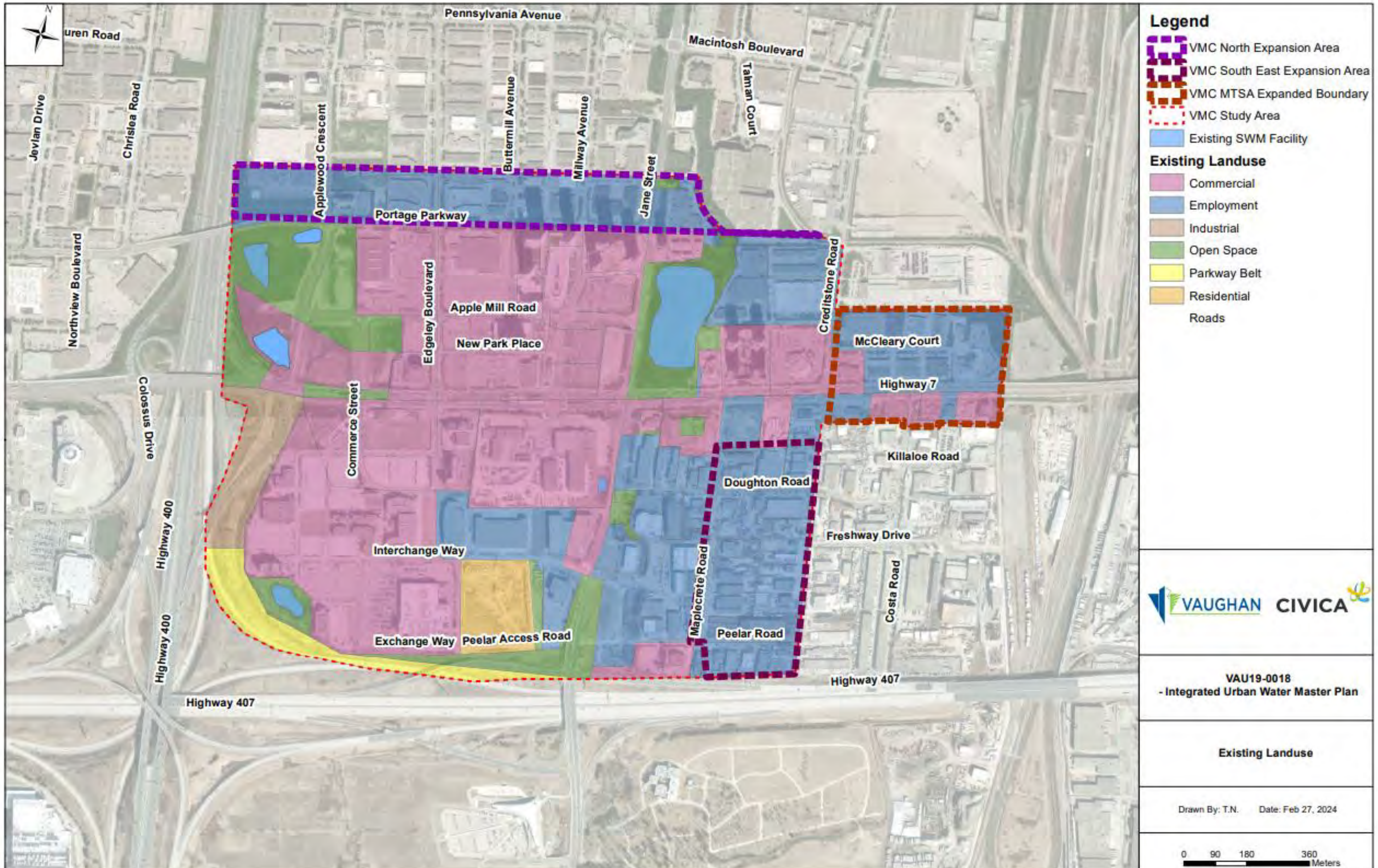

Figure 3-1 : Existing Land Use Mapping

3.4 Natural Environment

3.4.1 Fluvial Geomorphological Assessment

This fluvial geomorphological assessment was undertaken by GeoMorphix for this study and the full report is available as Appendix B of the Main Environmental Assessment Report. The following is a summary of the significant features and considerations for the Black Creek area of the Humber River Watershed of which this study area is located.

The VMC study area is located in the Black Creek sub-watershed which contributes to the Humber River watershed. The Black Creek sub-watershed has a tributary area of approximately 65km^2. Overall, the Black Creek sub-watershed is considered degraded, with local flooding, poor water quality, and excessive instream erosion (AECOM, 2012). The Municipal Infrastructure Group (TMIG) prepared the Vaughan Metropolitan Centre Black Creek Renewal Class EA in 2018 to identify a range of alternative solutions to reduce flooding and flood damage, improve water quality, and limit stream bank erosion in Black Creek within the VMC NE quadrant. The VMC Black Creek renewal study area and the preferred Black Creek Realignment are presented in Figure 3-2, Figure 3-3, and Figure 3-4 respectively.

3.4.2 Groundwater Resource Characterization

The groundwater assessment was undertaken by Banks Groundwater Engineering Limited, and the technical memo is available as Appendix B of the Main Environmental Assessment Report. This following is a summary of significant features and considerations for this study area.

The groundwater characteristics considered for the report are based on regulatory requirements for drinking water source protection and impact mitigation to groundwater resources. These stem from the studies and assessment reports prepared through the Credit Valley, Toronto Region, Central Lake Ontario (CTC) Source Protection Committee. These assessments identify locations and the nature of potential threats to sources of municipal drinking water supplies.

Most of the City of Vaughan is within the CTC region which completed this areas Source Protection Plan in December 2015. This was after to last City of Vaughan (2010) Official Plan; however, requirements as defined thought local and regional planning approvals are required to consider the guidance of the Source Protection Plan.

Stormwater management and the discharge of stormwater are considered a significant threat to groundwater resources where they are within well head protection areas A, B, or E based on specific criteria outlined in the CTC reports. Further, Significant Groundwater Recharge Area and Well Head Protection Quantity Areas are also relevant to stormwater management where is it important to maintain pre-development recharge rates while minimizing the risk of threats to groundwater quality. These requirements are to be considered during development design and Infiltration Management Plans. Significant Groundwater Recharge areas encompass over half of the City wide area.

Highly vulnerable Aquifers are also identified within the CTC reports and are areas where the relative amount of protection provided by the overlaying geological materials decreases. These areas are scored on a number of factors including the type, thickness, composition and characteristics of the overlaying material. Higher risk is associated with areas where surface water has a higher potential to infiltrate to the aquifer and thereby impact water quality.

This study area is not within a Significant Groundwater Recharge Area and therefore not subject to the Source Protection Plan policies. The study area is not within an area that has Highly Vulnerable Aquifers. The study area is not within the Wellhead Protection area Q1/Q2.

An LID study was conducted for the VMC study by EOR to develop a stormwater retention guideline. In this report LID options were considered and assessed to determine whether or not it is feasible to be implemented. In some parts within the VMC area there are shallow ground water levels which would make it not suitable for LID options.

3.4.3 Natural Heritage Characterization

Natural Heritage Characterization was completed by Natural Resource Solutions Inc. and the report is available as Appendix B of the Main Environmental Assessment Report. This characterization includes features of aquatic, Terrestrial and wildlife conditions and environments.

The Vegetation Communities mapping from the main report does not identify any significant vegetation communities in this study area.

The Aquatic Resources mapping from the main report does identify the Black Creek watercourse near Hwy 7 as a cool water fish community with the location near the southern boundary of the study area as a cool/warm thermal regime.

Secondary Plan Areas constraints were identified mainly as wooded areas along the Black Creek watercourse.

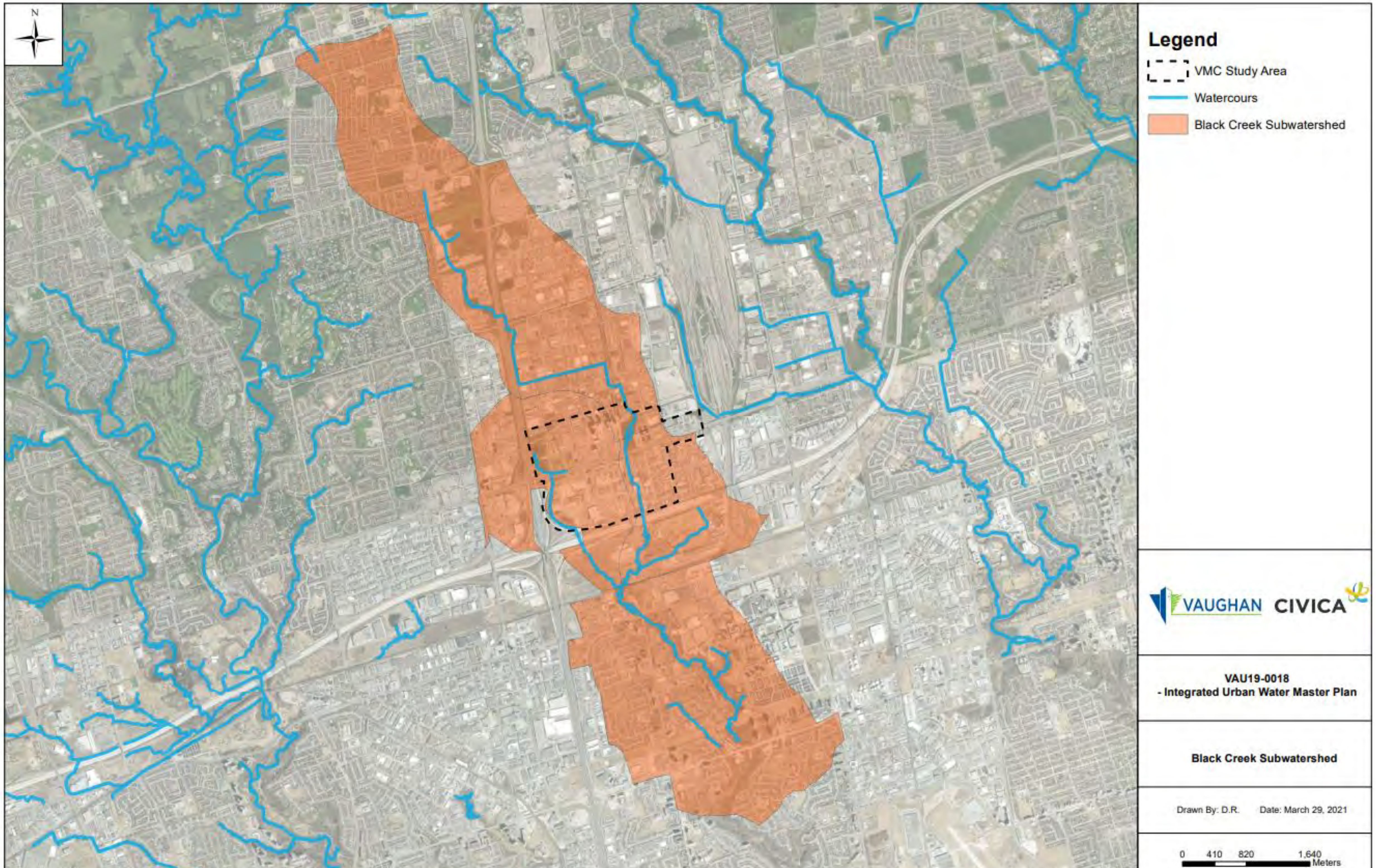

Figure 3-2: Black Creek Sub-Watershed

Figure ES-1 VMC Black Creek Renewal EA Study Area

Figure 3-3: VMC Black Creek Renewal EA Study Area

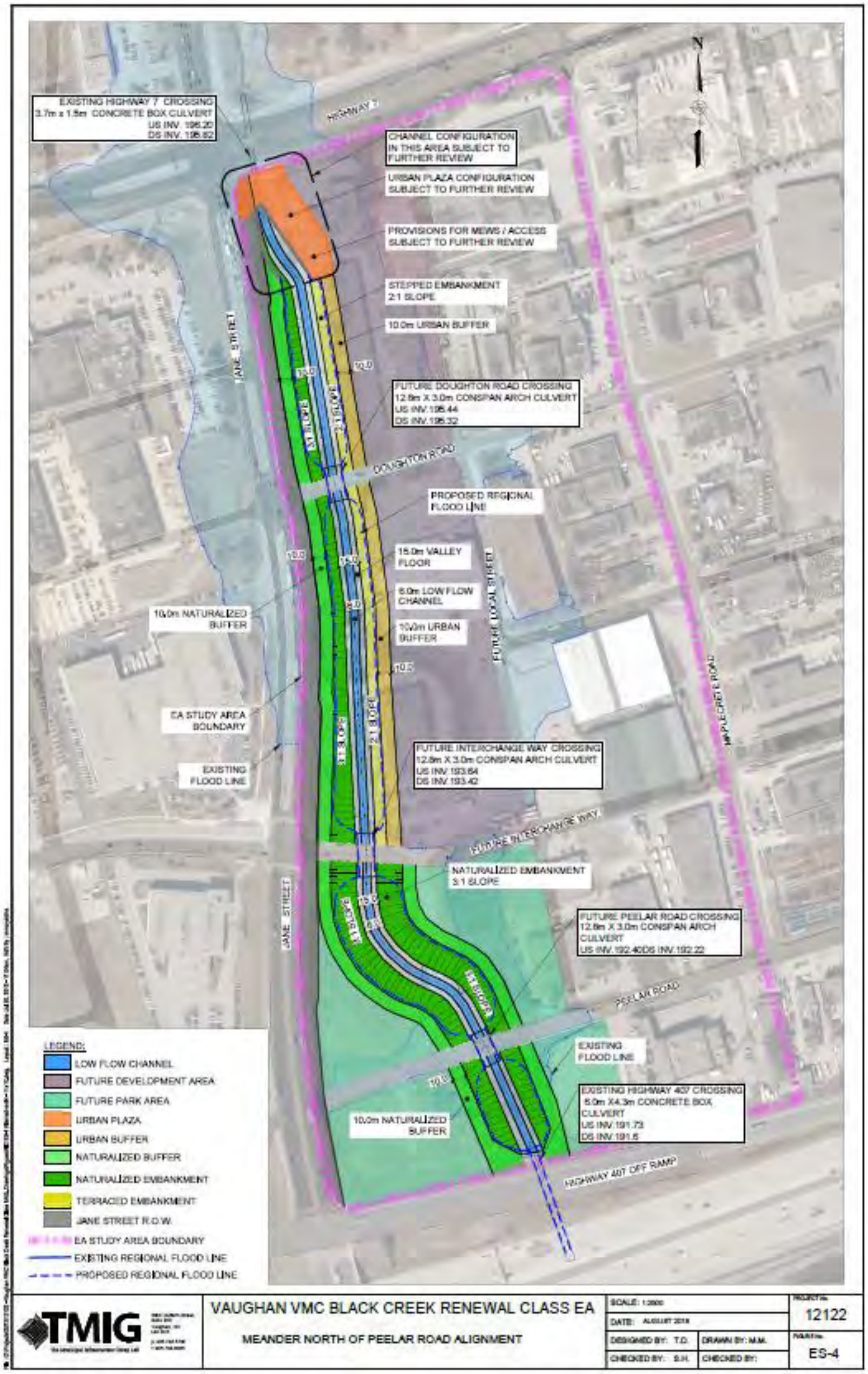

Figure 3-4: Proposed Black Creek Realignment

4.0 Future Conditions

The VMC study area has been identified as a Major Transit Area and seeks to meet an overall density target of 300 to 400 people and jobs per hectare by the year 2041 as previously noted in the MTSA areas. The anticipated redevelopment of land and population growth will increase the capacity required for existing infrastructure in the study area. The following section discusses the population growth, proposed land use changes and developmental constraints.

4.1 Proposed Land Use and Population

Population forecasting for the study period was based on existing population data for the base year 2019 and forecast growth projections for the years 2028, 2036, 2041 and 2051. Populations were derived from various sources and planned growth area designation and are detailed in Appendix D of the main report. The following assumptions were used to assess population impacts for infrastructure planning purposes.

- Existing development applications are assumed to be occupied by 2028.
- All areas with no development application assumed linear population growth **Error! Reference source not found.**.

Table 4-1 Population Growth Where Not Otherwise Defined

Year	2019	2028	2036	2041	2051
Percentage Growth Towards Ultimate Populations	0%	41%	77%	100%	100%

For the VMC FSSR area, the population forecast aggregated from all sources is summarized in **Error! Reference source not found.** The proposed land uses are presented in Figure 4-1and the various population distributions are presented in Figure 4-2**Error! Reference source not found.**, Figure 4-3, Figure 4-4, and Figure 4-5.

Table 4-2 VMC FSSR Population Forecast

Year	2019	2028	2036	2041	2051
VMC FSSR Planning Area Population Forecast	12,620	111,043	172,798	194,886	194,886

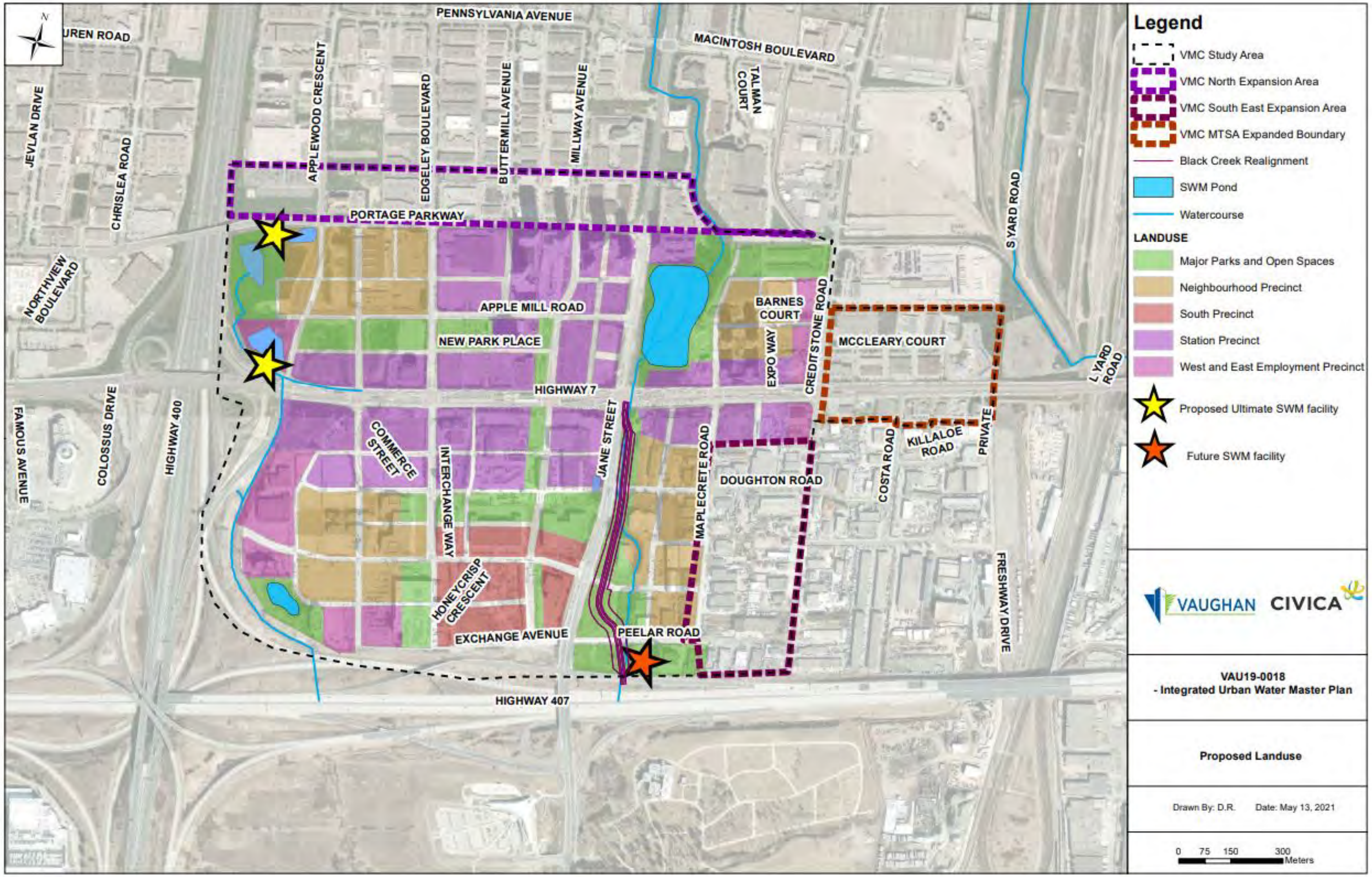

Figure 4-1: VMC Proposed Land Use

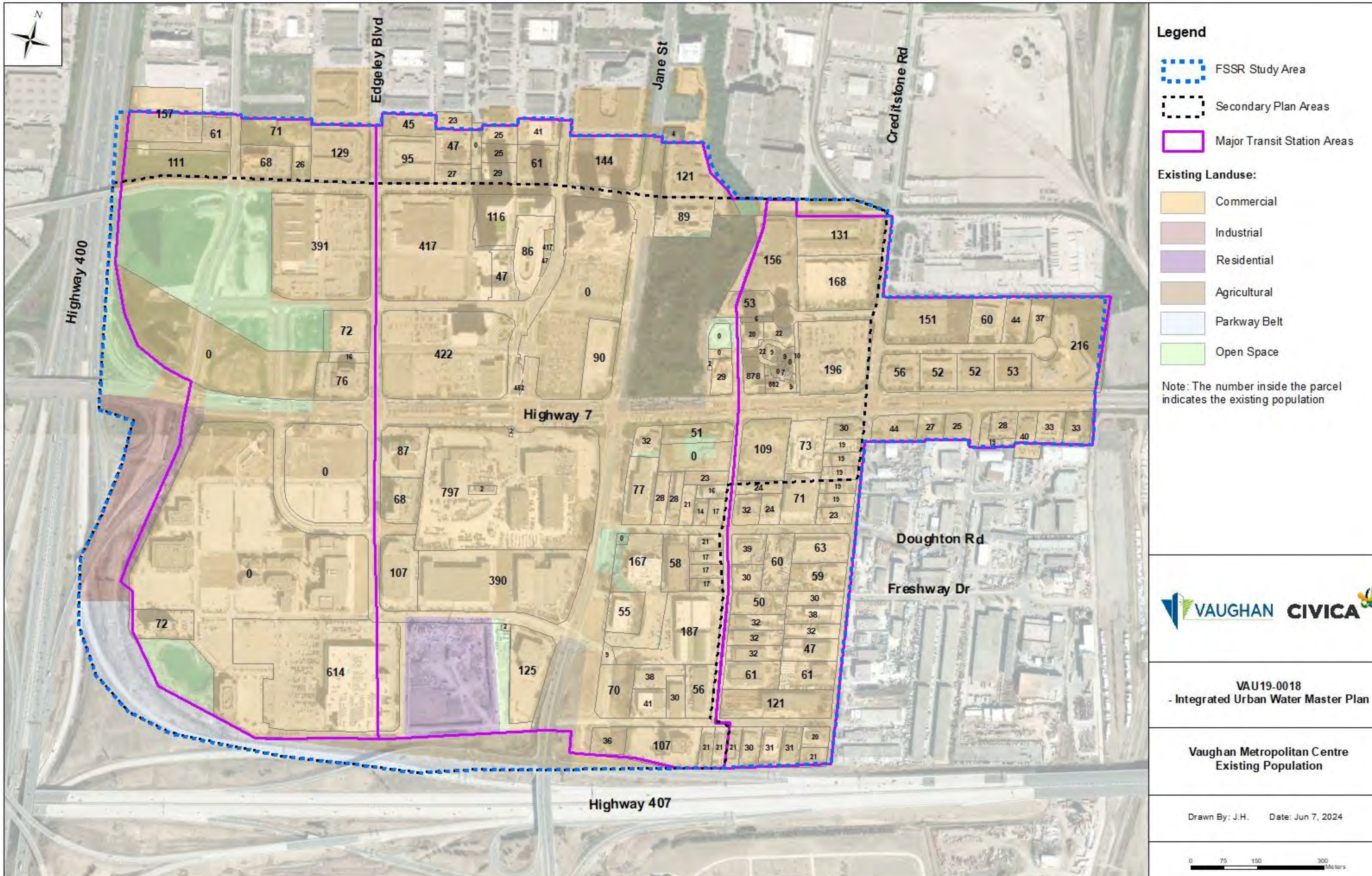
Legend
FSSR Study Area
Secondary Plan Areas
Major Transit Station Areas
Existing Landuse:
Commercial
Industrial
Residential
Agricultural
Parkway Belt
Open Space
Note: The number inside the parcel indicates the existing population
Highway 400
Edgeley Blvd
Jane St
Creditstone Rd
Highway 7
Doughton Rd
Freshway Dr
Highway 407
VAUGHAN
CIVICA
VAU19-0018
- Integrated Urban Water Master Plan
Vaughan Metropolitan Centre
Existing Population
Drawn By: J.H.
Date: Jun 7, 2024
0 75 150 300
Meters

Figure 4-2: Existing Population (2019)

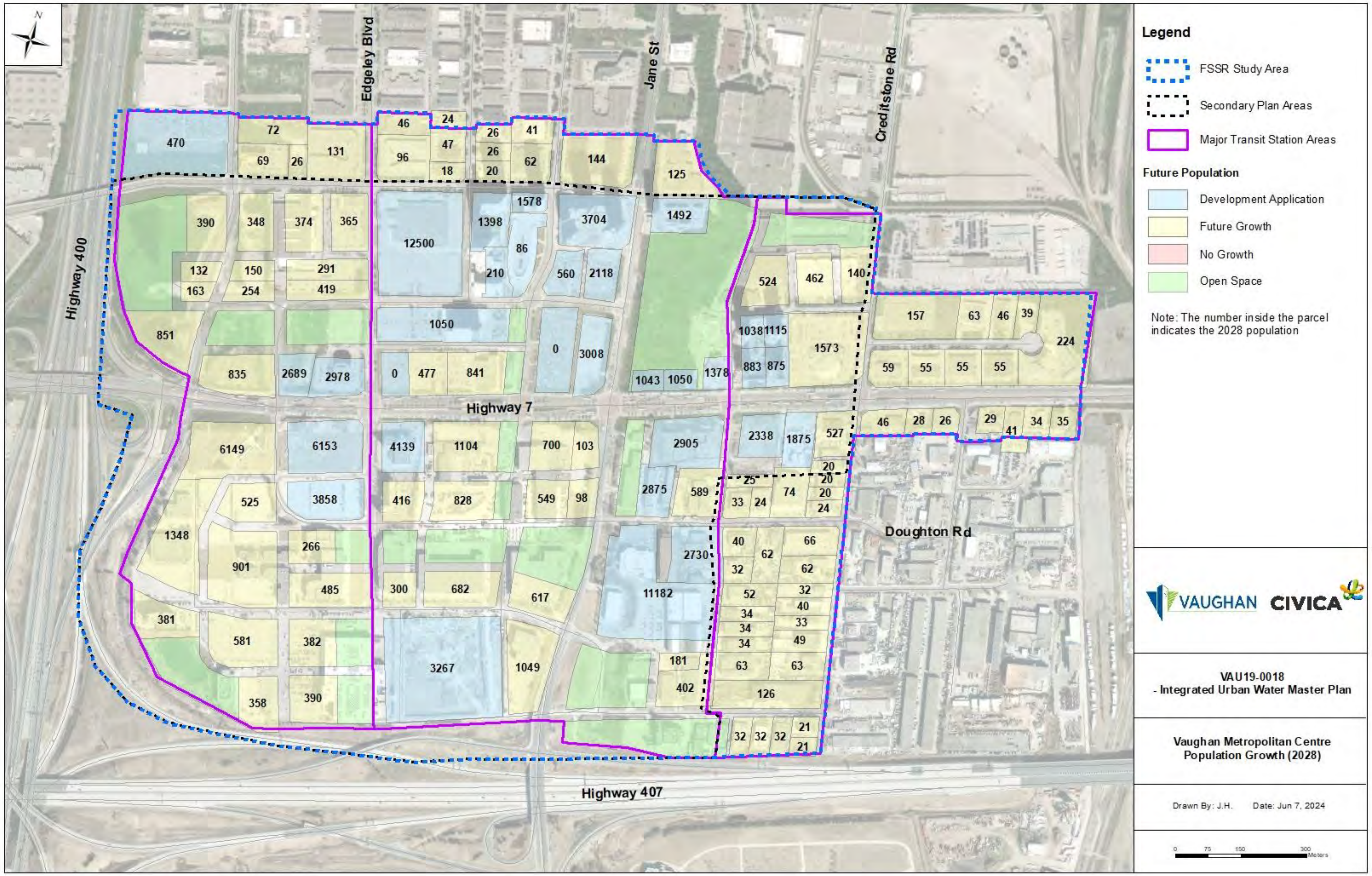

Figure 4-3: Population 2028

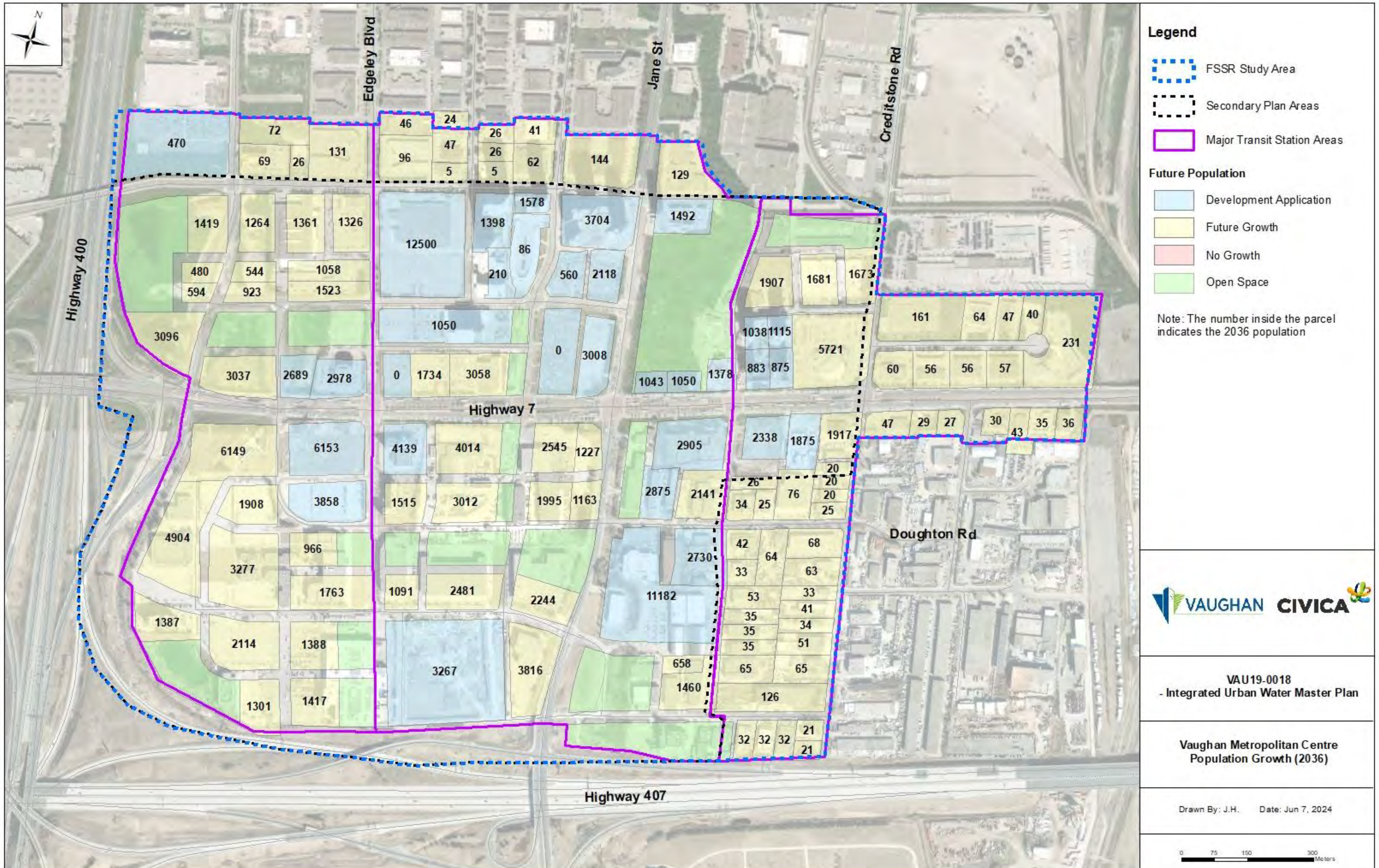

Figure 4-4: Population 2036

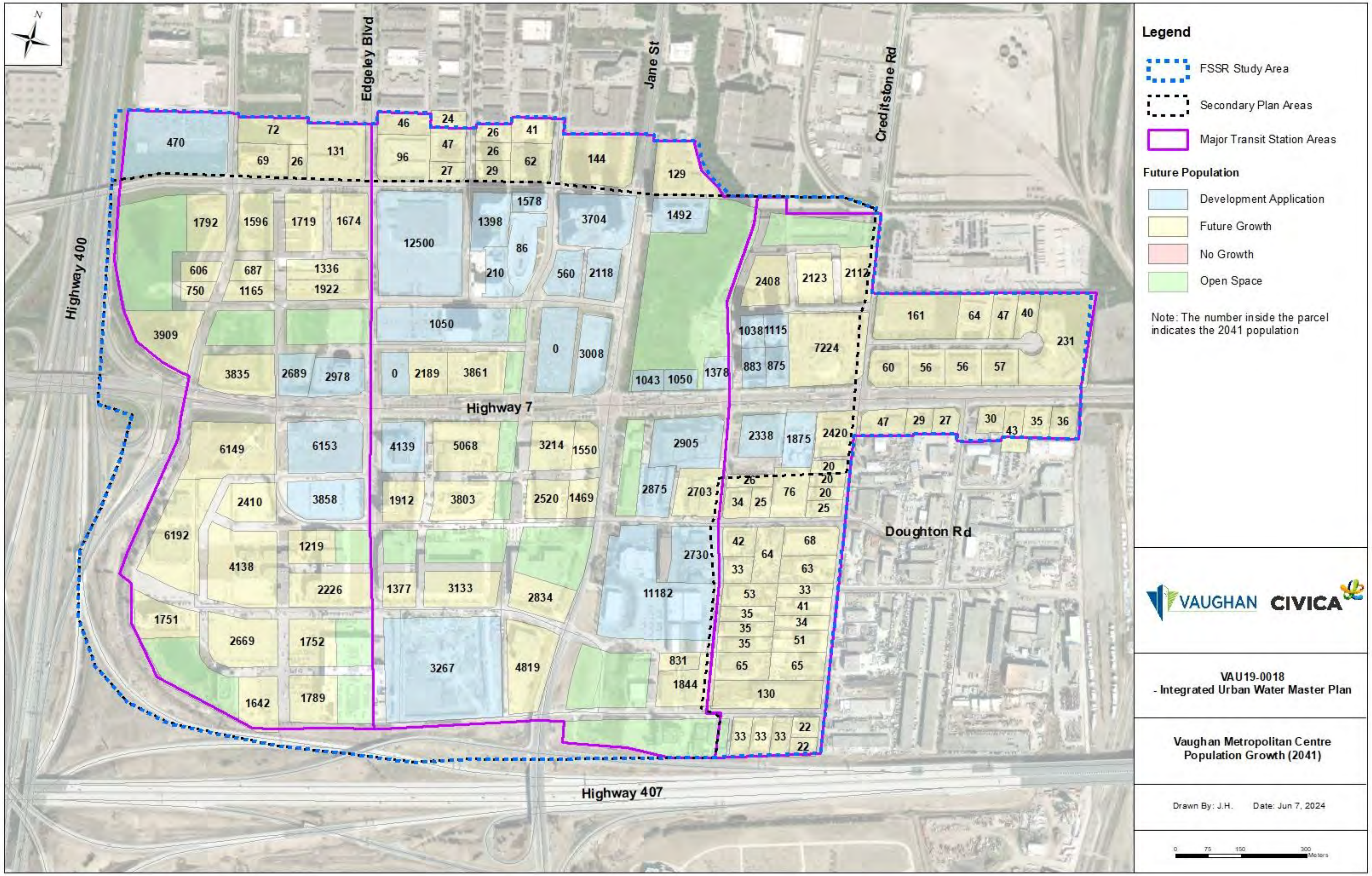

Figure 4-5: Population 2041

CITY OF VAUGHAN INTEGRATED URBAN WATER PLAN

FUNCTIONAL SERVICING STRATEGY REPORT

Vaughan Metropolitan Centre

Volume 2 – Water Servicing

Final Report

June 2024

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Ilmar Simanovskis, P.Eng, MBA
Project Manager

FP&P HydraTek Inc.

Fabian Papa, M.A.Sc., M.B.A., P.Eng.
Water Lead

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1.0 Water Servicing

1.1 Investigation Methodology

The methodology undertaken in this section includes the following:

- Application of the City's calibrated InfoWater operational model (2019) to reflect projected water demands and assess performance.
- Investigate the potential deficiencies in the existing water servicing infrastructure (e.g., low pressure, low available fire flow, etc.), as well as impacts on system-wide performance.
- Propose solutions to resolve deficiencies.

It is also noted that due to the large projected population identified for this study area, the infrastructure upgrades required to service growth therefore are expected to be significant. Accordingly, a sensitivity analysis is also considered herein which adopts more moderate water design criteria.

1.2 Water Servicing Design Criteria

The City's 2020 water design criteria are applied for this work are summarized below in **Table 1**.

Table 1: Water System Design Criteria

Operating Condition	Unit	Value	Pressure Requirement
Average Day Demand (ADD)	**Lpcd**	**300**	**-**
Maximum Day Demand + Fire Flow (MDD + Fire)	**Peak Factor**	**1.8**	**Minimum 140 kPa**
Peak Hour Demand (PHD)	**Peak Factor**	**3.0**	**Minimum 275 kPa**

Table 2 provides required fire flow rates by the City of Vaughan for various land use types. The study area consists of land uses that include low- to high-rise residential, mixed use, and commercial/office use. Therefore, required fire flow rates of **317 L/s** and **417 L/s** are used as assessment criteria for this FSSR.

Table 2: Required Fire Flow Rates

Land Use	Fire Flow Requirement
Single Family & Semi-Detached	**7,000 L/min or 117 L/s**
Townhouses	**9,000 L/min or 150 L/s**
Institutional	**15,000 L/min or 250 L/s**
Industrial/Commercial	**25,000 L/min or 417 L/s**
Multi-Unit Apartment Buildings	**19,000 L/min or 317 L/s**

1.3 Existing Water Servicing

The Vaughan Metropolitan Centre & Steeles West study areas are situated in Pressure District 6 (PD6), and the principal supply thereto is provided by a reservoir and pumping station at Keele Street and Steeles Avenue West which transmits water to the South Maple Reservoir at Keele Street and Teston Road. Water supply to the study area is generally described as follows:

- Via 900 mm and 750 mm diameter Region of York transmission mains along Keele Street and Highway 7, respectively, providing supply from the east.
- Via a 400 mm diameter City of Vaughan watermain along Highway 7 from Keele Street to Creditstone Road, providing supply from the east.
- Via 400 mm and 300 mm diameter City of Vaughan watermains along Steeles Avenue West from Keele Street to Jane Street and Jane Street therefrom to Doughton Road, respectively, providing supply from the south.
- Connectivity to watermains north of the study area via a 600 mm City-owned watermain on Jane Street, a 500 mm City-owned watermain on Millway Avenue and 300 mm City-owned watermains on Buttermill Avenue, Edgeley Boulevard and Applewood Crescent.

Figure 1-1 shows a map of existing water servicing infrastructure relevant to the Study Area.

An assessment of the performance of the existing watermain infrastructure was undertaken under existing as well as potential future demand conditions, hereinafter referred to as Scenarios A1 to D1 (see **Table 3**). These results are presented graphically as cumulative distribution plots in **Figure 1-2** (MDD + Fire) and **Figure 1-3** (PHD).

Table 3: Modelling Scenarios with Existing Infrastructure

Scenario ID	Population	Water Demand [1]	Water Servicing Infrastructure
A1	**Existing Population**	**Calibration**	**Existing Infrastructure**
B1	**Future (2028) Population**	**Calibration + City's Criteria**	**Existing Infrastructure**
C1	**Future (2036) Population**	**Calibration + City's Criteria**	**Existing Infrastructure**
D1	**Future (2041) Population**	**Calibration + City's Criteria**	**Existing Infrastructure**

[1] Demands for existing population are based on the City's (2019) calibrated hydraulic model and is denoted as "calibration", whereas the "City's Criteria" (as per Table 1) are applied to future populations.

Figure 1-1: Existing Water Servicing Infrastructure Map

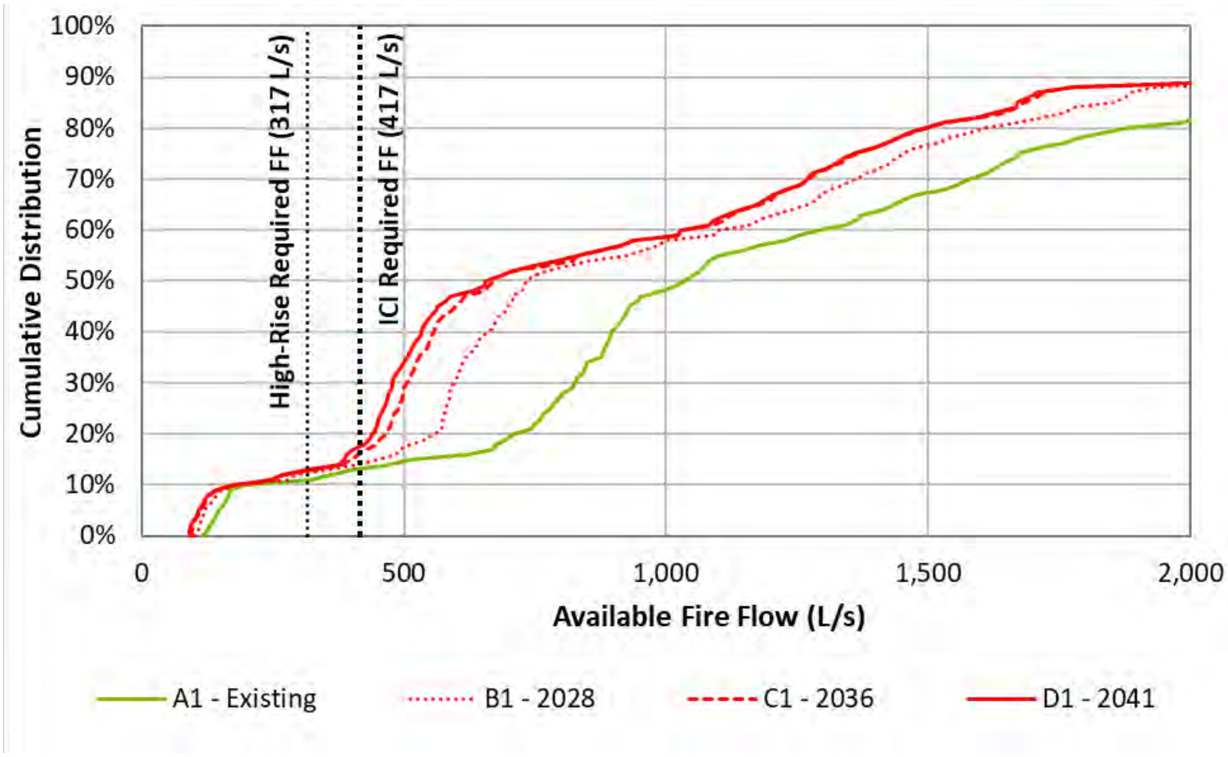

Figure 1-2: Available Fire Flow Distributions, Maximum Day Demand, Existing Infrastructure

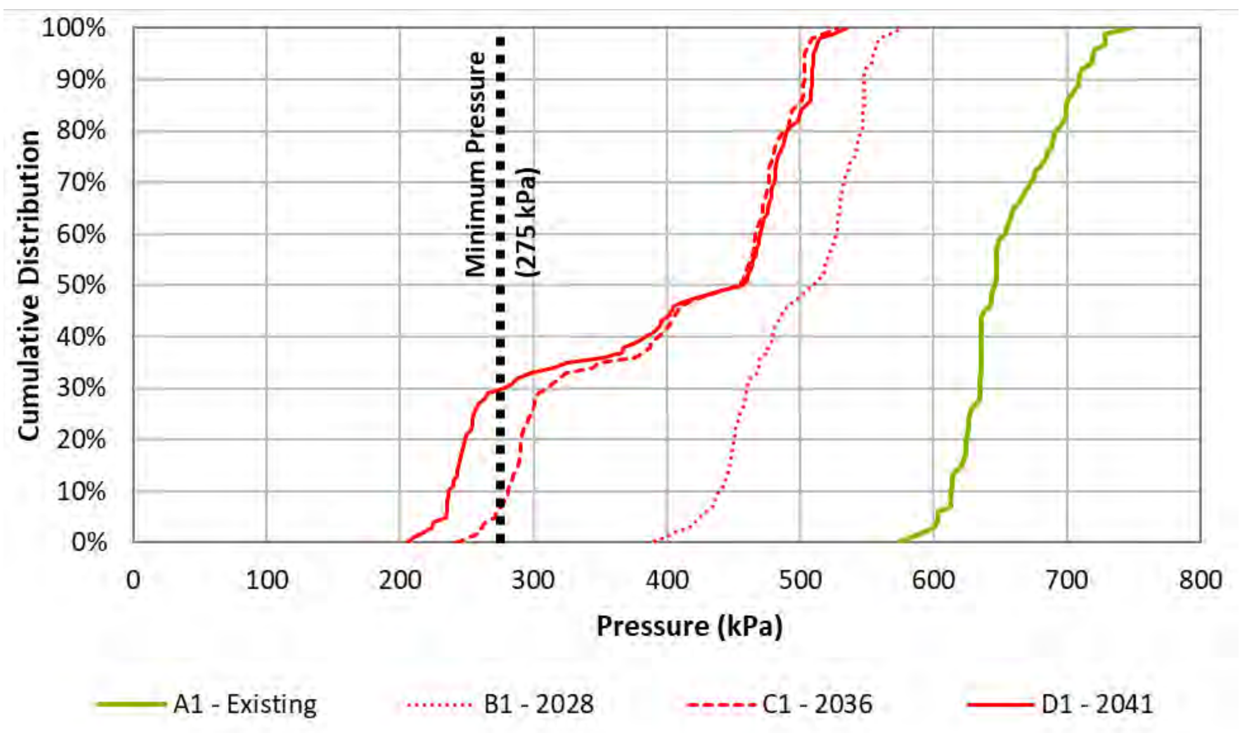

Figure 1-3: Pressure Distributions, PHD Conditions, Existing Infrastructure

The cumulative distribution plots suggest the following:

- **Fire Flow Capacity:** Approximately 10% of the model nodes do not meet the minimum available fire flow criterion for multi-unit apartment buildings of 317 L/s under existing demand conditions. This amount increases to 13% under 2041 demand conditions. While the increases in system demand are shown to exacerbate the fire supply, the effect is relatively minor at model nodes with already low available fire flows. The fire flow capacity exhibits greater decreases mostly at locations where there is already a considerable amount of available fire flow and where some lesser capacity can be tolerated whilst maintaining compliance with City criteria.

- **Operating Pressures:** Existing PHD operating pressures in the study area are relatively high, exceeding 550 kPa (80 psi) at all locations. This is expected to drop considerably under future demand conditions, resulting in approximately 29% of the model nodes not meeting the minimum 275 kPa (40 psi) pressure criterion under 2041 demand conditions (with current infrastructure). Further, the results indicate a wide range of service pressures throughout the study area under 2036 demand projections and beyond, suggesting the presence of a bottleneck in the distribution network. The expected range in diurnal operating pressures is expected to be rather wide.

It is worth noting that at this point in the analysis, the objective is not to address the acceptability of the modelling results (existing or future) relative to design criteria. Rather, it is to evaluate the impact of the projected water demands on the system's performance, as well as to identify possible capacity constraints such that future upgrades can be properly informed. As such, justifying and/or making recommendations with respect to the failure of 10% of the model nodes to meet the minimum available fire flow criterion of 317 L/s under existing conditions is not relevant to this analysis.

Figure 1-4 and **Figure 1-5** show maps of available fire flow during maximum day demand under existing and future (2041) demand conditions (respectively) based on the existing water servicing infrastructure. Areas with low available fire flows are primarily located around small diameter watermains in the southeast quadrant. For instance, the existing watermains in the vicinity of Maplecrete Road and Freshway Drive are 150 mm in diameter. As previously noted, the distribution and magnitude of available fire flows does not change significantly between existing and 2041 demand conditions, suggesting that the observed capacity deficiencies are primarily the result of undersized watermains and lack of interconnectivity as opposed to regular system demands.

Figure 1-6 and **Figure 1-7** show maps of water pressure during peak hour demand under existing and future (2041) demand conditions (respectively) based on the existing water servicing infrastructure. Under existing demand conditions, model nodes in the southern quadrants exhibit higher pressures due to having lower ground elevations. Conversely, under future demand conditions, the service pressures in the southern quadrants are substantially lower. This is due to a lack of conveyance capacity from the south via the 400 mm and 300 mm watermains on Steeles Avenue West and Jane Street (respectively), coupled with limited interconnectivity between the northern and southern quadrants. This capacity limitation is not manifested under the existing conditions, wherein the smaller system demands do not invoke enough head losses for it to become apparent. This is evidenced in the fact that the existing condition HGLs range from approximately 268 m to 272 m, whereas the 2041 condition HGLs range approximately from 221 m to 258 m.

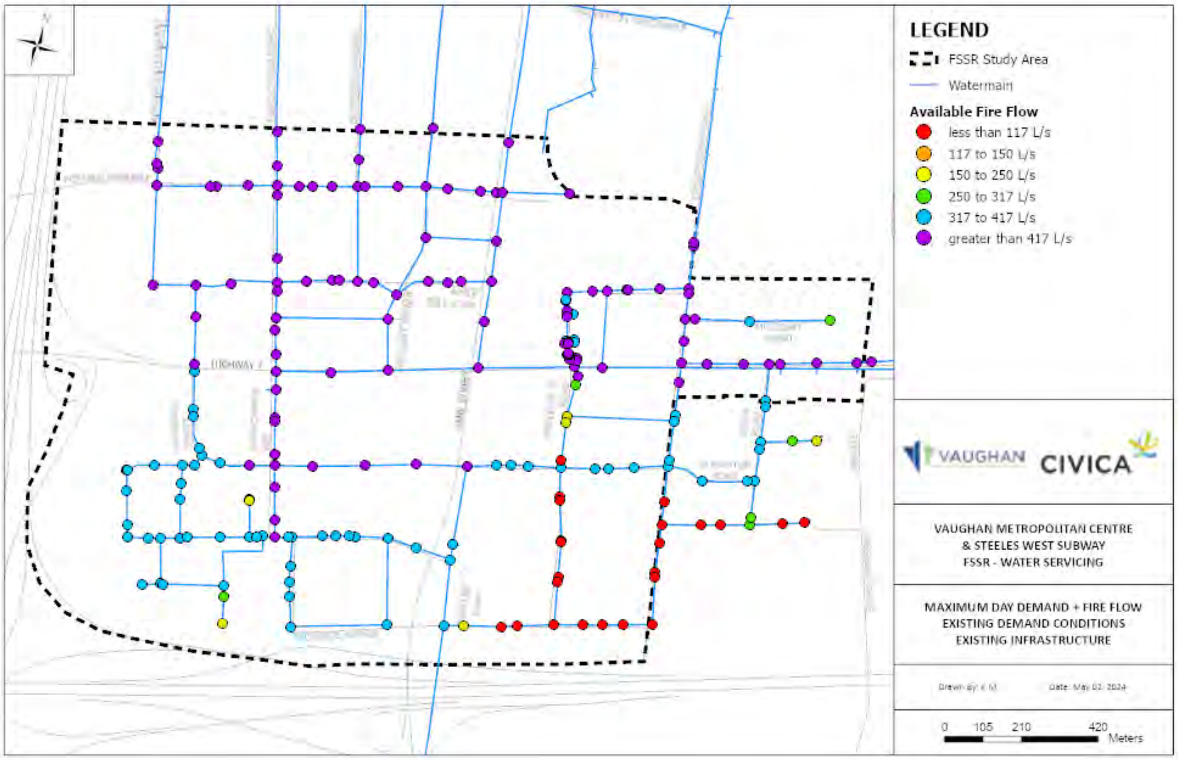

Figure 1-4: Available Fire Flows, Existing MDD + FF Conditions, Existing Water Servicing

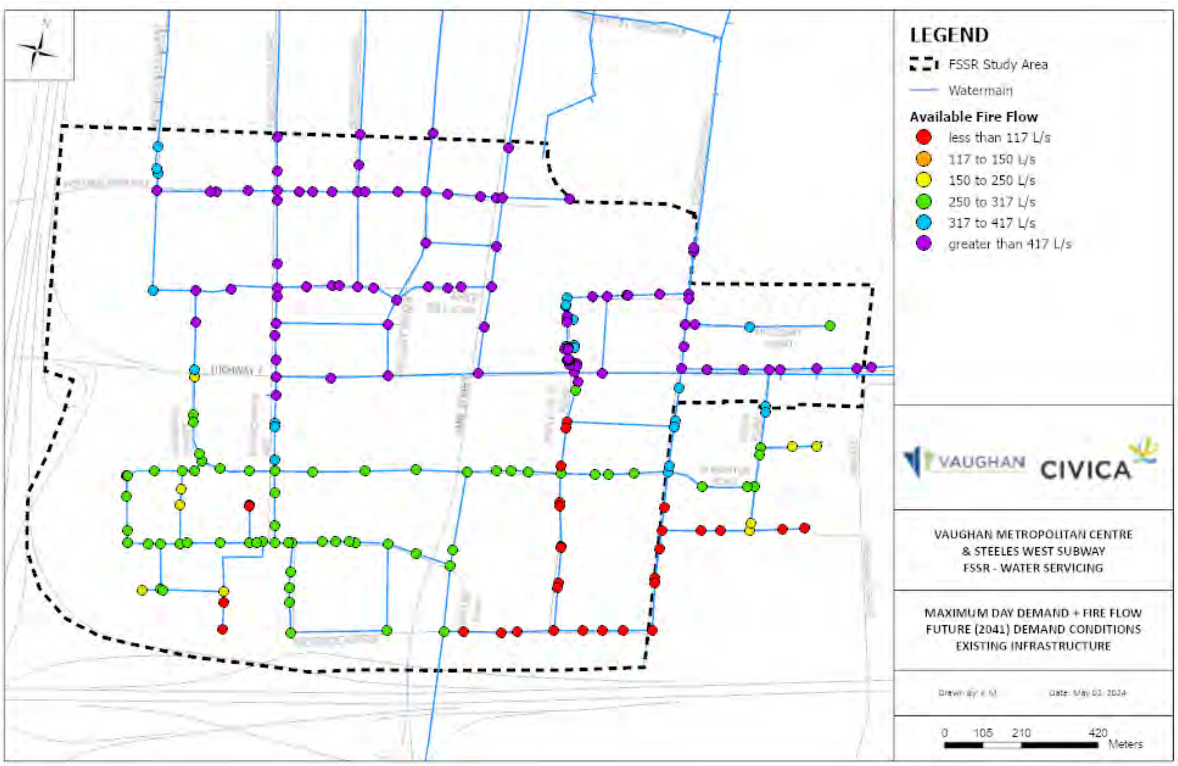

Figure 1-5: Available Fire Flows, Future (2041) MDD + FF Conditions, Existing Water Servicing

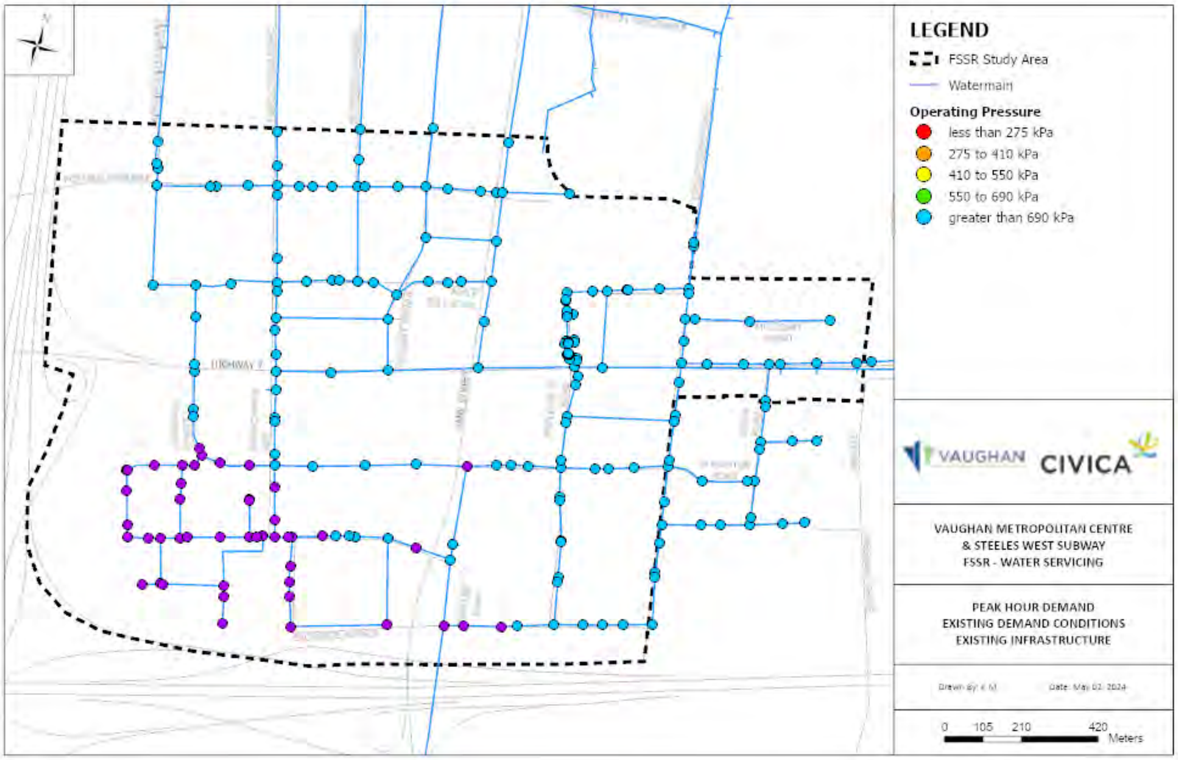

Figure 1-6: Pressures, Existing PHD Conditions, Existing Water Servicing

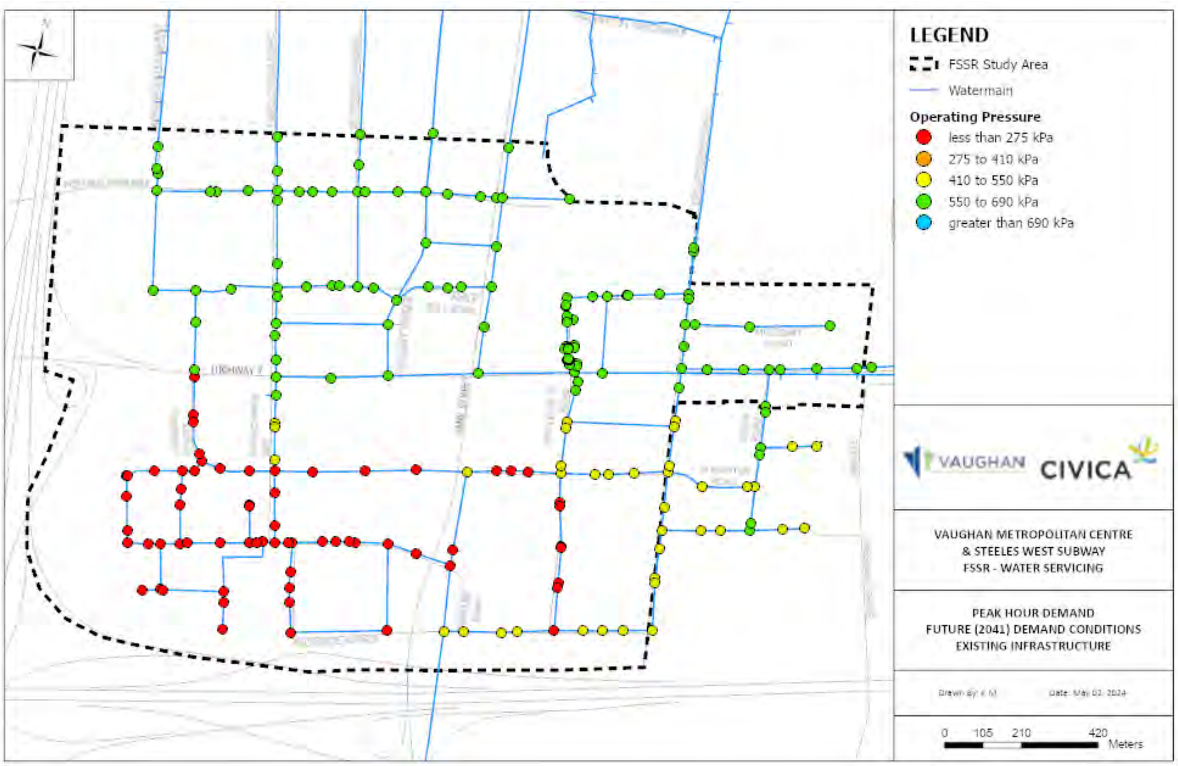

Figure 1-7: Pressures, Future (2041) PHD Conditions, Existing Water Servicing

1.4 Proposed Water Servicing

This section summarizes the proposed system upgrades, including latest recommended upgrade phasing timelines from 2028 through 2041. It is noted that the proposed upgrades do not have to be phased exactly in accordance with the timelines presented herein, but generally not any later. For instance, proposed watermain upgrades will most likely be implemented in conjunction with active developments whose frontages they belong to. The recommendations also include provisional watermain replacements that are not strictly necessary from a hydraulic perspective, although would be beneficial for purposes of completing an envisioned skeletal supply system consisting of 400 mm diameter watermains. Accordingly, these provisional watermain replacements may be implemented in conjunction with other major road or other infrastructure improvements occurring in the same area. A summary of the proposed upgrades is provided in **Table 4**, with detailed cost estimations provided in the recommendations section of this report.

It is noted that the previous Municipal Servicing Class Environmental Assessment (EA) for VMC, completed in 2012, provides a proposed water servicing infrastructure solution up to a 2051 build-out. This proposed solution has been considered in the development of the recommendations presented in this FSSR, but has ultimately been expanded upon due to the previous EA study using a 2051 population projection that is less than four times smaller than the 2041 population projection utilized in this FSSR.

A map showing the ultimate (2041) proposed servicing infrastructure, including both existing and proposed watermains, is provided in **Figure 1-8**. It is noted that project ID #1 is characteristic of "region-scale" infrastructure given that its principal function is to transmit water to the VMC area to supplement the anticipated supply deficit. Although such a function is generally in keeping with the role of York Region in the supply of water, whether this infrastructure falls within the domain of York Region or the City is not known as at the time of writing and is expected to be subject to consideration by both parties.

Table 4: Proposed Infrastructure Upgrades

ID	Description	Diameter (mm)	Length (m)	Cost	Phase	EA Schedule
1	Steeles Avenue West and Jane Street	600	4,200	$58,700,000	2036	Exempt/B (TBD)
2	Commerce Street, Highway 7 crossing	400	80	$1,300,000	2028	Exempt
3	Peelar Road	400	310	$1,700,000	2028	Exempt
4	Creditstone Road	300	710	$3,200,000	2028	Exempt
5	Peelar Road	300	270	$1,200,000	2028	B
6	Various streets	400	2,250	$12,700,000	2041	Exempt/B
7	Various streets	300	4,670	$21,200,000	2041	Exempt
8	Provisional watermain replacements	400	1,820	$11,300,000	n/a	Exempt/B
Total				$111.300,000		

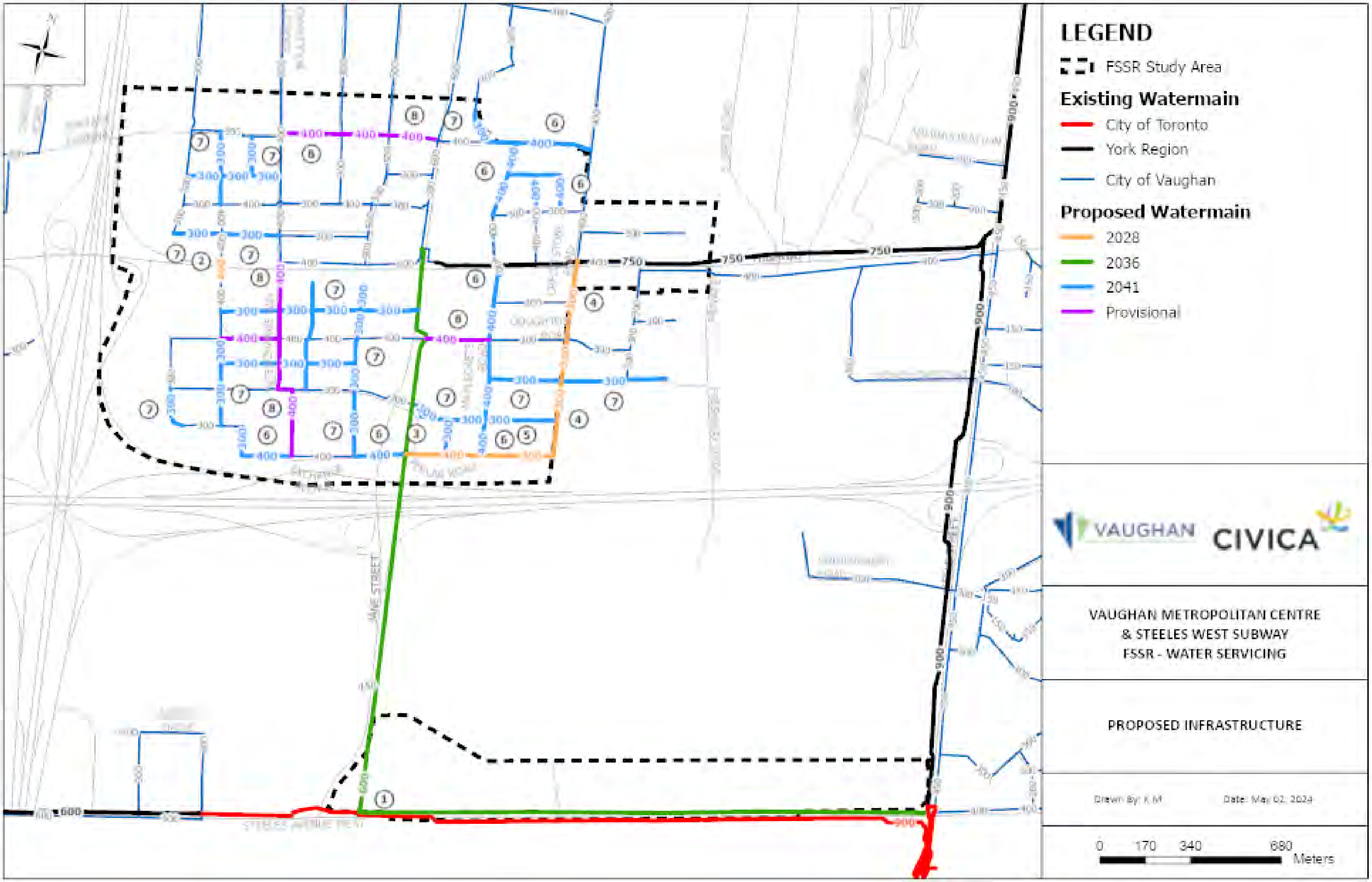

Figure 1-8: Ultimate (2041) Water Servicing Strategy

An assessment of the performance of the proposed watermain infrastructure was undertaken for all potential future demand conditions, hereinafter referred to as Scenarios B2 to D2 (see **Table 5**). These results are presented graphically as cumulative distribution plots in **Figure 1-9** (MDD + Fire) and **Figure 1-10** (PHD) in comparison with the previously discussed existing infrastructure results.

Table 5: Existing and Future Condition Modelling Scenarios

Scenario ID	Population	Water Demand [2]	Water Servicing Infrastructure
A1	Existing Population	Calibration	Existing Infrastructure
B1	Future (2028) Population	Calibration + City's Criteria	Existing Infrastructure
C1	Future (2036) Population	Calibration + City's Criteria	Existing Infrastructure
D1	Future (2041) Population	Calibration + City's Criteria	Existing Infrastructure
B2	Future (2028) Population	Calibration + City's Criteria	Proposed (2028) Infrastructure
C2	Future (2036) Population	Calibration + City's Criteria	Proposed (2036) Infrastructure
D2	Future (2041) Population	Calibration + City's Criteria	Proposed (2041) Infrastructure

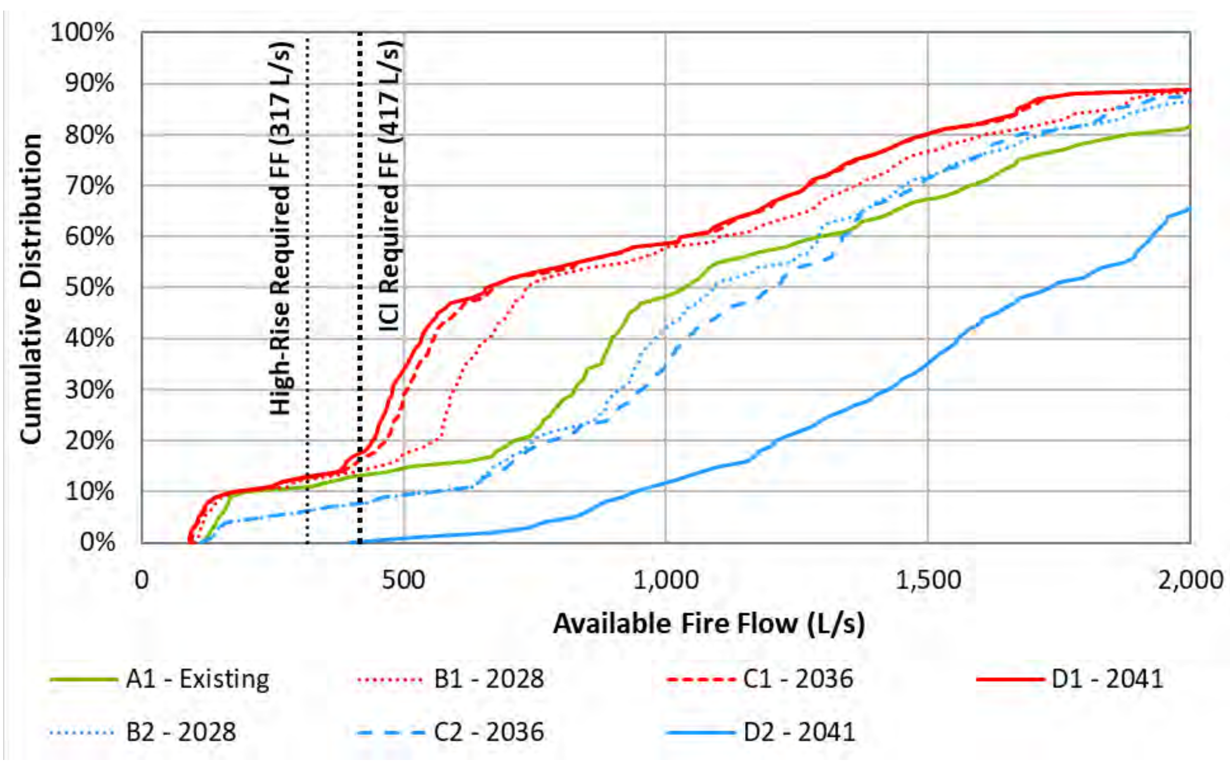

Figure 1-9: Available Fire Flow Distributions, MDD Conditions, Existing & Proposed Water Servicing

[2] Demands for existing population are based on the City's (2019) calibrated hydraulic model and is denoted as "calibration", whereas the "City's Criteria" (as per Table 1) are applied to future populations.

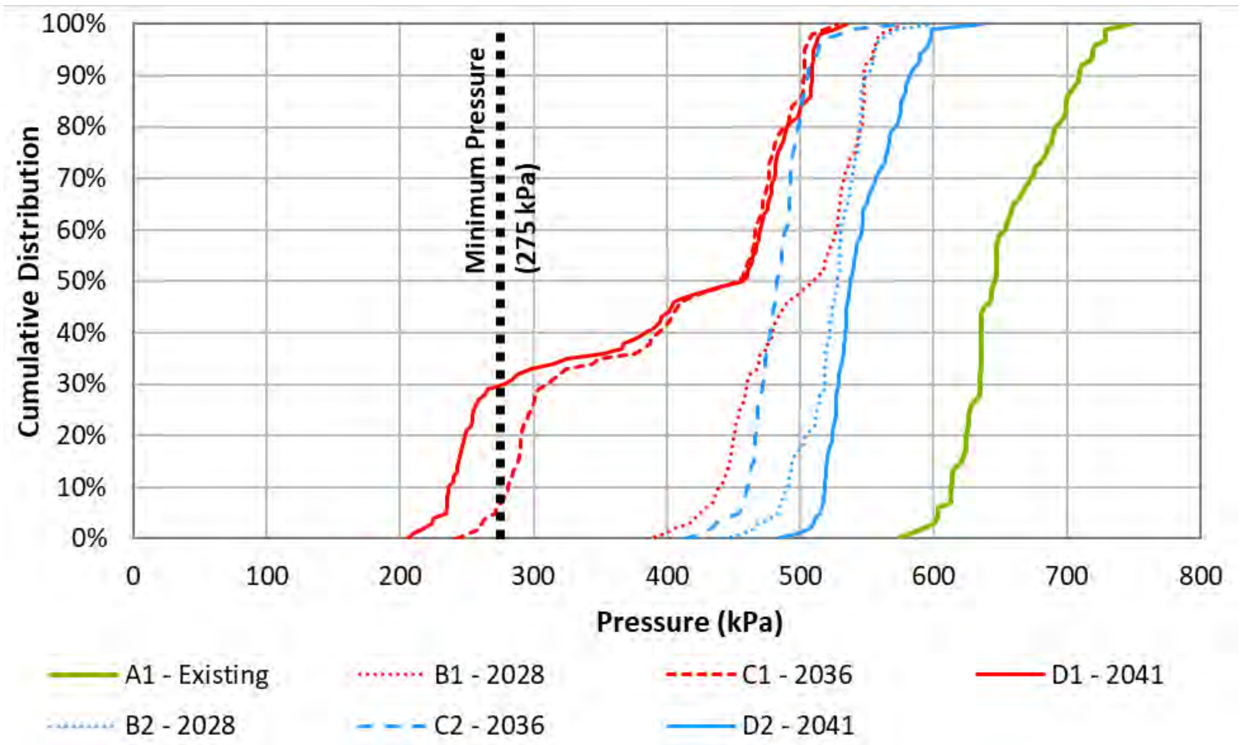

Figure 1-10: Pressure Distributions, PHD Conditions, Existing & Proposed Water Servicing

The cumulative distribution results suggest the following:

- **Fire Flow Capacity:** There is a modest improvement in model nodes previously noted to experience low available fire flows under the 2028 and 2036 upgrade phases, with larger improvement being exhibited after the 2041 upgrades. This is because, as previously noted, their low fire flow capacity is the result of locally undersized watermains which do not greatly impact the overall system performance and have thus not been identified as necessary for earlier phases. It is assumed that any developments occurring in these areas prior to 2041 will be accompanied by watermain upgrades along their frontages, thereby increasing their fire flow capacity, effectively improving these results.

- **Operating Pressures:** Although the PHD pressures are appreciably lower than the existing condition (approximately 110 kPa or 16 psi lower), they are comfortably above the minimum 275 kPa criterion. Further, the expected range in system pressures is considerably tighter than the modelled future demand scenarios based on existing infrastructure (Scenarios B1 to D1), and somewhat tighter than the existing condition (Scenario A1). This suggests that the overall pressures in the study area are caused by overall supply capacity limitations as opposed to the watermains internal to VMC. Improvements to increase the study area pressures to levels similar to the existing condition must factor in system-wide performance and are thus better considered in the City's the master planning process.

Figure 1-11 shows a map of available fire flow during maximum day demand under future (2041) demand conditions based on the proposed water servicing infrastructure. All model nodes appear to have sufficient fire flow capacity, with the exception of the dead-end of the existing 300 mm watermain on

Killaloe Road, where the existing land uses are commercial and/or industrial and the available fire flow is less than 417 L/s. The modelled available fire flow at this location under future conditions is 397 L/s which is expected to be sufficient for future developments, noting that their designs are expected to be reasonably flexible to address this condition in terms of construction materials and fire suppression systems. Further, the available fire flow at this location is not materially different compared to the present-day condition, where it is equal to 392 L/s.

Figure 1-12 shows a map of water pressure during peak hour demand under future (2041) demand conditions based on the proposed water servicing infrastructure. The increase in supply from the south via the Steeles Avenue West and Jane Street upgrades (A1 to A3) in combination to the added conveyance capacity between the northern and southern quadrants appears to resolve the previously noted disparity in service pressures throughout the study area. The HGL delivered throughout the area ranges from approximately 256 m to 261 m, or a 5 m wide band. This is a significant improvement from the 37 m wide band that was observed under 2041 demand conditions based on the existing infrastructure, further reinforcing the notion that there is adequate capacity internal to the study area, and that any limitations on service pressures are the result of overall supply.

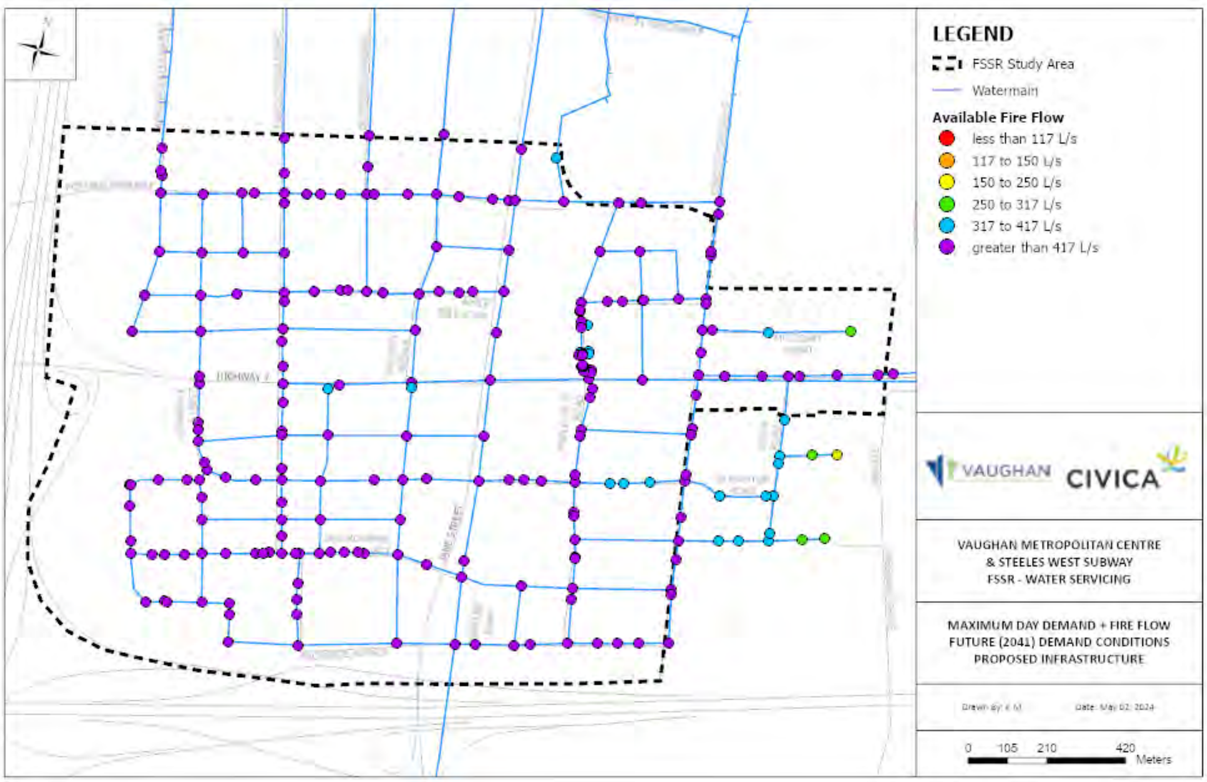

Figure 1-11: Available Fire Flows, Future (2041) MDD + FF Conditions, Proposed Water Servicing

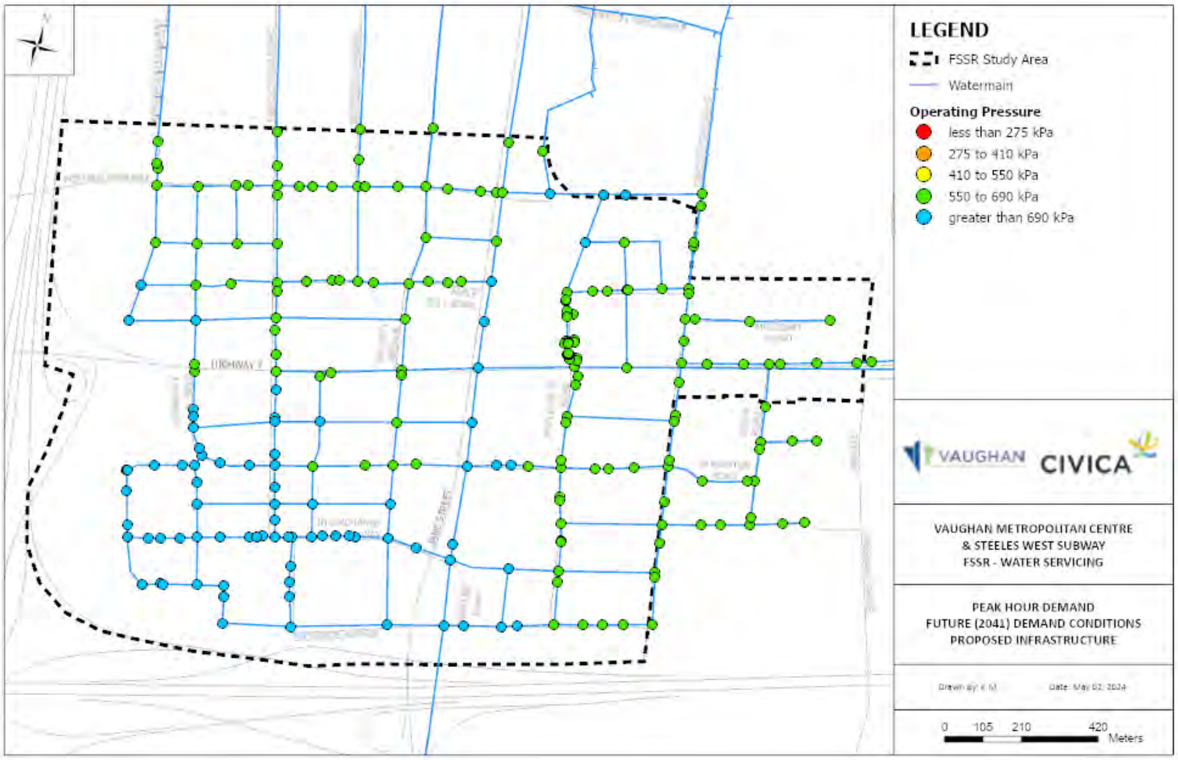

Figure 1-12: Pressures, Future (2041) PHD Conditions, Proposed Water Servicing

1.5 Sensitivity Analysis

For this sensitivity analysis, a unit consumption rate of 200 Lpcd was used based on a review of historical consumption data for the City of Vaughan. Peaking factors from the MECP's Design Guidelines for Drinking Water Systems of 1.50 and 2.25 for MDD and PHD were used, respectively (based on a population greater than 150,000). The same minimum pressure assessment criteria as outlined in Section 1.2 are used. The parameters applied in the sensitivity analysis are summarized in **Table 6**.

Table 6: Water System Design Criteria for Sensitivity Analysis

Operating Condition	Unit	Value	Pressure Requirement
Average Day Demand (ADD)	**Lpcd**	**200**	**-**
Maximum Day Demand + Fire Flow (MDD + Fire)	**Peak Factor**	**1.50**	**Minimum 140 kPa**
Peak Hour Demand (PHD)	**Peak Factor**	**2.25**	**Minimum 275 kPa**

In addition to testing the performance of the system under these alternative scenarios with the proposed infrastructure identified above, an alternative solution with less intensive upgrade requirements was developed (**Figure 1-13**). The only differences in the alternative solution are with respect to the "region-scale" upgrade projects (ID #1), wherein only an extension of the existing 300 mm watermain on Jane Street between Highway 7 and Doughton Road is carried. All other recommended upgrades and phasing requirements are unchanged in the alternative solution.

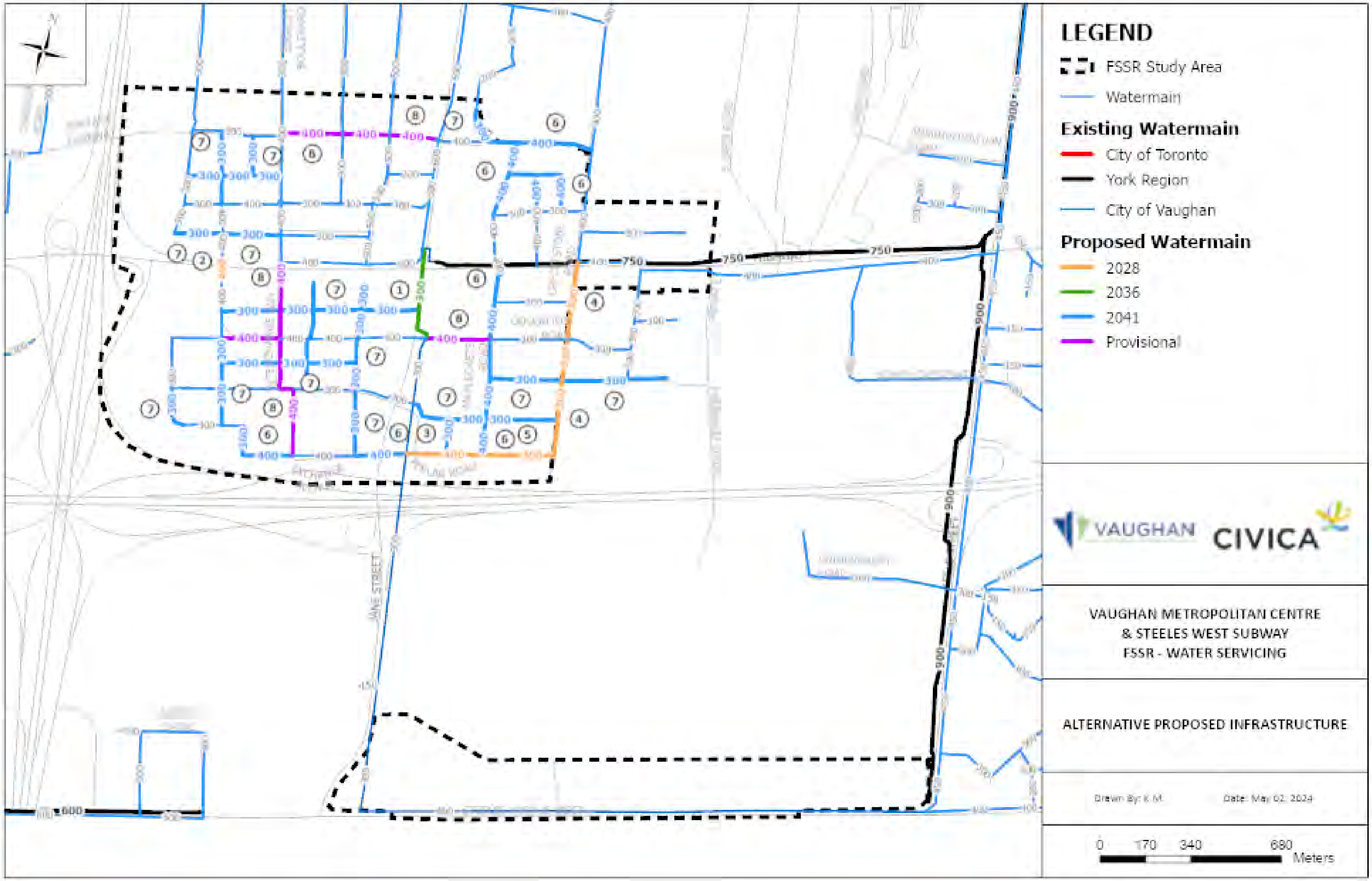

Figure 1-13: Ultimate (2041) Alternative Proposed Water Servicing Infrastructure Map

Sensitivity analysis results are presented herein with respect to 2041 build-out scenarios. Interim (2028 and 2036) build-out conditions have been considered in the analysis but are not shown for the sake of brevity, noting that no additional insights are afforded as a result of showing those interim condition results. **Figure 1-14** and **Figure 1-15** provide cumulative distribution plots of available fire flow during MDD conditions and operating pressure during PHD conditions (respectively) for the following scenarios:

Table 7: Modelling Scenarios for Sensitivity Analysis

Scenario ID	Population	Water Demand	Water Servicing Infrastructure
A1	Existing Population	Calibration	Existing
D1	Future (2041) Population	Calibration + City's Criteria	Existing
D2	Future (2041) Population	Calibration + City's Criteria	Proposed
E2	Future (2041) Population	Calibration + Reduced Criteria	Proposed
E3	Future (2041) Population	Calibration + Reduced Criteria	Alternative Proposed

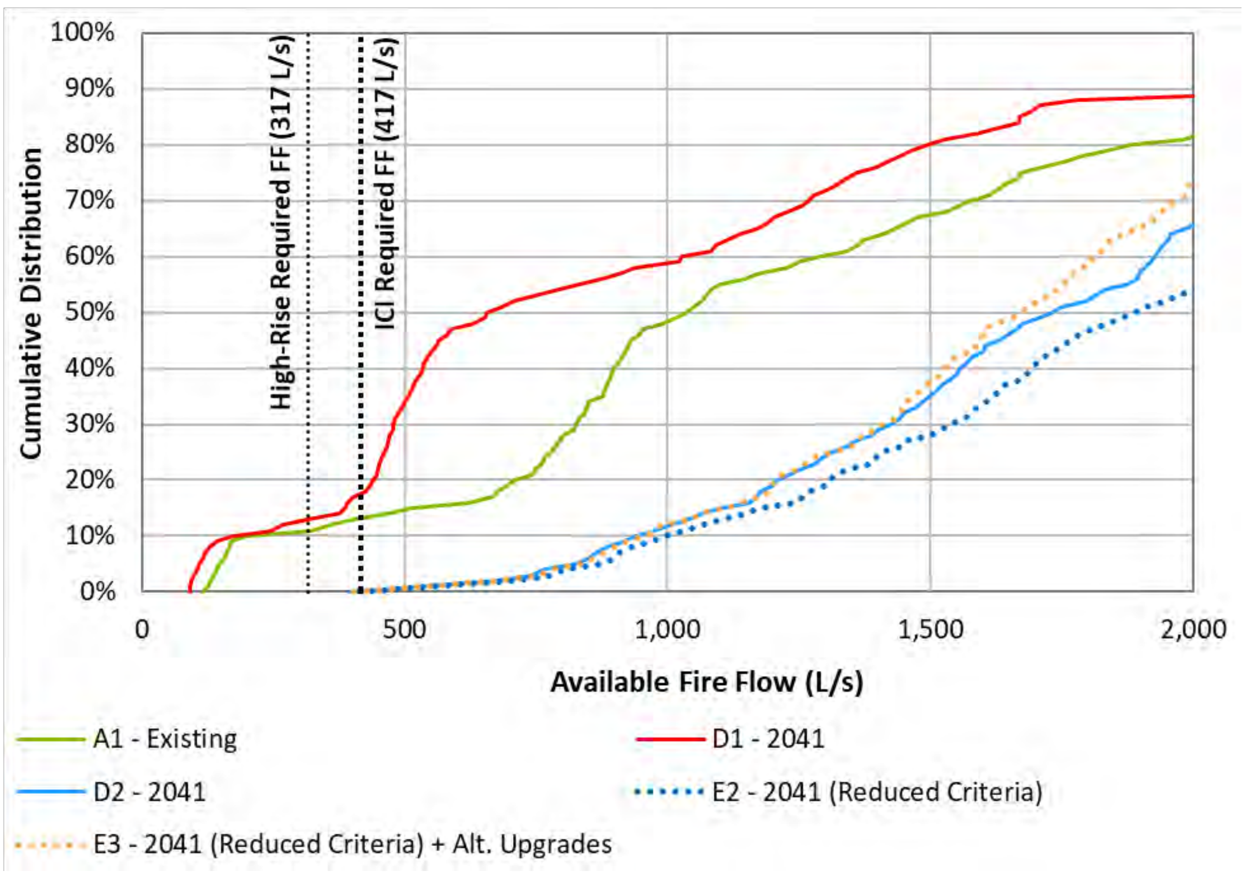

Figure 1-14: Available Fire Flows, MDD Conditions, All Scenarios

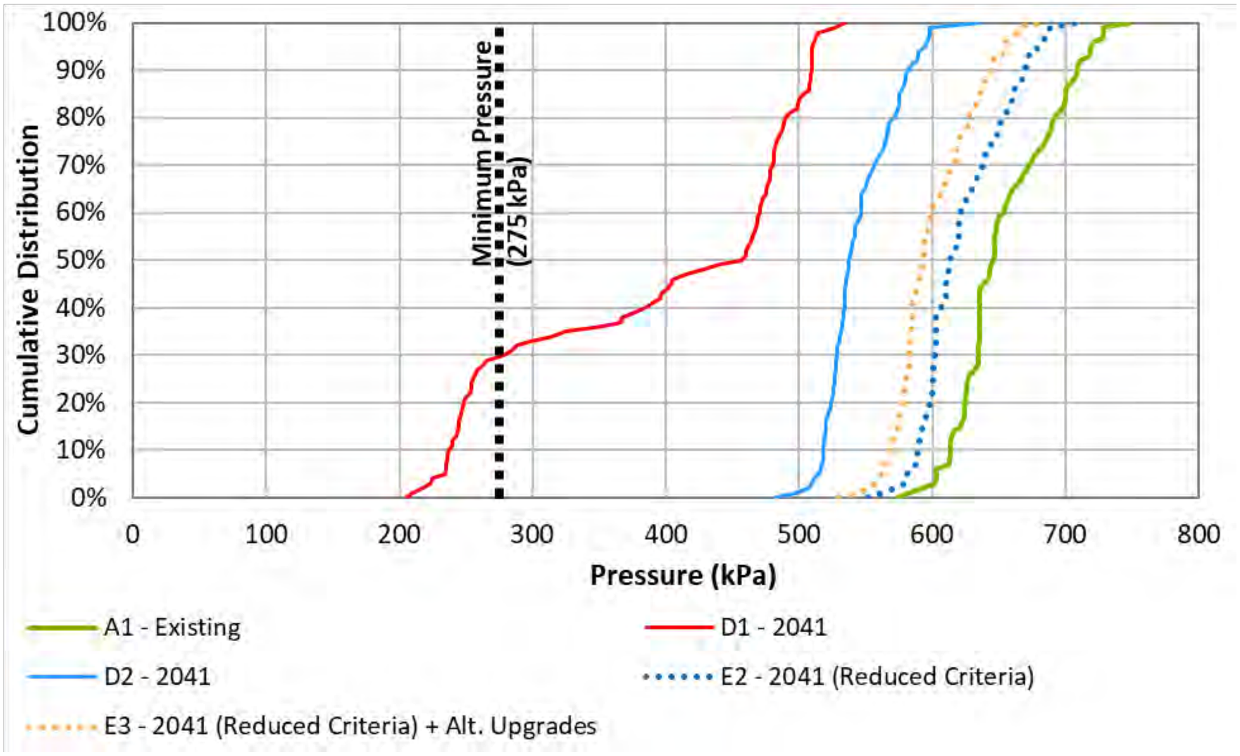

Figure 1-15: Pressures, PHD Conditions, All Scenarios

Based on these results, the following observations are made:

- Both the original and alternative proposed infrastructure upgrades appear sufficient in supplying fire flow, with no material change in capacity for model nodes with low available fire flows. Where there is surplus in the fire flow capacity relative to the City's requirements, the larger variations in capacity can be tolerated, whilst satisfying City criteria.

- The distribution of PHD pressures throughout the study area (i.e., the slope of the CDF curve) does not appear to change significantly between modelling scenarios, but are translated horizontally. This again indicates that conveyance capacity internal to the study area is not the primary servicing constraint, but rather overall supply to the area causing the HGL to drop uniformly.

- The alternative proposed infrastructure upgrades can sufficiently support the proposed developments whilst maintaining operating pressures above 275 kPa (40 psi). The performance degradation is more modest under the originally proposed upgrades for the same conditions.

- With the reduced demand criteria and the proposed infrastructure upgrades, operating pressures under PHD conditions more closely resemble current conditions. There is a modest degradation in performance with the alternative proposed upgrades (i.e., avoidance of major project to supply water along Steeles Avenue West from Keele Street and north on Jane Street to Doughton Road).

1.6 System-Wide Impacts

This section discusses the expected impact on operating pressures in the broader PD6 zone caused by the projected 2041 demands. This has been illustrated graphically by plotting the difference between the PHD pressures at all PD6 model nodes between existing conditions and various future (2041) conditions, summarized in **Table 8** below.

Table 8: Graphical Plots of System-Wide Pressure Impacts

Figure	Population	Water Demand	Water Servicing Infrastructure
Figure 16	**Future (2041) Population**	**Calibration + City's Criteria**	**Existing**
Figure 17	**Future (2041) Population**	**Calibration + Reduced Criteria**	**Existing**
Figure 18	**Future (2041) Population**	**Calibration + City's Criteria**	**Proposed**
Figure 19	**Future (2041) Population**	**Calibration + Reduced Criteria**	**Alt. Proposed**

Based on these results, the following observations are made:

- The projected (2041) study area demands without the expanded boundary and calculated with the City's design criteria (**Figure 1-16**) are expected to have the greatest impact on operating pressures to areas south of the existing 400 mm watermain on Langstaff Road (under existing infrastructure), wherein the decrease in PHD pressures is predicted to be on the order of 125 kPa (18 psi) or greater. Operating pressures northerly therefrom up to Rutherford Road are predicted to decrease by at least approximately 35 kPa (5 psi). The impact is notable but less significant for areas southwest of the intersection of Rutherford Road and Highway 400, and relatively modest for all other areas in PD6.

- In calculating the projected (2041) VMC demands using the reduced design criteria (**Figure 1-17**), the predicted impact on PD6 pressures is significantly diminished. The reduced design criteria are intended to represent a more realistic depiction of future demands and are likely more appropriate when considering performance on a system-wide scale. It is worth noting that the application of the reduced design criteria also affects the modelled demands outside of the VMC study area via reduction in the PHD peaking factor.

- The proposed infrastructure upgrades are expected to mitigate the impact of the projected (2041) demands (**Figure 1-18**) by providing increased supply from the south and connectivity to areas north of the study area.

- The alternative proposed infrastructure upgrades are expected to result in modest impacts when considered with the reduced design criteria (**Figure 1-19**). The decrease in PHD pressures is predicted to be no greater than 70 kPa (10 psi) at any location in PD6.

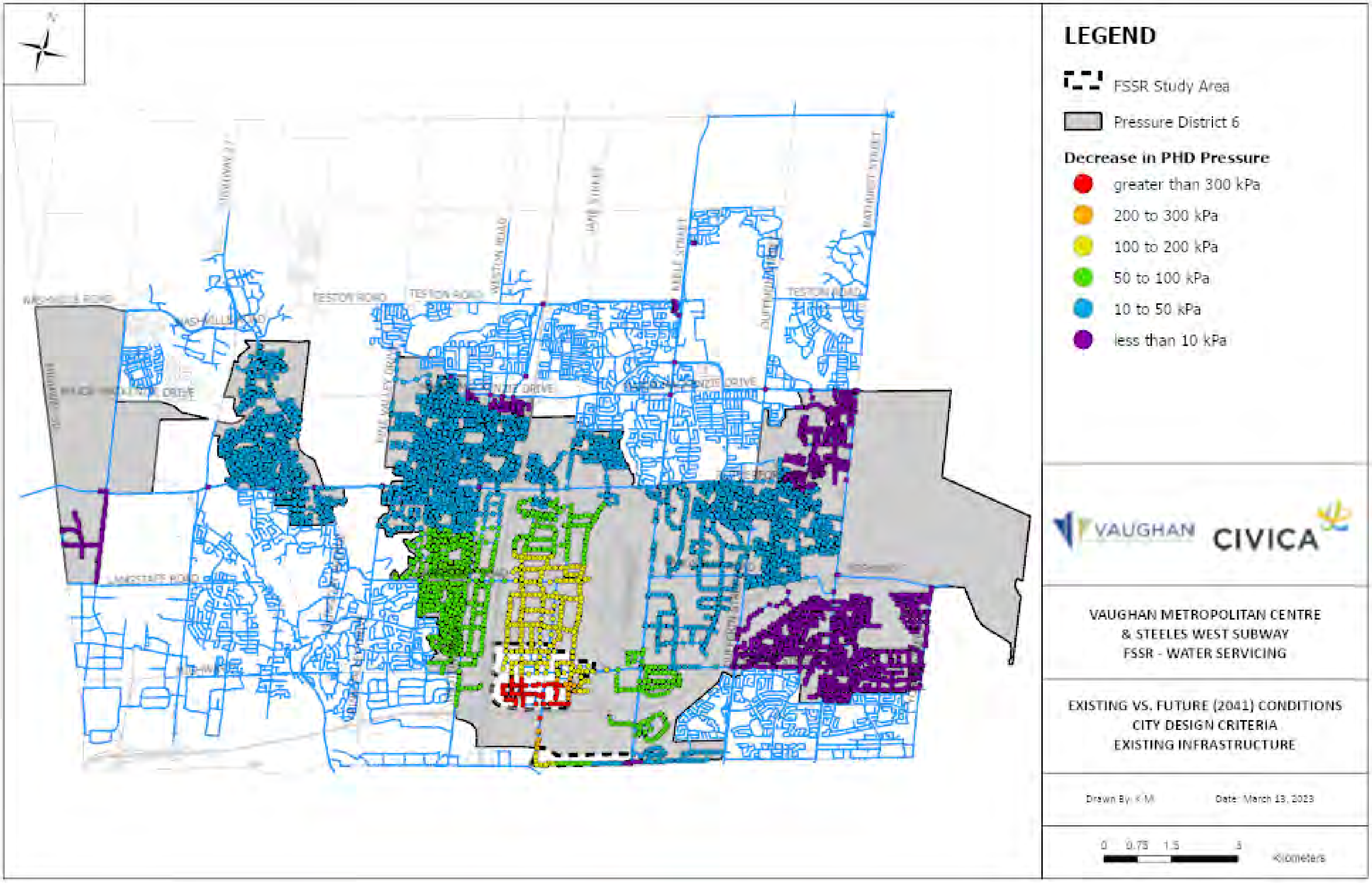

Figure 1-16: Impact of 2041 Demands on PD6 Pressures; based on City Design Criteria and with Existing Infrastructure

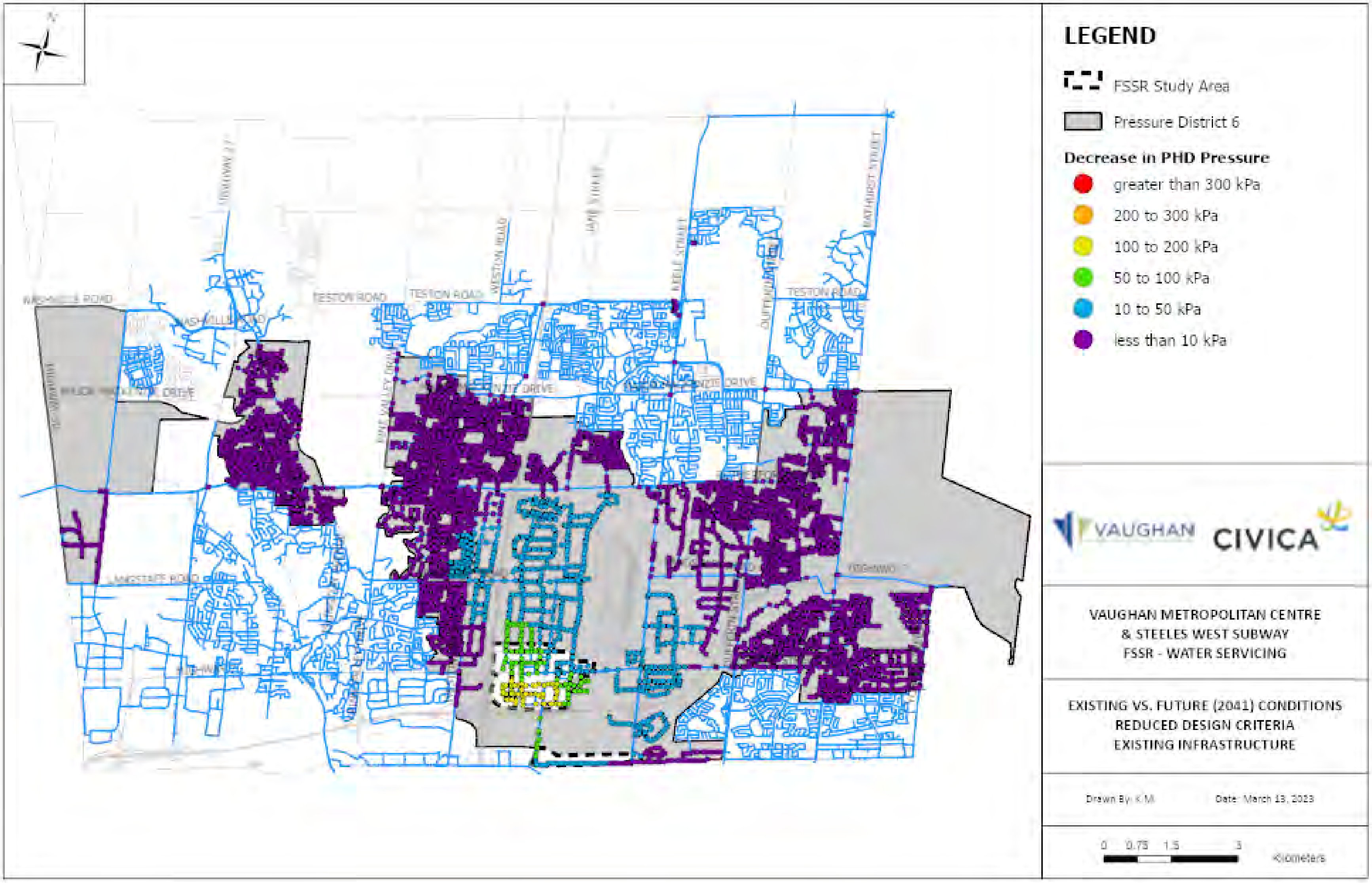

Figure 1-17: Impact of 2041 Demands on PD6 Pressures; based on Reduced Design Criteria and with Existing Infrastructure

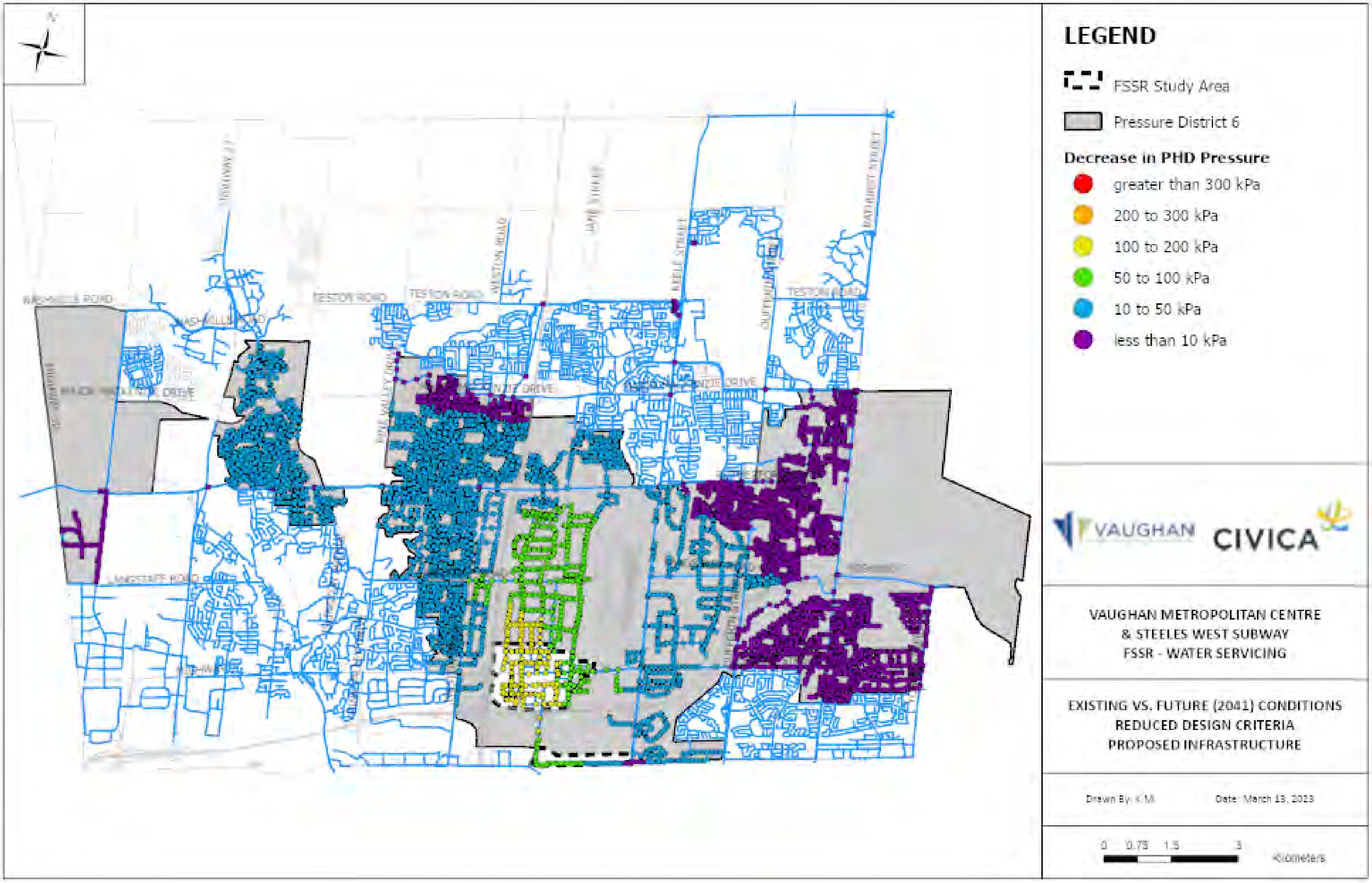

Figure 1-18: Impact of 2041 Demands on PD6 Pressures; based on City Design Criteria and with Proposed Infrastructure

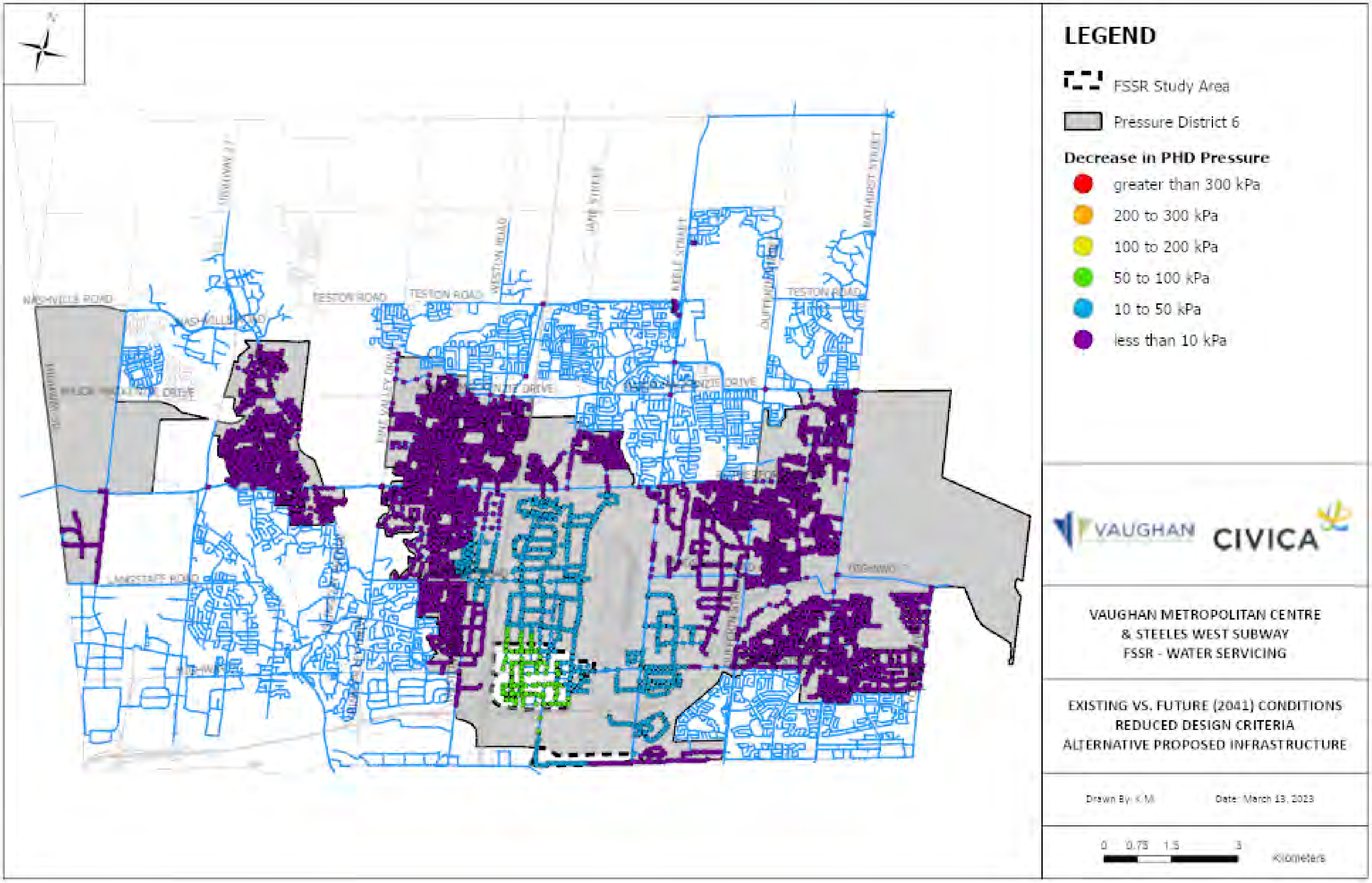

Figure 1-19: Impact of 2041 Demands on PHD Pressures; based on Reduced Design Criteria and with Alternative Proposed Infrastructure

1.7 Recommendations

Based on the assessment conducted and reported herein, the following recommendations are made:

- That the City plan for the full extent of the proposed infrastructure identified herein, for which the total estimated cost is equal to $111.30 million (including various contingencies). A detailed breakdown of the project cost estimates is provided below in **Figure 1-20**.

- That the City, perhaps in conjunction with York Region, more closely examine the design criteria to be applied for the projects categorized as "region-scale" (ID #1).

- That the City monitor system behaviour in the VMC area over time to quantify any performance degradation associated with increase demands as the area develops.

- That the City apply the results of the design criteria examination and system monitoring exercises noted above in a form of Real Options Analysis to determine whether the "region-scale" projects can be deferred or avoided.

- That the City assess matters related to the "region-scale" projects on a regular basis (e.g., annually) using the then best available information.

It is important to note that the projects identified and anticipated timing requirements are based on the assumptions of the temporal and spatial distribution of populations applied for this work. Any material deviation from these assumptions, or development proposals that may alter the upgrades required and/or the timing therefore, may require re-assessment, as appropriate.

CITY OF VAUGHAN INTEGRATED URBAN WATER MASTER PLAN (2023)

Project Cost Estimate

FSSR Area 06 - Vaughan Metropolitan Centre

Item	PID	Description	Qty	Unit	Rate	Amount
A		**Construction**				
1	1	600Ø watermain (U)	2100	m	$4,400	$9,240,000
2	1	600Ø watermain (T)	2100	m	$11,000	$23,100,000
3	2	400Ø watermain (T)	80	m	$8,700	$696,000
4	3	400Ø watermain (U)	310	m	$3,100	$961,000
5	4	300Ø watermain (U)	710	m	$2,500	$1,775,000
6	5	300Ø watermain (U)	270	m	$2,500	$675,000
7	6	400Ø watermain (U)	2250	m	$3,100	$6,975,000
8	7	300Ø watermain (U)	4670	m	$2,500	$11,675,000
9	8	400Ø watermain (U)	1820	m	$3,100	$5,642,000
10		Connect to existing	6	ea	$100,000	$600,000
11						
		Sub-Total Construction:				$61,339,000
12		Contingency			10.00%	$6,133,900
		Total Construction:				**$67,472,900**
B		**Design & Administration**				
1		Engineering (Design, Supervision, Administration)			24.00%	$16,193,496
2		Treasury Administration			3.00%	$2,024,187
3		Dense Urban Area Factor			5.00%	$3,373,645
		Total Design & Administration:				**$21,591,328**
C		**Land Acquisition**	0.000	ha	$0	**$0**
		Sub-Total Project:				**$89,064,228**
D		**Class D Estimate Contingency**			25.00%	**$22,266,057**
		PROJECT TOTAL:				**$111,340,000**

NOTES & ASSUMPTIONS

1. Watermain installation condition legend:
   (R) - Rural/Greenfield Open Cut
   (U) - Urban/Redevelopment Open Cut
   (T) - Trenchless
2. Assumed that 50% of Jane Street and Steeles Avenue West watermains to be installed using trenchless methods.
3. Project Item ID (PID) column represents the corresponding PID as seen in the project image.

Figure 1-20: Vaughan Metropolitan Centre Project 1 Cost Estimates

VAUGHAN

CITY OF VAUGHAN INTEGRATED URBAN WATER PLAN

FUNCTIONAL SERVICING STRATEGY REPORT

Vaughan Metropolitan Center (VMC)

Volume 3 – Sanitary Sewer Report
Final Report
June 2024

CIVICA

STATEMENT OF QUALIFICATIONS AND LIMITATIONS

The attached Report (the "Report") has been prepared by Civica Infrastructure Inc. (the "Consultant") at the request of, and for the exclusive use of the City of Vaughan (the "Client") in accordance with the terms of agreement between the Consultant and the Client, including the scope of work detailed therein (the "Agreement").

Please note that the information, data, analysis, recommendations, and conclusions contained in the Report was prepared for the specific purposes described in the Report and the Agreement and may be based upon information which has not been independently verified by the Consultant. The Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to the Consultant, and has no obligation to update such information. The material in this report reflects the Consultant's best professional judgement in the light of the information available to it at the time of preparation and publication.

The Consultant agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement. The Consultant makes no other representations, any guarantees or warranties whatsoever, whether expressed or implied, with respect to the Report or any part thereof.

The Report is to be treated as confidential and may not be used or relied upon by third parties, except as agreed in writing by the Consultant and the Client. Neither possession of the Report, nor a copy of it, carries the right of publication. The Report shall not be disclosed, produced or reproduced, in whole or in part, neither published in any manner, without the written consent of the Consultant and the Client.

The Consultant expressly excludes liability to any party except the Client for either any use of or reliance upon the Report.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any usage of the Report is subject to the terms therein.

Disclaimer

The data used for this analysis has been obtained from City of Vaughan sources with the understanding that these are provided without warranties. This data is included in the hydraulic model. The information has been reviewed to ensure consistency with general sanitary system modeling principles used in the City of Vaughan. Unless noted in this memo, specific water system geometric characteristics and operating conditions have not been verified in the field or by cross-referencing with As-Built drawings or other sources that may be available from the City of Vaughan.

June 2024 **VAU19-0018**

City of Vaughan
2141 Major Mackenzie Dr W
Maple, ON L6A 1T1

Attention: Michael Frieri

RE: City of Vaughan Integrated Urban Water Plan- Vaughan Metropolitan Centre (VMC) FSSR Vol 3 Sanitary Report

Civica Infrastructure Inc. is pleased to submit the following report. The Integrated Urban Water Plan is comprised of the main Environmental Assessment Report and a series of Functional Servicing Strategy Reports of which this is one. These reports focus on specific development areas and provide information to facilitate more comprehensive servicing planning direction for redevelopment projects in these designated community growth areas.

This report provides servicing area background information and is part of a four-volume series that provides information on Background Information (Vol. 1), Water Servicing (Vol. 2), Wastewater Servicing (Vol. 3), and Stormwater Servicing (Vol. 4).

Sincerely,

CIVICA INFRASTRUCTURE INC.

Ilmar Simanovskis, P.Eng, MBA
Project Manager

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Appendices

1.0 Introduction

1.1 Background

This Report evaluates and identifies the wastewater infrastructure required to support the growth in the planning area for the ultimate population time horizon (2041 and beyond).

1.1.1 VMC Sanitary Drainage Area

The sanitary capacity analysis was completed for the existing condition, the interim conditions (2028 and 2036) and the ultimate condition (2041 and beyond). Sanitary system deficiencies at each horizon year are identified and solutions are proposed based on the ultimate build-out condition. The phasing and cost of the proposed solutions are discussed, and a sensitivity analysis was conducted to evaluate the effect of climate change and boundary expansion. The study area is presented in Figure 1-1. This study area includes the VMC Secondary Plan, expanded area and the Major Transit Station Area (MTSA).

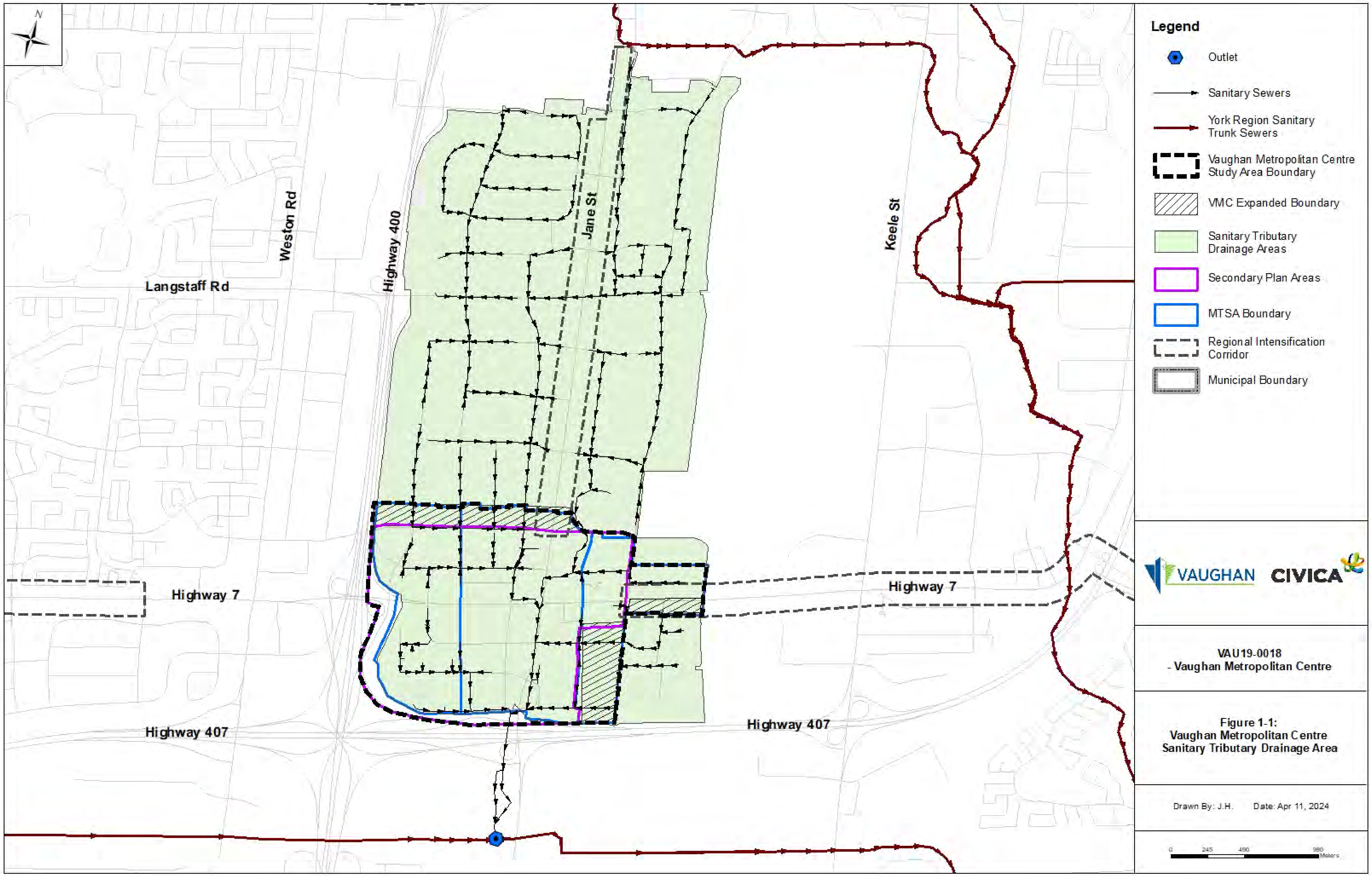

Figure 1-1: VMC Sanitary Drainage Area

2.0 Sanitary Servicing Design Criteria

2.1 Sanitary Flows

The sanitary sewer system conveys flow from the following sources:

- Domestic Sewage (Residential and ICI);
- Base flow (Ground Water Infiltration, GWI); and,
- Rainfall-Derived Inflow and Infiltration (RDII).

The first two sources of flow generation are considered as dry-weather flow (DWF). The third source is the extraneous flow known as RDII or I/I. Extraneous flows are undesirable as they increase the load on the sanitary sewer and reduce the capacity on treatment facilities. Figure 2-1 illustrate a typical sanitary flow hydrograph under WWF conditions.

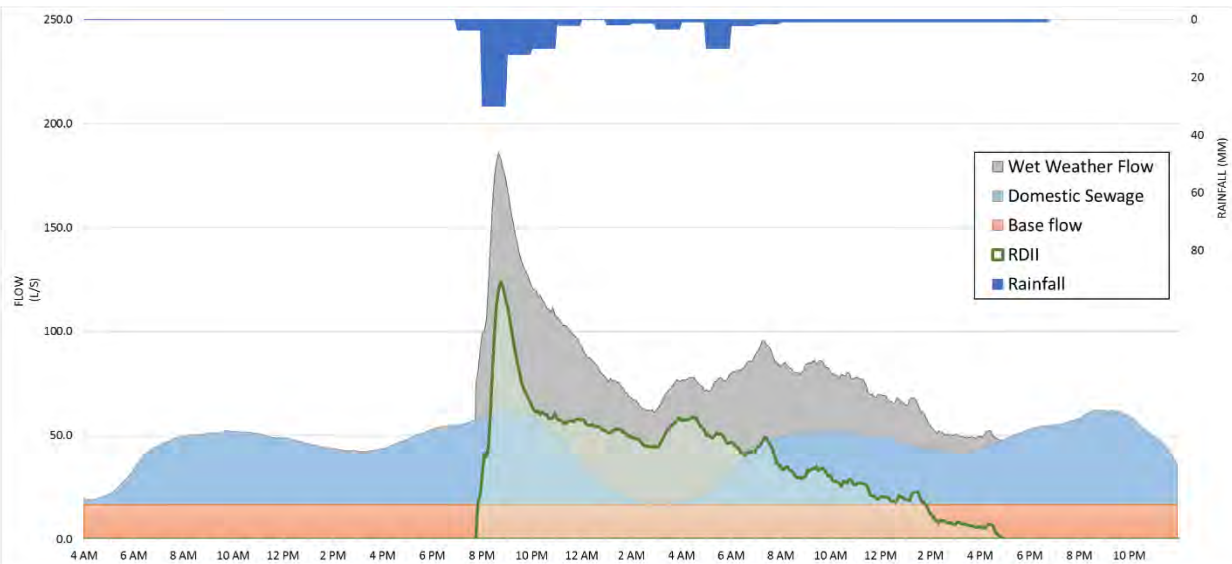

Figure 2-1: Sanitary Flow Components

Table 2-1 summarizes the design criteria for existing and future conditions. The existing condition model was provided by the City and is representative of conditions based on the status of the area for 2020 flow conditions.

Modelling parameters are established based on the following conditions:

- Per capita Dry Weather Flow (DWF) and Inflow and Infiltration (I/I) design rates are used to characterize the flow from future development subcatchments, as per the City's design criteria.
- The I/I rate is calculated based on the area design flow of each subcatchment and assigned as baseflow.

- The wastewater generation rates for future subcatchments are based on a peak flow using the Harmon Peaking Factor which is then assigned based on the total future population in the sewershed.
- Existing developments subcatchments that are not anticipated to be redeveloped are assigned DWF generation rates and peaking factors based on measured flows and I/I rates calculated by the model using available flow monitoring data.

Table 2-1 : Existing and Future Sanitary Flow Criteria

Development Condition	Per Capita DWF Generation Rates	Peaking Factor	Peak I/I Rate
Existing (At the time of flow monitoring, i.e., 2020)	Measured Flow Monitoring Results	Measured	Predicted by model (estimated using flow monitoring data)
Approved and Future Developments	370 L/c/d	Harmon Peaking Factor*	0.26 L/s/ha

* Minimum K = 2; Maximum K = 4.

2.2 Rainfall-Derived Inflow and Infiltration (I/I)

Rainfall-Derived Inflow and Infiltration (I/I) represents any extraneous source of water entering the sanitary system as a result of a storm event. I/I is calculated separately in the model. Since I/I varies between subcatchments primarily due to cross-connections, sewer infrastructure condition, soil conditions, and topography, this value was calibrated using the RTK unit hydrograph method. The RTK method generates a hydrograph based on precipitation data and catchment area. The total I/I into the sanitary sewer system is determined by combining triangular unit hydrographs from three components of flow:

- Rapid inflow (short-term response);
- Moderate infiltration (medium-term response); and,
- Slow infiltration (long-term response).

The following three (3) parameters describe the shape and volume of runoff that enters the sanitary sewer (See Figure 2-2):

- “R” is the fraction of precipitation that becomes direct inflow;
- “T” is the time to peak of the hydrograph; and,
- “K” is the ratio of the recession time to time to peak.

“R” can be equated to the area under the unit hydrograph curve and represents I/I volume per unit area as a fraction of precipitation.

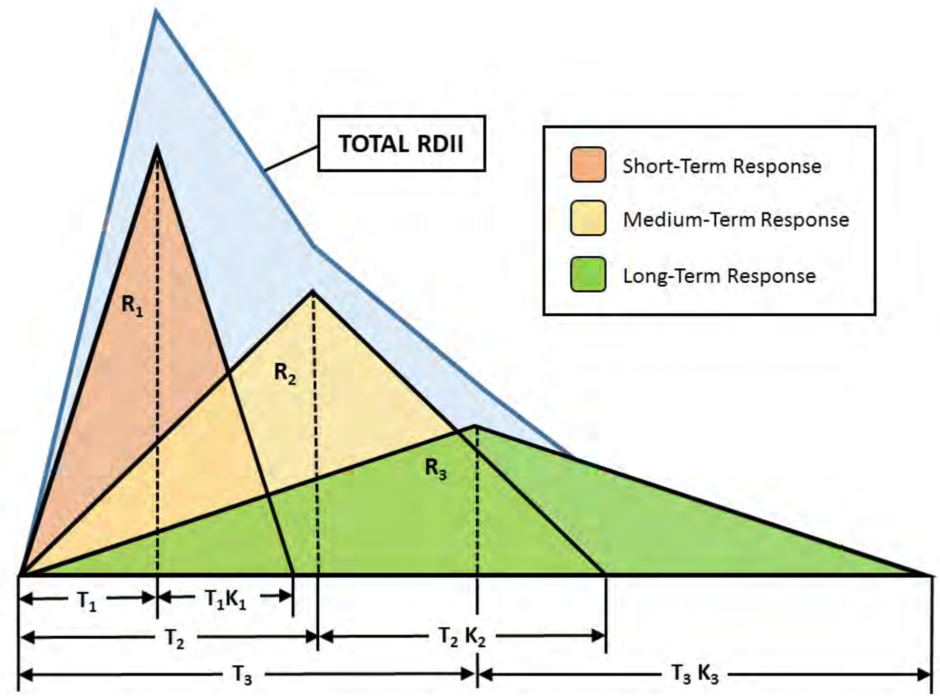

Figure 2-2: RTK hydrograph components

2.3 Design Storm

The calibrated model simulates the operating condition of the sewer under the City's 5-year and 25-year design storms. The design storms are three-hour storms with a time-to-peak ratio of 0.33 (Chicago-type storm) over 7-min intervals. The peak intensities for the 25-year and 5-year storms are 200 and 137 mm-/hr, respectively. Figure 2-3 and Figure 2-4 below are the hyetographs of the 5-year and 25-year storms used in this analysis, respectively.

In the model, the peak intensity of the design storms is aligned at 12:00 p.m. to match the (approximate) peak-measured DWF for existing conditions and the theoretical-peak DWF for future scenarios. This approach predicts the worst-case scenario in which the peak DWF and peak I/I occur at the same time.

I/I for the 5-year and 25-year design storms is predicted by the model based on the RTK method explained in the previous section.

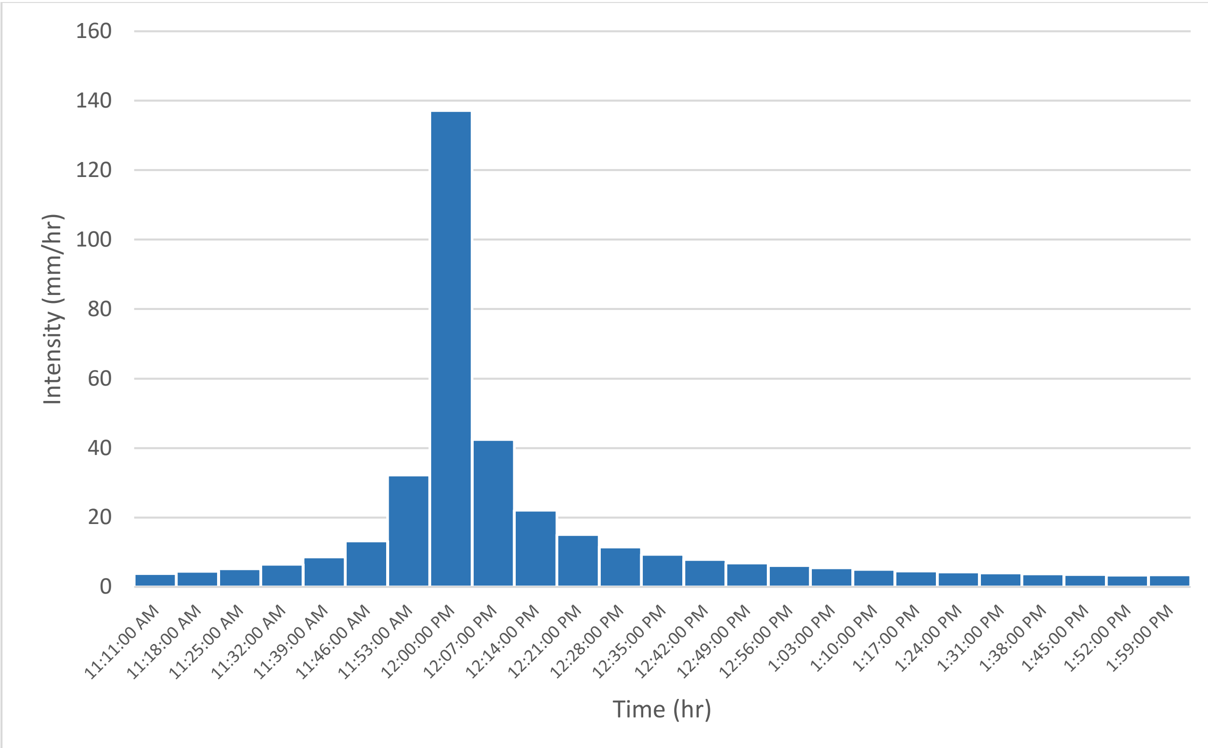

Figure 2-3: 1 in 5-year Storm Hyetograph (Intensity)

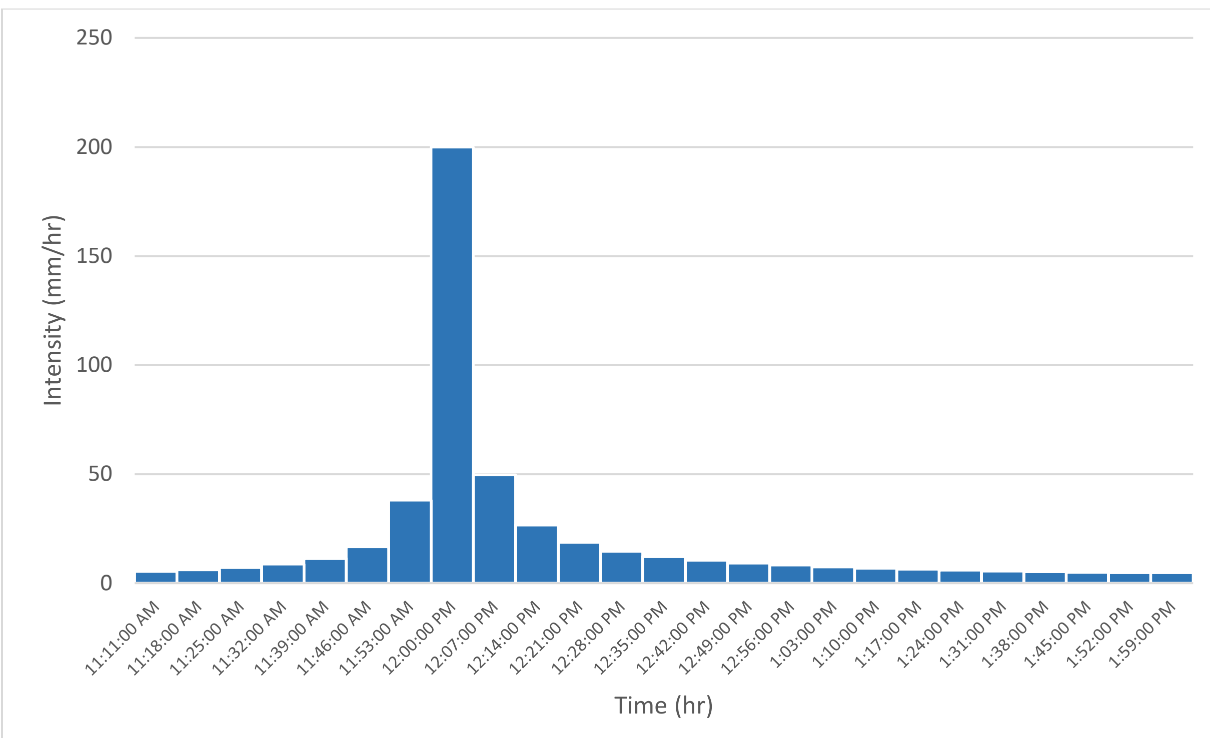

Figure 2-4: 1 in 25-year Storm Hyetograph (Intensity)

3.0 Sanitary Sewer Capacity Analysis Methodology

3.1 Population

The existing population is obtained from the Operational model. The various scenario population forecasts are discussed in Volume I of this FSSR and detailed in Technical Memorandum 18 - Planning: Population and Sewer Infrastructure.

Existing condition (2019) and four planning horizons were considered in the study: interim growth scenarios 2028, 2036, and ultimate growth 2041 and beyond. To phase the servicing plans, an interim condition population was assumed as follows:

- Existing considered development applications are assumed to be occupied by 2028.

All areas with no development application assumed linear population growth.

3.2 Level of Service

Acceptable level of service in this study is defined as the following:

- Free flow under the 25-Year Design Storm (no surcharge); i.e., the maximum flow depth is below the obvert of the pipe, no surcharge of the pipe; and

80% full pipe capacity under the 5-Year Design Storm (no surcharge); i.e. the ratio of water depth to pipe diameter (h/H) is less than 80%.

3.3 City of Vaughan Engineering Design Criteria Versus IUWMP EA Criteria

The City of Vaughan's Engineering Design Criteria and Standard Drawings (EDCSD) provide the criteria for model conditions. Although the intent of the design standards is to ensure design flow are not surcharging within the network, there is no specific criteria as stated above. The above level of service criteria have been provided and reviewed by the City as an acceptable approach to assessing network impacts for future conditions and are applied in this EA study and are recommended to be included in the future City's EDCSD updates. Detailed design and hydraulic modelling for engineering and approval purposes are to continue to follow that most current city design criteria as updates are issued.

3.4 Boundary Conditions

The boundary condition for the sanitary system is the discharge point into the York Durham Sanitary Sewer The peak flow elevation at the inlet point to the YDSS during a 25- year design storm is the boundary condition used in the model.

3.5 Capacity Analysis Scenarios

The calibrated model is used to analyze available residual capacities within outlet sewers to accommodate future developments. Five development scenarios are analyzed under the City's design storms to assess the performance of the sanitary sewer system in the study area. These scenarios are detailed below.

3.5.1 Scenario 1: Existing

This scenario represents the existing condition based on 2019 population data and as adjusted based on calibration to 2021 flow monitoring data. The sanitary generation rates, I/I rates, and DWF patterns for the existing developments are calculated based on flow monitoring data.

3.5.2 Scenario 2 (2028) and Scenario 3 (2036) Interim Conditions

To analyze the effect of phased development within the study area, population is estimated for two interim year conditions: being 2028 and year 2036. For 2028, all current active and approved development applications to 2021 are included in the population forecast. Sanitary connection points of the developments application used in this analysis are shown in Figure 3-1. Where no development applications are occurring, the population in those areas was increased to match the overall community growth forecast.

Population is assigned to the new subcatchment areas where greenfield development area planned, and population in existing areas was increased based on growth projections and target population information.

3.5.3 Scenario 4 (2041) Ultimate Future Condition

This scenario represents the condition where the study area ultimate population is reached (year 2041). The additional population growth was then distributed across the study area as appropriately as possible based on known growth plans and future building of lands in the study area.

3.5.4 Scenario 5: Population Sensitivity Analysis

This scenario represents the condition where the future population in the VMC expanded boundary and Major Transit Station Area (MTSA) will increase to approximately 74,000 persons and jobs, while the ultimate population in the secondary plan boundary stays the same as the 2041 scenario. The population of areas inside secondary plan boundary is calculated as described before in this report and in Volume I of the FSSR. The population of the blocks inside the expanded boundary and MTSA area is calculated assuming floor space index (FSI) of 3, the average area of $80m^2$ for each unit, and density of 2.5 persons per unit. The calculated population was then adjusted based on City's instruction to consider current planning goals. Figure 3-2 presents the developments which are used in the population sensitivity analysis.

3.5.5 Scenario 6: Climate change Sensitivity Analysis

This scenario represents the impact of climate change on the network related to storm intensification and increased I/I that could result from the effects of more intense storms.

The methodology considers two conditions, where there is existing development with flow monitoring results and where RDII can be calculated, the RTK unit hydrograph method is used based on a climate change modified 25-year design storm. To consider climate change, the 25-year design storm is increased by 15 percent.

Where there is the requirement for new sewers and areas of undeveloped land as an example, the infiltration allowance of 0.26 l/ha/d has been increased by 15 percent to 0.30 l/ha/d to allow for the impact of higher intensity storms that would increase the amount of surface water and potential infiltration.

These two methodologies were then applied to the 25-year storm event for the ultimate population scenario to assess the impact of climate change on the proposed solutions.

Figure 3-1: Sanitary Connections of Existing Development Applications

Figure 3-2: Expanded VMC Boundary (Population Sensitivity Analysis)

4.0 Sanitary Capacity Analysis Results

This section presents the results and recommended infrastructure needs for the scenarios identified above. The level of service criteria were applied to assess capacity constraints. The first model condition was to assess dry weather flows and flows during a 5-year storm event. It would be expected that no surcharging would be occurring for the dry weather flow scenario, however, any capacity constraints identified would be identified in red and considered a high priority. If the results of the 5-year storm event exceeded the design criteria, those pipe segments would be identified in red in the corresponding figure.

The second model condition was to assess the 25-year design storm event. If the results exceeded the design criteria, those pipe segments would be identified in red in the corresponding figure.

4.1 VMC Study Area

4.1.1 Sanitary Service Under Existing Condition

Figure 4-1 and Figure 4-5 show the sanitary system conditions under existing population and the 5-year storm and 25-year storm respectively. There are no capacity constraints within the VMC study area for these two WW conditions, however there are some areas of constraint in the upper areas of the servicing catchment.

4.1.2 Sanitary System Condition under 2028 Population

Figure 4-2 and Figure 4-6 show the sanitary system conditions under the 2028 population scenario and the 5-year and 25-year storm respectively. There are capacity constraints within the VMC study area for these two WWF conditions. The sanitary system conditions under 2028 population are assigned to the existing sanitary system network. Sanitary connection points of the existing developments used in this analysis are shown in Figure 3-1.

4.1.3 Sanitary System Condition under 2036 Population

Figure 4-3 and Figure 4-7 show the sanitary system conditions under the 2036 population scenario and the 5-year and 25-year storm respectively. There are capacity constraints within the VMC study area for these two WWF conditions.

4.1.4 Sanitary System Condition Under 2041 Population

Figure-4-4 and Figure 4-8 show the sanitary system conditions under the 2041 population scenario and the 5-year and 25-year storm respectively. There are capacity constraints within the VMC study area for these two WWF conditions.

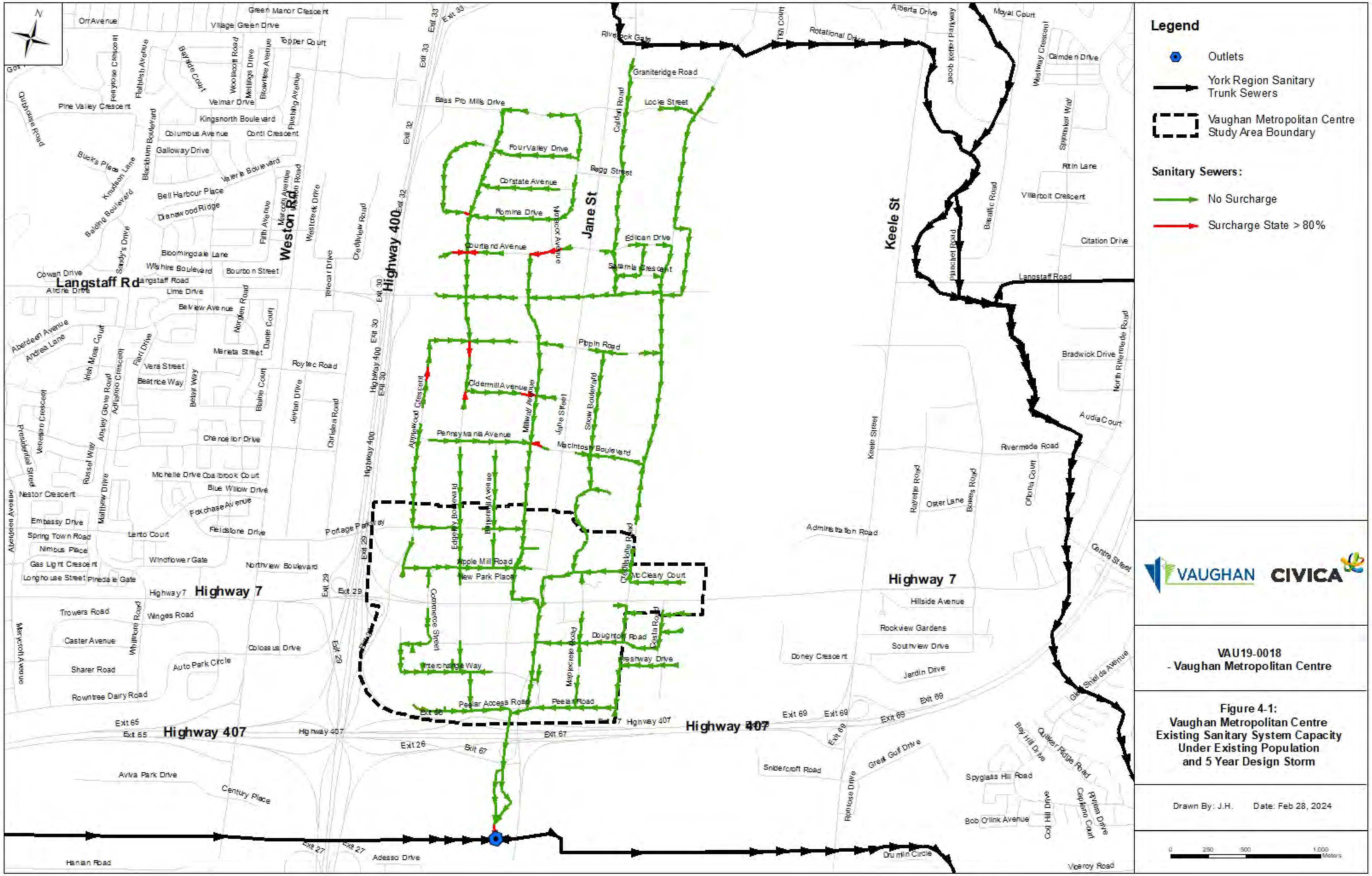

Figure 4-1: Sanitary Capacity Under Existing Population 5-Year Storm

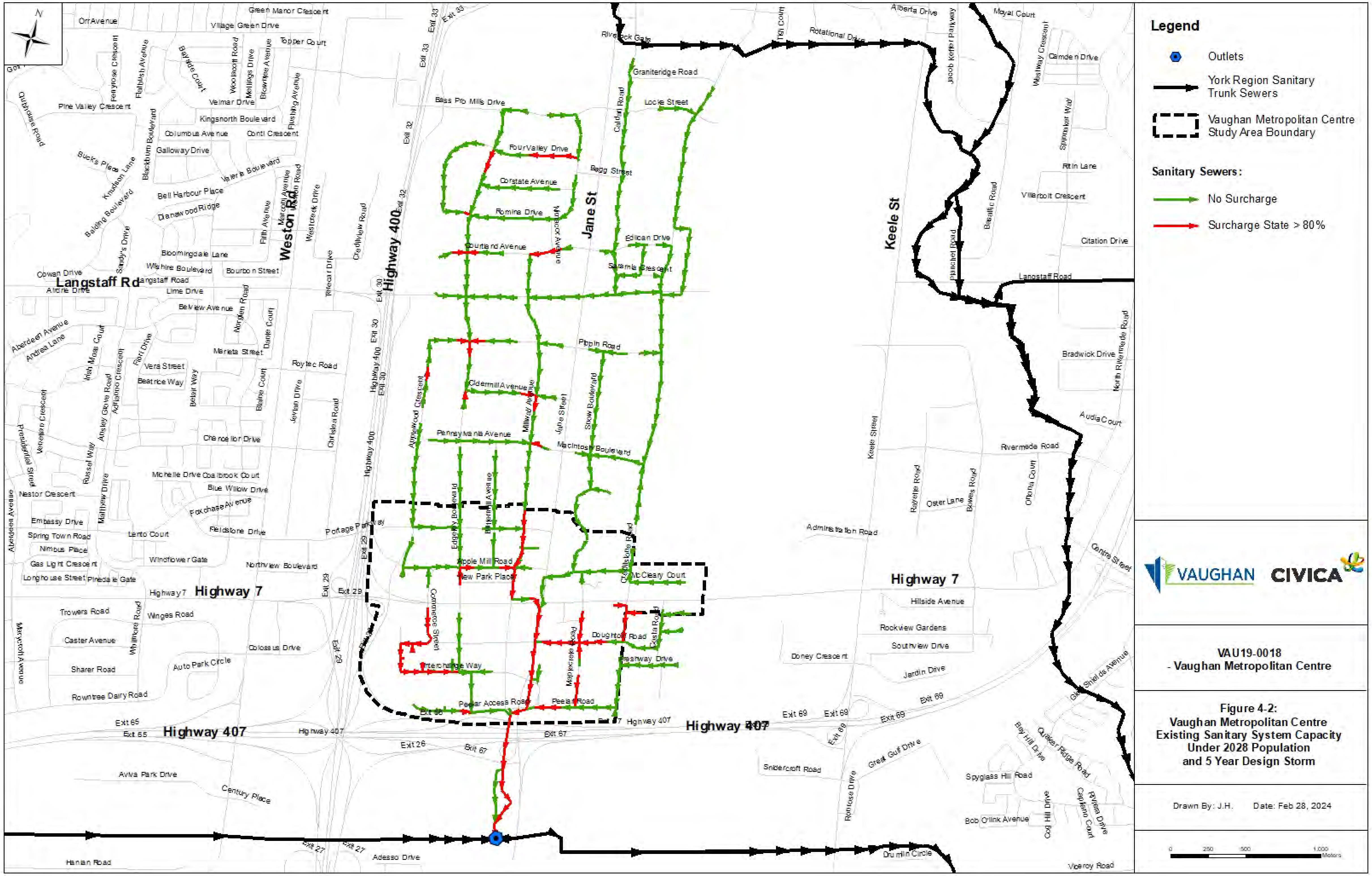

Figure 4-2: Sanitary Capacity Under 2028 Population & 5-Year Storm

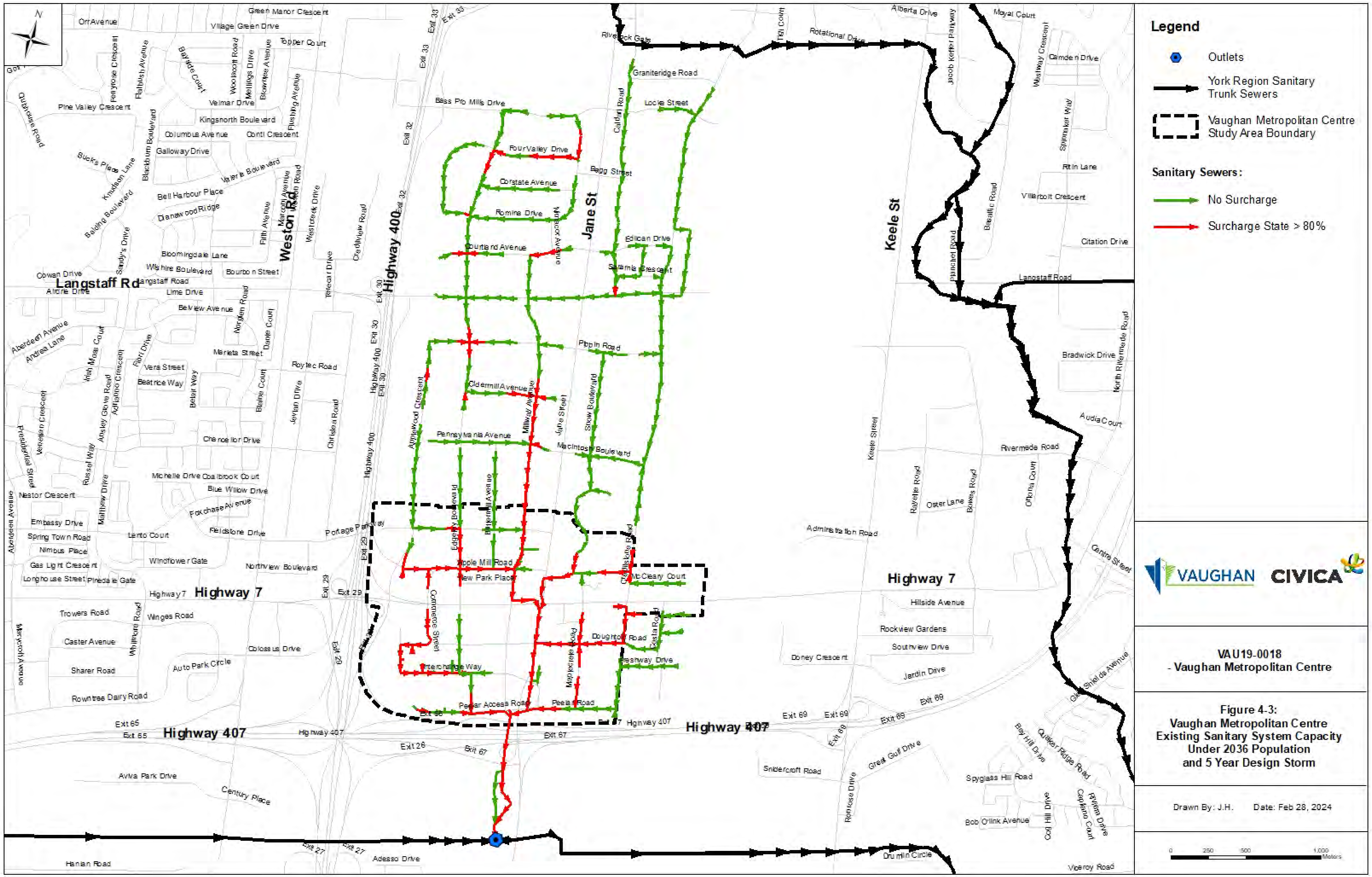

Figure 4-3: Sanitary Capacity Under 2036 Population & 5-Year Storm

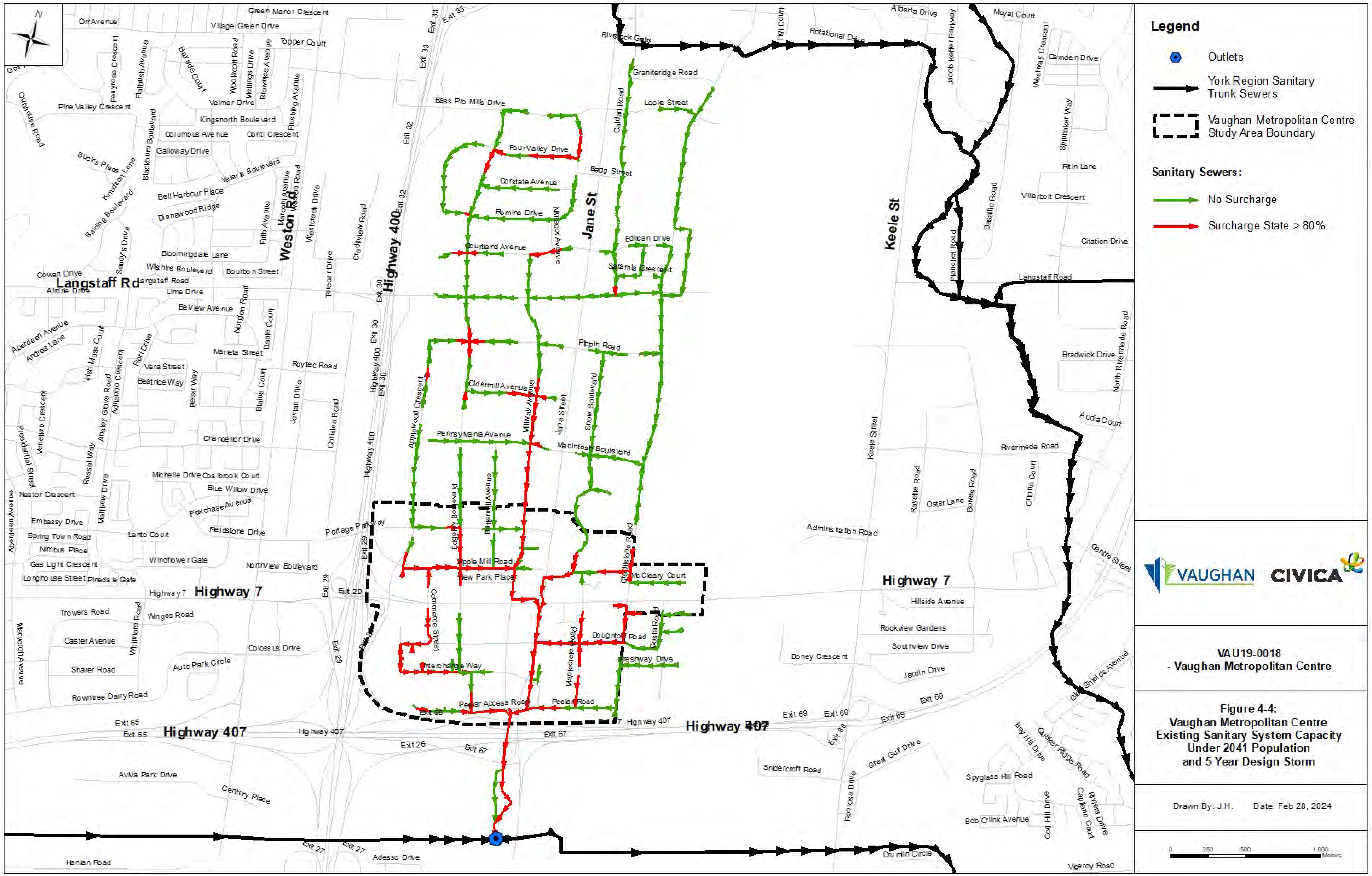

Figure-4-4: Sanitary Capacity Under Ultimate Population & 5-Year Storm

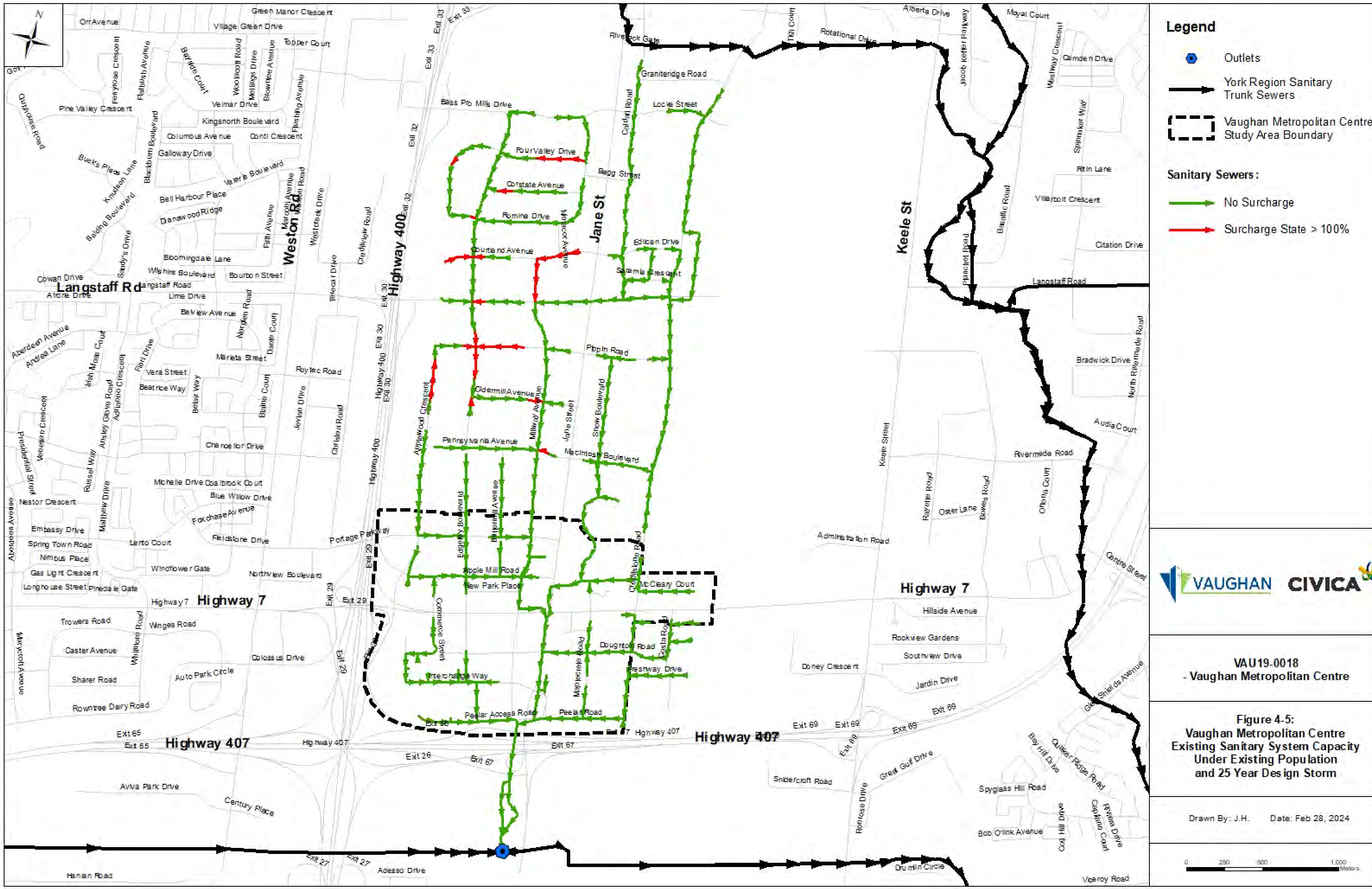

Figure 4-5: Sanitary Capacity Under Existing Population and 25-Year Storm

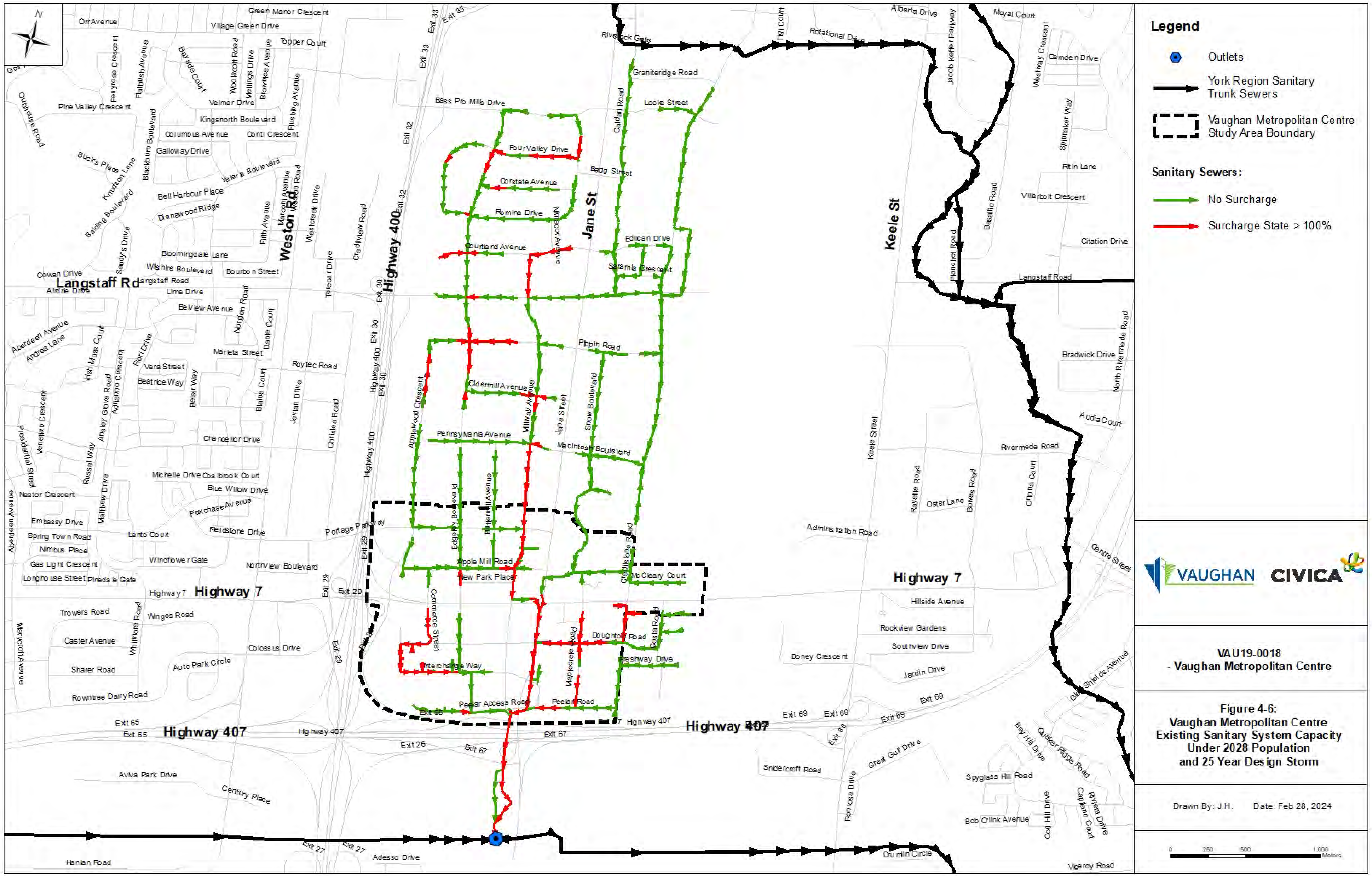

Figure 4-6: Sanitary Capacity Under 2028 Population & 25-Year Storm

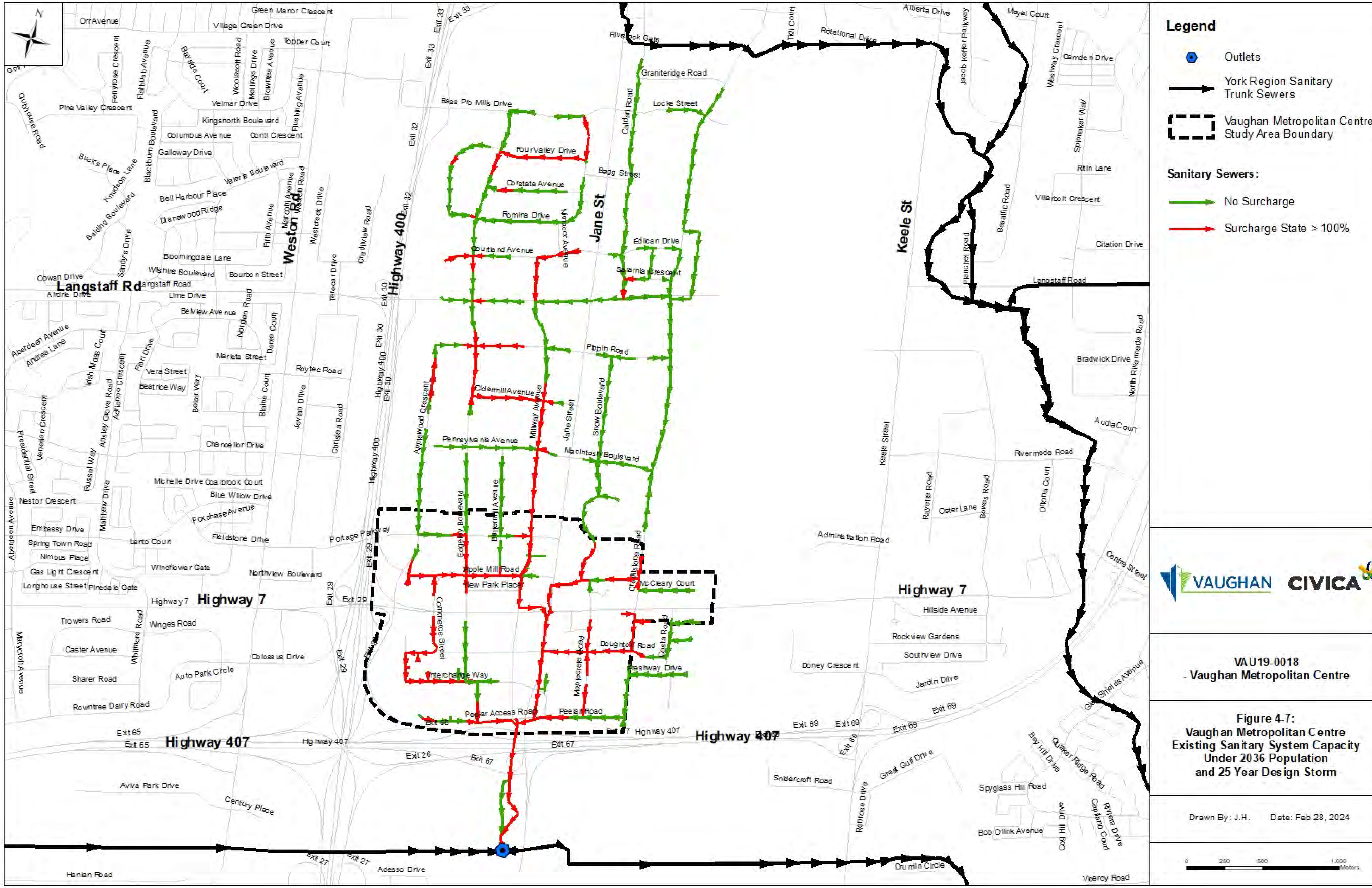

Figure 4-7: Sanitary Capacity Under 2036 Population & 25-Year Storm

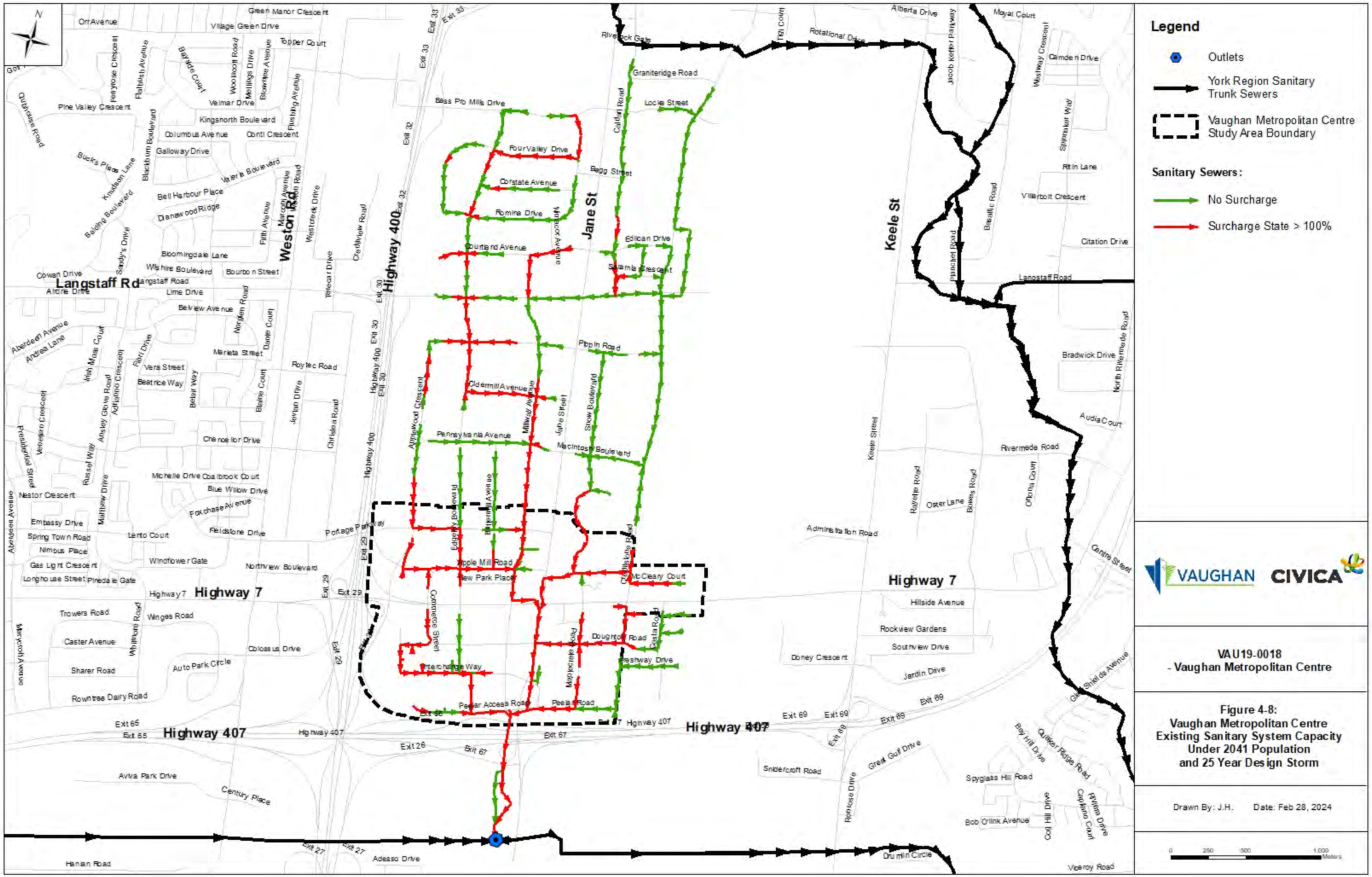

Figure 4-8: Sanitary Capacity Under Ultimate Population & 25-Year Storm

5.0 Sanitary Servicing Proposed Solutions

The proposed solutions for the ultimate conditions were investigated and are discussed in this section. Alternatives were analyzed and a preferred solution recommended with figures and tables illustrating the proposed sanitary upgrades.

The primary servicing needs resulting from the scenario analysis is to either provide for increased capacity to existing infrastructure or to add new infrastructure where service needs are outside of the current network. The approach to identifying solutions is predominantly guided by using the existing or proposed future road allowances. This is because use of existing rights of way has the least environmental impact and is generally the most appropriate from serving provision and operating and maintenance cost.

The priority solutions are therefore generally within the existing rights of way or within future rights of way that may be identified in a secondary plan or other planning approval process. As identification of alternatives is an important aspect of the environmental assessment process, were feasible and comparable, alternative solutions are identified. Although in some instances there are no practical alternatives to addressing the constraints, the most direct approach to meeting the servicing needs will be applied. Where either alternate, routes or access to other subcatchment areas is possible, these alternatives have been modelled and are included in the evaluation.

There is also a higher consideration of the impact to an identified alternative where there are conditions what would either result in access to a regional right of way or where there may be more significant environmental impacts such as water course crossings or other environmentally sensitive lands that are outside the existing right of way.

5.1 Alternative 1

Alternative 1 considers both the need for infrastructure upgrades within the VMC study area as well as upsizing requirements to address capacity constraints to the network components north of the study area. This solution is presented in Figure 5-1 and includes the network upgrade requirements for the study area and catchment just north of this area.

5.2 Alternative 2

Alternative 2 considers the implementation of a Wet-Weather Flow Reduction program upstream of the study area to reduce I/I flow. This recommendation is proposed as it was determined during model calibration that the 25-year storm estimated relatively high I&I in is area of 3.34 l/s/ha. Although a significant reduction in I&I through the WWFR Program is not expected, a reduction of 25 percent can be achieved which will reduce or eliminate the constraints identified in the model results. The 25 percent reduction in I&I was modelled and is part of the solution presented in Figure 5-2.

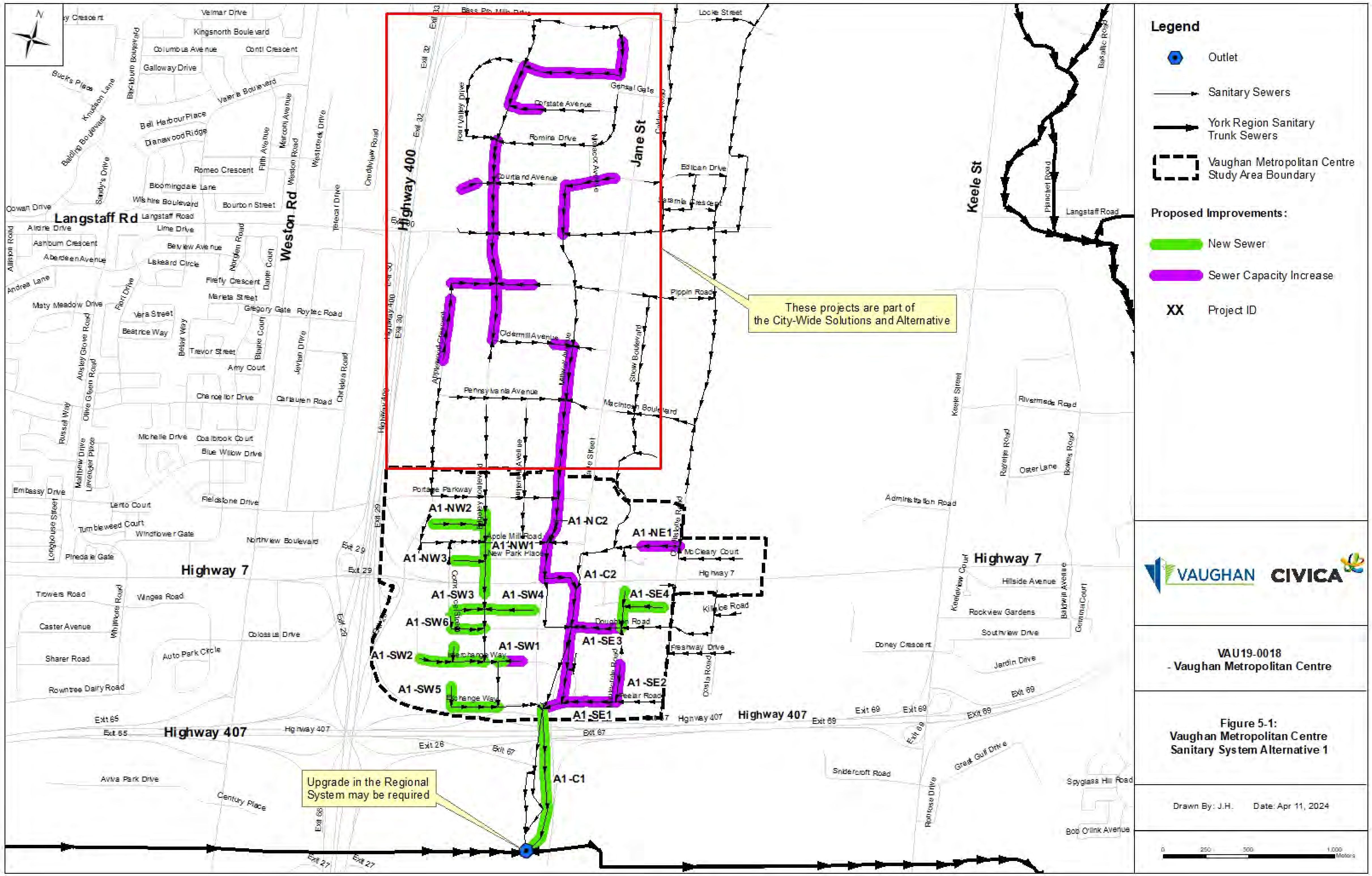

Figure 5-1: Proposed Solutions – Alternative 1

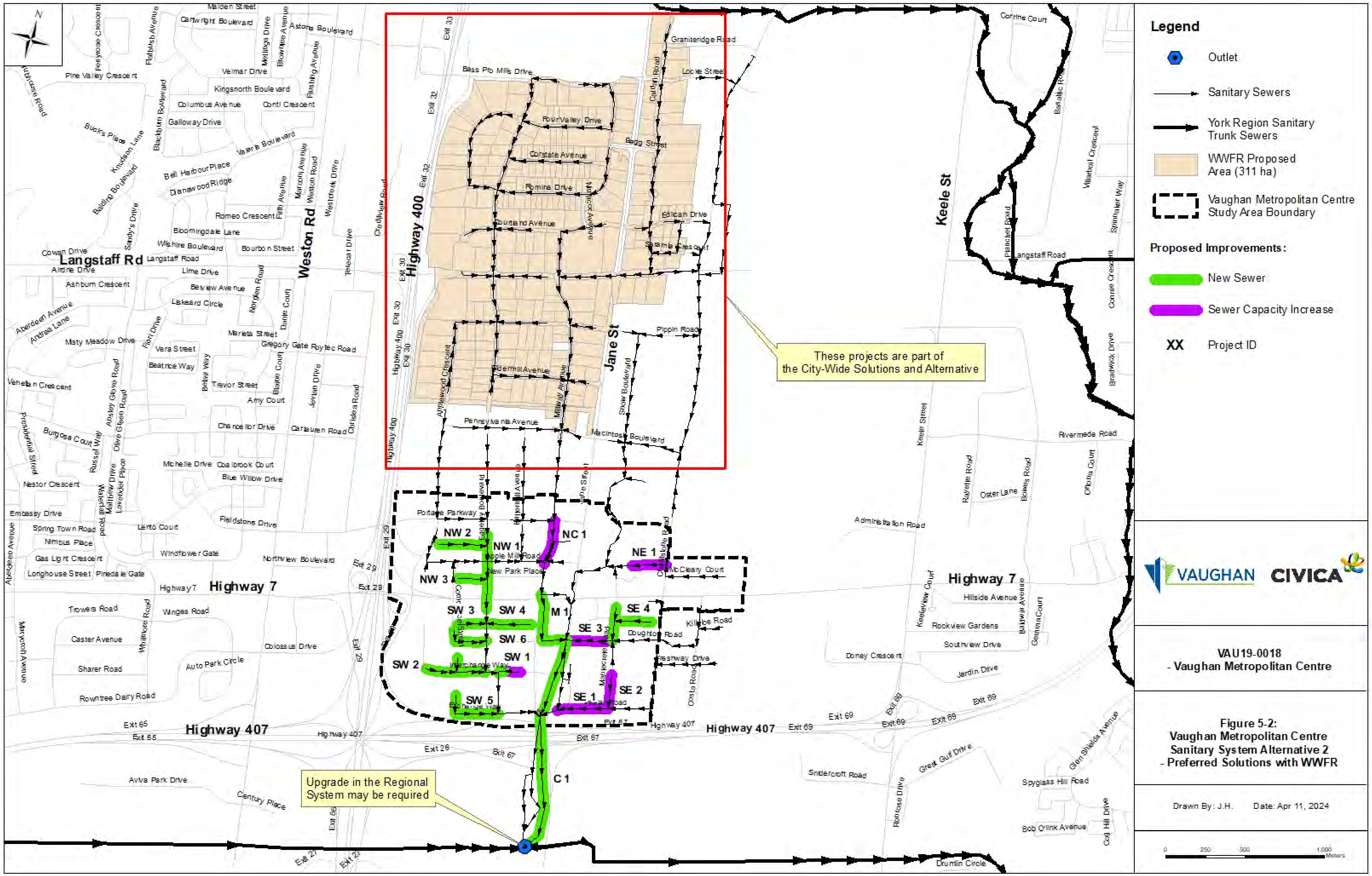

Figure 5-2: Proposed Solutions- Alternative 2 – Preferred Solution

5.3 Alternative Evaluation Matrix

Table 5-1 provides the evaluation matrix for alternative 1 and 2. For economic, constructability and social & economic benefits, Alternative 2 is preferred and is the recommended solution that addresses constraints both within the VMC study area and the high I/I area north of the study area.

Table 5-1: Evaluation Matrix

Criteria	Criteria Description	Alternative 1		Alternative 2	
		Description	Evaluation*	Description	Evaluation*
Flexibility, Redundancy and Integration	How flexible the option is to design changes or additional/future flows. How easy it is to integrate the planned system with the existing system while maximizing the utilization of the current assets.	This alternative recommends increasing sewer capacity along Jane St, taking into account the heavy traffic regional route, which poses a limiting factor	Low (1)	Enhanced sewer design along the future Millway Ave extension facilitates seamless integration of future flows, given the planned construction of the road	High (3)
Constructability	Ease of construction, clash/conflict with other infrastructure and sensitive locations, interfacing with existing projects, construction schedule. Schedule and cost risk associated with construction method	Construction along Jane St corridor may require additional permitting and less flexible schedule	Medium (2)	The proximity to the subway tunnel is a crucial factor under consideration. However, the advantage of designing the proposed new sewer along the forthcoming street enhances the planning perspective, simplifying the process	Medium (2)
Operation & Maintenance requirement	How easy or complex it is to operate and maintain the system. Gravity vs. Pumping	Easy Operation as gravity solution Maintenace can be challenging on Jane St	Medium (2)	Relatively Easy O&M. Gravity solution.	High (3)
Social & Environmental Considerations	Traffic disruption and impact due to construction. Environmental impact during project execution on sensitive receivers (noise, odour, air, waste impact, etc.) and long-term environmental impact on land, flora fauna, bio-diversity, public health, water resources	Low disruption on Jane St (trenchless construction method) Traffic disruption in local roads will not be very impactful.	Medium (2)	No traffic disruption is anticipated on the future Millway Avenue Extension. Traffic disruption in local roads will not be very impactful.	High (3)
Economic Considerations	Optimal capital and O&M cost of the alternative Amount of initial investment	Elevated costs are expected in comparison to Alternative 2, primarily due to the construction method involved in the sewer upsize along Jane	Medium (2)	Minimized costs related to the installation of a new sanitary sewer	High (3)
Summary Scoring			**9/15**		**14/15**

* The evaluation should be understood as the rating of one alternative in comparison to the other proposed alternatives. 'High' and "Low' are qualifications relative to the other proposed solutions only.

5.4 The VMC North West Quadrant Solution (NWQ)

5.4.1 NWQ - West of Edgeley Boulevard

The existing infrastructure in this area includes a 450mm sanitary section designed to collect flows from future developments, including Royal Centre and Smart Centre E2, and drain to the sewer at Edgeley Boulevard. The sanitary flow then proceeds eastward on Apple Mill Road and ultimately discharges to the Jane Street trunk Sewer.

The existing 450mm sewer on Apple Mill Road, west of Edgeley Blvd meets the criteria for the acceptable level of service under existing conditions but will not accommodate additional flow.

Proposed Solution: A new 450mm sewer is recommended to convey the flow from the developments south of Portage Parkway to the proposed Edgeley Blvd trunk (see next section). Flow monitoring is also proposed on Apple Mill Road just west of Edgeley Boulevard to monitor the flow rate in the upstream drainage area.

5.4.2 NWQ - Edgeley Boulevard

The 450mm sanitary sewer on Apple Mill Road east of Edgeley Blvd surcharges under ultimate future conditions.

Proposed Solution: the planned extension of the 900mm trunk on Interchange Way is recommended to be constructed before 2028 and according to the capacity limitation on Apple Mill Rd. The invert levels of the new trunk should be lower than the sanitary section on Apple Mill Road to allow the upstream sanitary flow to move southward; this will free up capacity in the sanitary sewers on Apple Mill Road and Jane Street trunk. As this project affects the capacity of the Jane Street Trunk and the sewers draining to it, it is recommended as a priority project.

5.4.3 The VMC North East Quadrant (NEQ)

The bottleneck in the sewers north of Highway 7, east of Jane Street, is the 250mm sanitary sewer along Barnes Court. 450mm sewers are proposed west of Creditstone Road before upstream future developments are occupied.

5.5 The VMC South East Quadrant Solution (SEQ)

Surcharging is predicted under 25-year design storm along Doughton Road, Maplecrete Road, Creditstone Rd, and Peelar Road. The proposed solutions for this section include upsizing the pipes on Maplecrete Road, Doughton Road, and Peelar Road. New sanitary pipes are also proposed to service Melrose and other future developments on the anticipated road at the north of Doughton Road, south of Highway 7.

The 300mm sanitary sections on Doughton Road are proposed to upsize to 450mm before the development at 216-220 Doughton Rd is occupied.

Upgrades are also recommended for the pipes on Maplecrete Road north of Peelar Road, as well as the sanitary sections on Peelar Road to the Jane Street trunk.

5.6 The VMC Southwest Quadrant Solution (SWQ)

Future developments in southwest quadrant will be serviced through the new 900mm trunk on Interchange Way. Phase 1 of this trunk, constructed in December 2020, starts on the south of Highway 7 and proceeds southward and eastward until it drains to the trunk on Highway 407. The extension of this trunk, proposed in section 5.4.2, will connect the drainage area north of Highway 7 to this constructed sewer.

All future developments are proposed to drain to the Interchange Way trunk. New sanitary sections are proposed to discharge the flow from the future populations on the side streets on the east and west side of Interchange Way. The work in SWQ will also include abandoning some of the existing sewers on Interchange Way and Commerce Street.

Future developments in the eastside of the southwest quadrant, along Jane Street, are proposed to be serviced through the Jane Street trunk.

Although the newly constructed trunk on Interchange Way operates under free flow (no surcharge) under the 25-year design storm, h/H more than 80% is predicted under the 5-year design storm. As this trunk is constructed recently, upsizing the trunk is not proposed in this report. However, flow monitoring is proposed to monitor the future flows and plan accordingly. Also, annual CCTV inspections are recommended to make sure the pipe is operating under full capacity.

5.6.1 Millway avenue extension and Highway 407 Trunk

The existing trunk along Millway Avenue and Jane Street is surcharging under the future conditions. Constructing phase 2 of the Interchange Way trunk will free capacity from the Jane Street trunk and remove surcharging under 25-year storm. However, the updated forecasted population of Smart Centers A5 Development is causing a surcharge in the Jane St under the 25-year storm, even after the Interchange Way trunk is fully in place. A new pipe along Millway avenue extension is proposed which will divert flow from Millway Avenue and then flow east through the future street and will connect to the existing trunk sewer at the Doughton Road intersection, from here will flow south along Jane Street, as open-cut construction is very challenging on Jane Street, alternative construction methods (e.g., micro-tunneling) should be considered.

The 900mm pipe crossing Highway 407 is surcharging in ultimate conditions as well as under interim conditions. For the section south of Highway 407 to the outlet (Regional trunk), twinning is proposed before 2028. As open-cut construction is not a viable option for crossing the 407 Highway, alternative construction methods (e.g., micro-tunneling) should be considered.

Note that surcharging in the 900mm pipes crossing Highway 407 is partly due to the backflow from the Regional trunk at MH95B. Therefore, coordination with the Region may be required to further investigate and upgrade the 900mm YDSS (asset ID YR-BLSS-01_46-05A) which connects to the 1050mm YDSS draining to the Black Creek SPS. More investigation will be required by the City and the Region to ascertain the causes of the backflow impacting the 900mm Highway 407 sewer.

5.7 Population Sensitivity Analysis

The additional population that has been provided by the City in the expansion areas of the VMC study area were modelled to assess the impact on the sanitary system and the results identify a number of additional upgrades required. Table 5-2 and Figure 5-3 presents the network pipe sizing impacts and the map of the network upgrade locations.

Table 5-2: Population Sensitivity Analysis project summary

<table>
<tr><th colspan="2" rowspan="2">Solution</th><th>Preferred Solution</th><th>Population Sensitivity Analysis</th><th rowspan="2">Comment</th></tr>
<tr><th>Diameter (mm)</th><th>Diameter (mm)</th></tr>
<tr><td rowspan="17">Preferred Solution</td><td>C 1</td><td>1050</td><td>1200</td><td>Pipe size increased required</td></tr>
<tr><td>M1</td><td>750 - 900 - 1050</td><td>825 - 1050 - 1200</td><td>Pipe size increased required</td></tr>
<tr><td>NC 1</td><td>750</td><td>750</td><td>No change</td></tr>
<tr><td>NE 1</td><td>450</td><td>600</td><td>Pipe size increased required</td></tr>
<tr><td>NW 1</td><td>450 - 900</td><td>450 - 900</td><td>No change</td></tr>
<tr><td>NW 2</td><td>450</td><td>450</td><td>No change</td></tr>
<tr><td>NW 3</td><td>450</td><td>450</td><td>No change</td></tr>
<tr><td>SW 1</td><td>375-450</td><td>375-450</td><td>No change</td></tr>
<tr><td>SW 2</td><td>450-600</td><td>450-600</td><td>No change</td></tr>
<tr><td>SW 3</td><td>450</td><td>450</td><td>No change</td></tr>
<tr><td>SW 4</td><td>450-525</td><td>450-525</td><td>No change</td></tr>
<tr><td>SW 5</td><td>375</td><td>375</td><td>No change</td></tr>
<tr><td>SW 6</td><td>375-450</td><td>375-450</td><td>No change</td></tr>
<tr><td>SE 1</td><td>600</td><td>600</td><td>No change</td></tr>
<tr><td>SE 2</td><td>450</td><td>450</td><td>No change</td></tr>
<tr><td>SE 3</td><td>450</td><td>600</td><td>Pipe size increased required</td></tr>
<tr><td>SE 4</td><td>375-450</td><td>375-450</td><td>No change</td></tr>
<tr><td rowspan="10">Extended area population increase</td><td>E 1</td><td>N/A</td><td>450</td><td>New Project required</td></tr>
<tr><td>E 2</td><td>N/A</td><td>750</td><td>New Project required</td></tr>
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<tr><td>E 5</td><td>N/A</td><td>450-525</td><td>New Project required</td></tr>
<tr><td>E 6</td><td>N/A</td><td>300</td><td>New Project required</td></tr>
<tr><td>E 7</td><td>N/A</td><td>300</td><td>New Project required</td></tr>
<tr><td>E 8</td><td>N/A</td><td>600</td><td>New Project required</td></tr>
<tr><td>E 9</td><td>N/A</td><td>375</td><td>New Project required</td></tr>
<tr><td>E 10</td><td>N/A</td><td>450</td><td>New Project required</td></tr>
<tr><td colspan="2">YDSS Upsizing (out of scope of this study)</td><td>1500</td><td>1500</td><td>No change</td></tr>
</table>

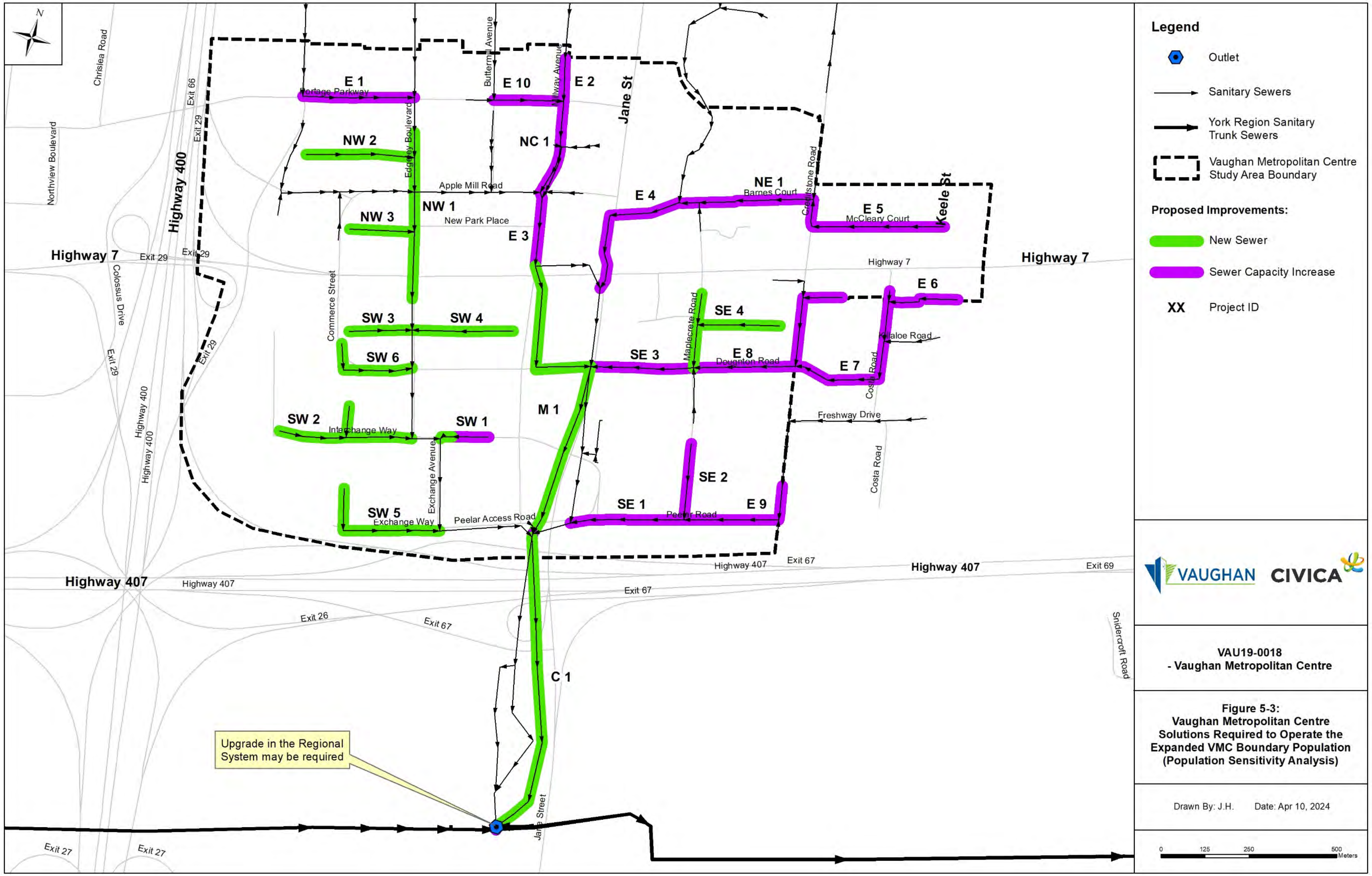


Figure 5-3 VMC Expanded Boundary Population Sensitivity Impact on Network

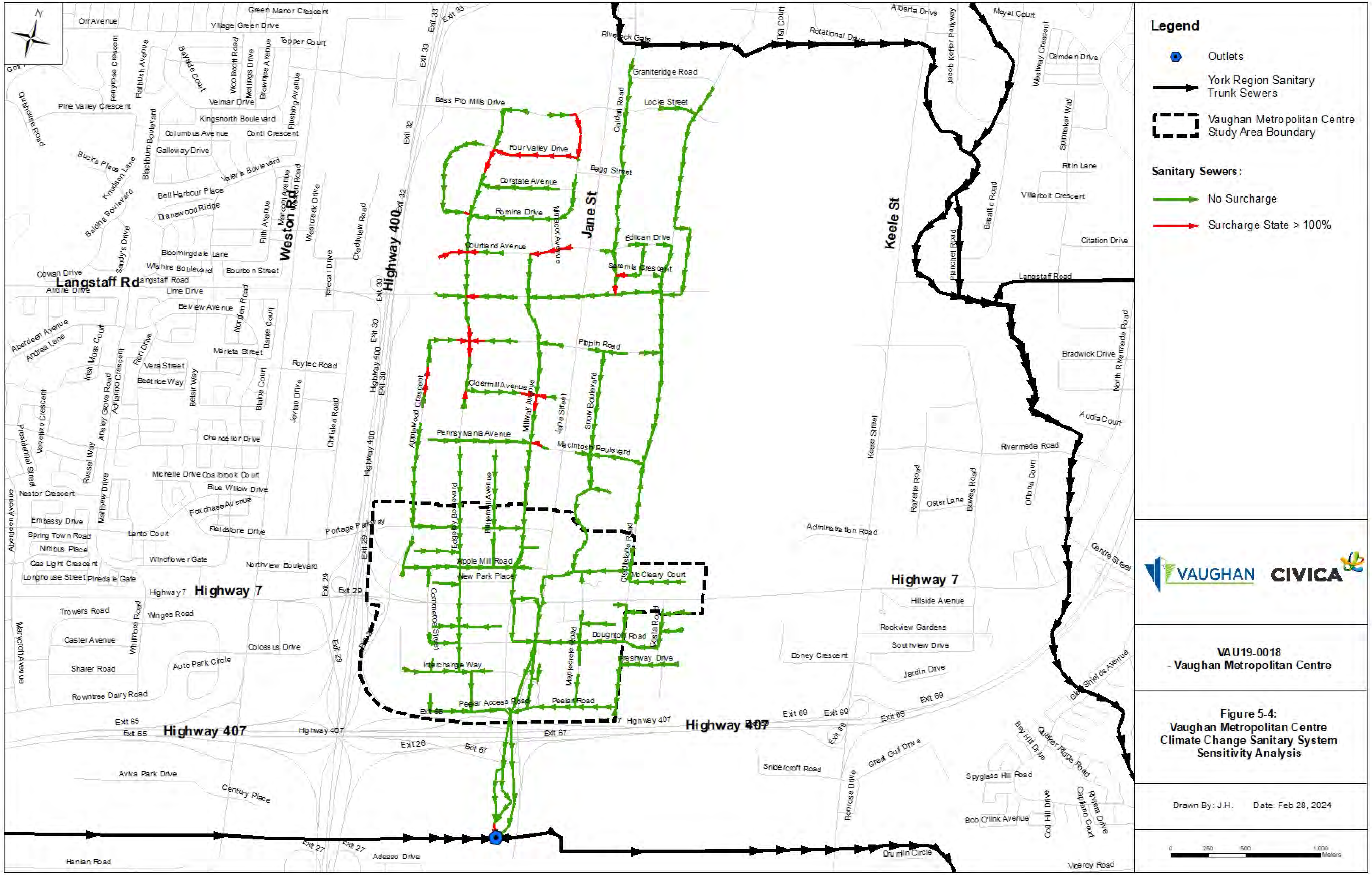


Figure 5-4: Climate Change Sensitivity Analysis

5.8 Recommendations

5.8.1 Preferred Solution

Alternative 2 is the preferred solution as it provides the most net benefit and the least negative impacts. This alternative meets all the requirements for servicing present and future populations within the study area.

5.8.2 Costing and Timing

Table 5-3 summarizes the recommended capital projects to accommodate future growth including timing, cost and the applicable environmental assessment project schedule. Details of each project cost can be found in Appendix A.

Table 5-3: Cost Table and Timing

Project	Description	Total Cost (2024)	Completed By	EA Schedule
NC 1	284m of 750mm	$2,700,000	Prior 2028	Exempted
NW 1	85m of 450mm 388m of 900mm Dia part directional Bore	$8,200,000	Prior 2028	Exempted
NW 2	309m of 450mm	$1,600,000	Prior 2028	Schedule B
NW 3	185m of 450mm	$1,000,000	Prior 2028	Schedule B
SW 1	142m of 375mm	$700,000	2036-2041	Exempted
SW 2	319m of 450mm and 161m of 600mm	$2,100,000	Prior 2028	Exempted
SW 3	181m of 450mm	$900,000	Prior 2028	Exempted
SW 4	152m of 450mm and 136m of 525mm	$1,700,000	Prior 2028	Schedule B
SW 5	394m of 375mm	$2,200,000	Prior 2028	Exempted
SW 6	138m of 375mm and 135m of 450mm	$1,300,000	Prior 2028	Exempted
SE 1	324m of 600mm	$2,300,000	Prior 2028	Exempted
SE 2	218m of 450mm	$1,100,000	Prior 2028	Exempted
SE 3	302m of 450mm	$1,700,000	Prior 2028	Exempted
SE 4	236m of 375mm and 214m of 450mm	$2,400,000	Prior 2028	Schedule B
C 1	876m of 1050mm tunnelling	$21,500,000	Prior 2028	Schedule B
M 1	448m of 750mm, 506m of 900 mm and 8m of 1050 mm.	$11,500,000	Prior 2028	Schedule B
NE 1	219m of 450mm	$1,400,000	Prior 2028	Exempted
Total		**$64,300,000**		

5.9 Climate Change Sensitivity Analysis

In Figure 5-4, the model output incorporates climate change sensitivity factors to account for increased wet weather effects. The figure indicates that the proposed solutions are effective in managing the increased flow resulting from climate change. However, constraints are evident in the northern part of the drainage area, suggesting the need for further consideration and potential adjustments in that region

Appendix A Cost Estimates

Project ID

NC 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 750 mm pipe, over 9.0 m to 10.0 m in depth	m	75	$4,923.73	$369,280
	Supply and install 750 mm, over 10.0 m to 11.0 m in depth	m	209	$5,215.70	$1,090,082
Subtotal					**$1,459,361**
Construction Allowances and Contingency					
	Construction Contingency	10%			$145,936
Base cost Sum					**$1,605,298**
Engineering and Management					
	Engineering Planning	4%			$64,212
	Engineering Design	10%			$160,530
	Engineering Construction Services	10%			$160,530
	City Program Management	3%			$48,159
	Dense Urban Factor	5%			$80,265
Support Cost Sum					**$513,695**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$529,748
Total Project Estimate (2024 dollars)					**$2,648,741**

Project ID

NW 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm, over 6.0 m to 7.0 m in depth	m	85	$3,030.68	$257,608
	Supply and install 900 mm, over 8.0 m to 9.0 m in depth	m	198	$5,161.63	$1,022,003
	Gravity sewer tunneling for 900 mm reinforced concrete pipe	m	190	$8,820.50	$1,675,895
	Shaft for 900 mm pipe- over 7.0 m to 8.0 m in depth	each	2	$758,617.78	$1,517,236
Subtotal					**$4,472,742**
Construction Allowances and Contingency					
	Construction Contingency	10%			$447,274
Base cost Sum					**$4,920,016**
Engineering and Management					
	Engineering Planning	4%			$196,801
	Engineering Design	10%			$492,002
	Engineering Construction Services	10%			$492,002
	City Program Management	3%			$147,600
	Dense Urban Factor	5%			$246,001
Support Cost Sum					**$1,574,405**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$1,623,605
Total Project Estimate (2024 dollars)					**$8,118,026**

Project ID

NW 2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	103	$2,614.16	$269,259
	Supply and install 450 mm pipe, over 5.0 m to 6.0 m in depth	m	206	$2,822.42	$581,419
Subtotal					**$850,678**
Construction Allowances and Contingency					
	Construction Contingency	10%			$85,068
Base cost Sum					**$935,745**
Engineering and Management					
	Engineering Planning	4%			$37,430
	Engineering Design	10%			$93,575
	Engineering Construction Services	10%			$93,575
	City Program Management	3%			$28,072
	Dense Urban Factor	5%			$46,787
Support Cost Sum					**$299,439**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$308,796
Total Project Estimate (2024 dollars)					**$1,543,980**

Project ID

NW 3

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	185	$2,822.42	$522,148
Subtotal					**$522,148**
Construction Allowances and Contingency					
	Construction Contingency	10%			$52,215
Base cost Sum					**$574,363**

Engineering and Management					
	Engineering Planning	4%			$22,975
	Engineering Design	10%			$57,436
	Engineering Construction Services	10%			$57,436
	City Program Management	3%			$17,231
	Dense Urban Factor	5%			$28,718
Support Cost Sum					**$183,796**

Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$189,540
Total Project Estimate (2024 dollars)					**$947,699**

Project ID

SW 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 375 mm pipe, over 4.0 m to 5.0 m in depth	m	104	$2,603.81	$270,796
	Supply and install 375 mm pipe, over 5.0 m to 6.0 m in depth	m	38	$2,788.48	$105,962
Subtotal					**$376,758**
Construction Allowances and Contingency					
	Construction Contingency	10%			$37,676
Base cost Sum					**$414,434**
Engineering and Management					
	Engineering Planning	4%			$16,577
	Engineering Design	10%			$41,443
	Engineering Construction Services	10%			$41,443
	City Program Management	3%			$12,433
	Dense Urban Factor	5%			$20,722
Support Cost Sum					**$132,619**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$136,763
Total Project Estimate (2024 dollars)					**$683,816**

Project ID

SW 2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 3.0 m in depth	m	68	$1,157.50	$78,710
	Supply and install 450 mm pipe, over 3.0 m to 4.0 m in depth	m	70	$1,778.83	$124,518
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	181	$2,614.16	$473,164
	Supply and install 600 mm pipe, over 5.0 m to 6.0 m in depth	m	109	$2,822.42	$307,644
	Supply and install 600 mm pipe, over 6.0 m to 7.0 m in depth	m	52	$3,030.68	$157,595
Subtotal					**$1,141,631**
Construction Allowances and Contingency					
	Construction Contingency	10%			$114,163
Base cost Sum					**$1,255,794**
Engineering and Management					
	Engineering Planning	4%			$50,232
	Engineering Design	10%			$125,579
	Engineering Construction Services	10%			$125,579
	City Program Management	3%			$37,674
	Dense Urban Factor	5%			$62,790
Support Cost Sum					**$401,854**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$414,412
Total Project Estimate (2024 dollars)					**$2,072,060**

Project ID

SW 3

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	100	$2,614.16	$261,416
	Supply and install 450 mm pipe,over 5.0 m to 6.0 m in depth	m	81	$2,822.42	$228,616
Subtotal					**$490,032**
Construction Allowances and Contingency					
	Construction Contingency	10%			$49,003
Base cost Sum					**$539,036**
Engineering and Management					
	Engineering Planning	4%			$21,561
	Engineering Design	10%			$53,904
	Engineering Construction Services	10%			$53,904
	City Program Management	3%			$16,171
	Dense Urban Factor	5%			$26,952
Support Cost Sum					**$172,491**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$177,882
Total Project Estimate (2024 dollars)					**$889,409**

Project ID

SW 4

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 6.0 m to 7.0 m in depth	m	152	$3,030.68	$460,663
	Supply and install 525 mm pipe, over 6.0 m to 7.0 m in depth	m	136	$3,157.25	$429,386
Subtotal					**$890,049**
Construction Allowances and Contingency					
	Construction Contingency	10%			$89,005
Base cost Sum					**$979,054**

Engineering and Management					
	Engineering Planning	4%			$39,162
	Engineering Design	10%			$97,905
	Engineering Construction Services	10%			$97,905
	City Program Management	3%			$29,372
	Dense Urban Factor	5%			$48,953
Support Cost Sum					**$313,297**

Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$323,088
Total Project Estimate (2024 dollars)					**$1,615,439**

Project ID

SW 5

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 375 mm pipe, over 5.0 m to 6.0 m in depth	m	220	$2,788.48	$613,465
	Supply and install 375 mm pipe, over 6.0 m to 7.0 m in depth	m	100	$2,973.15	$297,315
	Supply and install 375 mm pipe, over 8.0 m to 9.0 m in depth	m	74	$3,428.22	$253,689
Subtotal					**$1,164,469**
Construction Allowances and Contingency					
	Construction Contingency	10%			$116,447
Base cost Sum					**$1,280,916**

Engineering and Management			
	Engineering Planning	4%	$51,237
	Engineering Design	10%	$128,092
	Engineering Construction Services	10%	$128,092
	City Program Management	3%	$38,427
	Dense Urban Factor	5%	$64,046
Support Cost Sum			**$409,893**

Land for PS if Required			
	Station Design Capacity	L/s	$0
Contingency			
	Class D Estimate Contingency	25%	$422,702
Total Project Estimate (2024 dollars)			**$2,113,511**

Project ID

SW 6

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 375 mm pipe, over 3.0 m to 4.0 m in depth	m	75	$1,771.92	$132,894
	Supply and install 375 mm pipe, over 4.0 m to 5.0 m in depth	m	63	$2,603.81	$164,040
	Supply and install 450 mm pipe, over 5.0 m to 6.0 m in depth	m	135	$2,822.42	$381,027
Subtotal					**$677,961**
Construction Allowances and Contingency					
	Construction Contingency	10%			$67,796
Base cost Sum					**$745,757**
Engineering and Management					
	Engineering Planning	4%			$29,830
	Engineering Design	10%			$74,576
	Engineering Construction Services	10%			$74,576
	City Program Management	3%			$22,373
	Dense Urban Factor	5%			$37,288
Support Cost Sum					**$238,642**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$246,100
Total Project Estimate (2024 dollars)					**$1,230,499**

Project ID

SE 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 600 mm pipe, over 6.0 m to 7.0 m in depth	m	92	$3,334.44	$306,768
	Supply and install 600 mm pipe, over 7.0 m to 8.0 m in depth	m	83	$3,626.69	$301,015
	Supply and install 600 mm pipe, over 9.0 m to 10.0 m in depth	m	149	$4,100.74	$611,010
Subtotal					**$1,218,794**
Construction Allowances and Contingency					
	Construction Contingency	10%			$121,879
Base cost Sum					**$1,340,673**
Engineering and Management					
	Engineering Planning	4%			$53,627
	Engineering Design	10%			$134,067
	Engineering Construction Services	10%			$134,067
	City Program Management	3%			$40,220
	Dense Urban Factor	5%			$67,034
Support Cost Sum					**$429,015**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$442,422
Total Project Estimate (2024 dollars)					**$2,212,111**

Project ID

SE 2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 4.0 m to 6.0 m in depth	m	110	$2,614.16	$287,558
	Supply and install 450 mm pipe, over 5.0 m to 6.0 m in depth	m	108	$2,822.42	$304,822
Subtotal					**$592,380**
Construction Allowances and Contingency					
	Construction Contingency	10%			$59,238
Base cost Sum					**$651,617**
Engineering and Management					
	Engineering Planning	4%			$26,065
	Engineering Design	10%			$65,162
	Engineering Construction Services	10%			$65,162
	City Program Management	3%			$19,549
	Dense Urban Factor	5%			$32,581
Support Cost Sum					**$208,518**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$215,034
Total Project Estimate (2024 dollars)					**$1,075,169**

Project ID

SE 3

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450mm pipe, over 4.0 m to 5.0 m in depth	m	149	$2,614.16	$389,510
	Supply and install 450 mm pipe, over 6.0 m to 7.0 m in depth	m	102	$3,030.68	$309,129
	Supply and install 450 mm pipe, over 11.0 m to 12.0 m in depth	m	51	$4,198.73	$214,135
Subtotal					**$912,775**
Construction Allowances and Contingency					
	Construction Contingency	10%			$91,277
Base cost Sum					**$1,004,052**
Engineering and Management					
	Engineering Planning	4%			$40,162
	Engineering Design	10%			$100,405
	Engineering Construction Services	10%			$100,405
	City Program Management	3%			$30,122
	Dense Urban Factor	5%			$50,203
Support Cost Sum					**$321,297**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$331,337
Total Project Estimate (2024 dollars)					**$1,656,686**

Project ID

SE 4

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 375 mm pipe, over 5.0 m to 6.0 m in depth	m	236	$2,788.48	$658,081
	Supply and install 450 mm pipe, over 5.0 m to 6.0 m in depth	m	91	$2,822.42	$256,840
	Supply and install 450 mm pipe, over 6.0 m to 7.0 m in depth	m	123	$3,030.68	$372,774
Subtotal					**$1,287,695**
Construction Allowances and Contingency					
	Construction Contingency	10%			$128,770
Base cost Sum					**$1,416,465**
Engineering and Management					
	Engineering Planning	4%			$56,659
	Engineering Design	10%			$141,646
	Engineering Construction Services	10%			$141,646
	City Program Management	3%			$42,494
	Dense Urban Factor	5%			$70,823
Support Cost Sum					**$453,269**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$467,433
Total Project Estimate (2024 dollars)					**$2,337,167**

Project ID

C 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Gravity sewer tunneling for 1050 mm reinforced concrete pipe	m	876	$9,274.99	$8,124,888
	Shaft for 1050 mm pipe- over 10.0 m to 11.0 m in depth	each	1	$1,043,099.44	$1,043,099
	Shaft for 1050 mm pipe- over 12.0 m to 13.0 m in depth	each	1	$1,232,753.89	$1,232,754
	Shaft for 1050 mm pipe- over 14.0 m to 15.0 m in depth	each	1	$1,422,408.33	$1,422,408
Subtotal					**$11,823,150**
Construction Allowances and Contingency					
	Construction Contingency	10%			$1,182,315
Base cost Sum					**$13,005,465**
Engineering and Management					
	Engineering Planning	4%			$520,219
	Engineering Design	10%			$1,300,546
	Engineering Construction Services	10%			$1,300,546
	City Program Management	3%			$390,164
	Dense Urban Factor	5%			$650,273
Support Cost Sum					**$4,161,749**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$4,291,803
Total Project Estimate (2024 dollars)					**$21,459,017**

Project ID

M 1

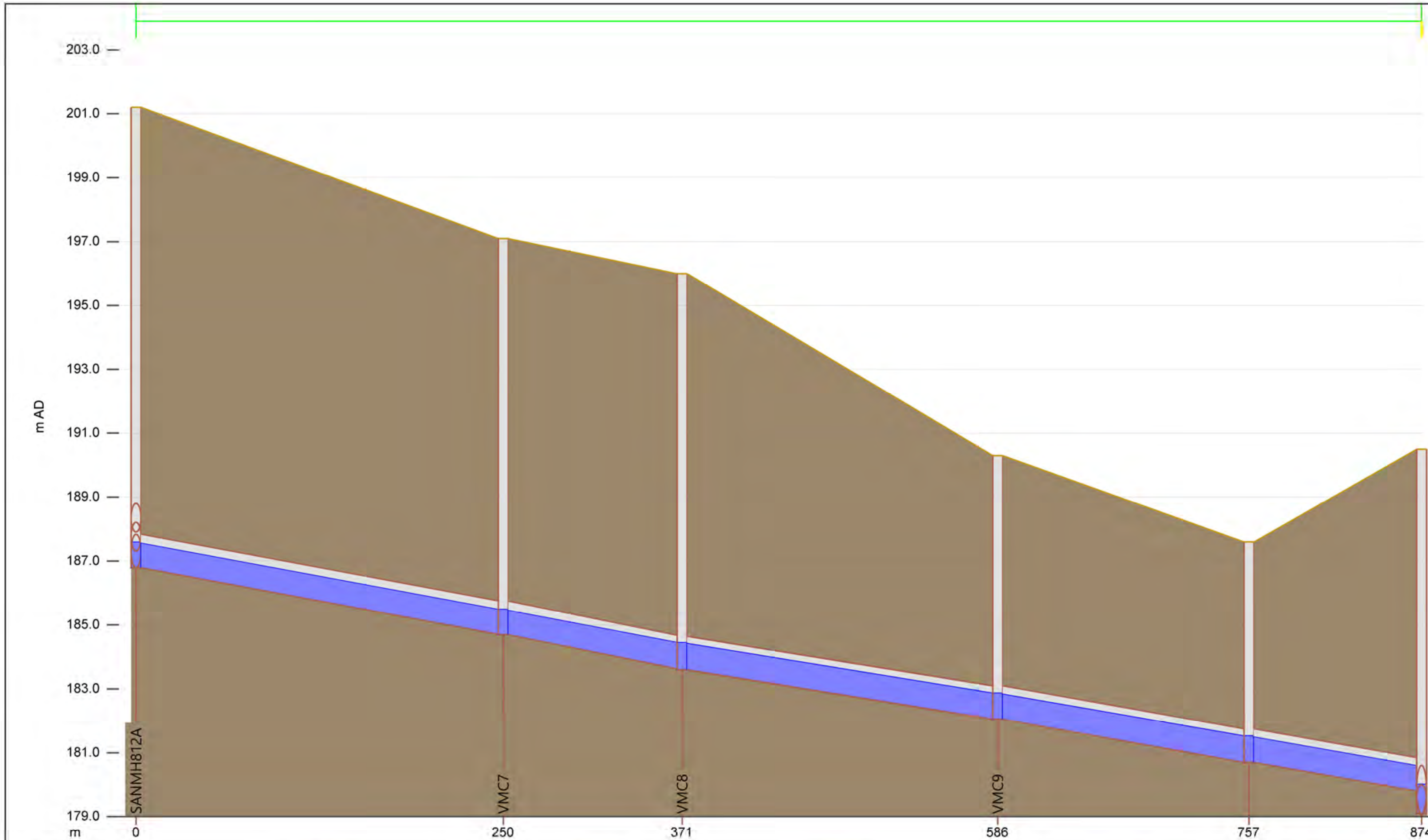
Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 750 mm pipe, over 10.0 m to 11.0 m in depth	m	448	$6,695.68	$2,999,663
	Supply and install 900 mm pipe, over 12.0 m to 13.0 m in depth	m	506	$6,443.86	$3,260,594
	Supply and install 1050 mm pipe, over 12.0 m to 13.0 m in depth	m	8	$6,734.63	$53,877
Subtotal					**$6,314,134**
Construction Allowances and Contingency					
	Construction Contingency	10%			$631,413
Base cost Sum					**$6,945,548**
Engineering and Management					
	Engineering Planning	4%			$277,822
	Engineering Design	10%			$694,555
	Engineering Construction Services	10%			$694,555
	City Program Management	3%			$208,366
	Dense Urban Factor	5%			$347,277
Support Cost Sum					**$2,222,575**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$2,292,031
Total Project Estimate (2023 dollars)					**$11,460,153**

Project ID

NE 1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 8.0 m to 9.0 m in depth	m	219	$3,513.89	$769,542
Subtotal					**$769,542**
Construction Allowances and Contingency					
	Construction Contingency	10%			$76,954
Base cost Sum					**$846,496**
Engineering and Management					
	Engineering Planning	4%			$33,860
	Engineering Design	10%			$84,650
	Engineering Construction Services	10%			$84,650
	City Program Management	3%			$25,395
	Dense Urban Factor	5%			$42,325
Support Cost Sum					**$270,879**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$279,344
Total Project Estimate (2023 dollars)					**$1,396,719**

Appendix B Hydraulic Model Outputs



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	SANMH812A.2	VMC7.2	VMC8.2	VMC9.2	VMC10.2
length (m)	249.7	121.7	214.6	170.7	117.4
width (mm)	1050	1050	1050	1050	1050
height (mm)	1050	1050	1050	1050	1050
us inv (m AD)	186.790	184.700	183.600	182.050	180.700
ds inv (m AD)	184.707	183.630	182.050	180.700	179.800
grad (m/m)	0.00834	0.00880	0.00722	0.00791	0.00767
pfc (l/s)	2494	2561	2321	2429	2392
surc	0.74	0.78	0.78	0.78	0.76
DS flow (l/s)	2189.16	2188.71	2188.27	2187.80	2187.64

Node	SANMH812A	VMC7	VMC8	VMC9	VMC10	95-B
expr:HGL	13.616275	11.618402	11.556274	7.437466	6.078683	10.493454

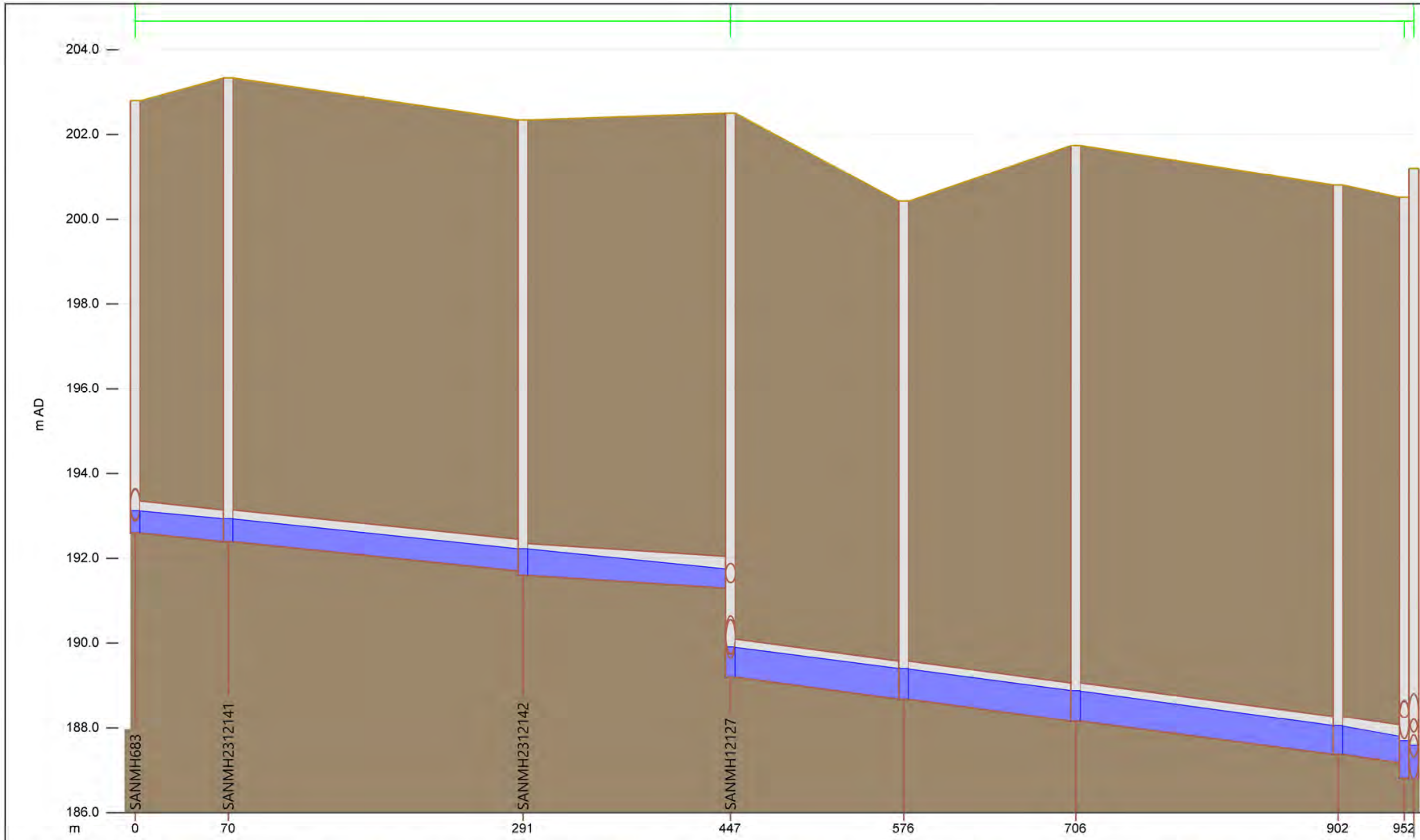
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: C1
Location: West of Jane St

DATE: March 2024

Figure: C1



Link	-	SANMH2312141.1	SANMH2312142.2	SANMH12127.1	SANMH12062602.1	SANMH112241.1	-
length (m)	69.8	221.2	155.6	130.0	129.0	196.9	49.6
width (mm)	750	750	750	900	900	900	900
height (mm)	750	750	750	900	900	900	900
us inv (m AD)	192.600	192.391	191.600	189.200	188.680	188.164	187.376
ds inv (m AD)	192.391	191.703	191.300	188.680	188.164	187.376	187.178
grad (m/m)	0.00300	0.00311	0.00193	0.00400	0.00400	0.00400	0.00400
pfc (l/s)	610	621	489	1145	1145	1145	1145
surc	0.71	0.71	0.82	0.80	0.79	0.78	0.74
DS flow (l/s)	472.56	522.48	522.81	1059.83	1084.07	1083.94	1083.94

Node	-	SANMH2312141	SANMH2312142	SANMH12127	SANMH12062602	SANMH112241	SANMH112242	-
expr:HGL	-	10.404524	10.120411	12.594742	11.033363	12.864557	12.759936	-

Proposed Improvements:

New Sewer

Sewer Capacity Increase

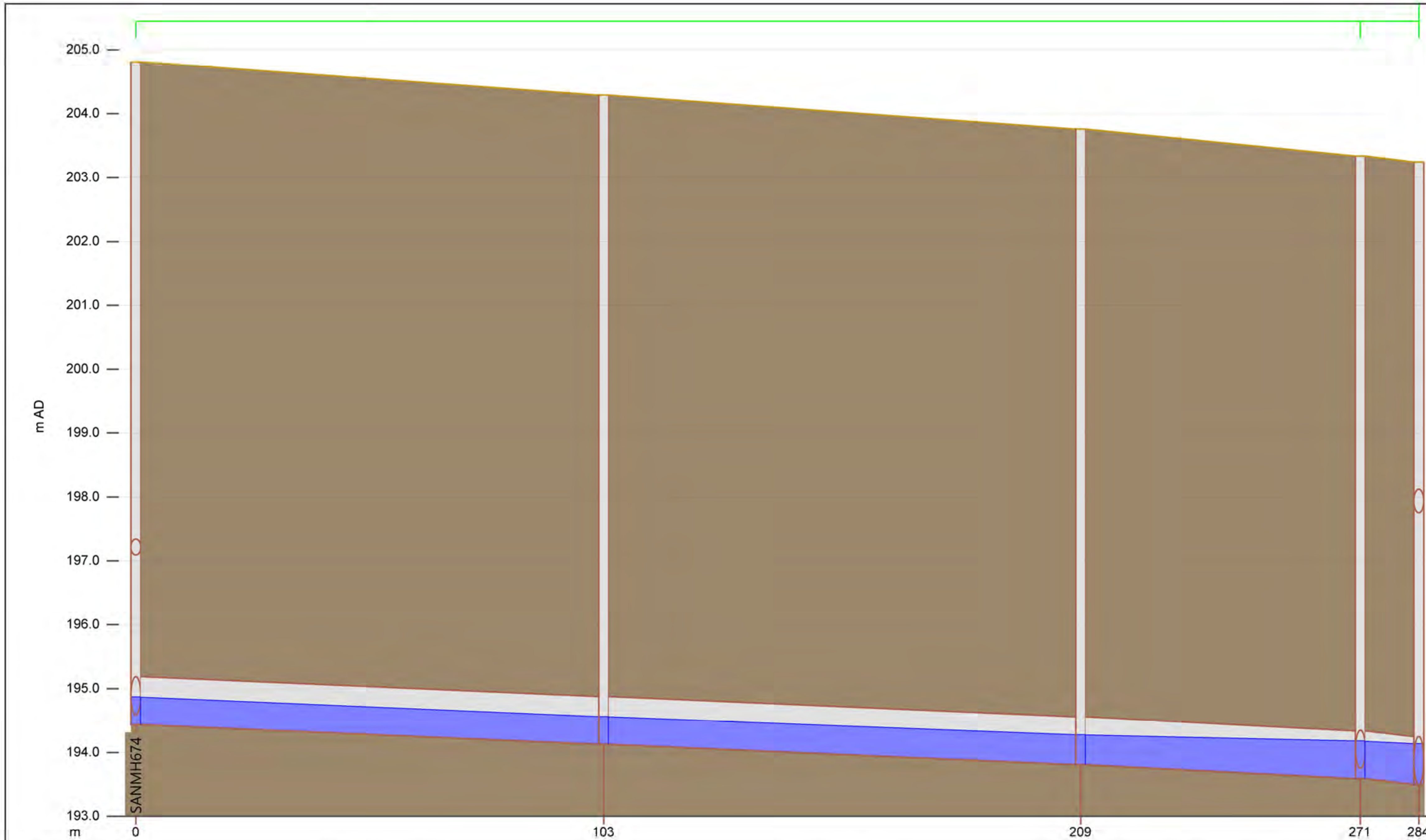
CIVICA Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: M1
Location: Millway Avenue extension and Jane St

DATE: March 2024

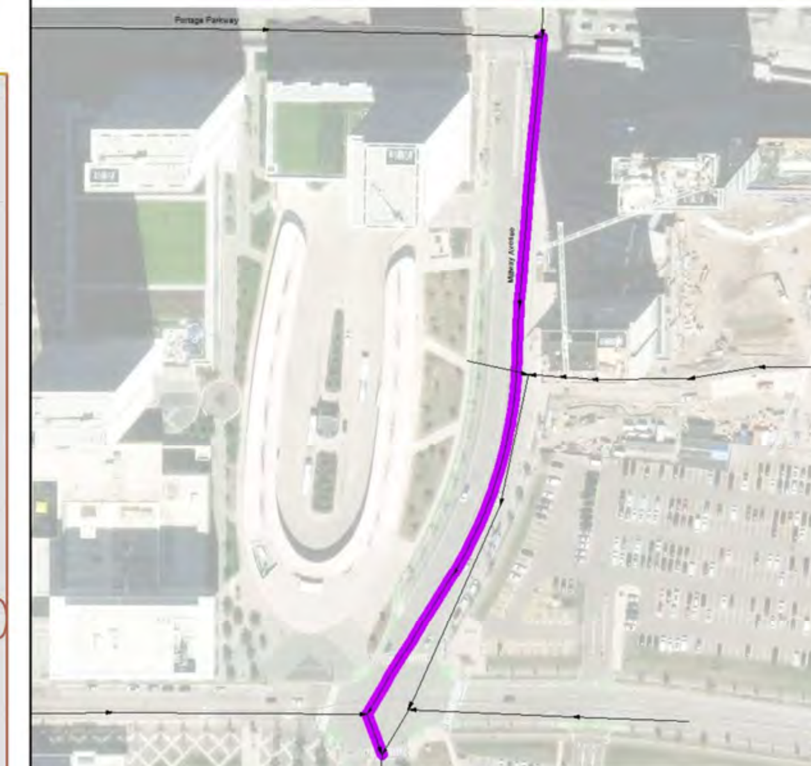
Figure: M1



Proposed Improvements:

New Sewer

Sewer Capacity Increase



Link	SANMH674.1	SANMH676.1	SANMH677.1	-
length (m)	103.4	105.4	61.8	12.9
width (mm)	750	750	750	750
height (mm)	750	750	750	750
us inv (m AD)	194.440	194.130	193.810	193.590
ds inv (m AD)	194.130	193.810	193.590	193.500
grad (m/m)	0.00300	0.00304	0.00356	0.00698
pfc (l/s)	610	614	664	930
surc	0.57	0.62	0.78	0.84
DS flow (l/s)	369.04	369.28	371.26	573.66

Node	SANMH674	SANMH676	SANMH677	SANMH33A	-
expr:HGL	9.945995	9.735527	9.486898	9.162098	-

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Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: NC1
Location: Millway Avenue

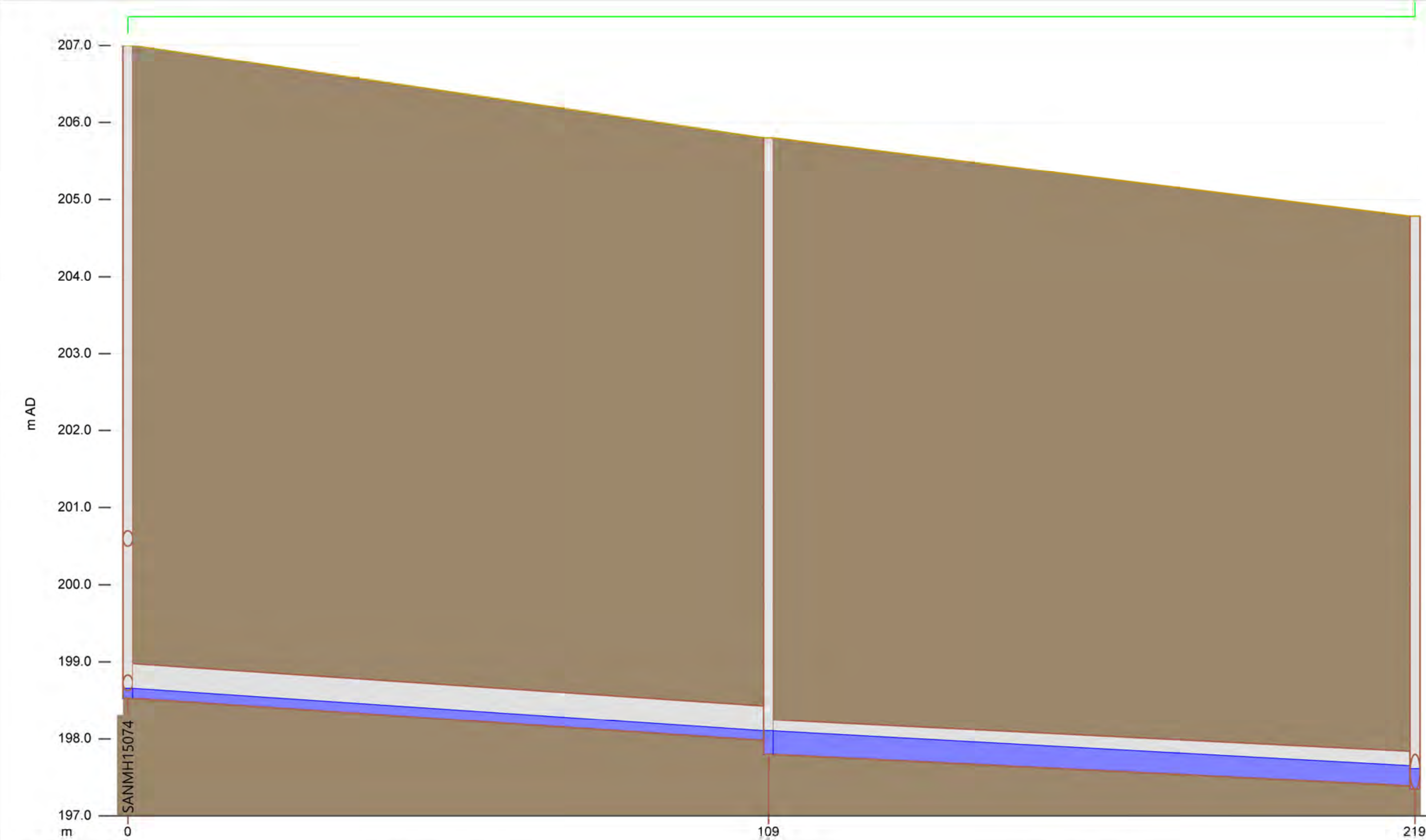
DATE: March 2024

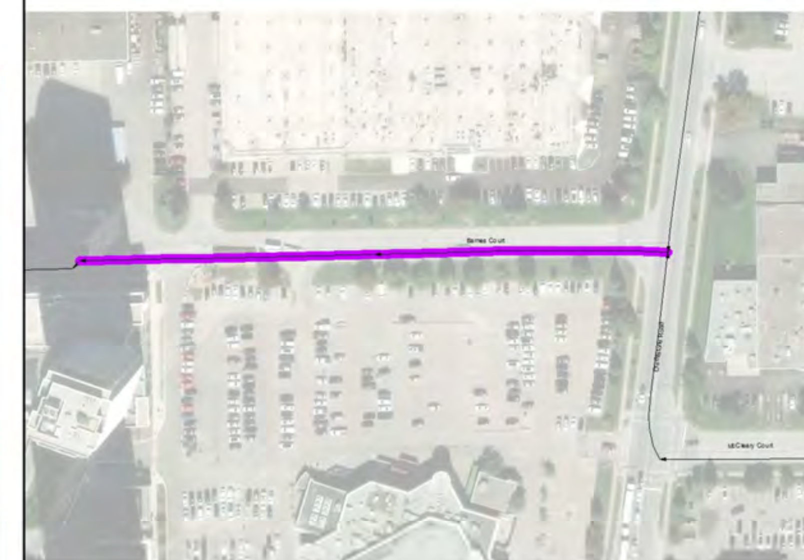
Figure: NC1

Proposed Improvements:

New Sewer

Sewer Capacity Increase





Link	SANMH15074.1	SANMH15073.1
length (m)	109.0	110.0
width (mm)	450	450
height (mm)	450	450
us inv (m AD)	198.530	197.800
ds inv (m AD)	197.980	197.390
grad (m/m)	0.00505	0.00373
pfc (l/s)	203	174
surc	0.28	0.67
DS flow (l/s)	32.64	135.70

Node	SANMH15074	SANMH15073	SANMH15072
expr:HGL	8.345413	7.697781	7.176541

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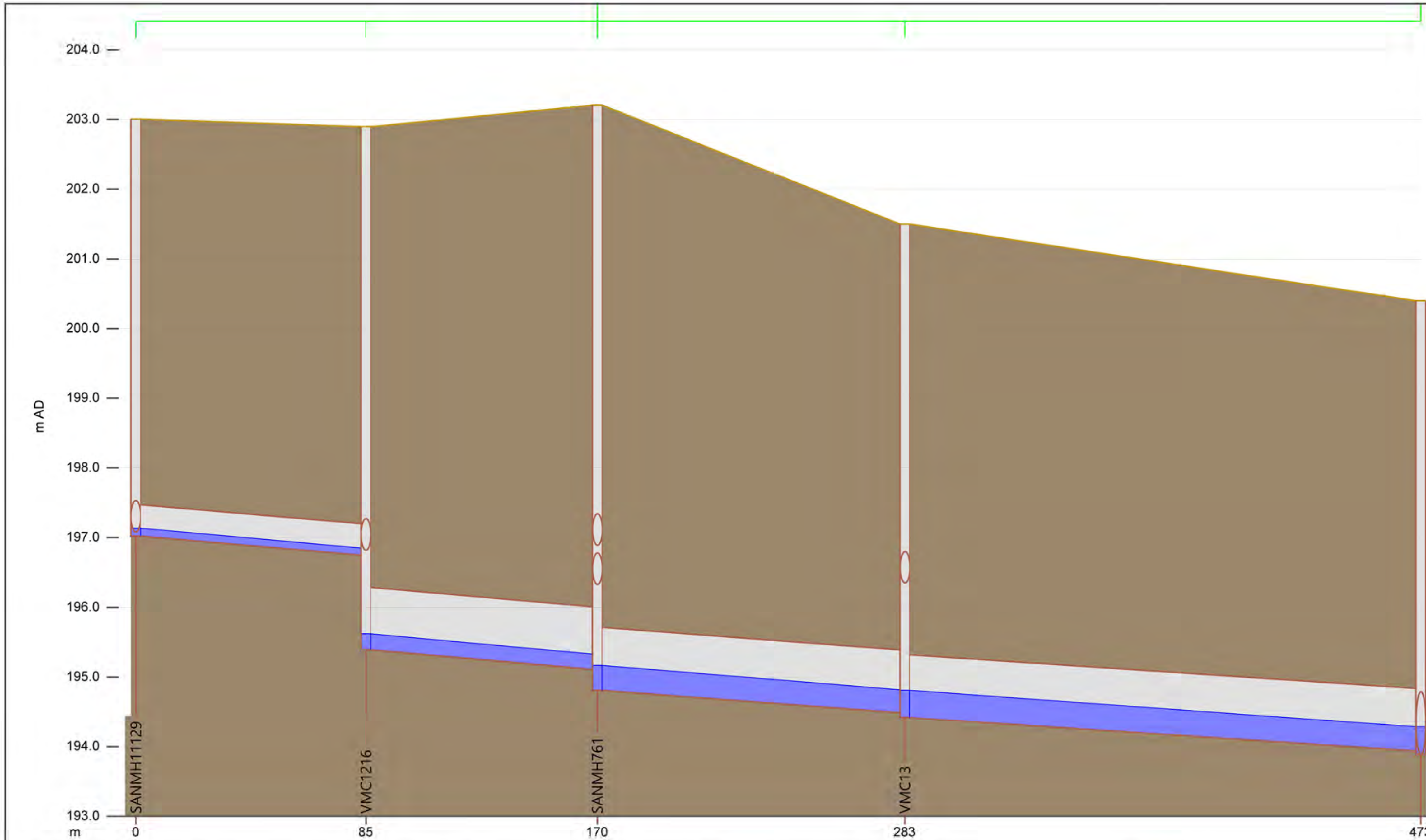
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

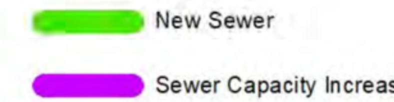
Project: NE1
Location: Barnes Court

DATE: March 2024

Figure: NE1



Proposed Improvements:



Link	SANMH11129.1	VMC1216.1	SANMH761.2	VMC13.2
length (m)	84.7	85.2	113.2	189.9
width (mm)	450	900	900	900
height (mm)	450	900	900	900
us inv (m AD)	197.020	195.390	194.810	194.420
ds inv (m AD)	196.750	195.110	194.490	193.940
grad (m/m)	0.00319	0.00329	0.00283	0.00253
pfc (l/s)	161	1038	963	910
surc	0.24	0.25	0.39	0.43
DS flow (l/s)	19.52	137.61	309.94	346.94

Node	SANMH11129	VMC1216	SANMH761	VMC13	SANMH802A
expr:HGL	5.878464	7.282272	8.045158	6.692154	6.122153

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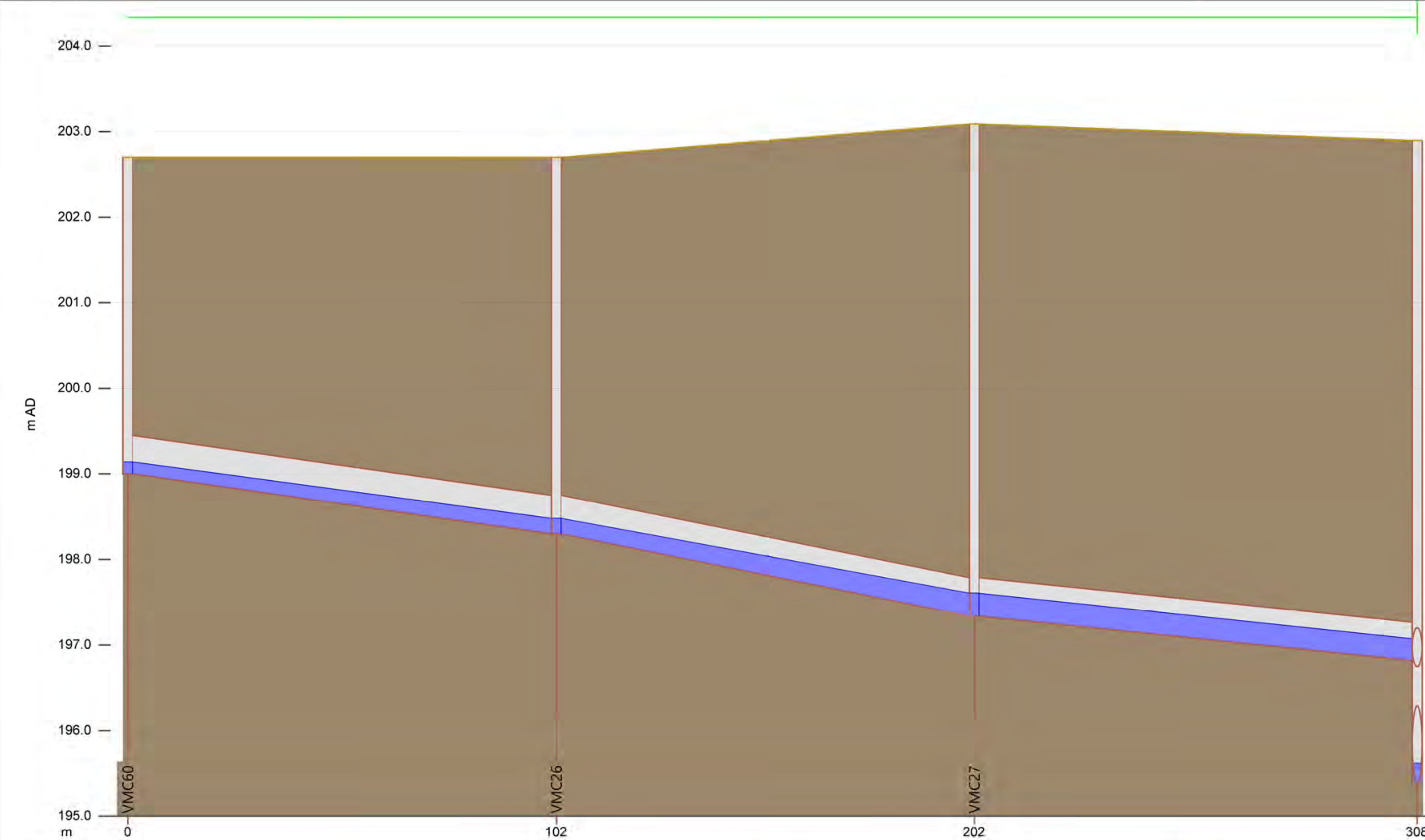
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: NW1
Location: Edgeley Boulevard and Interchange Way

DATE: March 2024

Figure: NW1



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	VMC60.1	VMC26.1	VMC27.1
length (m)	102.5	100.0	105.9
width (mm)	450	450	450
height (mm)	450	450	450
us inv (m AD)	199.000	198.300	197.340
ds inv (m AD)	198.300	197.340	196.820
grad (m/m)	0.00683	0.00960	0.00491
pfc (l/s)	236	279	200
surc	0.39	0.59	0.58
DS flow (l/s)	46.41	89.00	126.99

Node	VMC60	VMC26	VMC27	VMC1216
expr:HGL	3.562625	4.223788	5.486515	7.282272

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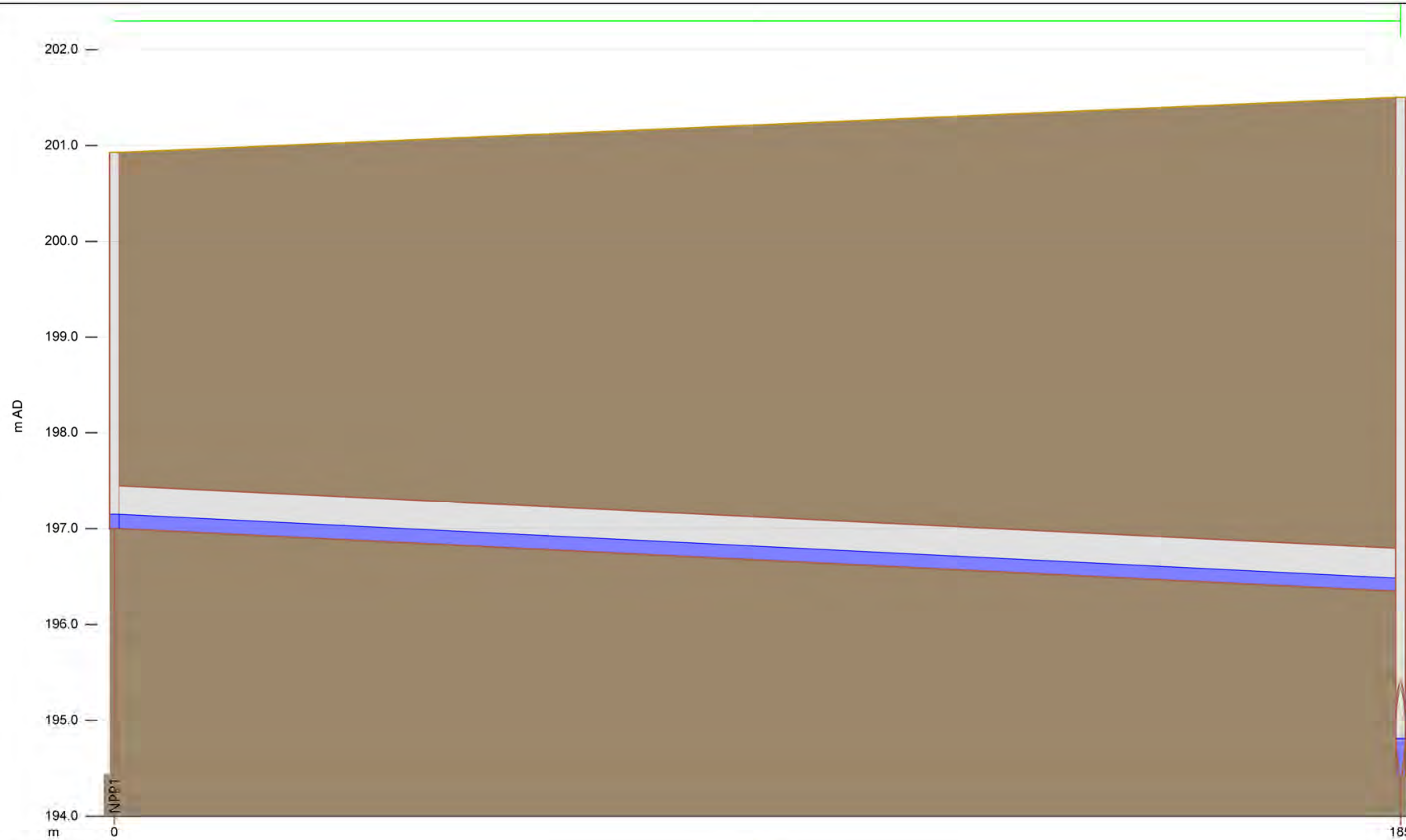
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: NW2
Location: Future Street (West of Edgeley Boulevard)

DATE: March 2024

Figure: NW2



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	NPP1.1	
length (m)	184.9	
width (mm)	450	
height (mm)	450	
us inv (m AD)	197.000	
ds inv (m AD)	196.350	
grad (m/m)	0.00351	
pfc (l/s)	169	
surc	0.33	
DS flow (l/s)	37.86	
Node	NPP1	VMC13
expr:HGL	3.782027	6.692154

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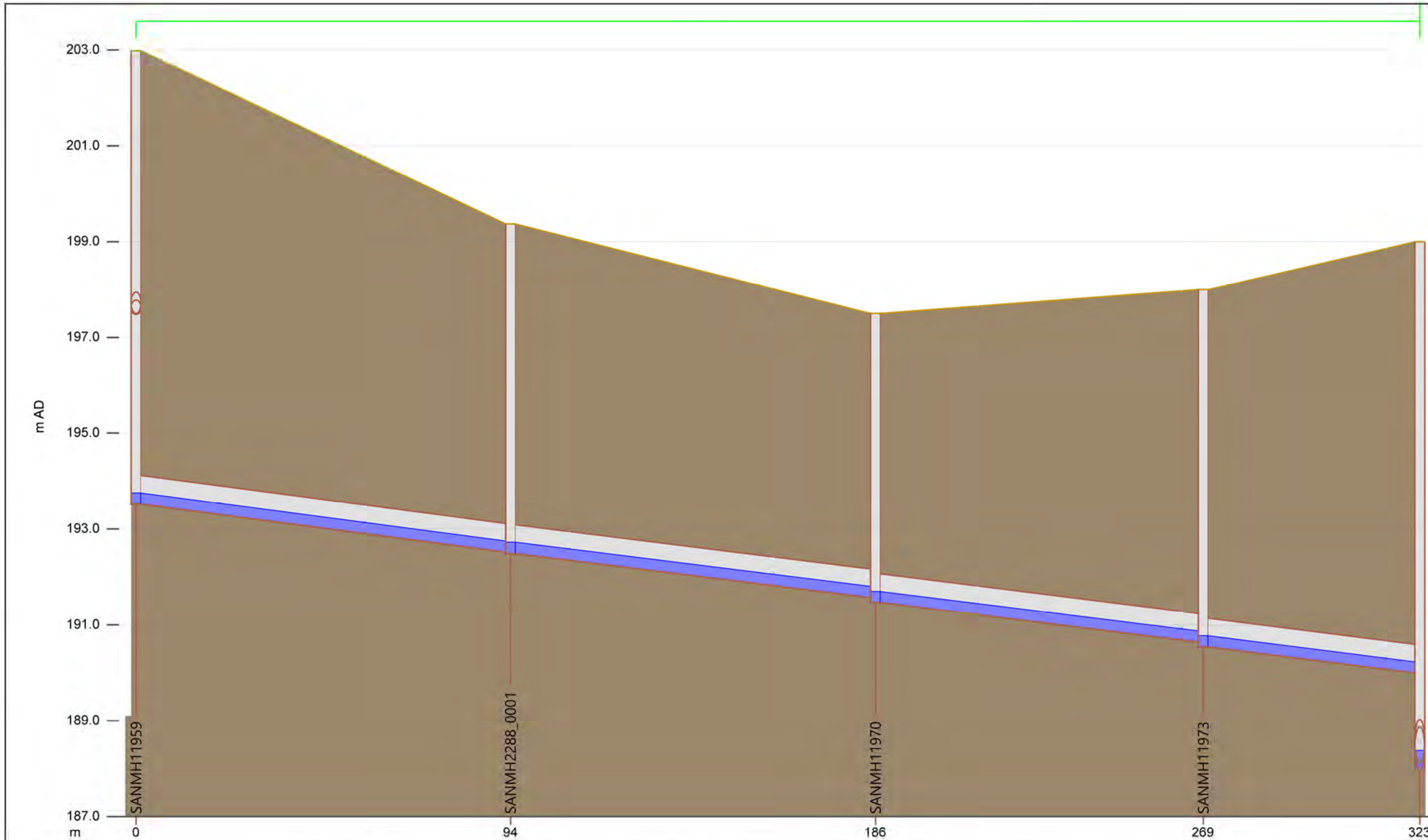
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: NW3
Location: Future Street (West of Edgeley Boulevard)

DATE: March 2024

Figure: NW3

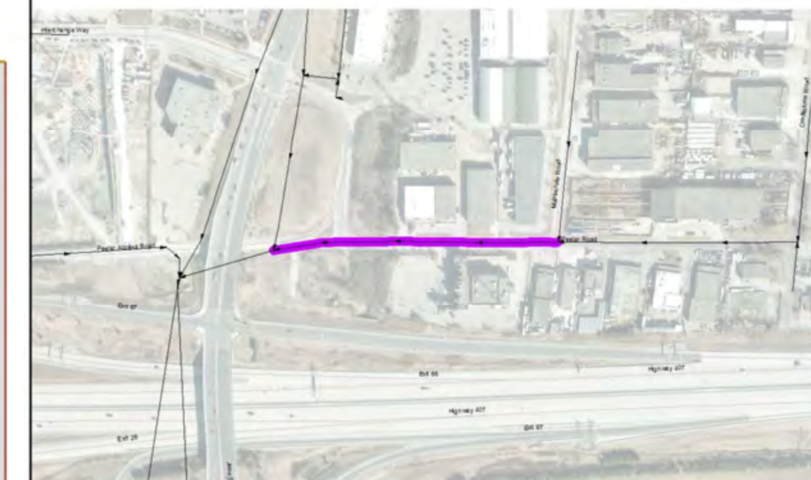


Link	SANMH11959.1	SANMH2288_0001.1	SANMH11970.1	SANMH11973.1
length (m)	94.3	91.9	82.5	54.5
width (mm)	600	600	600	600
height (mm)	600	600	600	600
us inv (m AD)	193.520	192.490	191.470	190.545
ds inv (m AD)	192.520	191.570	190.645	190.000
grad (m/m)	0.01060	0.01001	0.01000	0.01000
pfc (l/s)	632	614	614	614
surc	0.38	0.38	0.37	0.37
DS flow (l/s)	177.24	177.88	178.56	178.55

Node	SANMH11959	SANMH2288_0001	SANMH11970	SANMH11973	-
expr:HGL	9.233891	6.647797	5.806213	7.231125	10.627960

Proposed Improvements:

- New Sewer
- Sewer Capacity Increase



CIVICA
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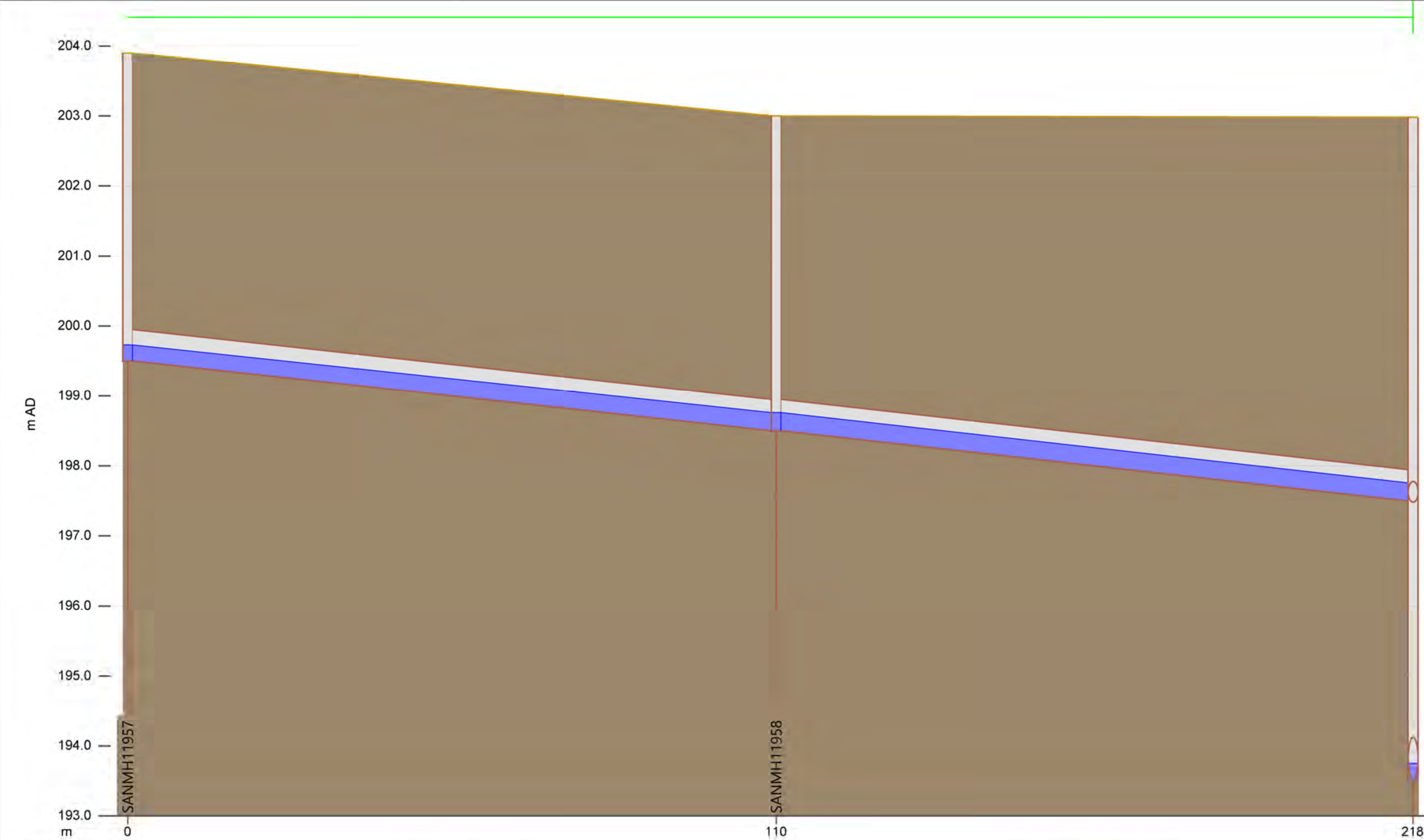
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SE1
Location: Peelar Road

DATE: March 2024

Figure: SE1



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	SANMH11957.1	SANMH11958.1
length (m)	110.0	108.0
width (mm)	450	450
height (mm)	450	450
us inv (m AD)	199.500	198.500
ds inv (m AD)	198.500	197.500
grad (m/m)	0.00909	0.00926
pfc (l/s)	272	274
surc	0.57	0.57
DS flow (l/s)	134.18	166.39

Node	SANMH11957	SANMH11958	SANMH11959
expr:HGL	4.174857	4.242996	9.233891

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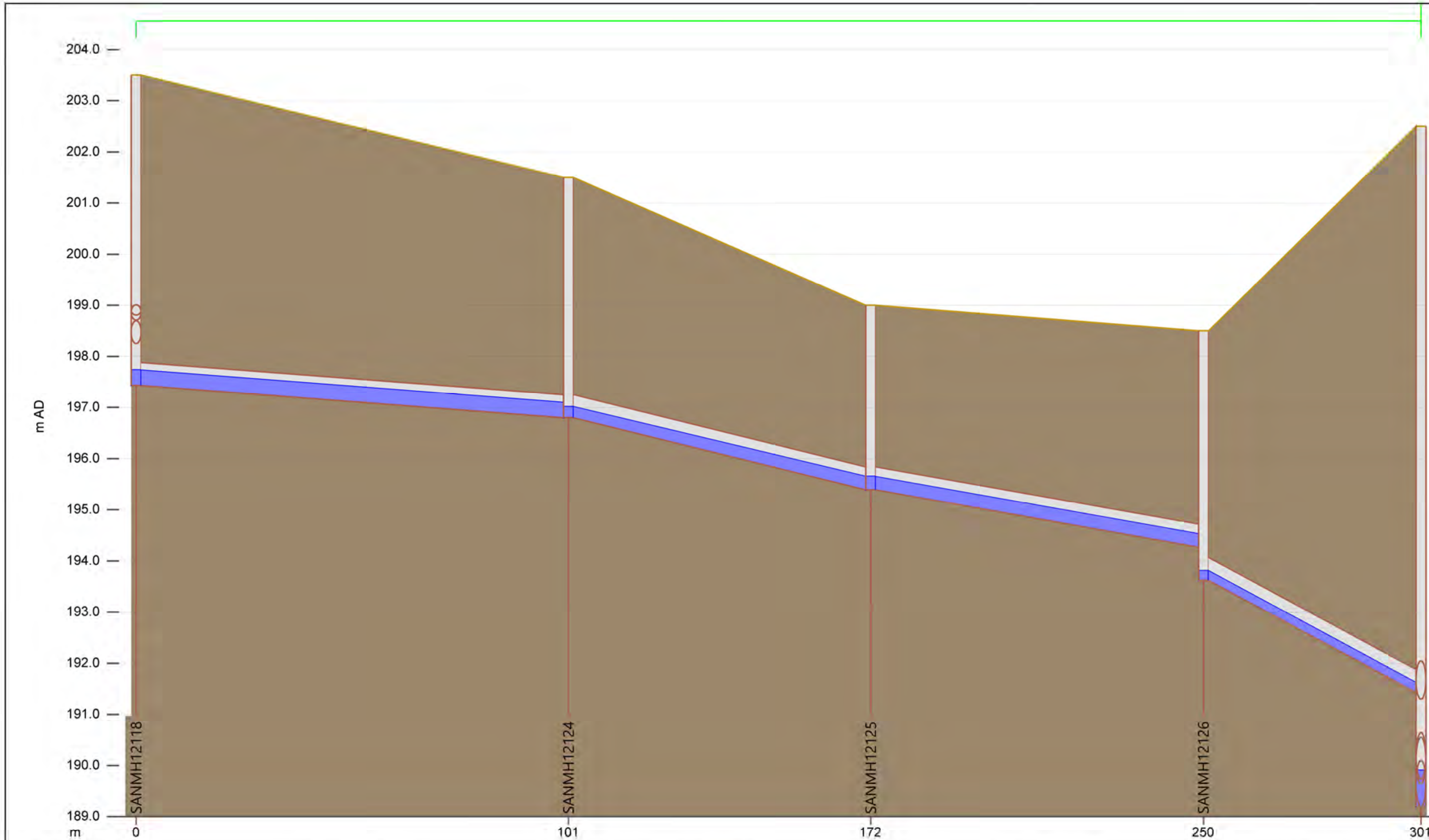
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SE2
Location: Maplecrete Road

DATE: March 2024

Figure: SE2



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	SANMH12118.1	SANMH12124.1	SANMH12125.1	SANMH12126.1
length (m)	101.4	70.9	78.0	51.0
width (mm)	450	450	450	450
height (mm)	450	450	450	450
us inv (m AD)	197.430	196.800	195.390	193.620
ds inv (m AD)	196.800	195.390	194.270	191.430
grad (m/m)	0.00621	0.01989	0.01436	0.04294
pfc (l/s)	225	402	342	591
surc	0.66	0.59	0.57	0.42
DS flow (l/s)	174.23	174.32	206.09	206.07

Node	SANMH12118	SANMH12124	SANMH12125	SANMH12126	-
expr:HGL	5.765671	4.486908	3.346634	4.689987	12.594742

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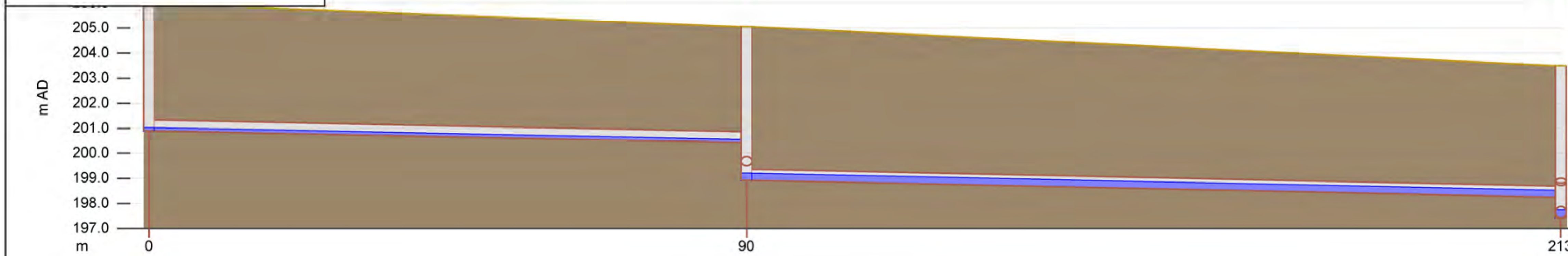
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SE3
Location: Doughton Road

DATE: March 2024

Figure: SE3

Maplecrete Road



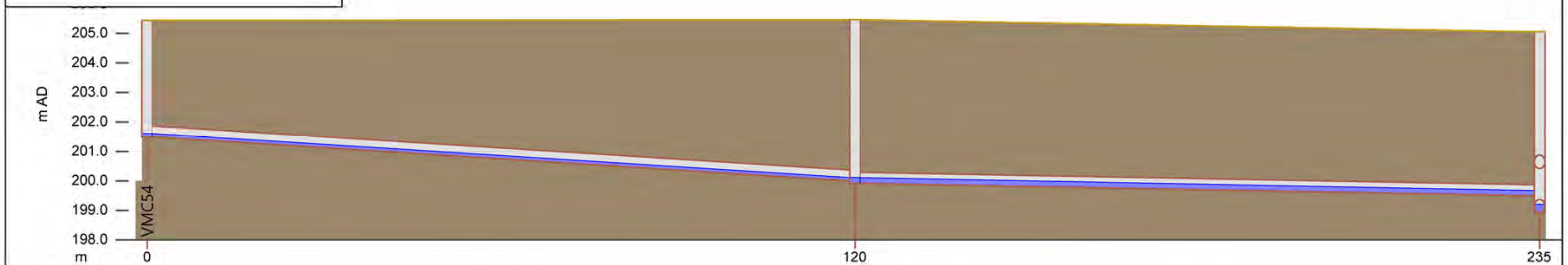
Link	SANMH12167.1	VMC52.1
length (m)	90.1	122.7
width (mm)	450	450
height (mm)	450	450
us inv (m AD)	200.900	198.925
ds inv (m AD)	200.425	198.250
grad (m/m)	0.00527	0.00550
pfc (l/s)	207	212
surc	0.28	0.60
DS flow (l/s)	33.29	139.37

Node	SANMH12167	VMC52	SANMH12118
expr:HGL	4.975861	5.853779	5.765671

Proposed Improvements:

- New Sewer
- Sewer Capacity Increase

Future Rd



Link	VMC54.1	VMC53.1
length (m)	119.7	115.7
width (mm)	375	375
height (mm)	375	375
us inv (m AD)	201.500	199.920
ds inv (m AD)	200.000	199.500
grad (m/m)	0.01253	0.00363
pfc (l/s)	196	106
surc	0.27	0.48
DS flow (l/s)	27.59	48.95

Node	VMC54	VMC53	VMC52
expr:HGL	3.837873	5.361155	5.853779

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City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SE4
Location: Maplecrete Road

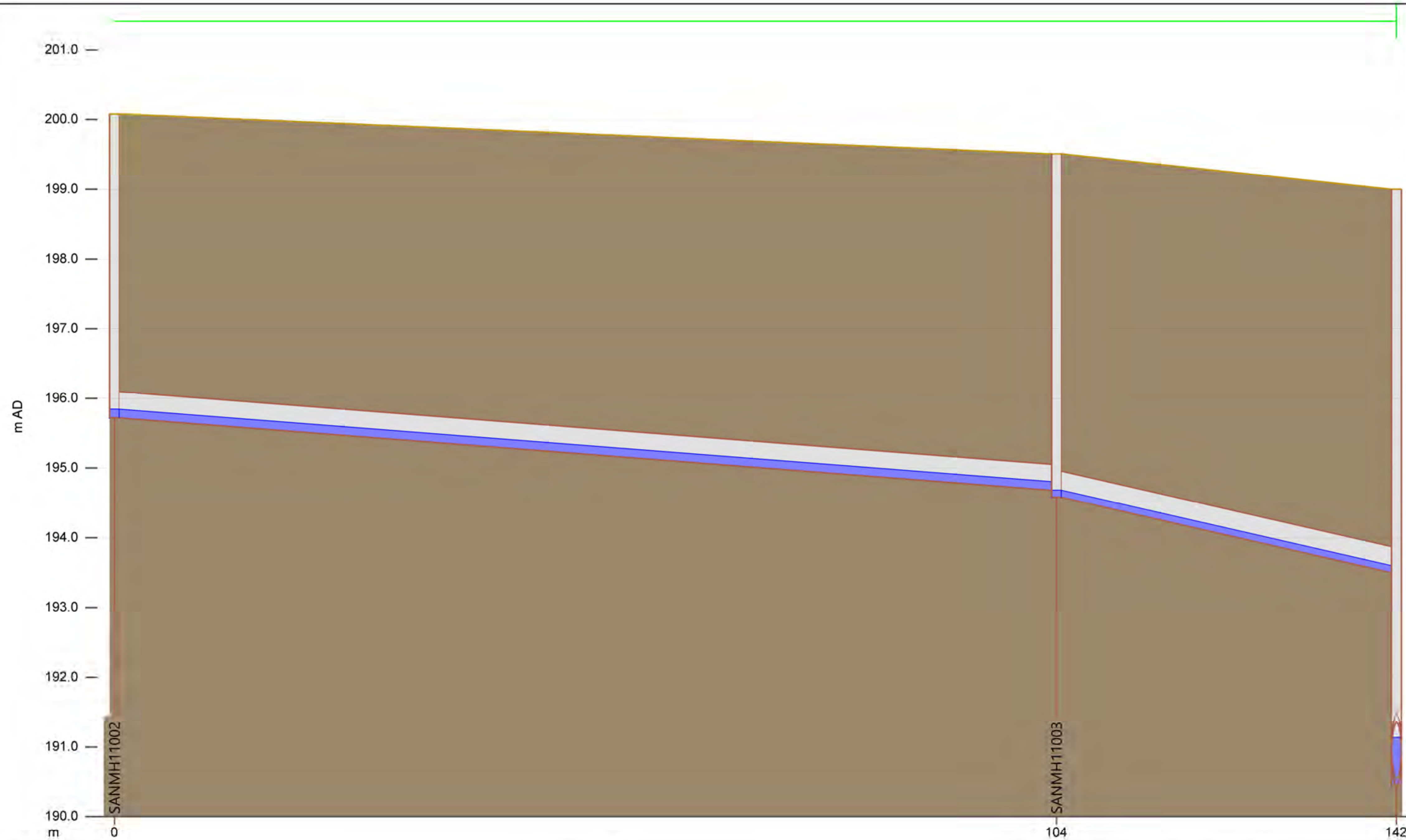
DATE: March 2024

Figure: SE4

Proposed Improvements:

New Sewer

Sewer Capacity Increase



Link	SANMH11002.1	SANMH11003.1
length (m)	104.0	37.5
width (mm)	375	375
height (mm)	375	375
us inv (m AD)	195.720	194.580
ds inv (m AD)	194.680	193.500
grad (m/m)	0.01000	0.02880
pfc (l/s)	175	298
surc	0.32	0.26
DS flow (l/s)	37.74	37.70

Node	SANMH11002	SANMH11003	SANMH807A
expr:HGL	4.239973	4.832464	7.870056

CIVICA Water Management Solutions

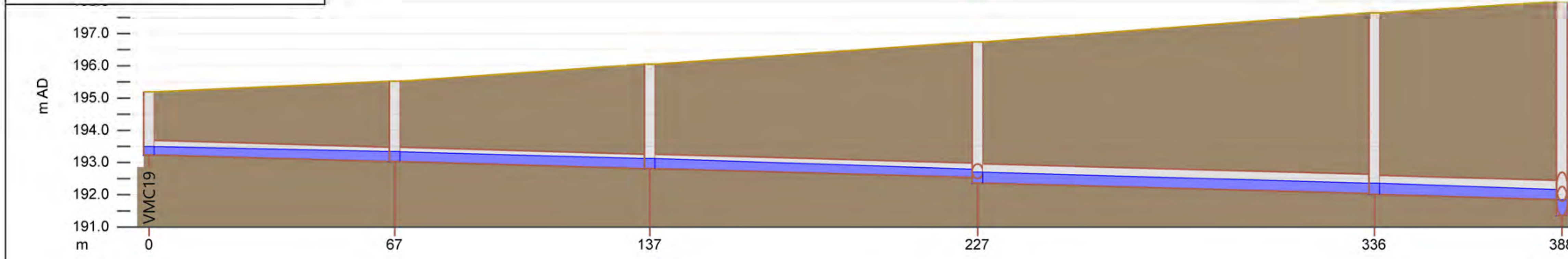
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW1
Location: Interchange Way

DATE: March 2024

Figure: SW1

Interchange Way



Link	VMC19.1	SANMH17556.1	SANMH17555.1	SANMH17553.1	SANMH17552.1
length (m)	67.5	70.0	90.0	108.9	51.5
width (mm)	450	450	450	600	600
height (mm)	450	450	450	600	600
us inv (m AD)	193.235	193.025	192.810	192.360	192.010
ds inv (m AD)	193.025	192.810	192.540	192.040	191.850
grad (m/m)	0.00311	0.00307	0.00300	0.00294	0.00311
pfc (l/s)	159	158	156	333	342
surc	0.67	0.66	0.66	0.55	0.56
DS flow (l/s)	91.30	121.46	121.22	194.20	214.03

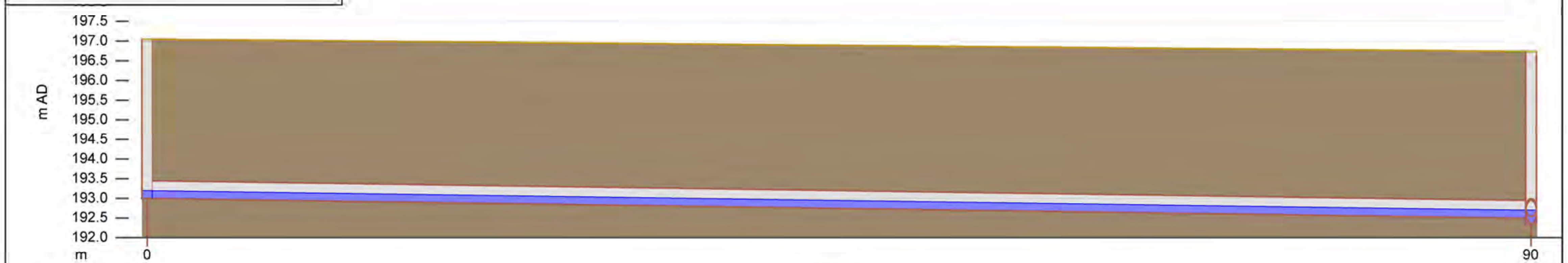
Node	VMC19	SANMH17556	SANMH17555	SANMH17553	SANMH17552	-
expr:HGL	1.714252	2.195354	2.941098	4.048762	5.302405	6.158554

Proposed Improvements:

New Sewer

Sewer Capacity Increase

Future Rd



Link	VMC-2.1
length (m)	90.2
width (mm)	450
height (mm)	450
us inv (m AD)	193.000
ds inv (m AD)	192.500
grad (m/m)	0.00554
pfc (l/s)	212
surc	0.42
DS flow (l/s)	72.86

Node	VMC-2	SANMH17553
expr:HGL	3.866223	4.048762

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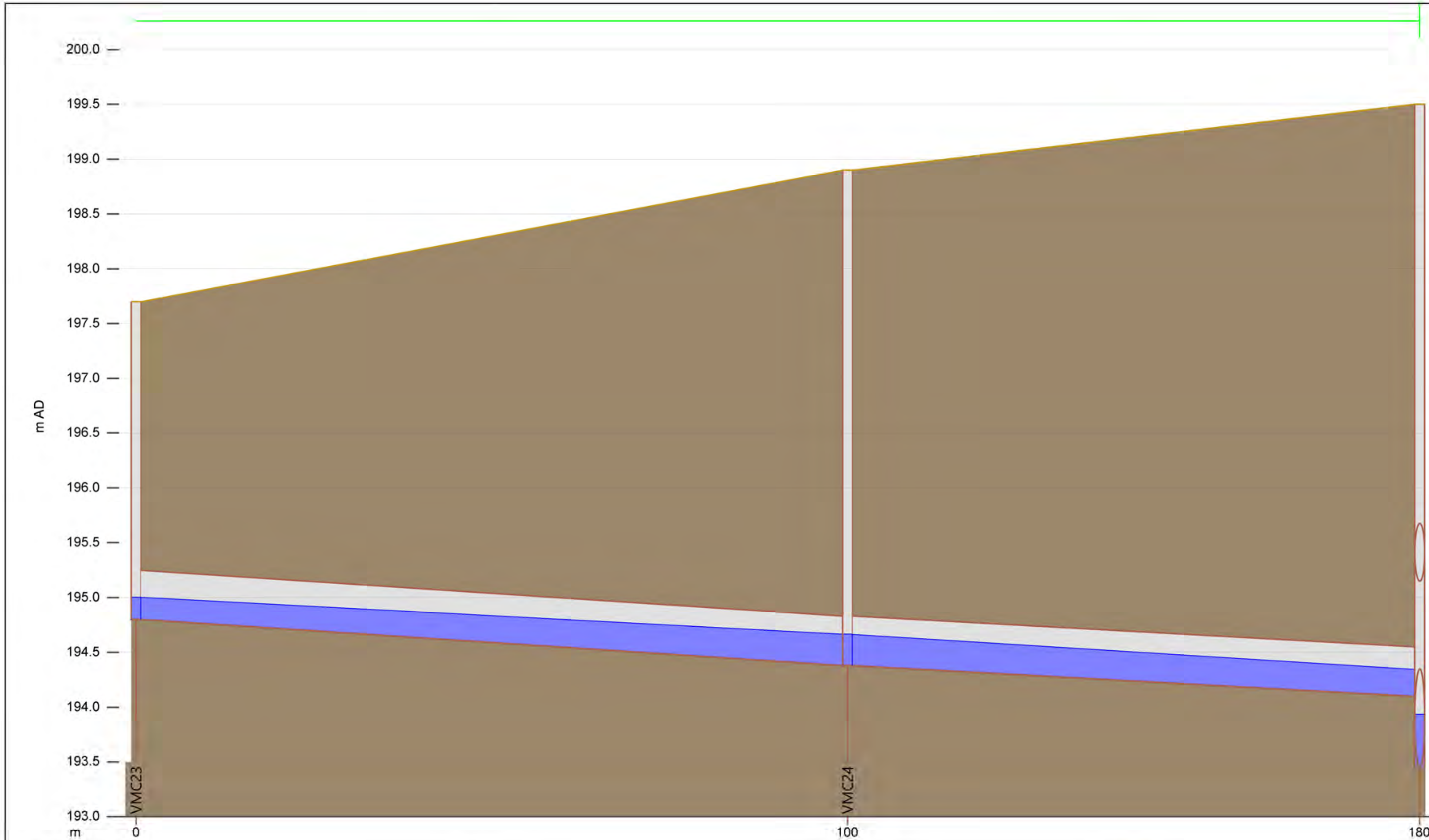
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW2
Location: Interchange Way

DATE: March 2024

Figure: SW2



Proposed Improvements:

- New Sewer
- Sewer Capacity Increase

Link	VMC23.1	VMC24.1
length (m)	100.0	80.4
width (mm)	450	450
height (mm)	450	450
us inv (m AD)	194.800	194.380
ds inv (m AD)	194.380	194.100
grad (m/m)	0.00420	0.00348
pfc (l/s)	185	168
surc	0.63	0.62
DS flow (l/s)	73.62	119.30

Node	VMC23	VMC24	SANMH803A
expr:HGL	2.700488	4.238394	5.568542

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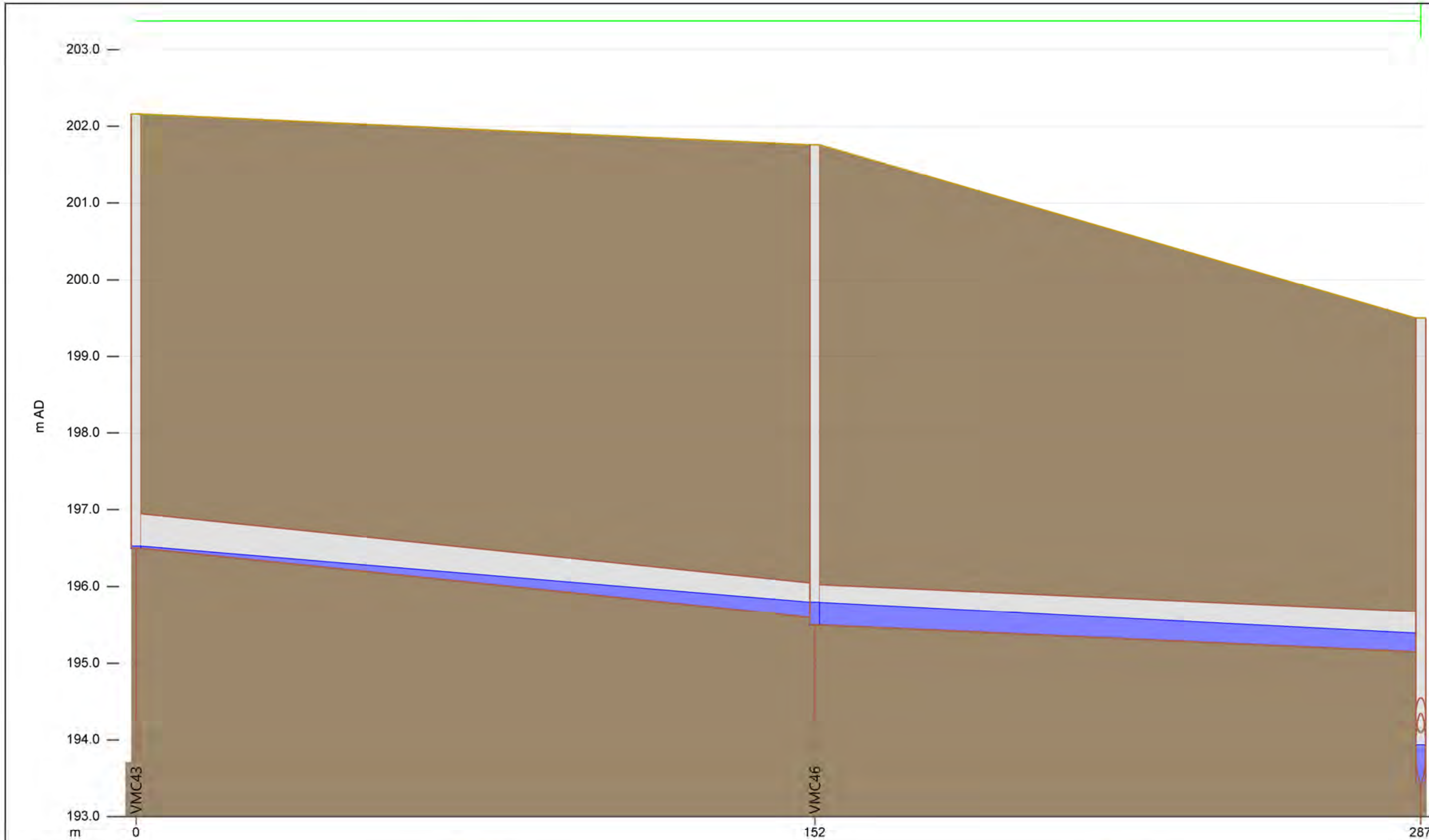
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW3
Location: Future St (West of Interchange Way)

DATE: March 2024

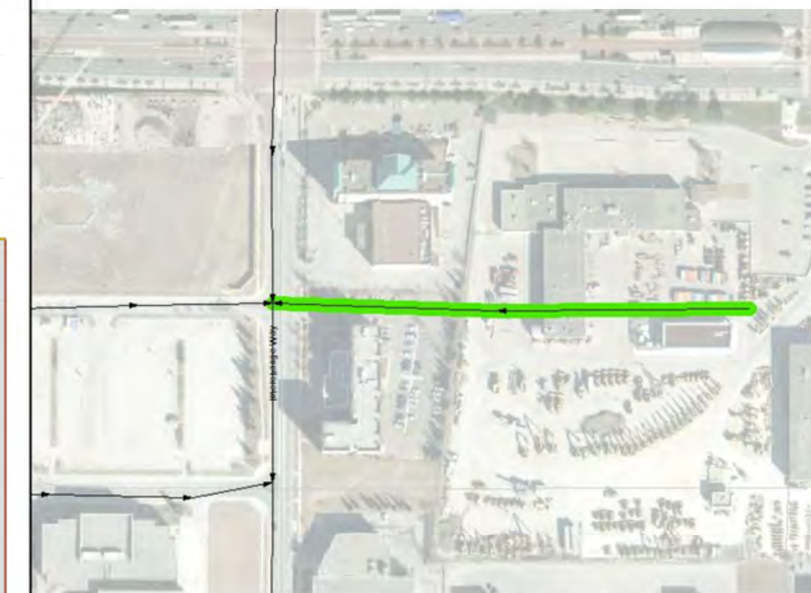
Figure: SW3



Proposed Improvements:

New Sewer

Sewer Capacity Increase



Link	VMC43.2	VMC46.2
length (m)	151.8	135.5
width (mm)	450	525
height (mm)	450	525
us inv (m AD)	196.500	195.500
ds inv (m AD)	195.600	195.150
grad (m/m)	0.00593	0.00258
pfc (l/s)	220	219
surc	0.43	0.55
DS flow (l/s)	0.35	128.43

Node	VMC43	VMC46	SANMH803A
expr:HGL	5.636639	5.968649	5.568542

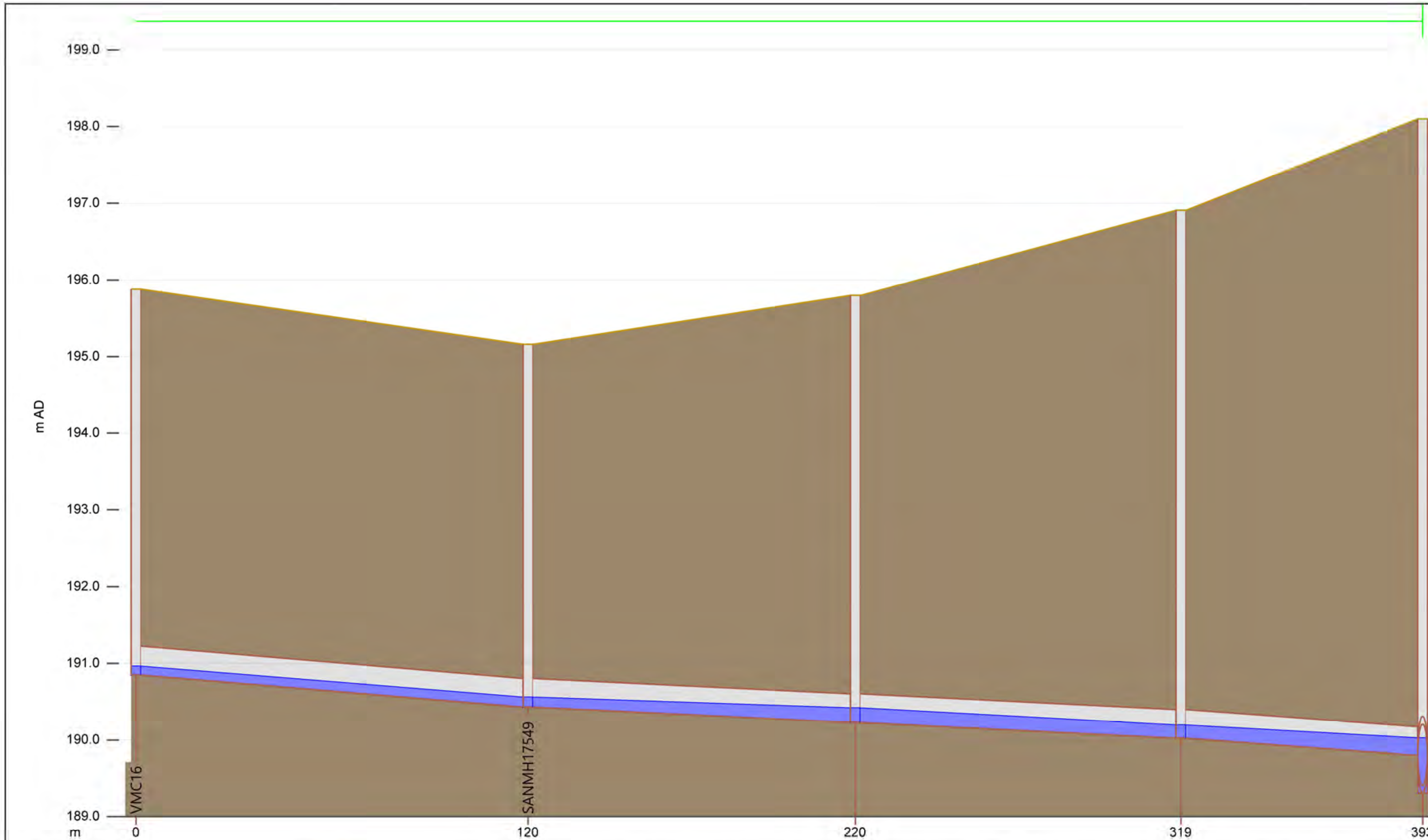
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW4
Location: Future St (East of Interchange Way)

DATE: March 2024

Figure: SW4



Proposed Improvements:

New Sewer

Sewer Capacity Increase

Link	VMC16.1	SANMH17549.1	SANMH17548.1	SANMH17545.1
length (m)	119.7	100.0	99.4	73.8
width (mm)	375	375	375	375
height (mm)	375	375	375	375
us inv (m AD)	190.850	190.430	190.230	190.025
ds inv (m AD)	190.430	190.230	190.025	189.800
grad (m/m)	0.00351	0.00200	0.00206	0.00305
pfc (l/s)	104	78	80	97
surc	0.34	0.50	0.50	0.60
DS flow (l/s)	19.32	19.30	39.27	39.09

Node	VMC16	SANMH17549	SANMH17548	SANMH17545	SANMH809A
expr:HGL	4.918406	4.601376	5.382733	6.716366	8.076181

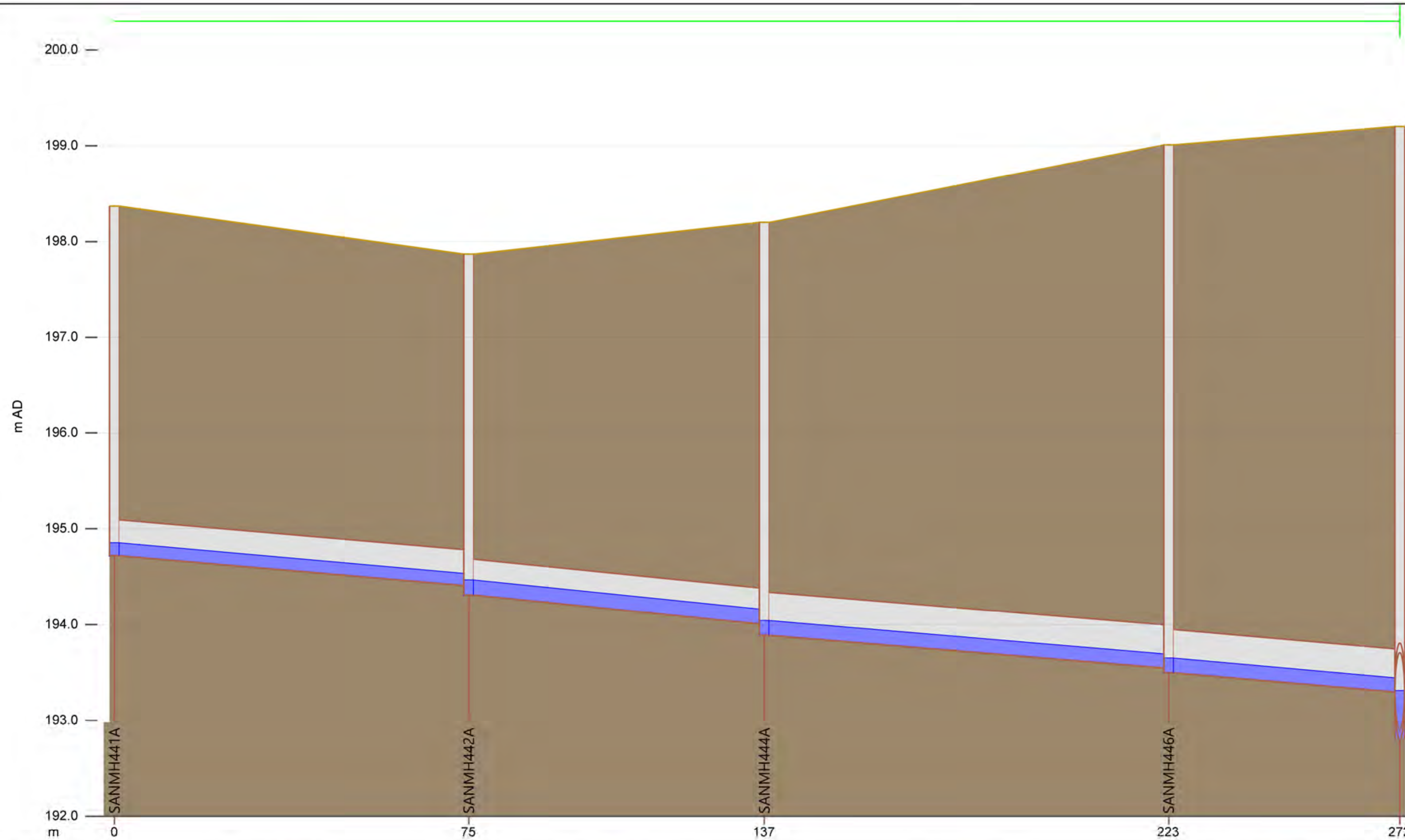
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW5
Location: Exchange Way

DATE: March 2024

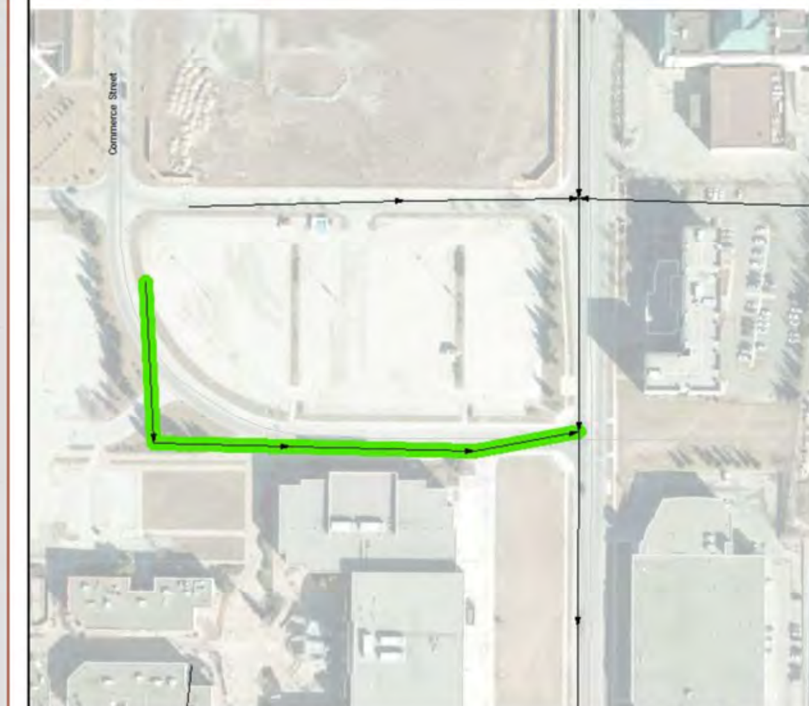
Figure: SW5



Proposed Improvements:

New Sewer

Sewer Capacity Increase



Link	SANMH441A.1	SANMH442A.1	SANMH444A.1	SANMH446A.1
length (m)	75.0	62.5	85.6	48.9
width (mm)	375	375	450	450
height (mm)	375	375	450	450
us inv (m AD)	194.720	194.310	193.890	193.500
ds inv (m AD)	194.410	194.010	193.550	193.300
grad (m/m)	0.00414	0.00480	0.00397	0.00409
pfc (l/s)	113	121	180	182
surc	0.35	0.41	0.34	0.33
DS flow (l/s)	28.82	42.68	42.59	42.73

Node	SANMH441A	SANMH442A	SANMH444A	SANMH446A	SANMH804A
expr:HGL	3.518987	3.405034	4.159152	5.360266	5.890231

CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SW6
Location: Commerce Street

DATE: March 2024

Figure: SW6

CITY OF VAUGHAN INTEGRATED URBAN WATER PLAN

FUNCTIONAL SERVICING STRATEGY REPORT

Vaughan Metropolitan Centre

Volume 4 – Stormwater Report
Final Report
September 2024

STATEMENT OF QUALIFICATIONS AND LIMITATIONS

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Disclaimer
The data used for this analysis has been obtained from City of Vaughan sources with the understanding that these are provided without warranties. This data is included in the hydraulic model. The information has been reviewed to ensure consistency with general sanitary system modeling principles used in the City of Vaughan. Unless noted in this memo, specific water system geometric characteristics and operating conditions have not been verified in the field or by cross-referencing with As-Built drawings or other sources that may be available from the City of Vaughan.

CIVICA
Water Management Solutions

September, 2024 **VAU19-0018**

City of Vaughan
2141 Major Mackenzie Dr W
Maple, ON L6A 1T1

Attention: Michael Frieri

RE: City of Vaughan Integrated Urban Water Plan- Vaughan Metropolitan Centre FSSR
Vol 4 Stormwater Report

Civica Infrastructure Inc. is pleased to submit the following report. The Integrated Urban Water Plan is comprised of the main Environmental Assessment Report and a series of Functional Servicing Strategy Reports of which this is one. These reports focus on specific development areas and provide information to facilitate more comprehensive servicing planning direction for redevelopment projects in these designated community growth areas.

This report provides servicing area background information and is part of a four-volume series that provides information on Background Information (Vol. 1), Water Servicing (Vol. 2), Wastewater Servicing (Vol. 3), and Stormwater Servicing (Vol. 4).

Sincerely,

CIVICA INFRASTRUCTURE INC.

Ilmar Simanovskis, P.Eng, MBA
Project Manager

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1.0 Introduction

The Vaughan Metropolitan Centre (VMC) is an emerging downtown area that is currently undergoing redevelopment. Stormwater management is provided through a local conveyance network with outlets either to adjacent receiver locations or through end-of-pipe treatment for quantity and quality control. The study area will be governed by watershed policies and design requirements provided by the conservation authority through TRCA design and watershed characterization studies as well as stormwater design requirements provided by the City. The VMC study area is rapidly redeveloping with high density residential, commercial and businesses, therefore there is a need to improve the stormwater infrastructure. This report will include a review of the existing conditions of the stormwater infrastructure and stormwater management ponds and assess the existing and future conditions to determine solutions to meet the future demands. The VMC Functional Servicing Strategy Report (FSSR) is an update to the VMC Municipal Servicing Class Environmental Assessment Master Plan (MSMP), prepared in 2012 by The Municipal Infrastructure Group (TMIG) and will re-evaluate the stormwater management solutions proposed.

The first objective for stormwater management is to manage the impact of development on the change in land surface permeability due to buildings and hard surfaces such as pavement. The consideration is that pre and post-development conditions will generally reduce surface permeability and increase the amount of water that will run off a property thereby increasing the amount of surface runoff that must be collected and directed to a watercourse and back to the natural system. The impact of this is generally a higher volume of runoff generated due to development as well as a higher and earlier peak flow that will be experienced at a discharge point to the natural receiver. Various controls such as stormwater ponds or other retention and flow control structures are used to create final discharge flow conditions that best recreate pre-development runoff characteristics that are intended to protect downstream watercourse and natural environment conditions.

The design objective for this study is to provide minor system capacity to convey a 5 year design storm without surcharge of the stormwater network and to provide major system capacity that will contain the 100 year design storm runoff within rights of way and not impact private lands as flow is directed to outlet locations through overland routes. The analysis of these conditions is modelled with InfoWorks based on the dual drainage methodology. Recommendations for future servicing needs is based on the balance of achieving minor system capacity criteria for a 5 year storm event while further achieving effective major system surface water flow management without surcharging the sewer network during a 100 year storm event. These results and the recommended solutions are provided through the dual drainage assessments.

The main criteria considered to mitigate the effects of urbanization and development are as follows:

Stormwater Quality Control- These are features and structures that are intended to clean the stormwater that is collected from the community to reduce sediment and other materials collected through the sewers. This is commonly achieved through features such as ponds that allow for storage capacity where sediments can settle out and thereby meet quality discharge limits established by the authority.

Stormwater Quantity Control- Quantity control is required to retain the higher peak flows caused by urbanization and lower ground infiltration so that the final discharge rate to the receiver better matches the flow pattern experienced before development. This also is generally controlled through stormwater management ponds.

Watercourse Erosion Control- Water course erosion control is intended to mitigate rapid and high rate surface flows that could impact watercourse conditions through sediment washout or bank erosion. The criteria for mitigating erosion are also related to stormwater storage and controlled release based on specific criteria set by the authority.

Water Balance- Water balance is a concept based on the hydrologic cycle and is intended to recognize the unique characteristics of a watershed that include the amount of rain, the portion that infiltrates as groundwater, the portion that evaporates to the atmosphere, and the portion that runs of the surface. As infiltration is often the factor most effected by urbanization, requirements for on site storage and other infiltration enhancing measures are used to demonstrate a mitigative approach to restoring infiltration function.

These objectives are applied in the evaluation of the future growth scenarios and how intensification and further urbanization may change stormwater system performance, and the recommended strategies to mitigate these effects.

1.1 Study Area

Based on the City of Vaughan's historical aerial photos, in the late 1960s to early 1970s, the existing farm fields in the Vaughan Metropolitan Centre (VMC) area began to develop into industrial land uses. Industrial developments expanded to the northeast and southeast quadrants by the mid to late 1970s. By the mid to late 1990's the on-line, Edgeley Pond and Interchange Pond were constructed along with more industrial land uses throughout the northeast, southeast and southwest quadrants. Commercial developments were added to the northwest and southwest quadrant by the early to mid 2000s along with more industrial land-uses and the construction of the pond southeast of Portage Parkway and Hwy. 400. By the mid 2010s, the VMC began its transformation to the new City of Vaughan's Downtown with new and redevelopments changing the industrial-heavy area to mixed land-uses including residential, commercial and institutional land-uses. Under existing conditions, as of 2021, the VMC study area consisted mainly of commercial, industrial, and residential land uses. VMC is serviced with existing storm sewers and stormwater management ponds. The existing local and regional stormwater infrastructure features are presented in Figure 1-2.

The VMC study area is within the Black Creek subwatershed and generally drains southeast toward the main tributary of Black Creek or drains southwest toward the west branch of Black Creek. The VMC is divided into four quadrants, which follow the four distinct drainage areas. Highway 7 delineates the study area into north and south while Edgeley Boulevard separates the northern area into the VMC northwest and northeast quadrants. Jane St. delineates the VMC south of Highway 7 into the VMC southwest and southeast quadrants. Figure 1-2 illustrates the four VMC quadrants – northwest, northeast, southwest and southeast.

The drainage system for each VCM quadrant is designed as a dual drainage system in accordance with the City design standards. The MSMP2012 TMIG VMC Master Plan EA – November 29, 2012, Final Appendix D – Stormwater Drainage and Management was used to set the on-site controls in the study area. Individual lots provide on-site control to restrict peak flows to the 2 year post development runoff rate.

On-site storage is provided to control runoff generated from the 100 year event to the 2 year post development flow rate. In addition, to assist in providing storage volume for the development site, rooftop controls to meet the release rate of 42 L/s/ha is acceptable.

The VMC is within the Black Creek subwatershed and drainage channels through the VMC require strategic improvements based on the Black Creek Stormwater Optimization (BCSO) Study prepared by AECOM in May 2011. Many of the BCSO recommended improvements are in the detailed design process or have approved detailed designs and will be constructed to the benefit of the Black Creek flow capacity and overall subwatershed performance through and downstream of the VMC study area.

1.1.1 Northwest Quadrant

The northwest quadrant consists of two separate catchment areas. The northern catchment drains to Stormwater Management (SWM) Pond 2 with a drainage area of 25.82 ha. This pond was constructed in approximately 1999. The interim SWM pond provides SWM controls for the minor drainage system received from a portion of Portage Parkway and Applewood Crescent. In this area, the major system flows from a portion of Portage Parkway before outletting to the existing large pond. Both Ponds provide quantity control for the upstream area. In this area, the major system flows from a portion of Portage Parkway before outletting to the existing large pond. Both Ponds provide quantity control for the upstream area. The flows from this existing pond discharges to the west tributary of the Black Creek.

The second catchment area drains to an existing pond that was recently constructed with a drainage area of approximately 14.45 ha. This pond provides SWM controls for a portion of the constructed spine roads (constructed in 2019 and 2020 on Applewood Crescent, Apple Mill Road and Commerce Street) and the undeveloped development sites within the northeast quadrant. The controlled flow from the existing pond discharges to the west tributary of Black Creek. The Commerce Superpipe and downstream OGS provide SWM controls for runoff received from Commerce St., Highway 7 to roughly New Park Place and undeveloped development sites located east and west of Commerce St. The controlled flow received from the Superpipe discharges to the existing Highway 7 storm sewer.

The three ponds in the Northwest Quadrant (NWQ) will be replaced with SWM facilities under the ultimate condition to meet the current SWM criteria.

This quadrant was also affected by the Black Creek Spill as is detailed in section 1.3.2.

1.1.1.1 First Vaughan Development FSR

As per the First Vaughan Development VMC West FSR (SCS, July 2018) and First Vaughan Lands – Phase Spine Roads Interim SWM Report (SCS, May 2019), the on-site controls for development blocks within the VMC draining to the temporary and ultimate north and south SWM facilities is to control post development flows to the 2 yr post flow rate with a maximum imperviousness of 80%. Runoff from approximately 20% of development blocks draining to these ponds would be left uncontrolled. According to the First Vaughan Lands Interim SWM report, this uncontrolled drainage is to be compensated for by over control of the controlled drainage area such that the overall site release rate does not exceed the allowable release rate. If it is determined that over controlling to achieve the allowable release rate is not feasible, the City of Vaughan will assess the allowance of uncontrolled flows in excess of the allowable release rate on a case-by-case basis. In this scenario, an assessment of downstream municipal infrastructure must be completed to demonstrate there is no negative impact.

Also, as per the First Vaughan Lands – Phase 1 Spine Roads Interim SWM Report (SCS, May 2019), the onsite controls for development blocks draining to the Commerce St. superpipe is to control post development flows to Humber River Unit Flow Rate, and Commerce St. superpipe was sized to accommodate the controlled and uncontrolled (15%) runoff from the contributing development blocks.

The southeast quadrant is presently not serviced by an end-of-pipe facility. The functionality of the quadrant is initially analyzed without a SWM facility for controlling the flow being conveyed to Humber River. Therefore, this quadrant will require an Alternative SWM strategy to provide the required level of stormwater management. The Alternative SWM strategy will include on-site control for each development and redevelopment block where the peak release rate is controlled to the 2-year post-development flow rate, based on an 80% level of imperviousness, with the 100-year less the 2-year excess runoff stored on-site. The SE quadrant will require on-site retention of 15 mm over entire development blocks. This is an increase in the requirement for on-site retention including all areas of development blocks, instead of only the building footprint and landscaped areas. The capture and retention of runoff from rainfall events are to be achieved through the implementation of LID measures. The Implementation of the alternative SWM method will assist in achieving the required level of stormwater management for the development sites in the SE quadrant. The addition of a SWM pond will ensure the overall SWM criteria are achieved prior to discharging to the Black Creek.

1.1.2 Northeast Quadrant

This quadrant drains to the existing on-line Edgeley Pond and includes a catchment area of 793.59 ha. This pond was designed in the late 1980s by Ander Engineering, constructed in the early 1990s and provides quantity control for an upstream drainage area of 767.31 ha. (Also referred to as Pond 18 in the City's 2007 Stormwater Management Retrofit Study). The City will be retrofitting the Edgeley Pond to meet local flood control and water quality goals and to accommodate development within these lands while integrating the Edgeley Pond Park into the City's Iconic Park. The 1986 Ander engineering report identified a release rate of 2 year post development for this quadrant related to on site quantity control with overall pond discharge control to meet Humber River unit rates. The detailed design of the pond retrofit was reviewed and approved by the majority of agencies. The retrofit design provides quantity, quality and erosion controls. The quantity control is designed for post flow to meet the existing flow conditions and is provided in the WSP Stormwater Management Report, February 2021.

The TRCA has recently updated their hydraulic model and floodplain mapping for Black Creek. Thus, the original spill of Black Creek at the 90 degree bend, located east of Hwy. 400 and by Pennsylvania Ave. was included in TRCA floodplain mapping update. This Black Creek spill now affects the western limit of the VMC. Please refer to Section 1.3.2 of this report for more details regarding the Black Creek spill.

1.1.3 Southeast Quadrant

The Southeast quadrant has a total drainage area of 93 ha that discharges directly to Black Creek as there is no existing pond for this area. As part of the recommendations for the future redevelopment of this quadrant including Expansion Area A, the addition of a storm pond is proposed, similar to what was proposed in the 2012 Municipal Servicing Environmental Assessment Master Plan (TMIG). The proposed pond remains within the open space as identified in the VMC Secondary Plan (2017 Review of the performance and function of this SWM pond is provided in the proposed scenarios discussion in section 4.8.5.

The Black Creek Renewal project will involve the realignment and recanalization of the Black Creek to mitigate the existing flood concerns that will allow to convey and contain flows up to the 100 year storm and Regional Hurricane Hazel flows.

1.1.4 Southwest Quadrant

The Southwest quadrant has two SWM ponds, the main existing pond, known as the Interchange Pond, has a catchment area of approximately 54 ha. This pond provides quality, quantity, and erosion control for the majority of the southwest quadrant. The design was completed by G.M. Sernas in June 1997, excludes the Toromont pond, did not consider onsite controls for the development sites and met SWM criteria relevant at the time of the design. The existing Interchange pond currently does not meet current SWM criteria and will require a retrofit design to meet current SWM criteria. As part of the 2012 MSMP, a 2 year post development release rate was applied for developmental sites and the Humber River unit flow rate was used for the SWM Ponds.

The smaller, second pond is a private pond within the Toromont property and is located southwest of Hwy. 7 and Jane St. The catchment area to the private pond is 10.63 ha and discharges to an existing Jane Street culvert that connects to the Black Creek watercourse, east of Jane St. This private pond was constructed when the Toromont lands were developed, and the Toromont pond stage storage was taken from the Humber River Hydrology Report (2015) prepared by Civica. The drainage area to the private pond was to be included as part of G.M. Sernas' design for the current Interchange Pond to address MTO comments from June 1997. However, drainage from the Toromont lands was not directed to the Interchange pond and continues to flow to the private pond and ultimately to Black Creek.

Under the ultimate condition, with the redevelopment of the southwest quadrant, the entire southwest quadrant drainage area, including the Toromont lands will be directed to the existing Interchange pond. Thus, the Interchange pond will require a retrofit design and consider the overall drainage area and on-site control for the development sites which is to control flows from up to and including the 100 year storm event to the 2yr post-development flow rate (maximum 80% imperviousness).

As noted in Section 1.1.2 Northwest Quadrant, the Black Creek spill also affects the west portion of the southwest quadrant. Refer to Section 1.3.2 for details regarding the Black Creek Spill.

1.1.5 Major Transit Station Area

The VMC has three distinct Major Transit Station Areas (MTSA) as shown in Figure 1-1 below. The western portion of the VMC is serviced by MTSA 54- Commerce BRT Station and has a gross area of 71.40 ha. The second and central areas of the VMC consist of MTSA 67- Vaughan Metropolitan Centre Subway Station which has a gross area of 110.76 ha. The third and eastern service area of the VMC is MTSA 56- Credit Stone BRT Station which has a gross area of 52.08 ha.

Figure 1-1: **York Region Major Transit Station Areas (MTSA's)**

1.1.6 Expansion Areas

The City of Vaughan has recently approved the inclusion of two expansion areas to the original VMC boundary area and are illustrated on Figure 1-2. Expansion Area A is located in the southeast quadrant and extends south from the current VCM boundary to Highway 407 west bound off ramp and east from Maplecrete Road to Creditstone Road. Expansion Area B is within the northwest and northeast quadrants and extends north one to two parcels, approximately 100m north of Portage Parkway from Highway 400 to Black Creek. The City is currently updating the VMC Secondary Plan, which will identify the land-use and road network for these expansion areas.

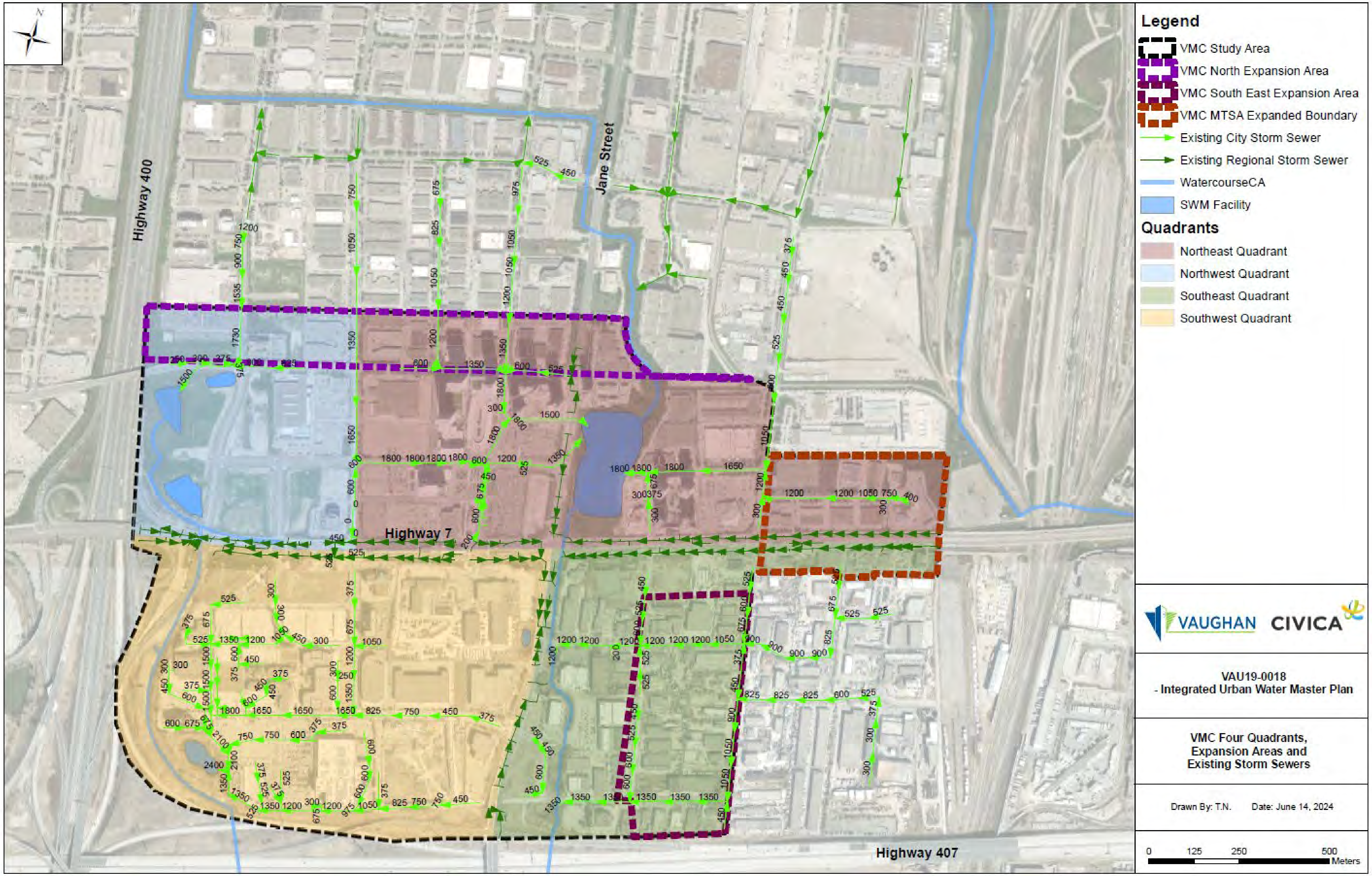

Figure 1-2: VMC Four Quadrants, Expansion Areas and Existing Stormwater Infrastructure

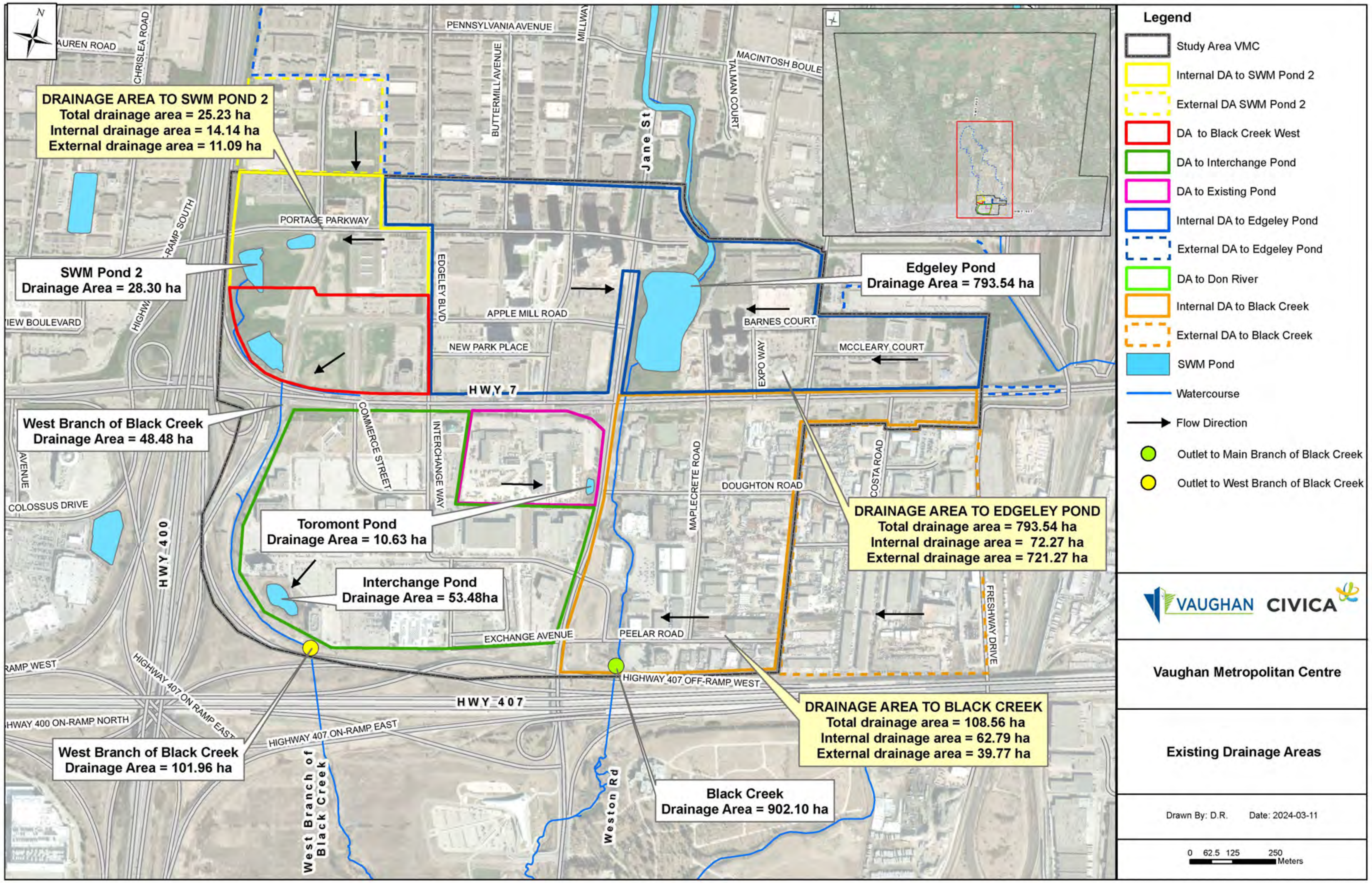

Figure 1-3: Existing Storm Drainage Area

1.2 Existing Stormwater Management Facilities

Four existing stormwater management ponds service the majority of the VMC study area. Table 1-1 provides the target release rate and storage volumes for the existing SWM facilities within the VMC study area. The target release rate from each existing SWM facility varies since the quantity control criteria varied at the time each SWM facility was designed and implemented. Table 1-1 identifies the quantity control criterion for each existing SWM pond. Also, the TRCA Stormwater Management Criteria identify that return period peak flows be based on Humber River target flows for the 6 and 12 hour AES storm. The bolded values in Table 1-1 identify the governing storm based on the larger required storage volume while achieving the target release rate.

Table 1-1: Existing SWM Facility Information

						6-hour AES (Bloor, TRCA)		12-hour AES (Bloor, TRCA)	
Quadrant	**Existing Pond and Location**	**Quantity Control Criterion**	**Storm Return Period**	**Target Release Rate (m3/s)**	**Storage Provided (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**
NW	Interim North SWM Facility - SW of Portage Parkway and Applewood Crescent (Servicing Area 4.18 ha)	Humber River Unit Flow	2 Yr	0.028	0.2129	**0.016**	**0.0235**	0.016	0.0234
			5 Yr	0.041	0.2129	**0.023**	**0.0323**	0.022	0.0310
			10 Yr	0.050	0.2129	**0.030**	**0.0448**	0.025	0.0363
			25 yr	0.063	0.2129	**0.040**	**0.0636**	0.030	0.0430
			50 Yr	0.072	0.2129	**0.046**	**0.0784**	0.032	0.0483
			100 Yr	0.083	0.2129	**0.051**	**0.0933**	0.035	0.0536
	Interim SWM Pond - NW of HWY 7 and Applewood Crescent (Servicing Area 10.74 ha)	Humber River Unit Flow	2 Yr	0.064	0.6374	0.027	0.1942	**0.029**	**0.2223**
			5 Yr	0.095	0.6374	0.033	0.2823	**0.034**	**0.3134**
			10 Yr	0.115	0.6374	0.041	0.3427	**0.049**	**0.3702**
			25 yr	0.144	0.6374	0.093	0.3963	**0.120**	**0.4083**
			50 Yr	0.166	0.6374	0.154	0.4238	**0.171**	**0.4314**
			100 Yr	0.189	0.6374	0.193	0.4528	**0.198**	**0.4589**
	Superpipe Facility - Commerce Street, N of HWY 7 (Servicing Area 2.03 ha)	Humber River Unit Flow	2 Yr	0.015	0.0383	0.012	0.0114	**0.013**	**0.0123**
			5 Yr	0.022	0.0383	0.016	0.0164	**0.016**	**0.0178**
			10 Yr	0.026	0.0383	0.017	0.0211	**0.019**	**0.0227**
			25 yr	0.033	0.0383	0.023	0.0257	**0.025**	**0.0267**
			50 Yr	0.038	0.0383	0.028	0.0284	**0.029**	**0.0289**

						6-hour AES (Bloor, TRCA)		12-hour AES (Bloor, TRCA)	
Quadrant	**Existing Pond and Location**	**Quantity Control Criterion**	**Storm Return Period**	**Target Release Rate (m3/s)**	**Storage Provided (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**
			100 Yr	0.043	0.0383	0.033	0.0309	**0.033**	**0.0312**
	Existing NWQ Pond - SE of Portage Parkway and HWY 400 (Servicing Area 25.2 ha)	Control Structures (Constricted outfall channel and broad-crested overspill weir)	2 Yr	1.135	2.0250	**0.688**	**0.2646**	0.630	0.2382
			5 Yr	NA	2.0250	**0.842**	**0.3740**	0.804	0.3189
			10 Yr	NA	2.0250	**0.905**	**0.4649**	0.854	0.3911
			25 yr	NA	2.0250	**0.988**	**0.5870**	0.920	0.4866
			50 Yr	NA	2.0250	**1.051**	**0.6825**	0.972	0.5633
			100 Yr	3.183	2.0250	**1.104**	**0.7805**	1.025	0.6430
SW	Interchange Pond - NE of HWY 407 and Hwy 7 (Servicing Area 53.5 ha)	Pre-development	2 Yr	1.120	3.4107	0.374	1.2796	**0.381**	**1.3311**
			5 Yr	1.450	3.4107	0.666	1.7307	**0.673**	**1.7337**
			10 Yr	NA	3.4107	**1.086**	**1.9172**	1.039	1.8961
			25 yr	NA	3.4107	**1.601**	**2.1451**	1.479	2.0912
			50 Yr	NA	3.4107	**1.984**	**2.3157**	1.802	2.2342
			100 Yr	3.330	3.4107	**2.365**	**2.4845**	2.134	2.3817
	Existing Toromont Pond - SW of HWY 7 and Jane St. (Servicing Area 10.6 ha)	Unknown	2 Yr	NA	0.616	0.095	0.2708	**0.097**	**0.2773**
			5 Yr	NA	0.616	**0.175**	**0.3572**	0.171	0.3561
			10 Yr	NA	0.616	**0.301**	**0.3918**	0.269	0.3829
			25 yr	NA	0.616	**0.455**	**0.4355**	0.423	0.4264
			50 Yr	NA	0.616	**0.570**	**0.4668**	0.534	0.4573
			100 Yr	NA	0.616	**0.700**	**0.5007**	0.639	0.4876
NE	Edgeley Pond - NE of Hwy 7 and Jane St. (Servicing Area 793.5 ha)	Original TRCA Model Flow	2 Yr	16.5	16.9514	7.904	7.6039	**8.403**	**7.7975**
			5 Yr	23.9	16.9514	**13.155**	**9.6418**	13.020	9.5933
			10 Yr	29.8	16.9514	**17.612**	**10.9583**	16.441	10.7667
			25 yr	37.2	16.9514	**24.601**	**12.1205**	22.296	11.7387
			50 Yr	44.2	16.9514	**29.205**	**12.8897**	26.560	12.4465
			100 Yr	50.6	16.9514	**34.582**	**13.7887**	30.879	13.1667

						6-hour AES (Bloor, TRCA)		12-hour AES (Bloor, TRCA)	
Quadrant	**Existing Pond and Location**	**Quantity Control Criterion**	**Storm Return Period**	**Target Release Rate (m3/s)**	**Storage Provided (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**	**Outflow (m^3/s)**	**Max. Storage Used (ha.m)**

Note: 1. Bold values indicate the more conservative (higher) discharge and storage volumes.
2. The analysis of the VO model shows that the existing facilities function according to design except for the South Interim SWM Pond in the NWQ, as this is an interim pond once the ultimate solution is designed that the discharge rates are to be met.

3. The quantity control criteria for the Toromont Pond was not available under the existing conditions. That is why it is marked "NA" in the table

1.3 Special Considerations

1.3.1 Retention Volume and Low Impact Development for VMC Southeast Quadrant

As part of previous studies noted for the SE quadrant area, the consideration of LID applications as a feasible alternative was considered and various evaluations were undertaken. To confirm the feasibility of LID features, this assignment included a detailed analysis of LID features and applicability in this area. The study is included in Appendix E of this report and titled Stormwater Retention Guideline- Vaughan Metropolitan Centre Southeast Quadrant ("Stormwater Retention Guideline") prepared in February 2023 by Emmons and Olivier Resources Canada Inc in consultation with the TRCA and is provided in Appendix 4 of the Main Report.

As part of the southeast quadrant future condition, the Black Creek Renewal Class Environmental Assessment (BCR EA) (TMIG, 2018) developed a stormwater management strategy unique for this quadrant, including infiltration trench and stormwater tree trench concepts to retain rainfall in parks and road right-of-way (ROW). The BCR EA also defined criteria for stormwater management within development blocks, including retention, attenuation and water quality.

Plans for the VMC have since evolved, including an expansion of the Southeast Quadrant's eastern boundary from Maplecrete Road to Creditstone Road, which is referenced as Expansion Area A. The expanded southeast quadrant, Expansion Area A is approximately 56% larger than the area considered in the BCR EA. In addition, development proposals have thus far been only able to engage rainwater harvesting practices to address retention criteria within development blocks as ground-level practices, including in adjacent parks, have been challenging due to constraints and conflicting demands.

The purpose of the report was to assess feasibility and provide guidance on stormwater retention in the ROW, parks and open spaces in the original VCM southeast quadrant and Expansion Area A. The Stormwater Retention Guideline – Vaughan Metropolitan Centre Southeast Quadrant document also provides insight for the City and development community to consider various LIDs within public and private lands across the other three VMC quadrants. The 2012 MSMP report was used as a reference and followed the on-site retention requirement. In this study, the on-site controls applied are within developmental sites and not on ROWs. All ROWs are uncontrolled areas.

Although a key feature of the Stormwater Retention Guideline was to assess the retention capacity and feasibility based on the BCR EA recommendations for the original southeast quadrant and Expansion Area A, it was discovered that there was high groundwater throughout this quadrant. Given that the City currently only accepts infiltration type LIDs within the boulevard, the 15mm on-site retention within City right of ways could not be fully achieved. It is noted that although the BCR EA was based on meeting quantity and quality control without the benefit of a storm water pond, the overall assessment of feasibility and ability to fully implement LID targeted solutions was discounted due to high groundwater levels which would not allow achieving the 15 mm retention in the ROW. Therefore, it was recommended to proceed with a new stormwater pond in the southeast quadrant. The SWM pond will be re-assessed to determine if it will meet the City's criteria. The recommended retention target for the public and private development sites within the southeast quadrant remains 15 mm over impermeable and permeable areas.

1.3.2 Black Creek Flood Event Evaluation

TRCA updated the hydraulic analysis and floodplain mapping for Black Creek (2020) north of Hwy. 407 which included the spill analysis between Hwy. 400 and Applewood Cres. by Pennsylvania Ave. TRCA's MikeFlood/2D model showed the flow from the Regional storm event will result in a spill and will be conveyed south within the exiting ditch along the east side Highway 400. The new floodplain within the VMC northwest and southwest quadrants result mainly from the Black Creek spill which will occur under the 350 year and Regional storm events. The spill and resulting floodplain do not occur under the 2 year through to 100 year storm events. Figures 1-4 and 1-5 illustrate the flow path of the spill under the 350 year and Regional storm events, from the Black Creek channel east of Highway 400 by Pennsylvania Ave.

Figure 1-4 Extent of Floodplain through the VMC Northwest and Southwest Quadrants under the Regional Event

Figure 1-5 Flow path of Black Creek Spill under the 350 year and Regional storm events

Given the newly identified floodplain in the Northwest and Southwest quadrants is due to the result of the Black Creek spill (under the 350 year and Regional storm events) that occurred at the 90 degree bend east of Highway 400 and North of Pennsylvania Avenue. TRCA has recognized that this area requires special consideration for development/redevelopment. TRCA has noted the following:

> ***Properties in this area may be within the floodplain, or within a floodplain spill, and the corresponding sections of the Living City Policies may apply, which may require mitigation or site-specific flood proofing. TRCA recommends a comprehensive mitigation option at the spill point. For clarity on mitigation options, and to obtain model information, or minimum floodproofing elevation requirements, please contact TRCA for further information.***

Additional flow data from the VMC northwest and southwest quadrants should be considered for future hydraulic assessments and/or a spill mitigation study conducted by TRCA and/or City of Vaughan for the Black Creek spill.

2.0 Stormwater Servicing Design Criteria

2.1 Quality and Quantity Control Criteria

The design criteria for this study area are in accordance with the City of Vaughan's Design Criteria, Toronto and Region Conservation Authority (TRCA) standards, and the Ontario Ministry of Environment Stormwater Management Planning and Design Manual (March 2003). The stormwater control criteria were also established in several previously approved studies including the VMC Municipal Servicing Municipal Class Environmental Assessment Master Plan (MSMP) prepared by TMIG, 2012, the Black Creek Renewal Municipal Class Environmental Assessment (BCR EA), prepared by TMIG, 2018, Black Creek Stormwater Optimization Municipal Class Environmental Assessment Master Plan (BCSOMP) prepared by AECOM. 2012), Hydrologic Analysis of the Black Creek Sub watershed (HABC) prepared by Ander 1986. Table 2-1 compares the SWM criteria for On-site/development sites, public right of ways and end of pipe facility as identified in the 2012 Municipal Servicing Master Plan, 2018 Black Creek Renewal EA and the current VMC Functional Servicing Strategy Report.

Table 2-1: Comparison of SWM Strategy Criteria:

SWM	2012 MSMP Applicable to the 4 VMC quadrants	2018 BCR EA – *Alternative SWM Strategy applicable to SEQ Only*	2024 VMC FSSR
On-site/Development Sites:			
Water Quality	None – to be provided via end of pipe facility	For SEQ: Enhanced (80% TSS removal)	For NWQ, NEQ, & SWQ: None – to be provided via end of pipe facility. For SEQ: Interim scenario: Until the SWM facility is implemented, Enhanced treatment (80% TSS removal) required Ultimate scenario: None – to be provided via end of pipe facility
Water Quantity/Peak Flow	Controlled to 2 year post development. (100 yr less 2 yr runoff stored on-site)	Controlled to 2 year post development. (100 yr less 2 yr runoff stored on-site)	For NWQ, NEQ, & SWQ Controlled to 2 year post development. (100 yr less 2 yr runoff stored on-site) For SEQ: Controlled to 2 year post development. (100 yr less 2 yr runoff stored on-site)
Retention Volume (i.e. Water Balance)	15mm for roof/building footprint and landscape areas only	For SEQ: 15mm for the entire site	For NWQ, NEQ, & SWQ: 15mm for roof/building footprint and landscape areas only For SEQ: 15mm for the entire site
City Right of Ways:			

SWM	2012 MSMP Applicable to the 4 VMC quadrants	2018 BCR EA – *Alternative SWM Strategy applicable to SEQ Only*	2024 VMC FSSR
Water Quality	None - to be provided via end of pipe facility	For SEQ: Via Retention Volume, see below.	For NWQ, NEQ, & SWQ: None – to be provided via end of pipe facility. For SEQ: Interim scenario*: Basic -Enhanced (60%-80% TSS removal) Ultimate scenario**: None – to be provided via end of pipe facility
Water Quantity/Peak Flow	None - to be provided via end of pipe facility	For SEQ: Via Retention Volume, see below.	For NWQ, NEQ, & SWQ: None. For SEQ: None.
Retention Volume (i.e. Water Balance)	None.	For SEQ: 15mm	For NWQ, NEQ, & SWQ: None. For SEQ: None.
End of Pipe Facility			
Water Quality	Enhanced (80% TSS removal)	n/a since the pond was deleted for the BCR EA. The 15mm on-site retention on RoWs is in lieu of the SEQ SWM facility.	For NWQ, NEQ, & SWQ: Enhanced (80% TSS removal) For SEQ: Enhanced (80% TSS removal)
Water Quantity/Peak Flow	Humber River Unit Flow Rates		For NWQ, NEQ, & SWQ: Humber River Unit Flow Rates For SEQ: Humber River Unit Flow Rates
Retention Volume	None.		Based on subwatershed area and unit release rates
Erosion Control	25mm storm – 48 hours		25mm storm – 48 hours

Notes:
Interim Scenario - Water quality for public ROWs: until the proposed SWM facility for the southeast quadrant is constructed or a more feasible SWM strategy for the VMC SEQ is approved, water quality control is required. 60-80% TSS removal is required pending the proposed treatment train approach.

*****Ultimate Scenario – Water quality for public ROWs***: The design of the proposed SEQ SWM pond will include quality control for the tributary area. Therefore, once the proposed SEQ SWM pond is constructed, water quality control within the public right of way will no longer be required.

Table 2-2 describes the stormwater management design criteria used in the VMC study area. The table provides details on the quality, erosion and quantity controls used.

Table 2-2: VMC Stormwater Management Design Criteria

Control Measure	Criteria
Quality Control	Enhanced/Level 1 Protection (80% TSS removal) for end of pipe solutions

<table>
<tr><th>Control Measure</th><th colspan="2">Criteria</th></tr>
<tr><td>Erosion Control</td><td colspan="2">Erosion and sediment control measures will be implemented in accordance with the standards of the City of Vaughan. The TRCA has identified that 25mm should be captured for 48 hours for erosion control where SWM ponds are provided.</td></tr>
<tr><td>Water Balance</td><td colspan="2">The on-site runoff retention is 15mm and applies to NW, SW, NE quadrants and is determined for building footprint and landscape of site developments. For the SE quadrant, the 15mm applies over the entire site development. This criterion does not apply to major parks, open spaces, or road allowances. This criterion came into effect in 2012.</td></tr>
<tr><td rowspan="6">Quantity Control</td><td>Right-of-Way (ROW), Open Parks</td><td>Will be uncontrolled unless a previous SWM Report on the study area indicates otherwise</td></tr>
<tr><td>Low density residential</td><td>Will be controlled downstream by a SWM pond.</td></tr>
<tr><td rowspan="2">Industrial, Commercial, Institutional (ICI), High density residential</td><td>For existing conditions, will be controlled to 180 L/s/ha unless a previous SWM Report on the study area indicates otherwise</td></tr>
<tr><td>
Proposed conditions will be controlled to 180L/s/ha for areas that do not have surcharging downstream from the proposed developments. (180 L/s/ha control meets the criteria for ICI areas with no basement, residential area 5 yr Stormwater no surcharging, 100 yr Stormwater freeboard > 1.8 m, 100 yr Overland depth < 0.15 m for Arterial and <0.3 m for local and collector road)
If there are surcharging pipes downstream from the proposed developments the 2 year post development control was applied. (2 yr post plus 15 mm retention control meet the criteria for ICI areas with no basement, residential area 5 yr Stormwater no surcharging, 100 yr Stormwater freeboard >1.8 m, 100 yr Overland depth < 0.15 m for Arterial and < 0.3 m for local and collector road)
If surcharging is still present downstream from pipes than resizing will be proposed. Solutions within the Secondary Plan Area will be proposed downstream from the development except for sewers that are not affected by future developments. (2 yr post plus 15 mm retention control has not met the criteria for ICI areas with no basement, residential areas, 5 yr minor no surcharging 100 yr minor freeboard > 1.8 m, 100 yr major < 0.15 m for Arterial and < 0.3 m for local and collector road).
</td></tr>
<tr><td>Development Application</td><td>Will be controlled according to the quantity control specified in the corresponding SWM Report. (To existing release rate of 180 l/s/ha or 2 year post with 80% impervious as current quantity control criteria)</td></tr>
<tr><td>Onsite Storage</td><td>The development sites should apply the on-site quantity control criterion of controlling 2-100 year post development flow to the 2 year post flow rate with a maximum of 80% imperviousness as per the MSMP (2012) and BCR EA (2018)</td></tr>
</table>

2.1.1 Development Blocks

Quantity control is required for all development blocks within the four quadrants of the VMC. Development blocks include privately owned site block developments and public lands excluding right of ways, open space and major parks. The quantity control requirement for development blocks is to control runoff from the redevelopment of a site to the 2-year post development flow rate (with a maximum of 80% imperviousness) for storm events up to and including the 100-year storm event.

All development blocks are assumed to self-contain stormwater runoff where no overland flow leaves the block. The specific storage requirement and flow control measures for each development block will be determined at the site plan development stage. Development blocks within each quadrant have been grouped based on land use and storage volumes determined to achieve the required on-site quantity control flow rates.

2.1.2 Stormwater Management Facilities

In addition to on-site controls within the development blocks, end of pipe facilities will also be required to meet quantity control targets. The existing ponds within the northwest, northeast and southwest quadrants will be retrofitted to meet the Table 2-2 criteria. Quantity control within the pond retrofits will provide flood control on a watershed scale. For the southeast quadrant, the VMC Municipal Servicing Master Plan (TMIG, 2012) recommended a new pond be implemented. Subsequently the Black Creek Renewal Environmental Assessment (TMIG, 2018) study provided an alternative SWM strategy that proposed the deletion of the proposed SWM pond. Based on the finding of the LID feasibility investigation for the VMC southeast quadrant for this FSSR, it was determined that LID solutions would not function adequately to meet the intended design recommendation of the BCR SWM strategy. It is also noted that there are site constraints for the pond block resulting in challenges to meeting the TRCA Humber River unit flow rate targets. Further analysis of the MSMP (TMIG 2012) recommendation of a new SWM facility for the VMC southeast quadrant was conducted as part of this study and detailed in Section 4.6. These findings of allowable release rates from a potential SWM facility for the southeast quadrant were shared with the TRCA and will require TRCA approval to establish as acceptable level of quantity control for the SE quadrant including Expansion Area A.

The quantity control criterion for the pond retrofit design within the northwest and southwest quadrants is the control of flow for the 2 year through to and including the 100-year storm events to the TRCA's Humber River unit flow rates for the Black Creek subwatershed. Although the quantity control criterion of meeting the Humber River Unit flow rate, the Stormwater Management Report – Edgeley Pond and Park (WSP, 2021) identifies that the quantity control through the northeast quadrant retrofit SWM facility is post to pre-development flow rates for the 2 year through to the 100 year storm events, which was approved by TRCA. For the southeast quadrant, the allowable release rate is to control post-development flow from the 2 year through to 100 year storms to the pre-development greenfield conditions, pending approval from TRCA. Details regarding the allowable release rate for the proposed southeast quadrant pond are provided in Section 4.6

2.1.3 Further Notes on Quantity Control- ROW

It is noted that quantity control for ROWs within the VMC will be left uncontrolled. This is consistent with the 2012 MSMP . However, it should be noted that the BCR (2018) recommended 15mm on-site retention via (infiltration) LIDs for ROWs within the SE quadrant, which is in lieu of the proposed SE quadrant SWM pond recommended in the MSMP (2012). With the geotechnical investigation for the FSSR, high groundwater within the SE quadrant was determined. Thus, the (infiltration) LID would not be feasible and the 15mm on-site retention could not be achieved. Until a new SWM strategy is established for the SE quadrant, quality control for ROWs within the SE quadrant should be provided as a minimum and can be identified as an interim approach. Although a proposed SWM facility is assessed in this study for the southeast quadrant, the City will conduct a separate study to assess various options for stormwater management in the southeast quadrant to ensure a feasible SWM strategy for the SE quadrant is identified and includes SWM solutions for on-site, ROWs, and end-of-pipe treatment.

2.2 Design Storm

2.2.1 Dual Drainage Model Design Storm

The model simulates the performance of the storm sewer under the City's 5- and 100-year design storms. The design storms are three-hour storms with a time-to-peak ratio of 0.33 (Chicago-type storm) over 7-minute intervals. Table 2-3 outlines the rainfall intensities for both the 5- and 100-year design storms.

Table 2-3: Rainfall Intensity for the 5- and 100-Year Design Storms

Time (hh:mm)	Rain Intensity (mm/hr)	
	5-Year Storm	100-Year Storm
7:00	0.0	0.0
7:07	3.9	6.0
7:14	4.4	6.9
7:21	5.3	8.2
7:28	6.5	10.2
7:35	8.6	13.8
7:42	13.2	21.6
7:49	32.3	55.0
7:56	137.2	247.8
8:03	42.5	73.2
8:10	22.1	36.9
8:17	15.0	24.7
8:24	11.5	18.6
8:31	9.3	15.0
8:38	7.9	12.6
8:45	6.9	10.9
8:52	6.1	9.6
8:59	5.5	8.6
9:06	5.0	7.8
9:13	4.6	7.2
9:20	4.3	6.6
9:27	4.0	6.2

Time (hh:mm)	Rain Intensity (mm/hr)	
	5-Year Storm	100-Year Storm
9:34	3.7	5.8
9:41	3.5	5.4
9:48	3.3	5.1
9:55	3.4	5.3
10:02	0.0	0.0

3.0 Modelling Methodology

3.1 Stormwater Pond Modelling Methodology

The methodology for modelling the stormwater pond requirements is based on the use of Visual Otthymo (VO) for SWM. The procedure for setting up the model consists of the following:

- Analyze the Digital Elevation Model (DEM) data of the area.
- Create a VO model based on existing and proposed drainage patterns and assumptions made.
- Existing Stormwater controls and pond volumes are added to the model based on available conditions information.
- Existing and Proposed Land uses are modelled to assess the impact.
- The appropriate design storm is applied based on watershed requirements

Output from the model provides stormwater storage and discharge rate information that is then used to compare the operating assumptions to the required discharge rates. Storage volume and discharge rate curves are modified to match the target release rate(s).

3.2 Dual Drainage Modelling Methodology

Dual drainage modelling requires both surface and piping network information to allow for the evaluation of storm sewer performance and the condition that occur when the major system (road surface areas) are conveying surface runoff. The modelling software used for this task is InfoWorks and the following describes the procedure for setup:

- Delineate drainage area into subcatchments
- Define minor and major systems in the model.
- Confirm model completeness and close/correct data gaps
- Input parameters, controls, and boundary conditions
- Model based on 5 year and 100 year design storm events

The output of the model provides results for the two design storm conditions, the first being the 5 year storm event and confirmation that the minor systems meets the design criteria. The second design storm condition is the 100 year storm event were the performance of the major system meets the design criteria.

Identify the minor and major system design criteria for the 5 year and 100 year storm events in a new paragraph.

3.2.1 Subcatchment Delineation

Delineation includes defining flow paths and boundaries of subcatchments. For existing condition, the topographic-based approach was adopted in which topographic information (DEM) was used to define subcatchment boundaries for the existing land-uses. The proposed development areas were discretized based on property boundaries using the parcel-based approach to facilitate controlled release rates from development areas.

4.0 Stormwater Management Pond Modelling

4.1 Objective

This section outlines the approach and parameters used to assess watershed conditions for stormwater management using the Visual Otthymo (VO) model. The results of the model are then used to assess outlet control conditions and how outlet flow rates compare to required criteria.

The objective of this section is to assess the difference between existing watershed runoff generation and proposed watershed runoff generation with future land uses and control rate applied to study area. This analysis is used to determine if ponds need to be sized to accommodate additional flow under the post development conditions.

Based on the existing and proposed outlet flow rates, storage requirements were analyzed to determine if the pond has sufficient capacity to meet future post development conditions. If so, then no recommendations are provided. If the pond does exhibit to have capacity constraints, then recommendations are provided to meet requirements. Ponds where post-development outlet flow rates exceed TRCA requirements, these differences are noted and post development conditions are targeted to be at or below the predevelopment condition to demonstrate a net benefit to the watershed.

4.2 Stormwater Outlet Scenarios

The following defines the scenarios evaluated for stormwater outlet controls:

- Outlet control target- Based on TRCA criteria and design parameters to meet service level objectives and identify the maximum condition for the analysis
- Existing condition- Based on current (2021) land use conditions and used to model outlet and pond storage quantities which are then compared to the results of the future condition
- Future Condition- Based on future land use conditions at ultimate buildout and used to model outlet and pond storage quantities to assess any mitigation strategies

4.3 Catchment Scenarios

The VMC study area is divided into four quadrants based on the existing catchment area delineations. A review of potential catchment scenarios and alternatives was considered and reviewed in reference to the analysis completed for the MSMP (TMIG 2012). There is confirmed to be no changes to the catchment areas as identified in the existing and future condition scenarios and that the proposed areas presented in this report are preferred. Proposed drainage areas and outlets are presented in Figure 4-1.

4.4 Current and Future Land Use Modelling Designation

The defined catchment areas and respective NHYD areas are presented in Figure 4-2 and Figure 4-3 for the existing and proposed conditions, respectively. These defined catchment areas were used to determine the impact of future land use changes and mitigating measures that may be needed to meet the defined design criteria and performance constraints.

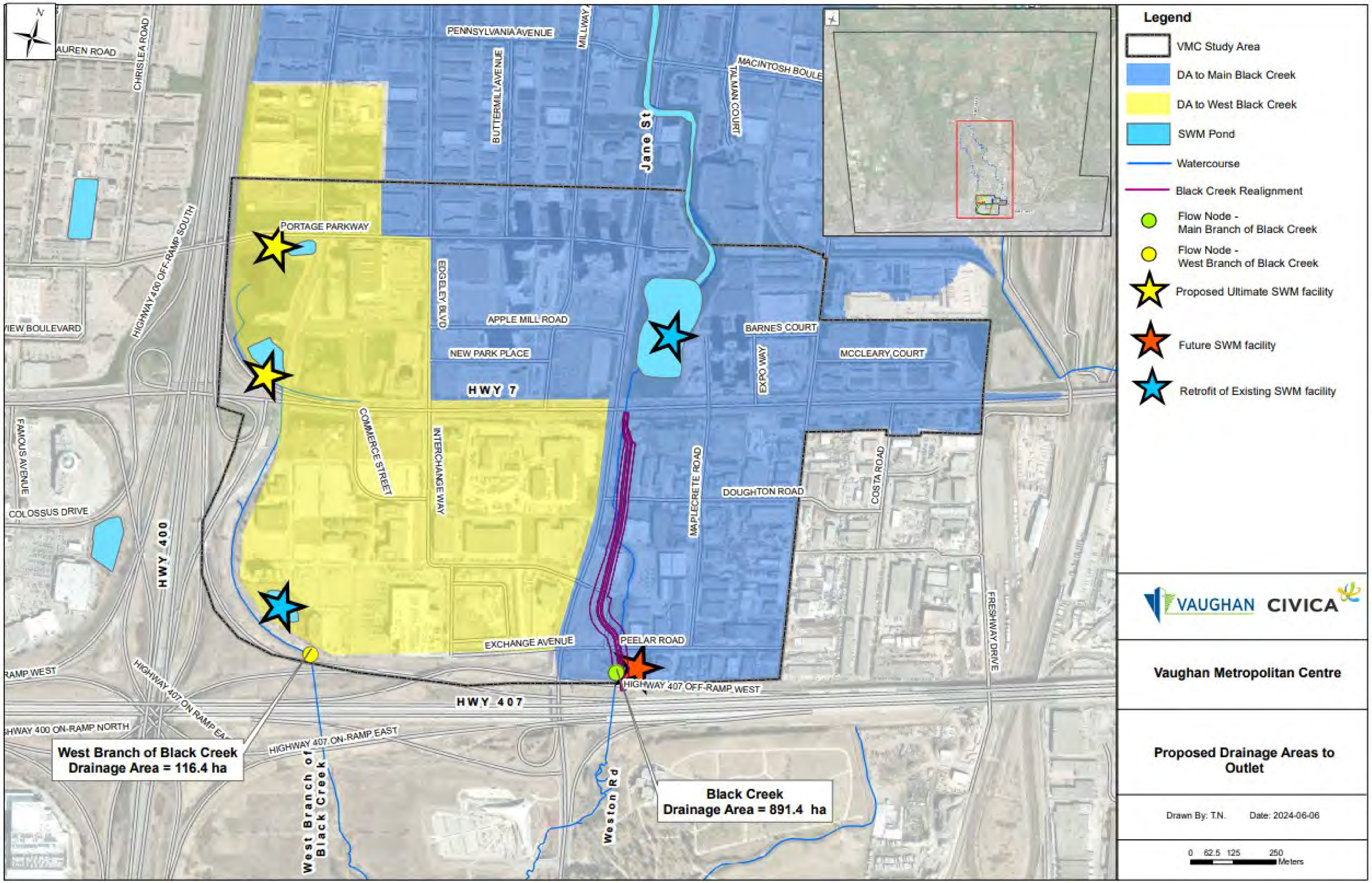

Figure 4-1: Proposed Drainage Areas to Outlets

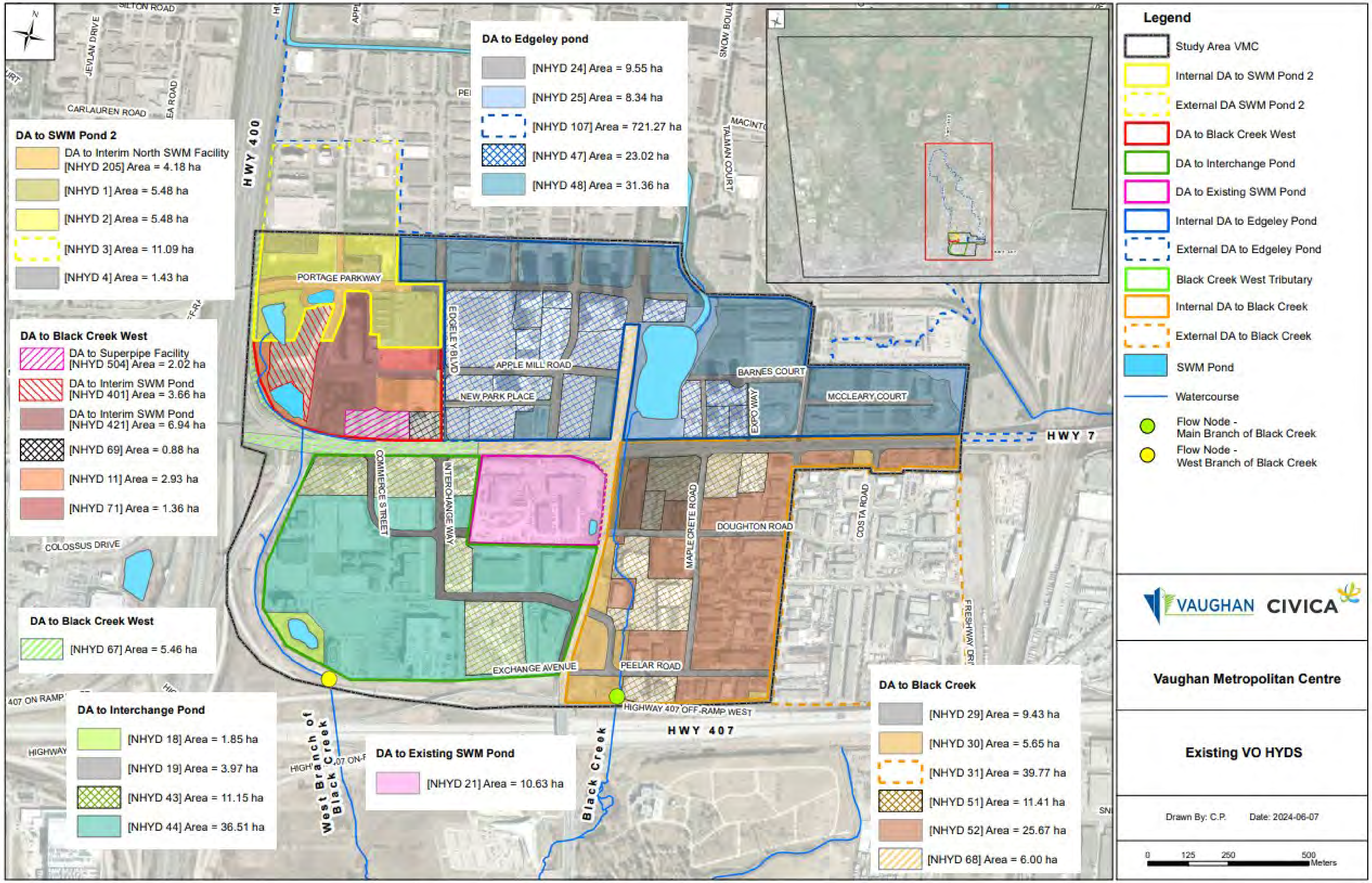

Figure 4-2: Existing VO HYDS

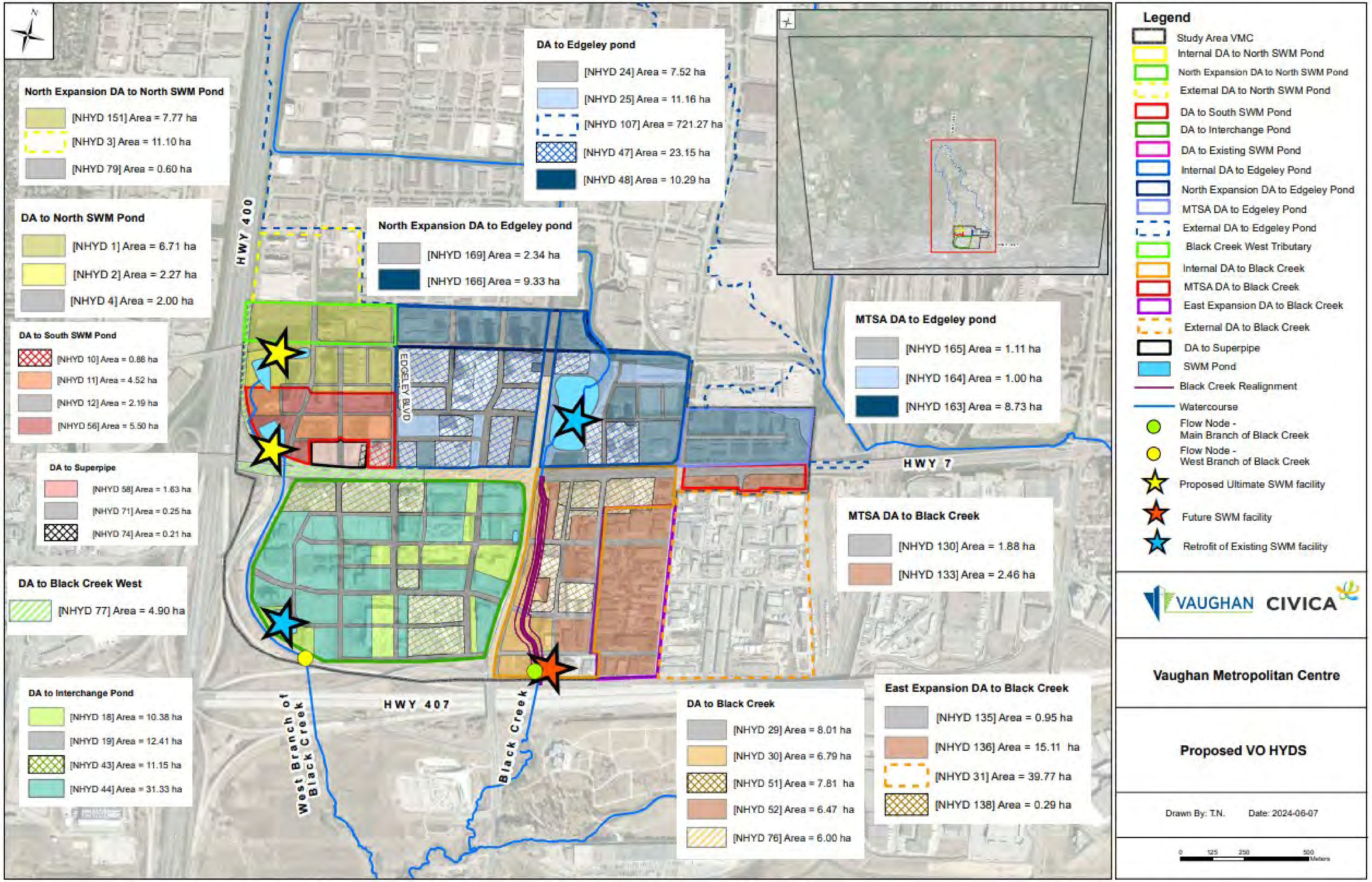

Figure 4-3: Proposed VO HYDS

4.5 Assumptions

The following parameter assumptions were made for the model development:

- A curve number of 79 is utilized based on Hydrologic Soil Group C/D, which corresponds to clay soils with low permeability coefficients.
- For SE Quadrant curve number of 80 was used from TRCA hydrology model.
- The peak flow generated by storms up to and including the 100-year return period event is to be attenuated to the following:
  - allowable release rate of 180L/s/ha for existing ICI development blocks;
  - 2-year and 100-year post-development flow rate control, using the 6 and 12 hour AES storm, for proposed development blocks;
- On-site retention requirements of 15mm over building footprint and 10mm over landscape areas was accounted for in the model by calculating a weighted impervious value based on 80 percent level of imperviousness with the 100 year storm less the 2 year excess runoff stored on site.
  - The proposed areas had on-site control with 61% imperviousness for the 5-Yr and 100-Yr design storms
- the impervious depression storage (DPSI) of 1 mm for developed areas (it is assumed that this value is typically 1.0 mm for roads, driveway, and roofs, and an additional 5 mm for initial abstraction for pervious area)

4.5.1 Existing Development Blocks and 180 L/s/ha Release Rate

This section provided further clarification on the release rates for existing development blocks related to the peak flow release rate of 180 l/s/ha.

- It is noted that on-Site Detention of the Hydrological Analysis of the Black Creek Watershed and the Resolution of the Post Development Stormwater Runoff Controls and Facilities for the Vaughan/400 Industrial Park report, prepared by Ander Engineering, revised January 1986 (Ander, 1986) indicated that flows up to the 100 year storm event should be controlled to the 2 year flow with storage kept on-site. The study area for the 1986 Ander report included the northern quadrants of the VMC. The 1986 Ander report was provided to Civica as part of the background info.
- Also, Section 4.3 Storm Drainage Infrastructure and Black Creek (for Existing Infrastructure) of the Municipal Servicing Class Environmental Assessment Master Plan (MSMP) prepared by TMIG in 2012 also indicated that existing individual lots provide on-site control to restrict the peak flow to the 2 year post development runoff rate with on-site storage.

Based on the above, the release rate from existing development sites within the VMC, for at least the sites north of Hwy. 7 should be controlled to the 2 year post. However, for the purpose of this VMC FSSR, the 180L/s/ha. on-site quantity control criterion is acceptable for existing site developments outside and within the VMC and expansion boundaries since the same target rate was applied to the other Integrated Urban Water Mater Plan study areas. The majority of existing development sites within the VMC are/were of industrial land-use.

Note, as the VMC and expansion areas undergo redevelopment, the 180L/s/ha. target rate can continue to be applied to the external existing industrial sites. Thus, the 180L/s/ha. control rate for the existing industrial lots outside the VMC area remains applicable.

4.5.2 TRCA Quantity Control Release Rate Targets

The proposed stormwater management controls from the TRCA Stormwater Management Criteria(2012) are based on the Black Creek, which is a sub-watershed to the Humber River watershed. According to TRCA's Humber River Hydrology Update, the Stormwater Management Quantity Control Release Rate for the Black Creek is the Humber River River Unit Flow Rate, specifically based on, Equation G,Subbasin 46, consistent with TRCA's Stormwater Management Criteria (August 2012).

To bring the southeast quadrant outlet release rates to meet the TRCA's Black Creek subwatershed quantity control criterion (i.e. Humber River unit flow equations), a number of scenarios were assessed based on the changing conditions related to increased service area and the limited applicability of right of way LID measures and on-site treatment and storage options within development sites.

Although the original VMC southeast quadrant was 31.9 ha., the actual drainage area to the proposed SWM pond excludes Jane St. and Hwy. 7, resulting in a 29.1 ha. The actual drainage area of 29.1 ha. was modelled and the results of that configuration are in Table 4-13. Subsequently, the City requested an evaluation of the addition of Expansion Area A (16.4 ha) and a portion of the MTSA area (4.34 ha), outside the VMC boundary limits. This section provides the results of these areas and how they impact servicing capacity of the proposed SWM pond identified in the 2012 Municipal Servicing Master Plan (MSMP) prepared by TMIG.

4.5.3 Proposed Storm Pond Configuration

The 2012 MSMP report provided recommendations to proceed with a stormwater management pond based on the then approved VMC servicing area of 31.9 ha. The required and provided pond storage of the proposed southeast quadrant SWM pond as identified in the 2012 MSMP are presented in Table 4-1.

Table 4-1 SE Quadrant Proposed Pond Volumes

Proposed SWM Pond Storage	Required Storage Volume per 2012 MSMP Proposed Design	Provided/Available Storage Volume per 2012 MSMP Proposed Design
Permanent Pool	5,675	7,769
Active Storage	16,325	20,000
Total Storage Volume	22,000	27,769

4.5.4 Stormwater Servicing Area

The service area of the VMC southeast quadrant has increased with the addition of Expansion Area A and inclusion of a portion of the MTSA east of Creditstone Road, several scenarios were developed to consider the SWM capacity requirements and the potential impact to the Black Creek sub-watershed quantity control criterion. Table 4-2, below provides the target release rates based on two service areas to the potential future southeast quadrant SWM pond. The first service area considered is comprised of the original VMC southeast quadrant plus Expansion Area A, which equates to 45.43 ha. The second service area considered is the same as the first service area plus the portion of the MTSA 56 south of Hwy 7 for a total drainage area of 49.77 ha Although tributary to the Black Creek, for this Study, the drainage area east of Creditstone is excluded from the assessment of the proposed southeast quadrant SWM pond and is defined as external drainage area only.

Table 4-2 TRCA Release Rates for SE Quadrant

Return Period	TRCA' Black Creek Sub-Watershed Quantity Control Criterion (Humber River Unit Flow – Equation G/Sub-basin 46)	Target Outflow (m^3/s)	
		Service Area 1: VMC southeast quadrant as per the Secondary Plan plus Expansion Area A (45.43 ha.)	Service 2: Scenario 1 plus MTSA 56 south of Highway 7. (49.77 ha.)
2-year	Q = 7.745 - 0.762ln(A)	0.22	0.24
5-year	Q = 11.468 - 1.123ln(A)	0.33	0.35
10-year	Q = 13.877 - 1.342ln(A)	0.4	0.43
25-year	Q = 17.381 - 1.690ln(A)	0.5	0.54
50-year	Q = 20.164 - 1.973ln(A)	0.57	0.62
100-year	Q = 22.973 - 2.256ln(A)	0.65	0.7

4.5.5 Scenarios Considered

Four scenarios were developed to consider the impacts of the added Expansion Area A and a portion of MTSA 56 to the servicing area to the 2012 proposed VMC southeast quadrant SWM pond design. Table 4-3 identifies the various service areas to the 2012 proposed SWM pond, on-site controls/uncontrolled for development sites and type of quantity control criterion for the proposed SWM pond. The greenfield control is based on the assumptions presented in Table 4-4 and were suggested by TRCA for an alternate target flow rate to the Humber River Unit Flow Rate. The review of the greenfield control assessment is yet to be formally approved by TRCA.

Table 4-3 Discharge Control Scenarios

Scenarios	Service Area to Proposed SEQ SWM Pond	Area (ha)	On-Site Control for Development Sites	SWM Pond Quantity Control Criterion
1	VMC SE quad plus Expansion Area A	45.43	2 yr – 100 yr flow controlled to 2 year post development	Humber Unit Flow
2	VMC SE quad Expansion Area A	45.43	2 yr – 100 yr flow controlled to 2 year post development	Humber Unit Flow
	MTSA Area	4.34	Uncontrolled	
3	VMC SE quad + Expansion Area A	45.43	Controlled to 2 year post development	Pre-greenfield flow 100 yr event
4	VMC SE quad Expansion Area A	45.43	Controlled to 2 year post development	Pre-greenfield flow 100 yr event
	MTSA Area	4.34	Uncontrolled	

Table 4-4 Pre-Development/Greenfield Release Rate

Return Period	Pre-development/ Greenfield	Pond Target Outflow, Q (m^3/s)	
		VMC SE quad Expansion Area A	VMC SE quad Expansion Area A + MTSA
2-year	CN = 80 Tp = 1.41 hr / 1.56 hr	0.39	0.40
5-year		0.66	0.67
10-year		0.87	0.88
25-year		1.14	1.16
50-year		1.36	1.38
100-year		1.58	1.61

4.5.6 Scenario 1

Scenario 1 includes the current VMC boundary area plus Expansion Area A, on-site controls for development sites and the quantity control criteria for the proposed SWM pond is the Humber River Unit Flow Rate. The results of this alternative are presented in Table 4-5. Based on the results the required storage exceeds the available volume of 20,000 m^3 by 589 m^3 (3% of available storage of 2012 pond design).

Table 4-5 Scenario 1 Outflow and Storage Results

Return Period	Outflow (m^3/s)		Required Storage (m^3)
	Target	Actual	
2-year	0.22	0.22	8,723
5-year	0.33	0.32	11,794
10-year	0.40	0.39	13,893
25-year	0.50	0.49	16,558
50-year	0.57	0.57	18,575
100-year	0.65	0.64	***20,589****

Note: * Required storage exceeded by 589m^3/3% of available storage volume.

4.5.7 Scenario 2

Scenario 2 includes the current VMC boundary area plus Expansion Area A with on-site controls for development sites and portion of MTSA 56 south of Hwy. 7 (uncontrolled). The quantity control criteria for the proposed SWM pond is Humber River Unit Flow Rate. The results of this scenario are presented in Table 4-6. Based on the results the required storage exceeds the available volume of 20,000m^3 by 2,786m^3 (14% of available storage of 2012 pond design).

Table 4-6 Scenario 2 Outflow and Storage Results

Return Period	Outflow (m^3/s)		Required Storage (m^3)
	Target	Actual	
2-year	0.24	0.25	9,664
5-year	0.35	0.36	13,074

Return Period	Outflow (m^3/s)		Required Storage (m^3)
	Target	Actual	
10-year	0.43	0.45	15,390
25-year	0.54	0.56	18,332
50-year	0.62	0.64	20,560
100-year	0.70	0.73	22,786*

Note: * Required storage exceeded by 2,786m^3/14% of available storage volume.

4.5.8 Scenario 3

Scenario 3 includes the current VMC boundary area plus Expansion Area A, on-site controls for development sites and the quantity control criteria for the proposed SWM pond flows based on Greenfield condition. The results of this scenario are presented in Table 4-7. Based on the results the required storage is less than what will be provided for the 2012 SWM pond design and meets the predevelopment greenfield condition.

Table 4-7 Scenario 3 Outflow and Storage Results

Return Period	Outflow (m^3/s)		Required Storage (m^3)
	Target	Actual	
2-year	0.39	0.39	7,520
5-year	0.66	0.64	9,392
10-year	0.87	0.81	10,702
25-year	1.14	1.03	12,370
50-year	1.36	1.20	13,627
100-year	1.58	1.37	14,870

4.5.9 Scenario 4

Scenario 4 includes the current VMC boundary area plus Expansion Area A with on-site controls for development sites and portion of MTSA 56 south of Hwy. 7 (uncontrolled). The quantity control criteria for the proposed SWM pond is flows based on Greenfield condition. The results of this scenario are presented in Table 4-8. Based on the results the required storage is less than what will be provided for the 2012 SWM pond design and meets the predevelopment greenfield condition.

Table 4-8 Scenario 4 Outflow and Storage Results

Return Period	Outflow (m^3/s)		Required Storage (m^3)
	Target	Actual	
2-year	0.40	0.40	8,563
5-year	0.67	0.67	10,830
10-year	0.88	0.88	12,285
25-year	1.16	1.16	14,007
50-year	1.38	1.38	15,284
100-year	1.61	1.61	16,507

4.5.10 Scenario 5 –Sensitivity Analysis: Between Scenarios 2 and 4

Scenarios 2 and 4 were evaluated as part of a sensitivity analysis to assess what the actual release rate would be with the full storage capacity of the 2012 proposed SWM pond design under the 100 yr storm event (Scenario 5). Table 4-9 summarizes the target release rate based on the Humber River Unit Flow Rate, Greenfield Condition flow rate and the expected release rates achievable by utilizing the available capacity of the 2012 proposed SWM pond design. This data provides a sense of how the fully utilized SWM pond capacity would perform, what the actual flow rates are and how they compare to the two quantity control criteria for the proposed SWM pond.

Table 4-9 Sensitivity Analysis of Scenario 2 and 4 and Actual Flow Rate Utilizing Storage Capacity of 2012 Proposed SWM Pond Design

Return Period	Scenario 2: Humber River Unit Flow Rate		Scenario 4: Greenfield Condition		Scenario 5: Full Utilization of 2012 SWM Pond Design Storage. (20,000m^{3})	
	Target Outflow (m^3/s)	Required Storage (m^3)	Target Outflow (m^3/s)	Required Storage (m^3)	Target Outflow (m^3/s)	Required Storage (m^3)
2-year	0.24	9,664	0.40	8,563	0.31	9,146
5-year	0.35	13,074	0.67	10,830	0.50	11,996
10-year	0.43	15,390	0.88	12,285	0.63	13,919
25-year	0.54	18,332	1.16	14,007	0.81	16,332
50-year	0.62	20,560	1.38	15,284	0.94	18,146
100-year	0.70	22,786	1.61	16,507	1.07	19,959

4.5.11 Evaluation and Recommendation

Table 4-10 provides a summary of the results for Scenarios (or Alternative) 1 to 5 under the 100 yr storm event. The location and footprint for the2012 proposed SWM pond design is limited and will require the purchase of existing properties. At the detailed design stage for the proposed southeast quadrant SWM pond, it is recommended that site optimization be undertaken to balance storage capacity and adjustments to the various design parameters used in the above analysis to avoid the need for additional lands. Also, quantity control criterion for the proposed SWM pond may need to be reassessed to balance storage and available lands for the pond.

Therefore, it is recommended that Scenario 5 be considered for the quantity control criterion of the proposed SWM pond. The quantity control criterion for Scenario 5 includes target flow rates for the 2 year through to 100 year storm events between the Humber River Unit Flow Rate (Scenario 2) and the Greenfield Condition (Scenario 4) while maintaining required storage equivalent to the maximum capacity of the 2012 proposed SWM pond design. The servicing area for Scenario 5 includes the current VMC boundary area, Expansion Area A and MTSA 56 south of Hwy. 7. Development sites will also be required to control development site flows to the 2 year post-development flow rate within the current VMC boundary area and Expansion Area A.

Table 4-10 Summary Storage Required for 100 yr Event Outlet Control

Scenario	Service Area			On-site Control of Development Sites: 2 yr = 2 year Post Development Or UC = Uncontrolled			Target Q (m^3/s)	Actual Q (m^3/s)	Required Storage (m^3)
	VMC	Expansion Area A	MTSA	VMC	Expansion Area A	MTSA			
1	Y	Y	N	Y	Y	n/a	0.65	0.64	20,589
2	Y	Y	Y	Y	Y	UC	0.70	0.73	22,786
3	Y	Y	N	Y	Y	n/a	1.58	1.37	14,870
4	Y	Y	Y	Y	Y	UC	1.61	1.61	16,507
5	Y	Y	Y	Y	Y	UC	0.70 to 1.61	1.07	19,959

4.6 Scenario Results

The results of the modelling outputs are summarized and compared to target criteria in Table 4-11. The information in the table provides the existing available SWM pond storage capacity, the target release rates based on TRCA Humber Watershed equations, and the outflow rate and storage requirements for each of the 6 hr and 12 hr AES design storm. The bolded values in each of the two scenarios represent the more conservate requirement.

Table 4-11: Proposed SWM Facility Results

Quadrant	Proposed Pond and Location	Quantity Control Criterion	Storm Return Period	Allowable Release Rate (m3/s)	Storage Provided (ha.m)	6-hour AES (Bloor, TRCA) Outflow (m^3/s)	6-hour AES (Bloor, TRCA) Max. Storage Used (ha.m)	12-hour AES (Bloor, TRCA) Outflow (m^3/s)	12-hour AES (Bloor, TRCA) Max. Storage Used (ha.m)
Northwest (NW)	North SWM Facility - SW of Portage Parkway and Applewood Crescent (Servicing Area 30.4 ha)	Humber River Unit Flow	2 Yr	0.157	1.2536	0.182	0.6139	**0.201**	**0.6647**
			5 Yr	0.232	1.2536	0.264	0.8377	**0.281**	**0.8798**
			10 Yr	0.283	1.2536	0.325	0.9892	**0.339**	**1.0246**
			25 yr	0.353	1.2536	0.405	1.1785	**0.415**	**1.2035**
			50 Yr	0.409	1.2536	0.466	1.3204	**0.473**	**1.3369**
			100 Yr	0.465	1.2536	0.526	1.4610	**0.531**	**1.4721**
	South SWM Facility - NW of HWY 7 and Applewood Crescent (Servicing Area 13.1 ha)	Humber River Unit Flow	2 Yr	0.076	0.2682	0.115	0.1718	**0.124**	**0.1800**
			5 Yr	0.112	0.2682	0.176	0.2384	**0.178**	**0.2413**
			10 Yr	0.136	0.2682	**0.226**	**0.2841**	0.224	0.2827
			25 yr	0.171	0.2682	**0.289**	**0.3409**	0.282	0.3340
			50 Yr	0.198	0.2682	**0.338**	**0.3840**	0.325	0.3724
			100 Yr	0.225	0.2682	**0.386**	**0.4270**	0.369	0.4119
	Commerce Superpipe - Commerce north of HWY 7 (Servicing Area 2.1 ha)	Humber River Unit Flow	2 Yr	0.015	0.0377	0.012	0.0126	**0.013**	**0.0141**
			5 Yr	0.022	0.0377	0.017	0.0178	**0.019**	**0.0192**
			10 Yr	0.027	0.0377	0.021	0.0209	**0.023**	**0.0222**
			25 yr	0.034	0.0377	0.026	0.0252	**0.027**	**0.0265**
			50 Yr	0.039	0.0377	0.030	0.0284	**0.032**	**0.0295**
			100 Yr	0.045	0.0377	0.034	0.0314	**0.036**	**0.0323**
South west	Interchange Pond - NE		2 Yr	0.298	3.3500	0.315	1.3107	**0.348**	**1.4477**

						6-hour AES (Bloor, TRCA)		12-hour AES (Bloor, TRCA)	
Quadrant	Proposed Pond and Location	Quantity Control Criterion	Storm Return Period	Allowable Release Rate (m3/s)	Storage Provided (ha.m)	Outflow (m^3/s)	Max. Storage Used (ha.m)	Outflow (m^3/s)	Max. Storage Used (ha.m)
	of HWY 407 and Hwy 7 (Servicing Area 65.3 ha)	Humber River Unit Flow	5 Yr	0.442	3.3500	0.43	1.7872	**0.466**	**1.9249**
			10 Yr	0.540	3.3500	0.52	2.1195	**0.559**	**2.2525**
			25 yr	0.674	3.3500	0.645	2.54	**0.682**	**2.6633**
			50 Yr	0.778	3.3500	0.741	2.8598	**0.775**	**2.9729**
			100 Yr	0.884	3.3500	0.837	3.1762	**0.869**	**3.2831**
Northeast (NE)	Edgeley Pond - NE of Hwy 7 and Jane St. (Servicing Area 795.9 ha)	Existing Conditions Flow Rates	2 Yr	7.904	19.3351	**6.448**	**5.7475**	6.421	5.6569
			5 Yr	13.155	19.3351	**8.507**	**9.0979**	8.169	8.9246
			10 Yr	17.612	19.3351	**12.514**	**10.5994**	10.899	10.3191
			25 yr	24.601	19.3351	**20.491**	**11.3600**	17.622	11.0862
			50 Yr	29.205	19.3351	**26.566**	**11.8504**	21.875	11.4961
			100 Yr	34.582	19.3351	**34.345**	**12.1745**	28.018	11.9135
Southeast (SE)	New SWM Facility - NE of HWY 407 and Jane St. (Servicing Area 49.8 ha)	Pre-development /Greenfield	2 Yr	0.40	2.0	0.31	0.9146	**0.362**	**0.9929**
			5 Yr	0.67	2.0	0.50	1.1996	**0.54**	**1.2631**
			10 Yr	0.88	2.0	0.63	1.3919	**0.667**	**1.4453**
			25 yr	1.16	2.0	0.81	1.6332	**0.834**	**1.6723**
			50 Yr	1.38	2.0	0.94	1.8146	**0.959**	**1.8417**
			100 Yr	1.61	2.0	1.07	1.9959	**1.085**	**2.0127**

Note: 1. Bold values indicate the more conservative (higher) discharge and storage volumes.

2. The SSD/rating curves for the ponds in this table are from development applications, City Study or part of this VMC FSSR study.

3. The discharge-storage curves for North SWM Facility, South SWM Facility, and Commerce Superpipe in the NWQ are taken from FSR, First Vaughan Development Limited - VMC West, July 2018. Prepared by SCS Consulting Ltd. The generated flow for both the North and South SWM facilities are greater than the allowable release rate. It is suggested to complete a pond detailed design to re-assess to determine if pond re-sizing would be suitable.

4.6.1 Black Creek Flow Comparison

The flows at the Black Creek Flow points presented in Table 4-12 for the existing and proposed scenarios are shown in Figure 4-2 and Figure 4-3.

Table 4-12: Existing and Proposed Release to Black Creek

Flow Node Location	Storm Return Period	Flow Rate (m3/s)	
		Existing	Proposed
West Branch of Black Creek (NHYD - 60)	2 Yr	2.03	1.20
	5 Yr	2.68	1.71
	10 Yr	3.08	2.05
	25 yr	3.60	2.45
	50 Yr	4.02	2.77
	100 Yr	4.41	3.07
Main Branch of Black Creek (NHYD - 128)	2 Yr	8.34	8.10
	5 Yr	14.07	10.46
	10 Yr	18.64	12.79
	25 yr	26.08	20.33
	50 Yr	31.21	25.58
	100 Yr	36.96	32.70

4.7 Conclusions and Recommendations

The following sections describe the current condition and future requirements for each of the VMC quadrants and specific ponds therein. Only the major pond locations where long-term solutions are required are described in detail. Where current temporary or interim solutions exist, they will continue as such and will continue in service until replaced by the ultimate stormwater solutions. The VMC study area is the most complex in terms of function and timing as the rapid growth and changes in land use will be occurring concurrently with the completion of the stormwater system and there may continue to be the need for temporary solutions either within city property or as part of private site controls as infrastructure is completed. This report recognizes these challenges and takes the approach to identify the ultimate solution and then comment on the transition challenges and opportunities that may be encountered from the current condition.

Storm drainage alternatives were explored and reviewed based on current and future planning considerations and compared to previous reports and studies that have been completed and that have informed current stormwater studies and projects. Based on the commitments in place at the time of preparing this report, further evaluation of drainage areas was considered where current drainage patterns are defined. Any recommendations within the four VMC quadrants are provided as an advancement to and in support of previous recommendations.

Stormwater management strategies were evaluated and modelled based on previous studies and current approaches and approvals that have been feasible for implementation. Although the goal is to meet TRCA discharge and release rate criteria, there is recognition from the TRCA that existing conditions may prove difficult to remediate to meet current criteria. As current strategies are in line with the TMIG 2012 Municipal Servicing Class EA, this report is continuing with those recommendations and augmenting where current conditions provide flexibility or verification of improved conditions within the land uses and as development progresses.

The preferred stormwater management strategy is presented in the criteria Section 2.0 of this report and are to be referenced.

Recognizing the difference between the TRCA outlet rates for this watershed and the high on site performance targets set for future development, the analysis and conclusions of this report have assessed the impact of various conditions and the sensitivity of achieving these goals compared to end of pipe discharge targets.

There are currently five stormwater ponds servicing the majority of the VMC area in addition to one private pond as described herein. The conclusions for stormwater management based on the above criteria require that the facilities in the NE, NW, SW quadrants be retrofitted to meet the recommended criteria, and that a new pond in the SE quadrant be carried forward as previously recommended.

For each landowner proposed development, supporting calculations and details for each private on site quality control measure will be required by the site plan development stage where these controls are required. The existing SWM facilities within each quadrant will likely not be retrofitted prior to construction commencing within each respective quadrant. Landowners will be required to verify that the existing facilities have the capacity to provide quality control for the redevelopment of a site. Otherwise, on-site quality controls may be required within the various quadrants until the respective SWM ponds are retrofitted/ constructed. The required on-site volume and provided volume for the water balance/retention volume requirement as well, details of the mitigation measures including possible limited application of LIDs to achieve the water balance/retention volume criterion must be provided by the site plan development stage. The City further requires that concept calculations are required for early stages of re/development with details required at site plan/detailed design.

For collection and reuse options, it is recommended that the dual drainage method continue to be used to meet the criteria for the 5 year minor system target and the 100 year major system target of control and conveyance. Where existing constraints are identified in the modelling results, these constraints will not be addressed unless further impact is identified and as a result of redevelopment impacts.

4.7.1 Existing and Proposed Release Rate Improvement to Black Creek.

The overall goal is to reduce future release rates to the Black Creek watershed at the two downstream discharge points with the ideal condition being that the TRCA release rates are met. As previously stated, this study area is constrained and there are limited opportunities to improve conditions based on existing land use and stormwater controls. Overall, and as noted in Table 4-12 the release rates have improved and continue to exceed TRCA targets. As redevelopment occurs and the more stringent on site controls applied to future land uses, there is the expectation that future flow rates to the watershed will decrease during peak flow conditions. The following sections describe the changes anticipated from the existing conditions to ultimate future conditions as upgrades and additions are completed.

4.7.2 Northwest Quadrant

The northwest quadrant drainage areas and outflows under the 100 year storm event are summarized in Table 4-13. The overall outflow for this quadrant is reduced from 2.53 m^3/s to 1.42 m^3/s while the overall required storage is also reduced from 2.757 ha*m to 1.587 ha*m. Refer to Figure 4-3 for the drainage area plan, location of the SWM ponds within the northwest quadrant and flow node.

Table 4-13 Northwest Quadrant Catchment Area Summary

Catchment area	Existing Area (ha)	Proposed Area (ha)	Existing Outflow(1) (m^3/s)	Proposed Outflow(1) (m^3/s)	Existing Available Storage (ha*m)	Proposed Available Storage (ha*m)	TRCA Target(1, 2) (m^3/s)
SWM Pond 2 & Interim/Ultimate North Facility	25.23	30.45	1.104	0.526	2.025	1.254	0.465
Interim & Ultimate South SWM Facility	10.60	13.09	0.193	0.208	0.637	0.268	0.225
Commerce Superpipe	2.02	2.09	0.213	0.046	0.042	0.065	0.045
Uncontrolled	8.39	5.46	1.302	1.081	0	0	0.105
On site control	2.24	0	0.317	0	0.053	0	0
Total	48.48	51.09	3.129	1.861	2.757	1.587	0.840
Cumulative Outflow			2.53	1.42			

Note 1- 100 year return period
Note 2- TRCA Target based on proposed areas

The northwest quadrant is serviced by two SWM facilities in the northwest corner of the quadrant, a SWM facility in the southwest corner of the quadrant and a super pipe structure servicing a small area along the south boundary of the quadrant as follows:

4.7.2.1 North SWM Facility - Southwest of Portage Parkway and Applewood Crescent and Northwest quadrant Pond Southeast of Portage Parkway and HWY 400

The two existing ponds are located at the northwest corner of the VMC area, between Hwy 400 and Applewood Crescent. There is limited information for the larger and older pond except that the pond provides quantity control. For the smaller pond, immediately southwest of Portage Parkway and Applewood Crescent, the pond provides quantity, quality and erosion controls.

The SCS 2018 report for First Vaughan Development Limited provided a servicing plan as part of the future redevelopment of this area. The proposed north SWM facility was assumed to be an underground storage facility, to accommodate the total required volume, which includes active and permanent pool volume. Although the concept of the underground storage facility was approved by the City for quantity control, the permanent pool was not supported by the City. Thus, a final design of the proposed underground storage facility and quality control measures are to be provided for the City to review for feasibility and approval.

4.7.2.2 South SWM Facility - NW of HWY 7 and Applewood Crescent

The SCS First Vaughan Investment Limited Phase 1 Spine Roads interim Stormwater Management Report (2018) identified a pond for the area in the northwest Quadrant just north of Hwy 7. This interim south SWM pond was constructed and is currently in service providing quantity control, quality control and erosion control for the contributing drainage area. An ultimate SWM facility is proposed for the full build out of the service area. An underground SWM facility is also proposed to replace the interim south SWM pond and was designed to provide active storage and permanent pool to achieve the SWM criteria. Similar to the north ultimate SWM facility, the the concept of the underground storage facility was approved by the City for quantity control, but the permanent pool was not supported by the City. Thus, a final design of the proposed underground storage facility and quality control measure(s) are to be provided for the City to review for feasibility and approval.

4.7.2.3 Commerce Superpipe - Commerce north of HWY 7

The SCS 2018 report for First Vaughan Development Limited provided a servicing plan as part of the future redevelopment of this area. The constructed superpipe was designed to provide storage volume required to achieve the quantity control criterion of meeting the Humber River Unit Flow Rates. For quality control, an oil-grit separator with catch basin inserts were implemented to achieve quality control. It should be noted that runoff from the future development sites tributary to the Commerce superpipe are to be controlled to the Humber River Unit Flow rates. As the Commerce superpipe service area undergoes further redevelopment and approvals, confirmation of the function and capacity of the as built superpipe is recommended and verification of performance related to the serviced catchment should be undertaken during site plan approval.

4.7.3 Northeast Quadrant

The VMC northeast quadrant is serviced by the existing Edgeley pond, an on-line pond. The Edgeley pond was originally designed in the late 1980's (Ander Engineering, July 1986) and provides quantity control for a tributary area of 767.31 ha., including approximately 49.0 ha. from the VMC area. The Edgeley pond is proposed to be retrofitted to accommodate future redevelopment within the VMC boundary as recognized in the Vaughan Stormwater Management Retrofit Study (2007). A detailed design of the Edgeley Pond retrofit (WSP, 2021) was approved by the Toronto and Region Conservation Authority (TRCA), Ministry of Environment and Conservation (MECP), Department of Fisheries and Ocean (DFO), and York Region. Approval from Ministry of Natural Resources and Forestry is imminent with construction of the retrofit design to commence in 2025 and take a few years to complete. The northeast Quadrant drainage areas and outflow conditions are summarized in Table 4-14. While the outflow remains the same, the overall storage requirement increased from 16.651 ha*m to 19.335 ha*m.

Table 4-14 Northeast Quadrant Catchment Area Summary

Catchment area	Existing Area (ha)	Proposed Area (ha)	Existing Outflow(1) (m^3/s)	Proposed Outflow(1) (m^3/s)	Existing Available Storage (ha*m)	Proposed Available Storage (ha*m)
Edgeley Pond	793.5	795.9	34.582	34.345	16.651	19.335

Note 1- 100 year return period
Note 2- TRCA Target based on proposed areas

The design parameters modeled within this report are from the 2021 WSP report. Table 4-15 provides a summary of the pond performance from various relevant reports and studies and corroborates the various findings in the recent reports including this FSSR.

Table 4-15 Comparison of SWM Pond Performance for the 100 Year Storm Event

Parameters	Municipal Servicing Master Plan (TMIG, 2012)	TRCA Humber River Hydrology Update (Civica, 2018)	WSP SWM Report 2021	Civica FSSR
Drainage Area to EPP (ha.)	767	783	767	795.90
Inflow to EPP (m3/s)	39.6	50.5	56.1	55.74
Outflow from EPP (m3/s)	17.4	32.3	36.9	34.34

Based on these results, it is concluded that the proposed retrofit design to the Edgeley Pond are consistent with the results of this VMC FSSR and no further improvements to the Edgeley Pond retrofit design are required.

4.7.4 Southeast Quadrant

The southeast quadrant drainage areas and outflow conditions are summarized in Table 4-16. In considering the recommended Scenario 5 as detailed in Section 4.6.8, Sensitivity Analysis: Between Scenarios 2 and 4, which includes Expansion Area A and the MTSA area south of Hwy. 7. Under the 100 year storm event, the overall flow for the southeast quadrant was reduced from 8.519 m^3/s, which does not include a SWM facility to 1.070 m^3/s, the controlled flow from the proposed future SWM facility. The proposed SWM pond for the southeast quadrant is proposed to be located south of Peelar Road and east of the existing and future Black Creek, as noted in the 2012 MSMP (TMIG), also so illustrated in Figure 4-3.

Table 4-16 Southeast Quadrant Catchment Area Summary

Catchment area	Existing Area (ha)	Proposed Area (ha)	Existing Outflow(1) (m^3/s)	Proposed Outflow(1) (m^3/s)	Existing Available Storage (ha*m)	Proposed Available Storage (ha*m)	TRCA Target(1, 2) (m^3/s)
Existing Drainage + Expanded Area +MTSA	62.79	49.77	8.519	1.07	N/A	2.000	1.61
Area External to Study Boundary	39.77	39.77	7.053	7.053	N/A	0	0.583
Total	102.56	89.54	15.572	8.123	1.010	2.000	2.193

Note 1- 100 year return period
Note 2- TRCA Target based on proposed areas

Note 3 – The Greenfield target rate is used for the existing drainage + Expanded Aera + MTSA

The proposal is to provide a new pond as previously identified in the 2012 MSMP report. As detailed in Section 4.6, the VO modelling was based on four scenarios to assess the performance of the proposed future pond based on 2012 MSMP recommended parameters. The site for this pond is constrained as previously identified in the 2012 MSMP) report and covers 3 parcels that are currently privately owned and operating with ICI activities. There was no ability to consider including additional land for a larger pond that would be ideal considering the increased catchment area with the addition of the Additional Area A and the MTSA lands.

The assessment confirmed that the Humber River Unit Flow rates could not be achieved with the 2012 MSMP proposed pond design. However, through discussions with TRCA, it was suggested that the quantity control criterion could be a hybrid between the Humber River Unit Flow rate and the pre-development greenfield condition. Although tributary to the Black Creek, for this Study, the area east of Creditstone and south of Hwy. 7 as shown in Figure 4-3, is considered as external and not tributary to the SWM facility.

Although the proposed SWM facility identified in the 2012 MSMP could be implemented to provide water quantity, quality and erosion controls to achieve the SWM criteria, implementing a single SWM facility may not be feasible due to the complexity of the southeast quadrant. Therefore, the City has commenced a separate SWM study to assess various stormwater management measure options to establish a feasible SWM strategy for the VMC southeast quadrant.

4.7.5 Southwest Quadrant

The southwest quadrant drainage areas and outflow conditions are summarized in Table 4-17.

Table 4-17 Southwest Quadrant Catchment Area Summary

Catchment area	Existing Area (ha)	Proposed Area (ha)	Existing Outflow(1) (m^3/s)	Proposed Outflow(1) (m^3/s)	Existing Available Storage (ha*m)	Proposed Available Storage (ha*m)	TRCA Target(1, 2) (m^3/s)
Interchange Pond	53.5	65.3	2.572	0.837	7.868	7.868	0.869
Toromont Pond	10.6	N/A	0.700	N/A	0.616	N/A	N/A
Uncontrolled	0	0	0	0	0	0	0
Total	64.1	65.3	3.272	0.837	8.484	7.868	0.869

Note 1- 100 year return period
Note 2- TRCA Target based on proposed areas

The condition of the southwest quadrant is that the drainage area will increase for the Interchange pond as the Toromont Pond is removed from service and this catchment redirected to the Interchange watershed area.

4.7.5.1 Interchange Pond - NE of HWY 407 and Hwy 7

The current Interchange Pond provides quality, erosion and quantity control for a 62.3 ha area and is located in the southwest corner of the VMC area. The design was completed by G.M. Sernas in 1997 and did not include consideration for onsite controls or the existence of the Toromont SWM pond.

The results of our modelling confirm that there is sufficient storage proposed on the development application submissions and that the final configuration and location is to be determined through the site plan submission and approval process.

5.0 Dual Drainage Modelling

5.1 Objective

The objective of the dual drainage modeling is to assess the impact of pre and post development land use conditions and how these changes impact the minor system for network capacity and how the overland flows routes are affected for the major system.

As this study is focused on the impact of growth on stormwater management, no recommended upgrades to the minor or major systems are identified unless the service level criteria are violated within the VMC and Expansion Areas A and B. Further, network deficiencies noted on York Region assets including ROW's and infrastructure are excluded from this study.

Therefore, infrastructure improvement recommendations are only recommended for areas within the secondary plan area and downstream from it.

5.2 Dual Drainage Scenarios

InfoWorks ICM model was used for the VMC dual drainage model to represent the major and minor drainage systems. Two model scenarios were prepared and analyzed for the four VMC quadrants along with Expansion Area A and B and MTSA 56 east of Creditstone including:

1. ***Existing Condition***: In this scenario, the purpose is to evaluate the capacity of the existing infrastructure, including storm sewers and overland flow routes (i.e. rights-of-way) and the current land uses, as of 2021.
2. ***Ultimate Future Condition***: In this scenario, the future land uses are applied to assess the impact of development on runoff and infrastructure performance with full build-out of the VMC area as per the 2010 VMC Secondary Plan (revised 2021).

5.3 Impervious Area Calculation

Impervious surfaces are land surfaces such as roads, parking lots, and building roofs that prevent rainwater from infiltrating into the ground. The percentage of impervious area under the existing and future conditions were assigned a value based on the land use type. Table 5-1 lists the land use designations identified and the imperviousness percentage assigned for each land use type in the model.

Table 5-1: Land Use Type Imperviousness Percentage

Land Use Designation	Existing and Future Condition Imperviousness (%)
Commercial	95%
Industrial	95%
Institutional	80%
Residential Commercial	80%

Land Use Designation	Existing and Future Condition Imperviousness (%)
High Density Residential	80%
Medium Residential	60%
Estate Residential	40%
Recreational/ Open Space	10%
ROW	90%

5.4 *Future Stormwater Peak Flows*

The future stormwater peak flows for each future re/development are estimated based on the City of Vaughan's standard runoff coefficients for specific land uses as shown in Table 5-2.

The target rate for ICI was implemented in the model having these sites controlled by the 2-year post development with 15 mm on-site retention with 90% imperviousness. Parks and open spaces are also controlled by the 2-year post development and 15 mm retention with 40% imperviousness.

Table 5-2: Runoff Coefficients

Landuse	Runoff Coefficient for 5-Year Return Period Storm (R5)
Residential Single family, semi-detached, duplex, triplex, quad	Designer to calculate actual composite runoff coefficient. Minimum = 0.50
Block Residential Development Block town housing, stack town housing, apartments	Designer to calculate actual composite runoff coefficient. Minimum = 0.65
Neighborhood Commercial, Commercial Centre, Institutional	Designer to calculate actual composite runoff coefficient. Minimum = 0.75
Infill Development	Site-specific Designer to calculate actual composite runoff coefficient
Unimproved Open Space <7% Slop	0.25
Unimproved Open Space ≥7% Slope	0.30
Neighborhood Park, Cemetery	0.45
District/Regional Park	0.75
Sodded Area	0.25
Paved and Gravel Areas	0.90
Roof Area	0.90

5.5 Boundary Conditions

Boundary conditions for the downstream receiving location at the storm sewer outlets are modeled based on available information where one of the following conditions prevail:

i. Where the outfall is directly to the watercourse, the appropriate Hec-Ras model results provided from the TRCA were used to define the receiver elevation for the various return periods.
ii. Where the outlet condition is unknown or undefined, then a free flow condition is used

Table 5-3 provides the outlet conditions in the model for a 5 year and 100 year design storm.

Table 5-3: Outfalls Boundary Water Level and Submerged Under the 5 yr and 100 yr Design Storm

Item	Outfall Manhole	System Type	Invert Elevation (m)	Obvert Elevation (m)	Existing 5-year Water Level (m)	Existing 100-year Water Level (m)	Proposed 5-year Water Level (m)	Proposed 100-year Water Level (m)	Submerged during the Existing 5-year design storm	Submerged during the Existing 100-year design storm	Submerged during the Proposed 5-year design storm	Submerged during the Proposed 100-year design storm
1 – NEQ	IO12 – Edgeley Pond - west – north outfall	Storm	196.500	198.000	200.180	200.180	200.180	200.180	Yes	Yes	Yes	Yes
2 – NEQ	IO3017_0001 – Edgeley Pond – west – south outfall	Storm	197.300	198.650	200.180	200.180	200.180	200.180	Yes	Yes	Yes	Yes
3 – NEQ	IO303 – Edgeley Pond – east outfall	Storm	197.500	199.300	200.180	200.180	200.180	200.180	Yes	Yes	Yes	Yes
4 – NEQ	OF616 – Black Creek Channel, south Edgeley Pond, east	Storm	196.690	197.290	200.410	200.410	200.410	200.410	Yes	Yes	Yes	Yes
5 – NEQ	OF617 - Black Creek Channel, south Edgeley Pond, west	Storm	196.640	197.315	200.410	200.410	200.410	200.410	Yes	Yes	Yes	Yes
6 - SEQ	OF622 – Black Creek channel, south Hwy. 7 (Hwy. 7 culvert???)	Storm	198.860	199.535	198.700	198.700	198.700	198.700	No	No	No	No
7 - SEQ	OF940 – Black Creek Channel, south Hwy. 7 (from Jane)	Storm	195.980	196.705	196.920	196.920	196.920	196.920	Yes	Yes	Yes	Yes
8 - SEQ	OF1214 – Black Creek Channel, north of Doughton (from Jane)	Storm	196.500	197.025	196.540	196.540	196.540	196.540	No	No	No	No
9 - SEQ	IO283 – Black Creek Channel, south of Doughton (from Doughton)	Storm	195.400	196.750	196.140	196.140	196.140	196.140	No	No	No	No
10 - SEQ	OF1213 – Black Creek Channel – by 7601 Jane (from Jane)	Storm	197.500	198.100	195.510	195.510	195.510	195.510	No	No	No	No
11 - SEQ	OF1215 – Black Creek Channel – by 7581 Jane (from Jane)	Storm	198.000	198.600	195.340	195.340	195.340	195.340	No	No	No	No
12- SEQ	IO285 – Black Creek Channel, south Peelar	Storm	191.000	192.350	193.180	193.180	193.180	193.180	Yes	Yes	Yes	Yes
13 – NWQ	NW_Pond_Out1 – Applewood North Pond	Storm	197.720	199.220	N/A	196.880	196.880	196.880	N/A	No	No	No
14 – NWQ	NW_Pond_Out2 – Applewood North Pond???? – see image below	Storm	197.720	198.920	N/A	196.880	196.880	196.880	N/A	No	No	No
15 – NWQ	NW_Pond_Out3 – Applewood South Pond	Storm	197.470	198.820	N/A	196.790	196.790	196.790	N/A	No	No	No
16 – SWQ	IO472 – Interchange Pond	Storm	189.980	192.380	N/A	190.300	190.300	190.300	N/A	No	No	No
17 - SWQ	STMMH17491 – this is not an outfall, flow continues to the Interchange pond – see image below	Storm	191.650	193.000	N/A	190.300	190.300	190.300	N/A	No	No	No
18- NEQ	ST_AD_5 – Edgeley Pond – north (from Portage Parkway)	Storm	201.500	202.250	N/A	202.110	N/A	N/A	N/A	No	N/A	N/A

5.5.1 Proposed Discharge Control Condition

The land use and discharge criteria conditions were modelled to assess how these criteria met the requirements from Table 2-2. The majority of the existing sites within the VMC study area are industrial and are controlled to 180/s/ha. Under the proposed conditions the ICI secondary plan areas are controlled to the 2 year post development discharge rate with 15 mm of onsite retention with 90% imperviousness. Parks and open spaces are controlled to the 2-year post development and 15 mm on-site retention with 40% imperviousness. The discharge rate control targets for the various land uses are presented in Figure 5-1.

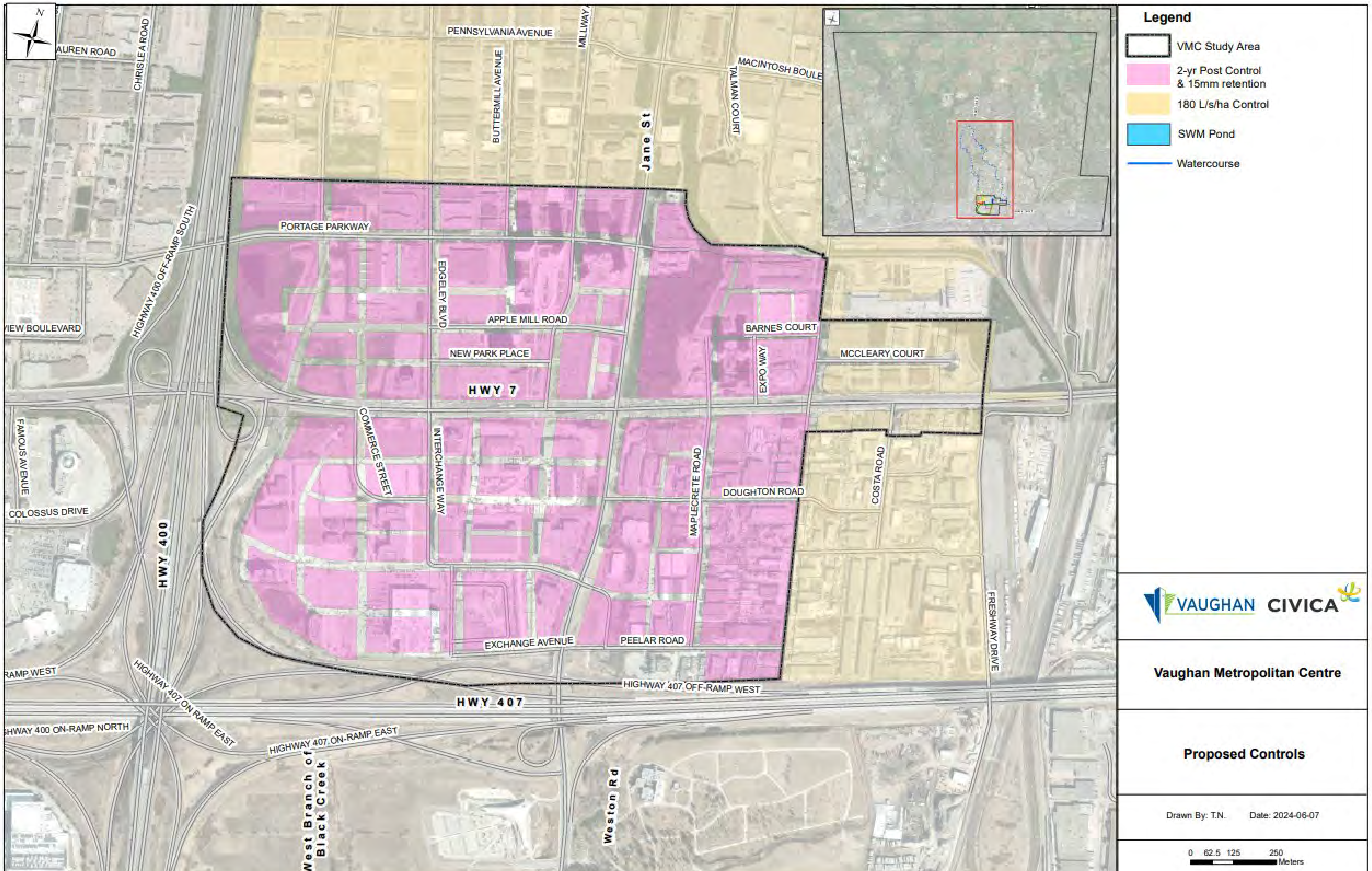

Figure 5-1: Proposed Controls

5.6 Storm Sewer System Model Approach (Minor System)

For the existing condition scenario, the assumption for Institutional-Commercial-Industrial (ICI) and high-density residential buildings is that they are directly connected to the storm system with on-site conveyance controls. For existing conditions, directly connected sub-catchments were discretized based on lots and blocks, and it was assumed that the 100-year design storm runoff was controlled to 180 L/s/ha, as per the City's design criteria. For redeveloped sites the target flow is based on 2-year post with a maximum 90% imperviousness.

The future condition scenario future land uses were assessed to determine runoff coefficients and to estimate future runoff volumes. The proposed future condition assumes that the parcels within the VMC Secondary Plan area and Expansion Area A and B will be controlled to the 2 year post development discharge rate up to and including the 100-year design storm. Currently, there are no plans to redevelop the lands within MTSA 56 east of Creditstone and lands upstream and external to the VMC boundary. Thus, the 180 L/s/ha. was applied to these lands.

The InfoWorks model uses the Stormwater Management Model (SWMM) routine procedure to calculate runoff over different types of surfaces, and the Horton method to calculate infiltration in pervious areas to determine the flows of the minor storm sewer system. The subsurface conditions in the study area are typically clay soils with low permeability, which corresponds to a soil type C/D based on the SCS hydrologic soil group classification.

5.7 Overland Drainage System Model Approach (Major System)

The major system is designed to convey the surface runoff to the minor system inlets (catch basins) and carry flows beyond what the minor system can handle. The model simulates the overland flow paths along with road networks and open natural channels (i.e. roadside ditches and culverts, etc.). For municipal rights-of-way, the existing subcatchments were delineated on a MH-to-MH basis using Civica's VO SWMM flow path tool which utilizes the Digital Elevation Model (DEM) data provided by the City. This approach accounts for the actual topography of the terrain.

Once the existing storm subcatchments were delineated, the pervious and impervious areas were calculated for each subcatchment. The approach taken was to calculate the impervious areas and then assign the pervious areas as the difference between total area minus impervious area.

5.8 Level of Service Conditions

5.8.1 Storm Sewer System (Minor System)

The storm sewers shall convey the 5-year design storm at a maximum full flow capacity. Therefore, when the pipe is not surcharged, the water level (h) upstream or downstream from the subject storm sewer pipe is above the obvert elevation (H); the flow is less than the pipe's full capacity (backflow) or greater than the pipe's full capacity (bottleneck).

The following criteria determines if the storm sewers are surcharged under a 5-yr design storm event and are presented in the figures as noted and where h is the water depth and H is the pipe height:

- $h/H < 1$: No surcharge is green
- $h/H \geq 1$: Surcharge is red

For the 100 year storm event, the target design criteria conditions are as follows:

i. The maximum HGL in the storm sewer shall be maintained below basement elevation (1.8 m below the ground elevation);
ii. Shallow sewer systems do not require infrastructure upgrades where the existing sewer HGL is below the obvert of the existing pipe; and
iii. Where the HGL is above the obvert elevation and the HGL is less than 1.8m below grade, it is recommended to:
    a. Confirm that the area properties r do not have basements (typical IC and some institutional types)
    b. Confirm that the area properties connected to the storm sewer have a basement elevation at least 300mm above the HGL
    c. Deepen the sewer to achieve the 1.8 m freeboard requirement from the surface or mitigate the surcharging condition such that resultant HGL is low enough to mitigate risk of basement flooding.

Based on these criteria, the results of the 100 year storm event are presented in Section 5 figures as follows:

- h < H, pipe segment is illustrated as green in Section 5 figures
- h > H and the freeboard >1.8m, pipe segment is yellow in Section 5 figures
- h > H and the freeboard <1.8m, pipe segment is red in Section 5 figures
    - where;
    - h is the hydraulic grade line elevation, and,
    - H is the pipe height/obvert.

5.8.2 Overland System (Major System)

The capacity of the major storm drainage system shall be adequate to carry the remaining discharge from 100-year return period storm when the capacity of the minor storm drainage system is exceeded. The overland flow system shall be maintained within the road allowance and no deeper than the recommended standard which varies depending on the type of road. Table 5-4 lists the relevant ponding depths for major storm system as per City of Vaughan Engineering Criteria.

Table 5-4: Permissible Overland Flow Depth

Location	Criteria
Open Spaces	As required for overland flow outlets
Local Roads	Maximum depth of ponding is 0.20 m above the crown of the road (i.e., 0.30 m above the gutter level of the road) and the water level up to the right-of-way
Collector Roads	Maximum depth of ponding is 0.10 m above the crown of the road (i.e., 0.30 m above the gutter level of the road) and the water level up to the right-of-way
Arterial Roads	Maximum depth of ponding/flow is to the crown of the road (i.e., 0.15 m above the gutter level of the road) and the water level up to the right-of-way

For the purposes of this analysis, model results are presented based on the following overland flood depth conditions at the critical control points and illustrated in Section 5 figures:

- Flood Depth <0.15m, the overland flow route (i.e. right of way) is illustrated as green,
- 0.15m < Flood Depth < 0.3m, the overland flow route (i.e. right of way) is illustrated as yellow, and,
- Flood Depth >0.3m, the overland flow route (i.e. right of way) is illustrated as red.

5.9 Dual Drainage Results- Existing Condition

The results of the stormwater service model for existing conditions are summarized in this section. The model was used to evaluate the conveyance capacities of each storm sewer pipe and the ponding depths of the major overland flow routes during the 5 and the 100-year design storms, respectively.

5.9.1 Storm Sewer System (Existing Minor System)

The capacity of the existing storm sewer performance under the 5 year design storm is presented in Figure 5-2 where areas not meeting the service level criteria for surcharging are depicted in red. Similarly, the capacity of the existing storm sewer under the 100 year design storm is presented in Figure 5-3 where areas not meeting the service level criteria for surcharging are depicted in red.

5.9.2 Overland Flow System (Existing Major System)

The overland flow system is required when the minor sewer system is surcharged to the point that flow from the sewer is backed up to the surface. The major system model identifies the overland flow paths and the depths of flow under the 100-yr design storm scenario. The depths of the overland flow of the 100-year design storm are shown in Figure 5-4..

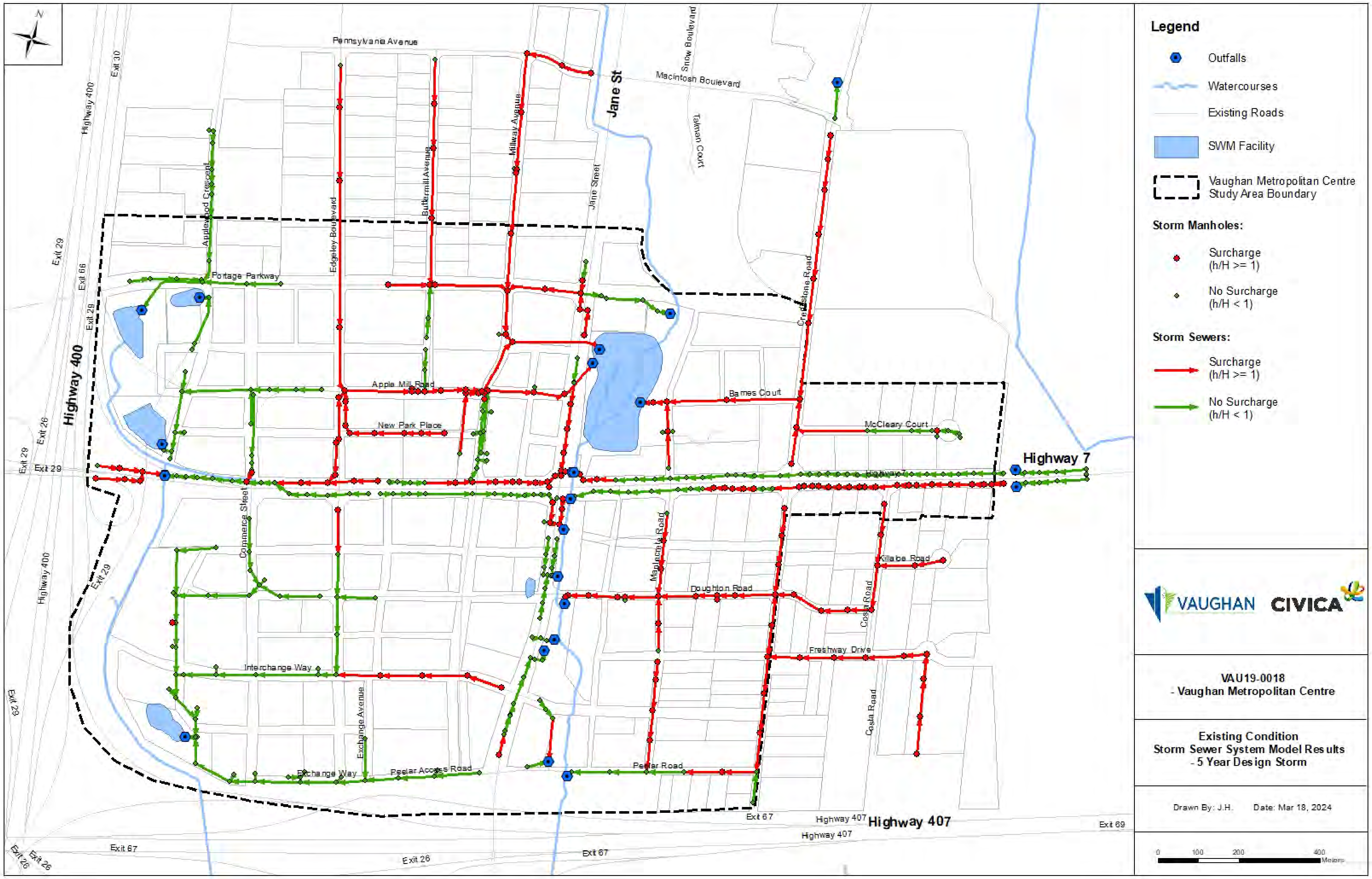

Figure 5-2: Existing Storm Sewer Minor System 5-Year Design Storm Model Results

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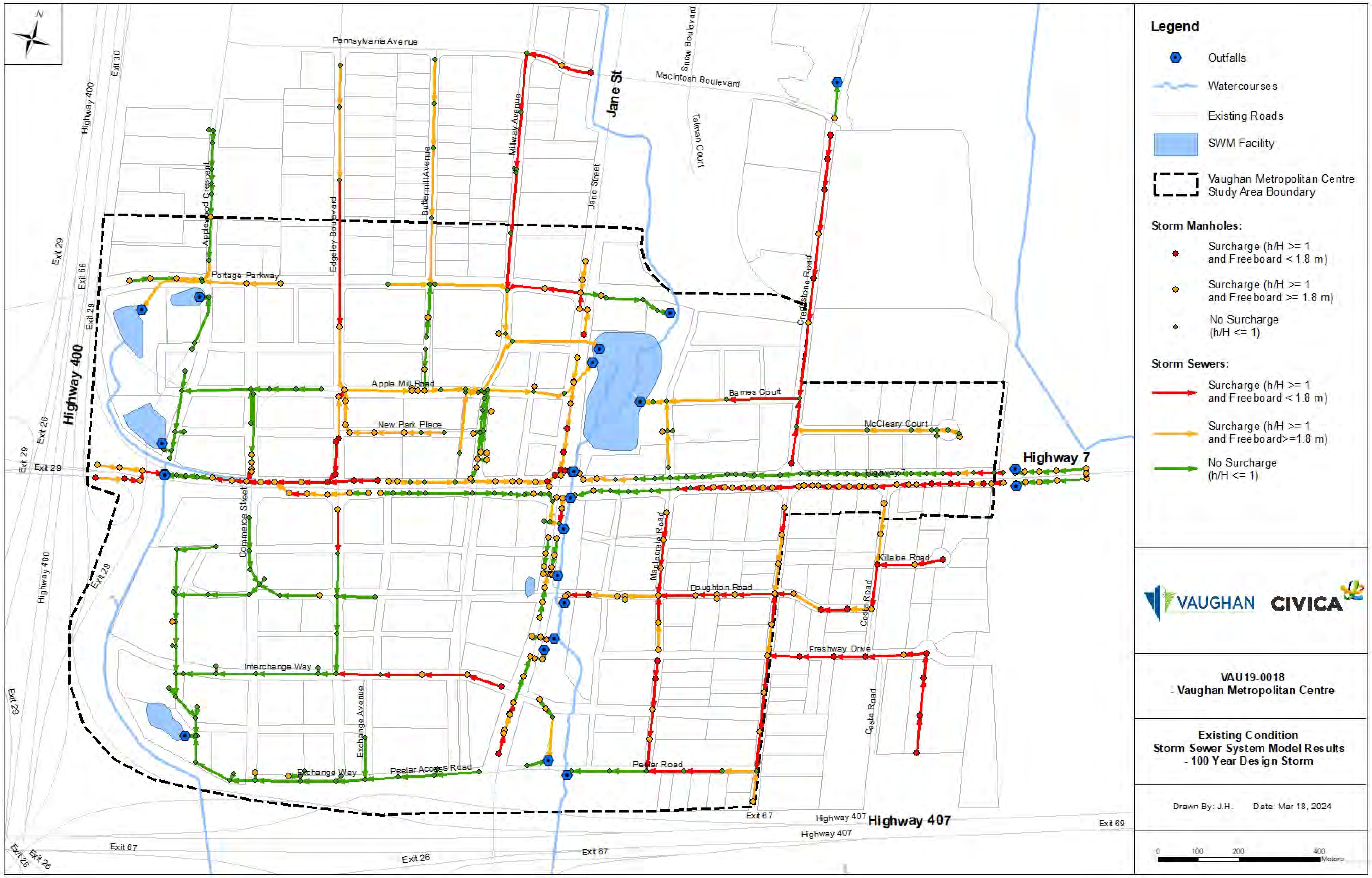

Figure 5-3: Existing Storm Sewer Minor System 100-Year Design Storm Model Results

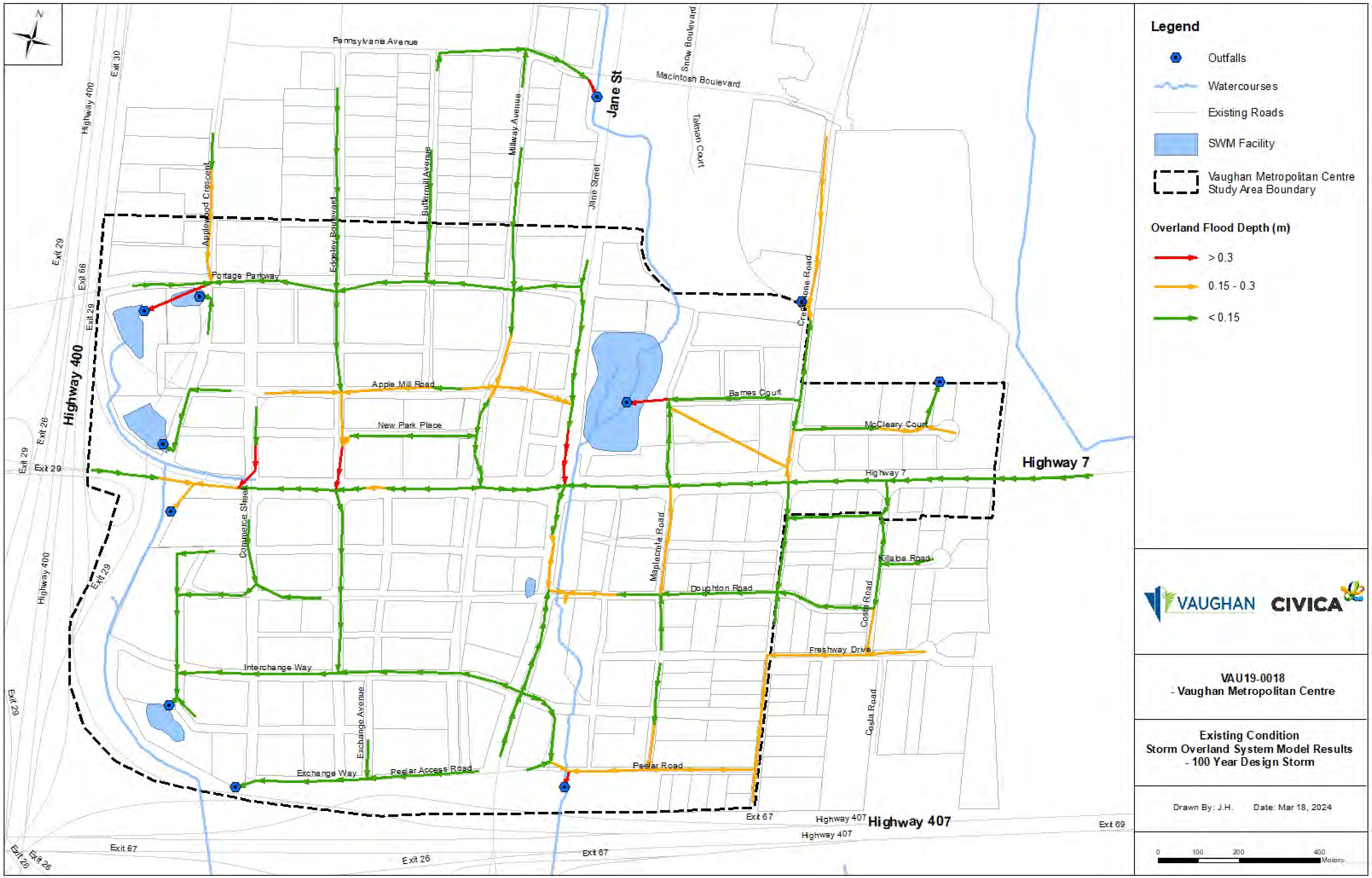

Figure 5-4: Existing Major System 100-Year Design Storm Model Results

5.10 Dual Drainage Modelling Results- Future Condition

The results of the stormwater service model for future conditions are summarized in this section. The model was used to evaluate the conveyance capacities of each storm sewer pipe and the ponding depths of the major overland flow routes during the 5 and 100-year design storms, respectively.

Recommendations for infrastructure improvement are made when:

- The new constraint is due to adding the flow conditions for land use areas that are controlled by the 2 year post development outlet flow limit and 15 mm onsite retention and
- The future flows have increased to the point where the existing conditions are further constrained or now are exceeding the service level targets

5.10.1 Storm Sewer System (Future Minor System)

It is observed that there are a number of sewer pipes experiencing surcharging under the existing conditions. For the proposed minor and major system solutions, surcharging within the Secondary Plan areas and downstream are considered. Downstream pipes that are not affected by the future development will be maintained. Sewer pipes that are within the VMC and Expansion Area A and B and experiencing sewer capacity issues were assessed based on the following criteria:

- For redevelopment within the VMC and Expansion Area A and B as well as downstream areas that already meet the 180 L/s/ha criteria, then no solutions will be proposed.
- If proposed areas for redevelopment and downstream do not meet the 180 L/s/ha criterion then a 2 – year post development outlet flow limit and 15 mm onsite retention was applied.
    - The 2-yr post flow rate and 15mm criteria approach was followed from the MSMP2012 TMIG VMC Master Plan EA – November 29, 2012, Final Appendix D – Stormwater Drainage and Management. Appendix D in this report provides the release rate calculations used for VMC
    - On-site control quantity control criterion of controlling 2-100 year post development flow to the 2-year post flow rate with an 80% imperviousness was applied for the proposed redevelopment sites
    - The criteria for 15mm on-site retention for on-site building footprint and landscape areas was applied. The proposed areas had on-site control with 61% imperviousness for the 5-Yr and 100-Yr design storms
- If proposed areas for development and downstream meet the 2 – year post development and 15 mm retention criteria, then no solutions will be proposed.
    - It is assumed that ICI areas do not have basements, no surcharging in residential areas for the 5 – year storm, 100 year storm freeboard > 1.8m, 100- year overland depth is <0.15m for arterial and <0.3 m for local and collector roads, therefore
    - If surcharging exists within the Secondary Plan areas and downstream from it, then solutions are proposed

There will not be any proposed solutions for pipes that are surcharging due to backwater from SWM ponds.

Figure 5-5 and Figure 5-6 outlines the study area and the sewer pipes that experience surcharging under the minor system 5 yr and 100 yr design storm events. It is recommended that with the proposed SWM pond located in the SEQ along the south end of the quadrant, the stormwater network will need to be revised to ensure that it can convey flow to the proposed SWM pond. Further investigation is suggested to analyze the stormwater network.

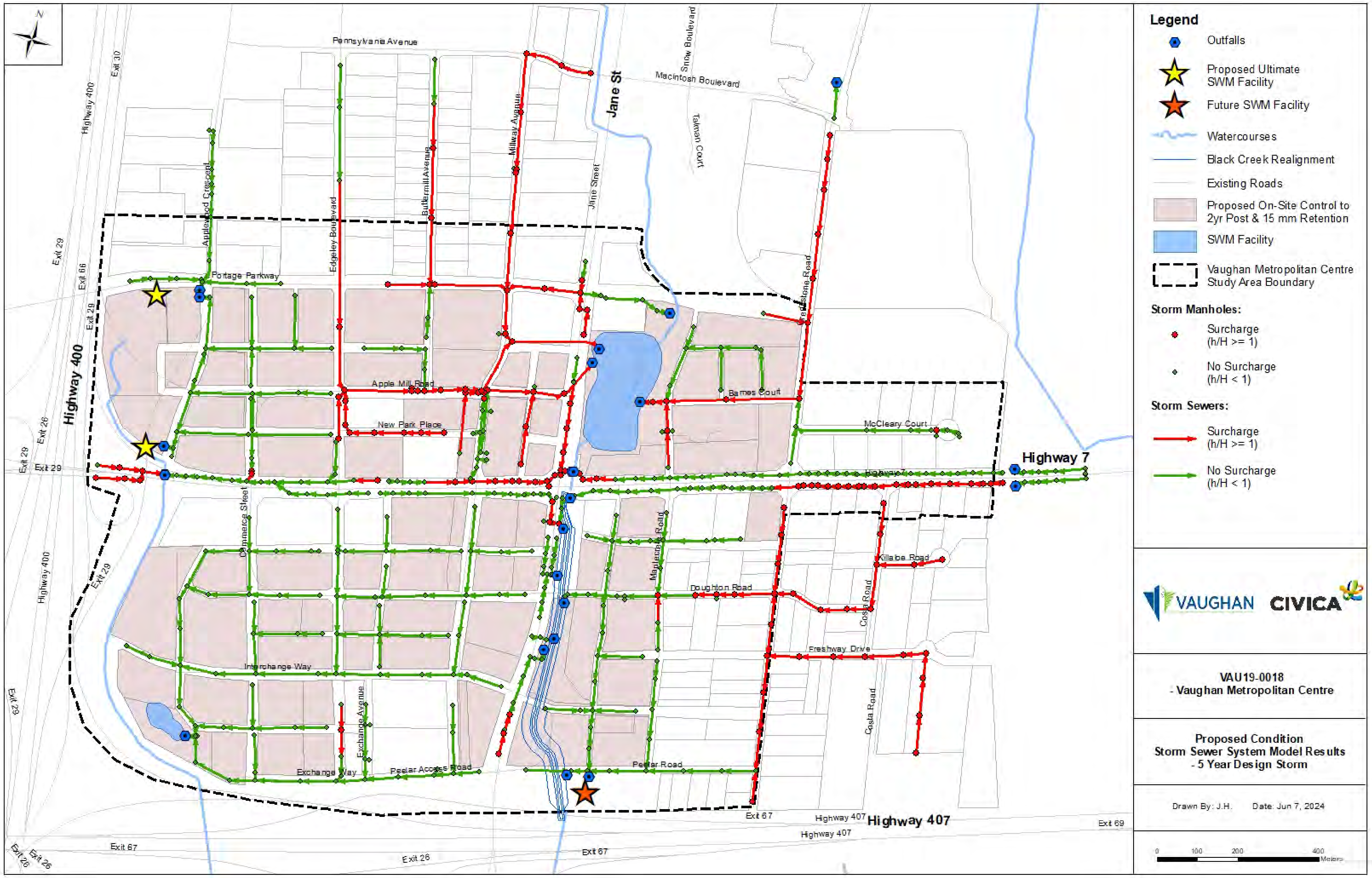

Figure 5-5: Proposed Minor Storm System under Future Conditions (5-Year Design Storm)

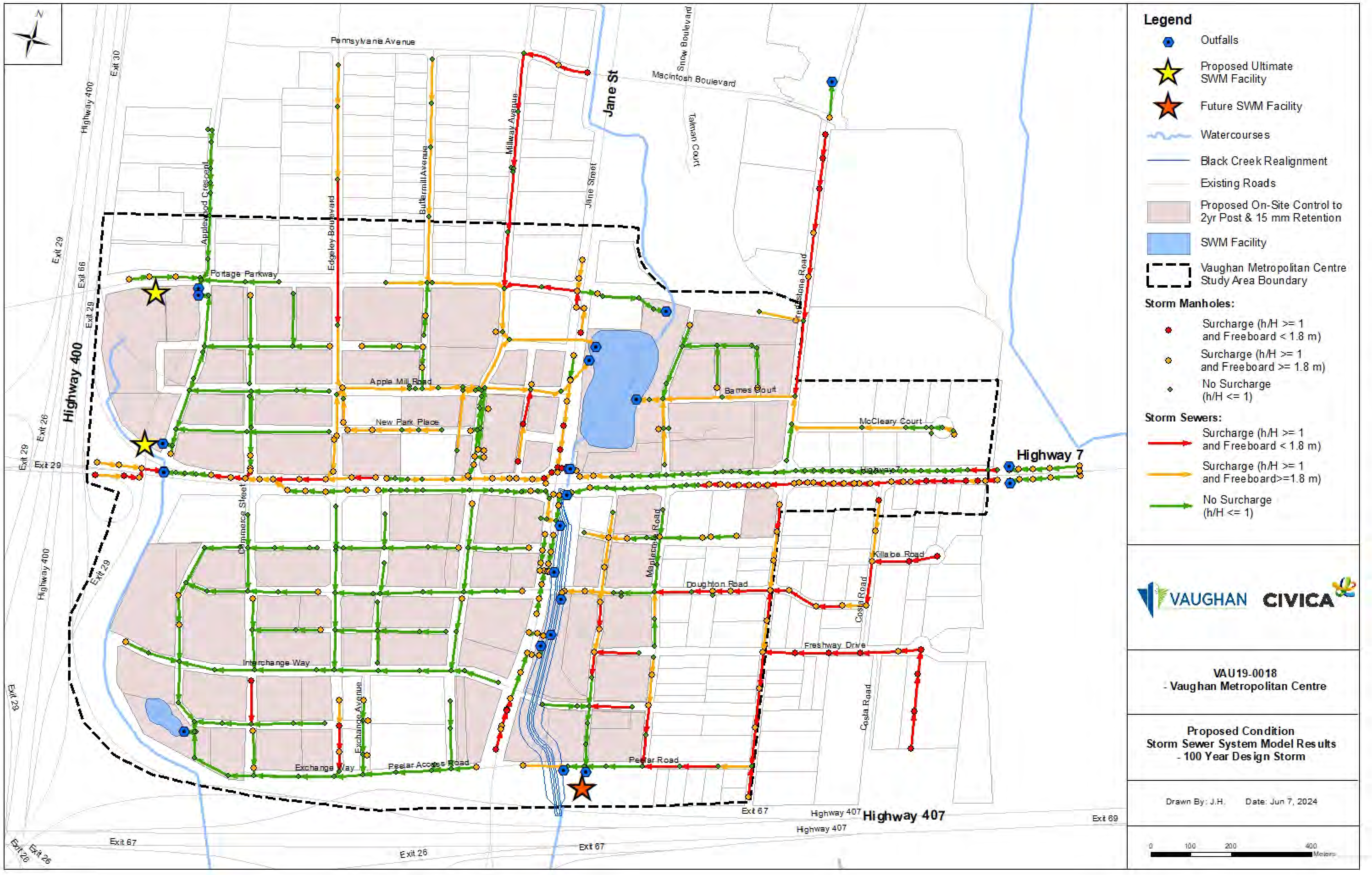

Figure 5-6: Proposed Minor Storm System under Future Conditions (100-year Design Storm)

5.10.2 Overland Flow System (Proposed Major System Solutions Under Future Conditions)

The results of the model analysis outline the overland flow depths and flooding locations under the future conditions for the proposed street network and end-of-pipe stormwater management solutions. The results of the major overland flows under the proposed ultimate VMC buildout are shown in Figure 5-7.

City ROWs are designed to convey major system runoff and direct the resulting runoff to SWM facilities before being released back into natural watercourses. The proposed street network and road classification in the VMC study area have been adapted from "Schedule C, Street Network" of the VMC Secondary Plan. The street cross-sections used to convey the future major storm event runoff are defined for each road classification from "Appendix B – Street Cross Sections" of the VMC Secondary Plan.

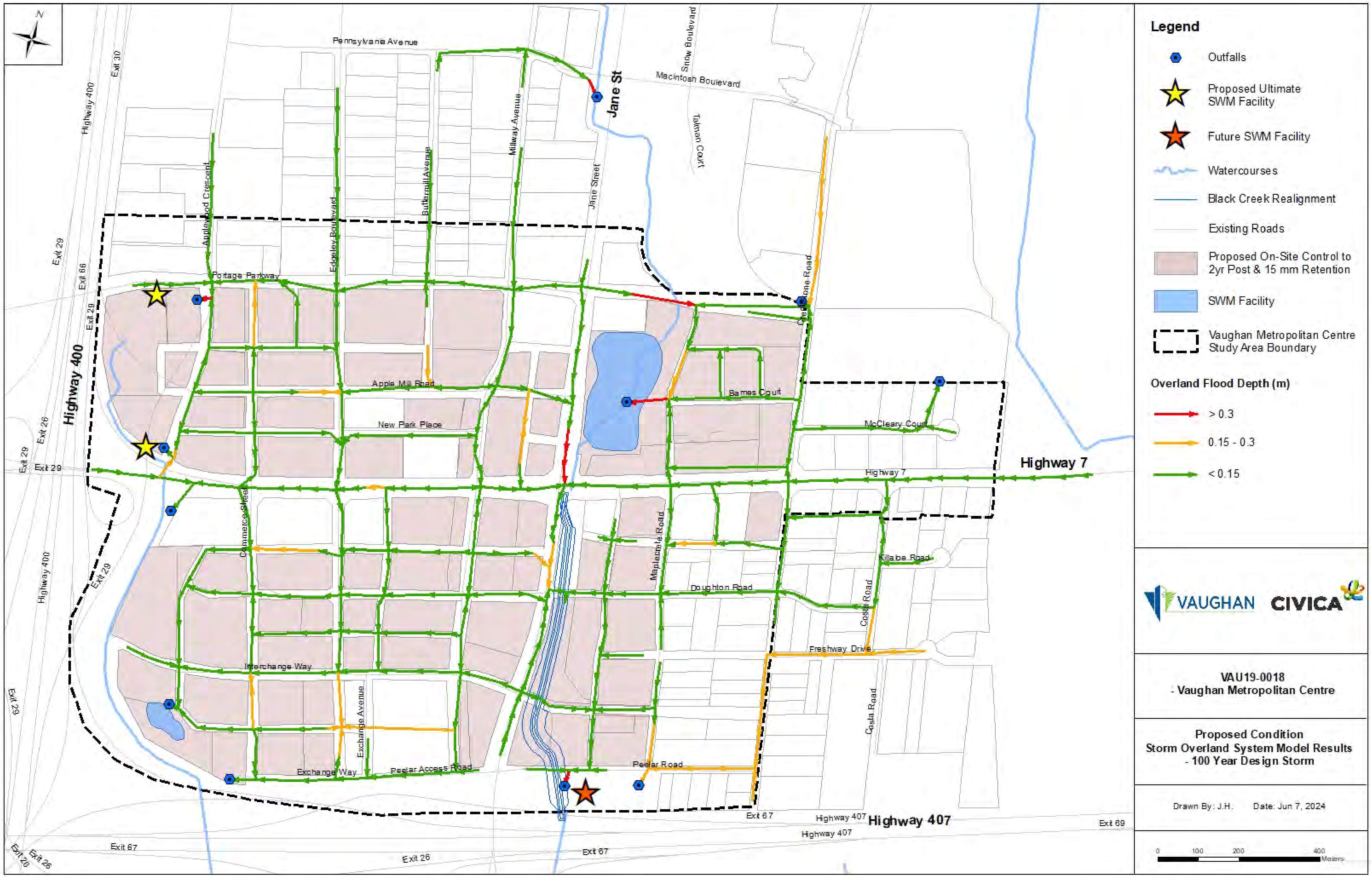

Figure 5-7: Proposed Major Storm System Under Future Conditions (100- Year Design Storm)

5.11 Proposed Solutions

Figure 5-8 shows the proposed stormwater servicing solutions for the VMC study area. The proposed solutions from the dual drainage analysis identify sewer capacity increase for pipes in the northwest, northeast and southeast quadrants. Two ponds in the northwest quadrant are recommended for retrofitting and a new SWM pond is proposed in the southeast quadrant. The new pipes identified in the Figure 5-8 are a part of the City's Secondary Plan. These pipes will be built when the roads are constructed. The new pipes were modelled under the proposed conditions and no deficiencies were observed and performed to meet the City's criteria.

Figure 5-9 and Figure 5-10 show the performance of the proposed solutions for the 5 – year and 100 – year design storm event. As shown in the figure the system can convey stormwater under future conditions. Pipes that indicate to be surcharging in the figure are due to backwater received from the ponds. The pipes are not surcharging due to inadequate storage capacity.

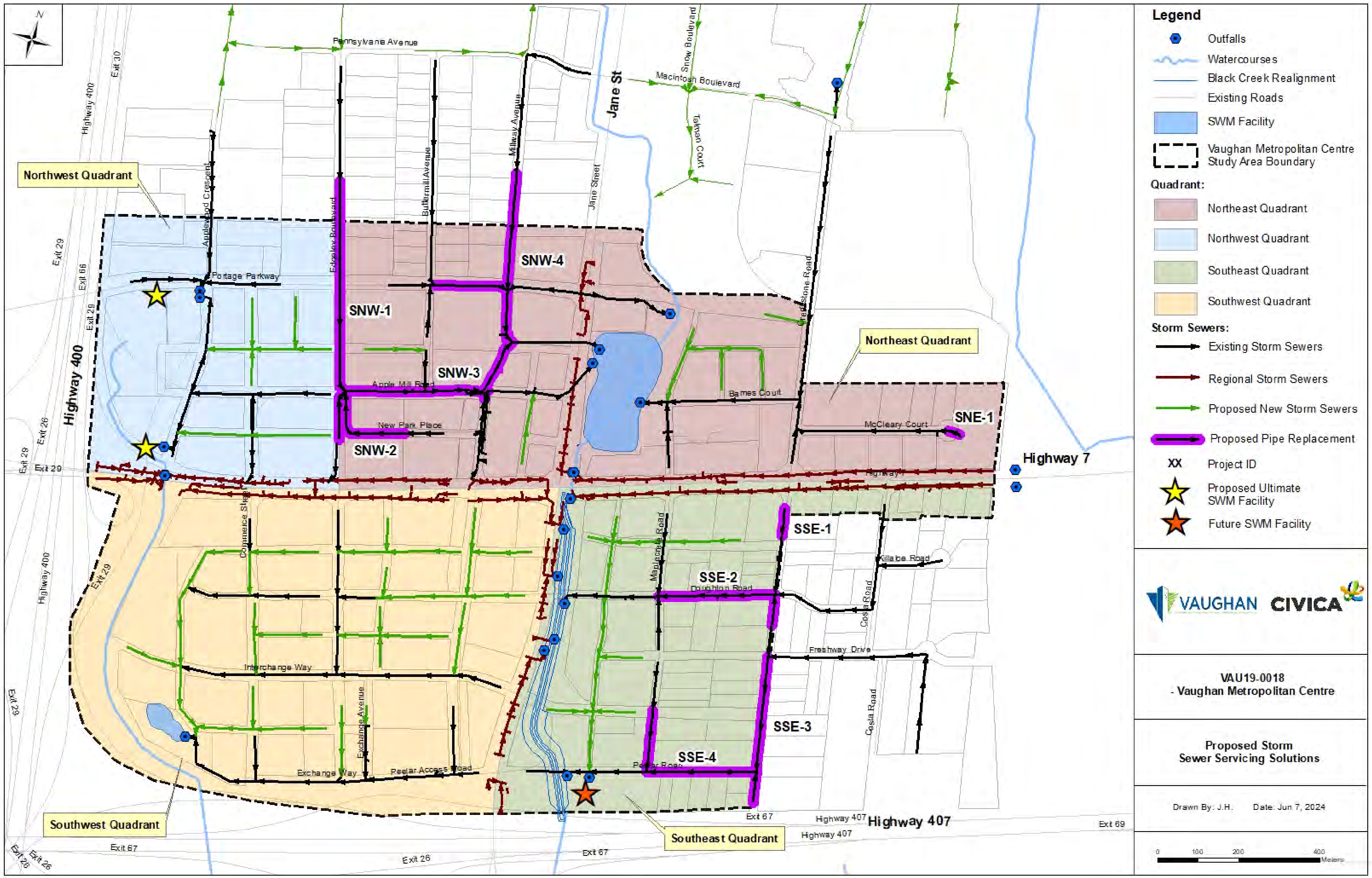

Figure 5-8: Proposed Stormwater Servicing Solutions

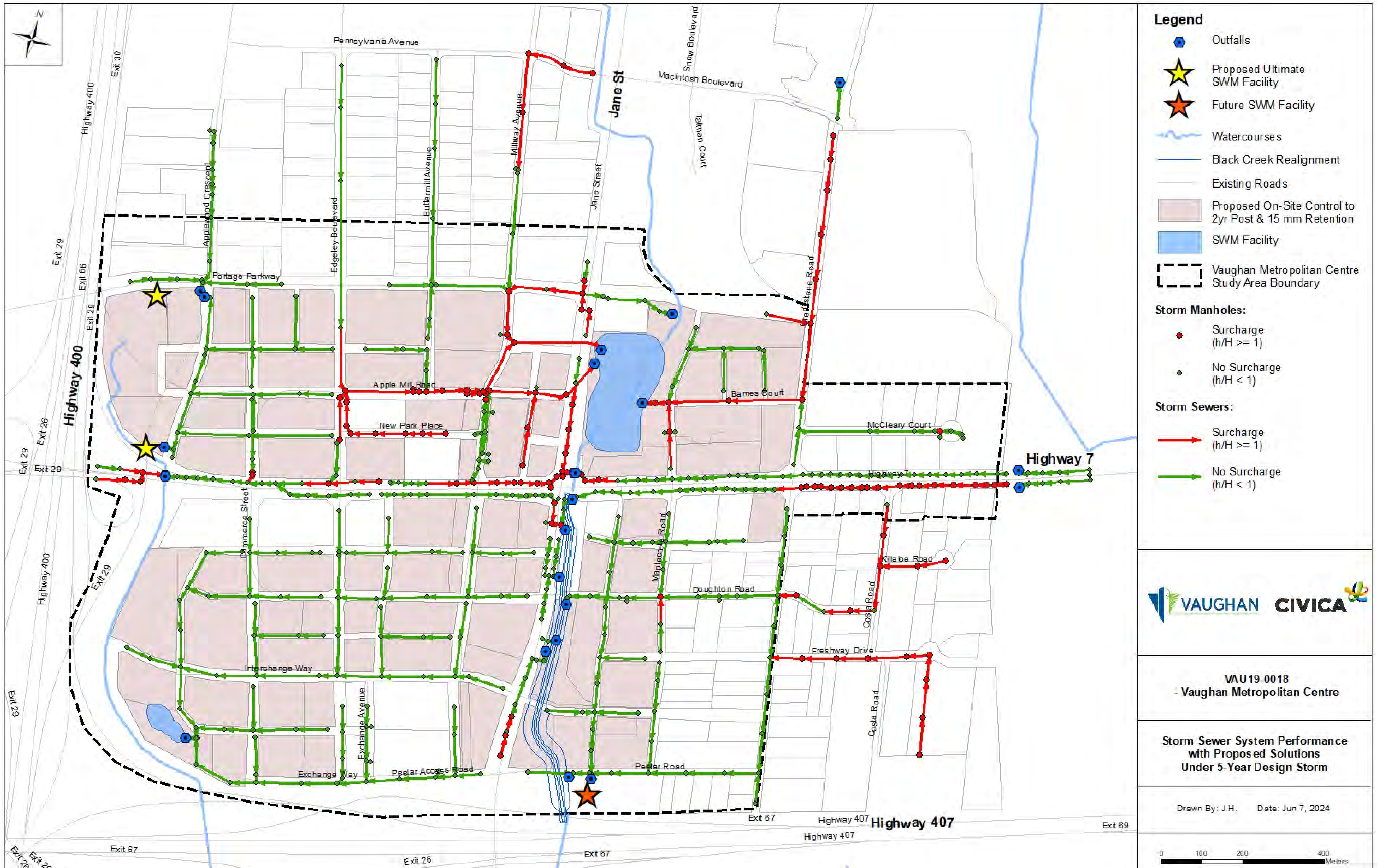

Figure 5-9: Storm Sewer System Performance with Proposed Solutions Under 5-Year Design Storm

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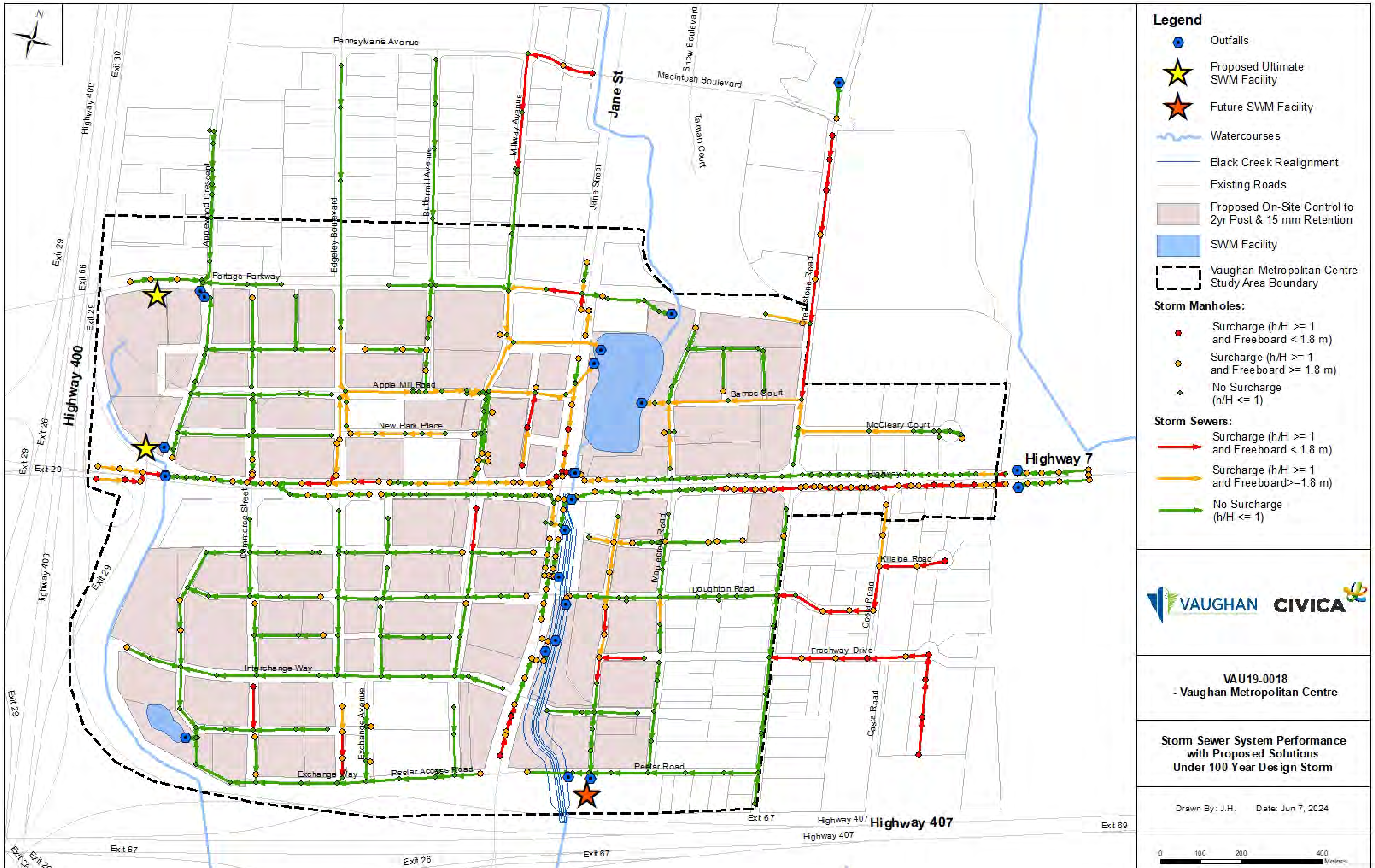

Figure 5-10: Storm Sewer System Performance with Proposed Solutions Under 100-Year Design Storm

5.12 Climate Change Sensitivity Analysis

A climate change sensitivity analysis was conducted using the City's design criteria based on the August 19, 2005, storm event. The results of this analysis of the proposed solution are presented in Figure 5-11 *and* Figure 5-12*.*

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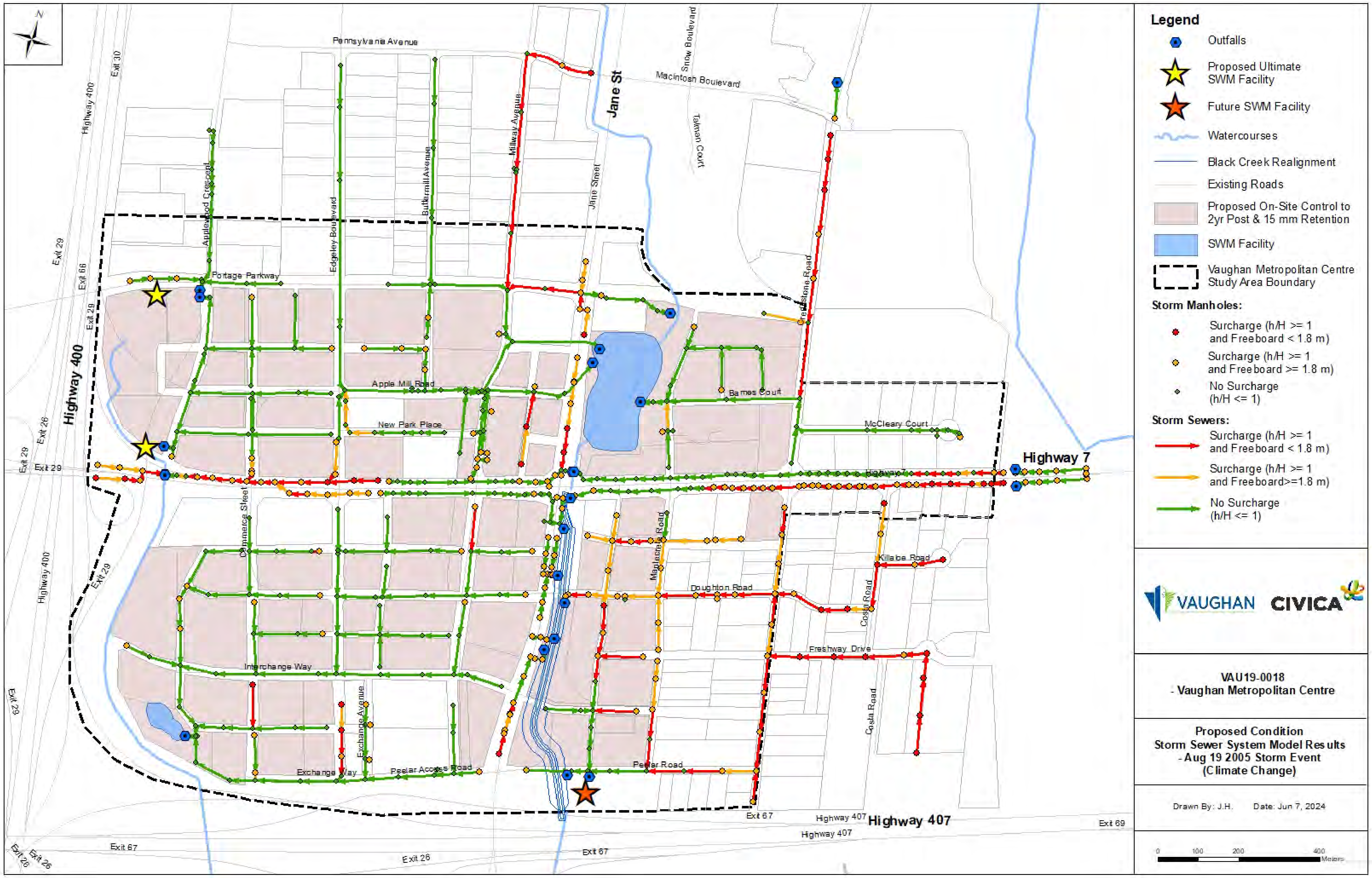

Figure 5-11: Climate Change(August 19, 2005) Sensitivity Proposed Condition Minor System -

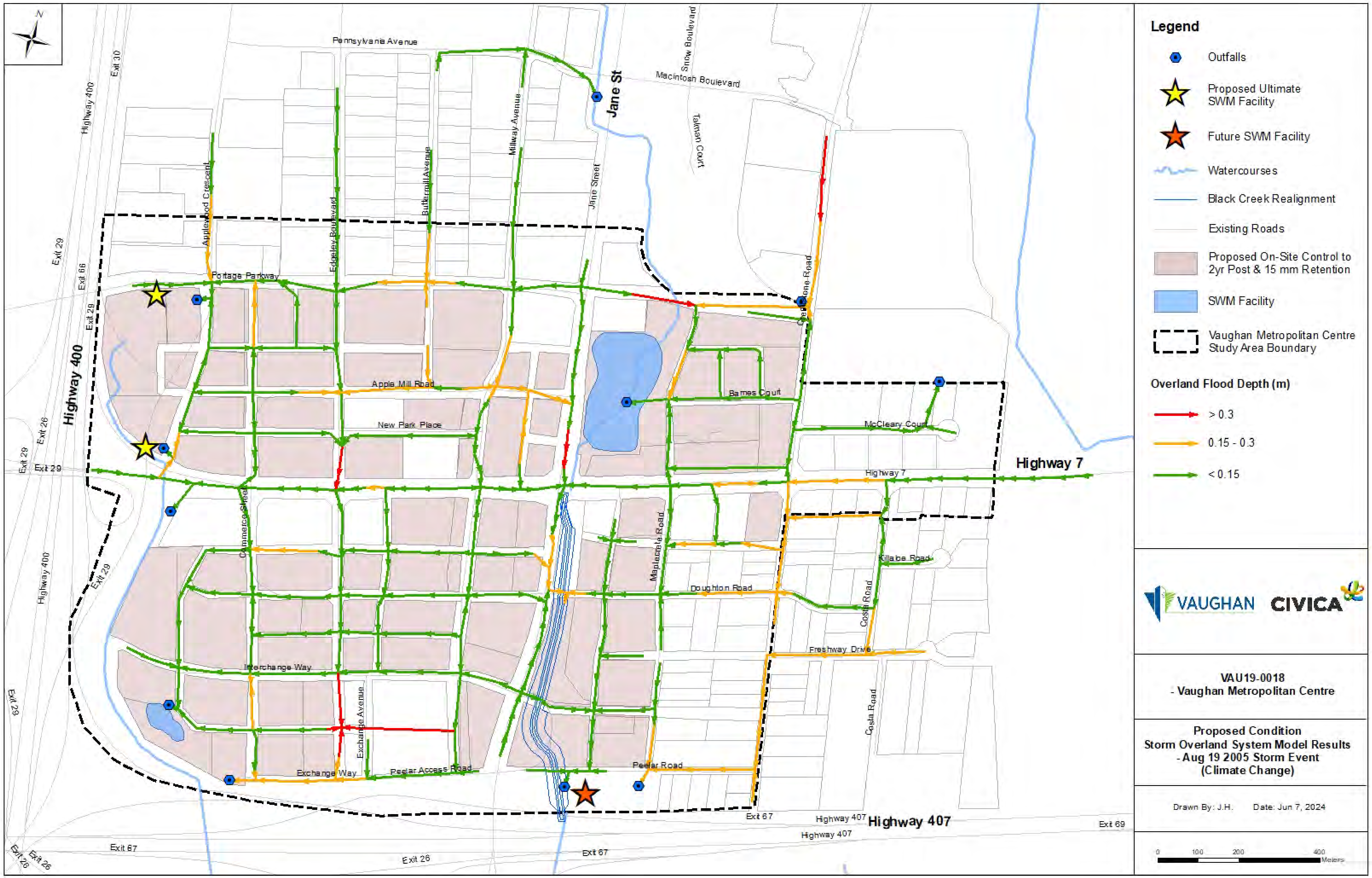

Figure 5-12: Climate Change (August 19, 2005) Sensitivity Proposed Condition Overland System

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6.0 Cost and Timing

Table 6-1 summarizes the recommended capital projects to accommodate future growth including timing, cost and the applicable environmental assessment project schedule. Details of each project cost can be found in Appendix A.

Table 6-1: Cost Estimate for the Proposed Stormwater Solutions

Project	Description	Total Cost (2024)	Completed By	EA Schedule
SNE-1	101m of 525mm	$600,000	2028-2036	Exempt
SNW-1	283m of 1,800mm	$2,500,000	2028-2036	Exempt
SNW-2	234m of 975, 283m of 1,200mm	$2,500,000	2028-2036	Exempt
SNW-3	508m ranging from 675mm to 2,400mm	$5,000,000	2028-2036	Exempt
SNW-4	580m ranging from 1,500mm to 2,400mm	$6,600,000	2028-2036	Exempt
SSE-1	70m of 600mm	$200,000	2028-2036	Exempt
SSE-2	77m of 450mm, 50m of 600mm, 237m of 1,350mm	$1,500,000	2028-2036	Exempt
SSE-3	77m of 600mm, 92m of 1,200mm, 194m of 1,350mm	$1,500,000	2028-2036	Exempt
SSE-4	153m of 675mm, 270m of 1,500mm	$2,600,000	2028-2036	Exempt
Northwest Quadrant	91 m of 300mm, 115m of 325mm, 93 of 375mm, 219m of 450 mm, 254 of 600 mm, 105m of 750mm, 199m of 825mm, 199m of 975mm and 173m of 1050mm	$10,400,000	2028-2036	Schedule B
Northeast Quadrant	55 m of 300mm, 104m of 525mm, 199 m of 975mm, 139m of 1050mm, 98m of 1350mm	$11,100,000	2028-2036	Schedule B
Southeast Quadrant	216 m of 300mm, 61.5m of 450mm, 687.4 m of 525mm, 118.4 m of 600mm, 72.4m of 900mm, 93m of 1200mm and 54m of 1350 mm	$8,700,000	2028-2036	Schedule B
Southwest Quadrant	184.6m of 300mm, 232 m of 375mm, 614.3m of 450mm, 463m of 525mm, 787.5 m of 600mm, 597m of 675mm, 414m of 752mm, 98.3m of 825mm, 185m of 900mm, 16.7m of 975mm, 197m of 1200mm and 185m of 2250mm	$15,300,000	2028-2036	Schedule B
Total		**$68,500,000**		

Appendix A Cost Estimates

Project ID

SNE-1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 525 mm pipe, over 4.0 m to 5.0 m in depth	m	101.1	$2,728.07	$275,808
Subtotal					**$275,808**
Construction Allowances and Contingency					
	Construction Contingency	10%			$27,581
Base cost Sum					**$303,389**
Engineering and Management					
	Engineering Planning	4%			$12,136
	Engineering Design	10%			$30,339
	Engineering Construction Services	10%			$30,339
	City Program Management	3%			$9,102
	Dense Urban Factor	5%			$15,169
Support Cost Sum					**$97,084**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$100,118
Total Project Estimate (2024 dollars)					**$500,592**

Project ID

S2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 1800 mm pipe, over 4.0 m to 5.0 m in depth	m	283	$4,831.37	$1,367,278
Subtotal					**$1,367,278**
Construction Allowances and Contingency					
	Construction Contingency	10%			$136,728
Base cost Sum					**$1,504,005**
Engineering and Management					
	Engineering Planning	4%			$60,160
	Engineering Design	10%			$150,401
	Engineering Construction Services	10%			$150,401
	City Program Management	3%			$45,120
	Dense Urban Factor	5%			$75,200
Support Cost Sum					**$481,282**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$496,322
Total Project Estimate (2024 dollars)					**$2,481,609**

Project ID

SNW-2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 975 mm pipe, over 3.0 m to 4.0 m in depth	**m**	79	$3,058.29	$241,605
	Supply and install 975 mm pipe, over 4.0 m to 5.0 m in depth	**m**	154.7	$4,061.62	$628,332
	Supply and install 1200 mm pipe, over 4.0 m to 5.0 m in depth	m	283	$4,831.37	$1,367,278
Subtotal					**$1,367,278**
Construction Allowances and Contingency					
	Construction Contingency	10%			$136,728
Base cost Sum					**$1,504,005**
Engineering and Management					
	Engineering Planning	4%			$60,160
	Engineering Design	10%			$150,401
	Engineering Construction Services	10%			$150,401
	City Program Management	3%			$45,120
	Dense Urban Factor	5%			$75,200
Support Cost Sum					**$481,282**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$496,322
Total Project Estimate (2024 dollars)					**$2,481,609**

Project ID

SNW-3

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 975 mm pipe, over 4.0 m to 5.0 m in depth	**m**	165.3	$3,058.29	$505,536
	Supply and install 2100 mm pipe, over 4.0 m to 5.0 m in depth	m	32.1	$6,039.21	$193,859
	Supply and install 675 mm pipe, over 5.0 m to 6.0 m in depth	m	13.6	$3,539.25	$48,134
	Supply and install 1050 mm pipe, over 5.0 m to 6.0 m in depth	m	10.3	$4,602.40	$47,405
	Supply and install 2100 mm pipe, over 5.0 m to 6.0 m in depth	m	141.3	$6,508.08	$919,592
	Supply and install 2400 mm pipe, over 6.0 m to 7.0 m in depth	m	145.4	$6,976.95	$1,014,449
Subtotal					$2,728,974
Construction Allowances and Contingency					
	Construction Contingency	10%			$272,897
Base cost Sum					**$3,001,871**
Engineering and Management					
	Engineering Planning	4%			$120,075
	Engineering Design	10%			$300,187
	Engineering Construction Services	10%			$300,187
	City Program Management	3%			$90,056
	Dense Urban Factor	5%			$150,094
Support Cost Sum					**$960,599**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$990,617
Total Project Estimate (2024 dollars)					**$4,953,087**

Project ID

SNW-4

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 1500 mm pipe, over 5.0 m to 6.0 m in depth	m	290.4	$5,727.11	$1,663,153
	Supply and install 2100 mm pipe, over 5.0 m to 6.0 m in depth	m	182.6	$6,508.08	$1,188,376
	Supply and install 2400 mm pipe, over 6.0 m to 7.0 m in depth	m	106.8	$6,976.95	$745,138
Subtotal					**$3,596,667**
Construction Allowances and Contingency					
	Construction Contingency	10%			$359,667
Base cost Sum					**$3,956,334**
Engineering and Management					
	Engineering Planning	4%			$158,253
	Engineering Design	10%			$395,633
	Engineering Construction Services	10%			$395,633
	City Program Management	3%			$118,690
	Dense Urban Factor	5%			$197,817
Support Cost Sum					**$1,266,027**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$1,305,590
Total Project Estimate (2024 dollars)					**$6,527,951**

Project ID

SSE-1

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 600 mm pipe, over 2.0 m to 3.0 m in depth	m	67.5	$1,357.71	$91,645
Subtotal					**$91,645**
Construction Allowances and Contingency					
	Construction Contingency	10%			$9,165
Base cost Sum					**$100,810**
Engineering and Management					
	Engineering Planning	4%			$4,032
	Engineering Design	10%			$10,081
	Engineering Construction Services	10%			$10,081
	City Program Management	3%			$3,024
	Dense Urban Factor	5%			$5,040
Support Cost Sum					**$32,259**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$33,267
Total Project Estimate (2024 dollars)					**$166,336**

Project ID

SSE-2

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 450 mm pipe, over 2.0 m to 3.0 m in depth	m	76.8	$1,157.50	$88,896
	Supply and install 600 mm pipe, over 3.0 m to 4.0 m in depth	m	52	$1,993.99	$103,687
	Supply and install 1350 mm pipe, over 3.0 m to 4.0 m in depth	m	236.2	$3,326.15	$785,638
Subtotal					**$785,638**
Construction Allowances and Contingency					
	Construction Contingency	10%			$78,564
Base cost Sum					**$864,201**

Engineering and Management					
	Engineering Planning	4%			$34,568
	Engineering Design	10%			$86,420
	Engineering Construction Services	10%			$86,420
	City Program Management	3%			$25,926
	Dense Urban Factor	5%			$43,210
Support Cost Sum					**$276,544**

Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$285,186
Total Project Estimate (2024 dollars)					**$1,425,932**

Project ID

SSE-3

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 600 mm pipe, over 2.0 m to 3.0 m in depth	m	77	$1,357.71	$104,544
	Supply and install 1200 mm pipe, over 3.0 m to 4.0 m in depth	m	91.6	$3,768.22	$345,168
	Supply and install 1350 mm pipe, over 3.0 m to 4.0 m in depth	m	193.9	$4,145.04	$803,723
Subtotal					**$803,723**
Construction Allowances and Contingency					
	Construction Contingency	10%			$80,372
Base cost Sum					**$884,095**
Engineering and Management					
	Engineering Planning	4%			$35,364
	Engineering Design	10%			$88,409
	Engineering Construction Services	10%			$88,409
	City Program Management	3%			$26,523
	Dense Urban Factor	5%			$44,205
Support Cost Sum					**$282,910**
Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$291,751
Total Project Estimate (2024 dollars)					**$1,458,756**

Project ID

SSE-4

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 675 mm pipe, over 2.0 m to 3.0 m in depth	m	153.4	$1,706.34	$261,753
	Supply and install 1500 mm pipe, over 3.0 m to 4.0 m in depth	m	270.9	$4,145.04	$1,122,890
Subtotal					**$1,384,643**
Construction Allowances and Contingency					
	Construction Contingency	10%			$138,464
Base cost Sum					**$1,523,107**

Engineering and Management					
	Engineering Planning	4%			$60,924
	Engineering Design	10%			$152,311
	Engineering Construction Services	10%			$152,311
	City Program Management	3%			$45,693
	Dense Urban Factor	5%			$76,155
Support Cost Sum					**$487,394**

Land for PS if Required					
	Station Design Capacity	L/s			$0
Contingency					
	Class D Estimate Contingency	25%			$502,625
Total Project Estimate (2024 dollars)					**$2,513,127**

Project ID
Northwest Quadrant

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 300 mm pipe, over 3.0 m to 4.0 m in depth	m	91	$1,640.76	$149,309
	Supply and install 450 mm pipe, over 2.0 m to 3.0 m in depth	m	46	$1,157.50	$53,245
	Supply and install 600 mm pipe, over 3.0 m to 4.0 m in depth	m	254	$1,993.99	$506,473
	Supply and install 750 mm pipe, over 3.0 m to 4.0 m in depth	m	105	$2,527.87	$265,426
	Supply and install 825 mm pipe, over 3.0 m to 4.0 m in depth	m	199	$2,679.75	$533,270
	Supply and install 975 mm pipe, over 3.0 m to 4.0 m in depth	m	173	$3,058.29	$529,085
	Supply and install 1050 mm pipe, over 4.0 m to 5.0 m in depth	m	109	$4,256.07	$463,912
	Storm Pond Construction	m3	33580	$100.00	$3,358,000
Subtotal					**$5,709,411**
Construction Allowances and Contingency					
	Construction Contingency	10%			$570,941
Base cost Sum					**$6,280,352**
Engineering and Management					
	Engineering Planning	4%			$251,214
	Engineering Design	10%			$628,035
	Engineering Construction Services	10%			$628,035
	City Program Management	3%			$188,411
	Dense Urban Factor	5%			$314,018
Support Cost Sum					**$2,009,713**
Land for Pond if Required					
Contingency					
	Class D Estimate Contingency	25%			$2,072,516
Total Project Estimate (2024 dollars)					**$10,362,581**

Project ID

Northeast Quadrant

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 300 mm pipe, over 2.0 m to 3.0 m in depth	m	55	$1,033.24	$56,828
	Supply and install 375 mm pipe, over 2.0 m to 3.0 m in depth	m	93	$1,156.35	$107,541
	Supply and install 325 mm pipe, over 3.0 m to 4.0 m in depth	m	115	$1,640.76	$188,687
	Supply and install 450 mm pipe, over 2.0 m to 3.0 m in depth	m	58	$2,614.16	$151,621
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	115	$2,614.16	$300,629
	Supply and install 525 mm pipe, over 2.0 m to 3.0 m in depth	m	104	$1,227.69	$127,680
	Supply and install 600 mm pipe, over 2.0 m to 3.0 m in depth	m	102	$1,357.71	$138,486
	Supply and install 975 mm pipe, over 4.0 m to 5.0 m in depth	m	112	$4,061.62	$454,901
	Supply and install 975 mm pipe, over 2.0 m to 3.0 m in depth	m	87	$2,371.39	$206,311
	Supply and install 1050 mm pipe, over 2.0 m to 3.0 m in depth	m	139	$2,527.87	$351,374
	Supply and install 1350 mm pipe, over 2.0 m to 3.0 m in depth	m	98	$6,624.97	$649,247
Subtotal					**$6,100,000**
Construction Allowances and Contingency					
	Construction Contingency	10%			$610,000
Base cost Sum					**$6,710,000**
Engineering and Management					
	Engineering Planning	4%			$268,400
	Engineering Design	10%			$671,000
	Engineering Construction Services	10%			$671,000
	City Program Management	3%			$201,300
	Dense Urban Factor	5%			$335,500
Support Cost Sum					**$2,147,200**
Land for Pond if Required					

	Pond Design Capacity	L/s	$0
Contingency			
	Class D Estimate Contingency	25%	$2,214,300
Total Project Estimate (2024 dollars)			**$11,071,500**

CIVICA Water Management Solutions

Project ID

Southeast Quadrant

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 300 mm pipe, over 3.0 m to 4.0 m in depth	m	110	$1,640.76	$180,483
	Supply and install 300 mm pipe, over 4.0 m to 5.0 m in depth	m	106	$2,464.59	$261,246
	Supply and install 450 mm pipe, over 2.0 m to 3.0 m in depth	m	61.5	$1,157.50	$71,186
	Supply and install 525 mm pipe, over 2.0 m to 3.0 m in depth	m	574	$1,227.69	$704,694
	Supply and install 525 mm pipe, over 3.0 m to 4.0 m in depth	m	86	$1,855.92	$159,609
	Supply and install 525 mm pipe, over 4.0 m to 5.0 m in depth	m	27.4	$2,728.07	$74,749
	Supply and install 600 mm pipe, over 2.0 m to 3.0 m in depth	m	57	$1,357.71	$77,389
	Supply and install 600 mm pipe, over 3.0 m to 4.0 m in depth	m	61.4	$1,993.99	$122,431
	Supply and install 900 mm pipe, over 4.0 m to 5.0 m in depth	m	72.4	$3,884.43	$281,232
	Supply and install 1200 mm pipe, over 4.0 m to 5.0 m in depth	m	53	$4,831.37	$256,063
	Supply and install 1200 mm pipe, over 5.0 m to 6.0 m in depth	m	40	$4,831.37	$193,255
	Supply and install 1350 mm pipe, over 4.0 m to 5.0 m in depth	m	54	$6,805.73	$367,509
	Storm Pond Construction m3	20000	$100.00	$2,000,000	
Subtotal					$4,749,847
Construction Allowances and Contingency					
	Construction Contingency	10%			$474,985
Base cost Sum					**$5,224,832**

Engineering and Management					
	Engineering Planning	4%			$208,993
	Engineering Design	10%			$522,483
	Engineering Construction Services	10%			$522,483
	City Program Management	3%			$156,745
	Dense Urban Factor	5%			$261,242

Support Cost Sum		**$1,671,946**
Land for Pond if Required		
Contingency		
Class D Estimate Contingency	25%	$1,724,195
Total Project Estimate (2024 dollars)		**$8,620,973**

Project ID

Southwest Quadrant

Reference	Description	Unit	Quantity	Est. Cost	Amount
Construction					
	Supply and install 300 mm pipe, over 2.0 m to 3.0 m in depth	m	156	$1,033.24	$161,185
	Supply and install 300 mm pipe, over 3.0 m to 4.0 m in depth	m	28.6	$1,640.76	$46,926
	Supply and install 375mm pipe, over 2.0 m to 3.0 m in depth	m	60.3	$1,156.35	$69,728
	Supply and install 375 mm pipe, over 3.0 m to 4.0 m in depth	m	107.1	$1,771.92	$189,773
	Supply and install 375 mm pipe, over 5.0 m to 6.0 m in depth	m	64.7	$2,788.48	$180,415
	Supply and install 450 mm pipe, over 2.0 m to 3.0 m in depth	m	305.3	$1,157.50	$353,386
	Supply and install 450 mm pipe, over 3.0 m to 4.0 m in depth	m	149	$1,778.83	$265,045
	Supply and install 450 mm pipe, over 4.0 m to 5.0 m in depth	m	160	$2,614.16	$418,266
	Supply and install 525 mm pipe, over 2.0 m to 3.0 m in depth	m	359	$1,227.69	$440,741
	Supply and install 525 mm pipe, over 5.0 m to 6.0 m in depth	m	104	$2,942.66	$306,037
	Supply and install 600 mm pipe, over 2.0 m to 3.0 m in depth	m	458	$1,357.71	$621,830
	Supply and install 600 mm pipe, over 3.0 m to 4.0 m in depth	m	151.5	$1,993.99	$302,089
	Supply and install 600 mm pipe, over 4.0 m to 5.0 m in depth	m	178	$2,879.95	$512,631
	Supply and install 675 mm pipe, over 2.0 m to 3.0 m in depth	m	259	$1,706.34	$441,942
	Supply and install 675 mm pipe, over 3.0 m to 4.0 m in depth	m	229	$2,358.73	$540,149
	Supply and install 675 mm pipe, over 4.0 m to 5.0 m in depth	m	109	$3,278.06	$357,308
	Supply and install 750 mm pipe, over 2.0 m to 3.0 m in depth	m	414	$1,867.42	$773,113
	Supply and install 825 mm pipe, over 5.0 m to 6.0 m in depth	m	98.3	$3,969.57	$390,209

	Supply and install 900 mm pipe, over 2.0 m to 3.0 m in depth	m	78	$2,219.51	$173,122
	Supply and install 900 mm pipe, over 5.0 m to 6.0 m in depth	m	107	$4,197.39	$449,121
	Supply and install 975 mm pipe, over 6.0 m to 7.0 m in depth	m	16.7	$4,724.36	$78,897
	Supply and install 1200 mm pipe, over 2.0 m to 3.0 m in depth	m	197	$3,023.78	$595,684
	Supply and install 2250 mm pipe, over 3.0 m to 4.0 m in depth	m	160	$3,965.83	$634,533
	Supply and install 2250 mm pipe, over 4.0 m to 5.0 m in depth	m	25	$4,976.06	$124,401
Subtotal					$8,426,532
Construction Allowances and Contingency					
	Construction Contingency	10%			$842,653
Base cost Sum					**$9,269,185**
Engineering and Management					
	Engineering Planning	4%			$370,767
	Engineering Design	10%			$926,918
	Engineering Construction Services	10%			$926,918
	City Program Management	3%			$278,076
	Dense Urban Factor	5%			$463,459
Support Cost Sum					**$2,966,139**
Land for Pond if Required					
	Pond Design Capacity	m3			$0
Contingency					
	Class D Estimate Contingency	25%			$3,058,831
Total Project Estimate (2024 dollars)					**$15,294,155**

Appendix B VO Model Outputs

Appendix

Contents

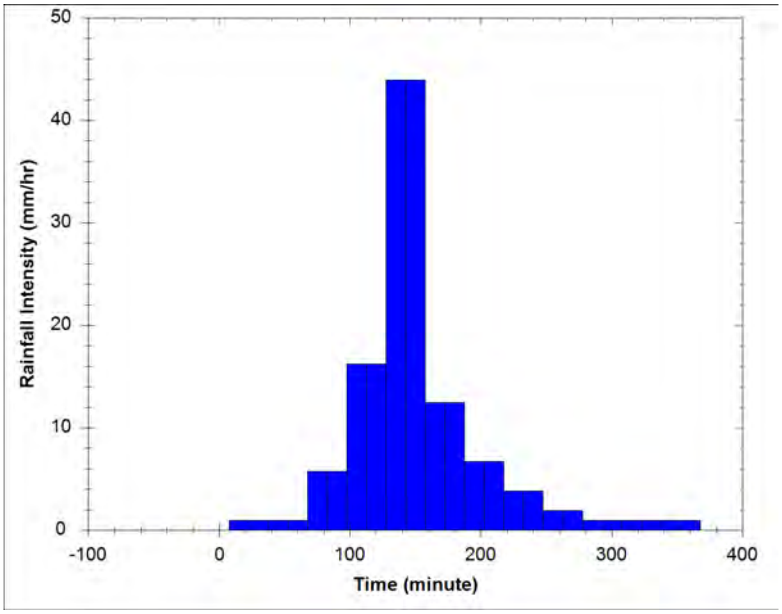

Figure 1. 5 yr- 6 hr AES Storm.

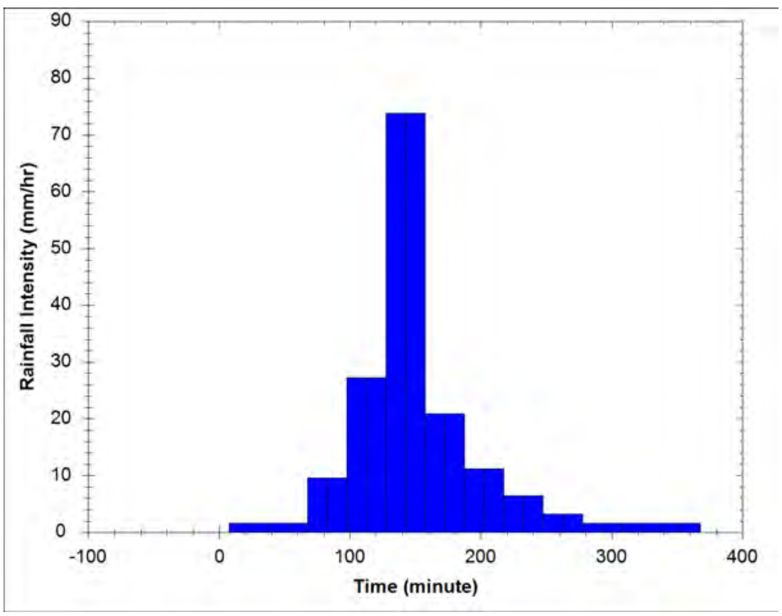

Figure 2. 100 yr- 6 hr AES Storm.

VMC - 5yr- 6hr Storm- Existing Condition

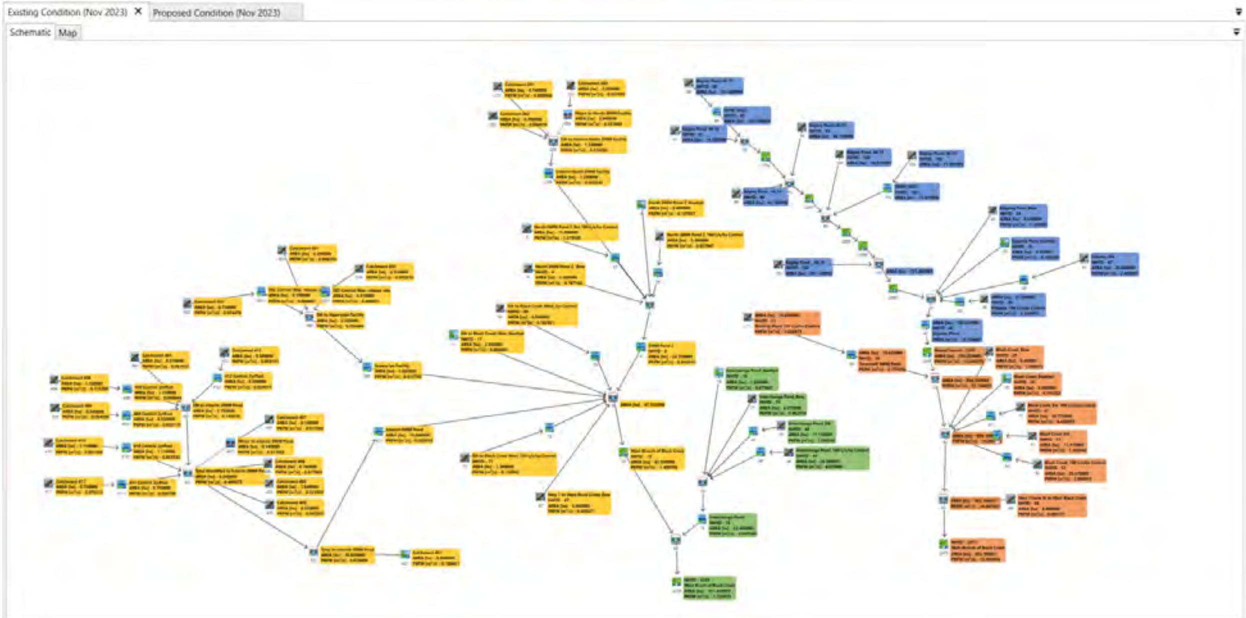

Figure 3. VMC - 5yr- 6hr Storm- Existing Condition.

```
=====================================================================================================

      V    V   I    SSSSS  U    U    A    L              (v 6.2.2013)
      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: D:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\42c587f1-e443-4
  Summary filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\42c587f1-e443-4

DATE: 06/18/2024                          TIME: 11:03:23

USER:

COMMENTS: ____________________________________________________________

-----------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5yr                          **
  ************************************************

--------------------
|    READ STORM     |    Filename: C:\Users\rhe\AppData\
|                   |              Local\Temp\
|                   |              5ba76906-13ea-4b66-90ff-302ac1cad32c\10b1293c
| Ptotal= 47.81 mm  |    Comments: 5 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    0.00 |  1.75   16.25 |   3.50    6.69 |  5.25    0.96
                 0.25    0.96 |  2.00   16.25 |   3.75    3.82 |  5.50    0.96
                 0.50    0.96 |  2.25   43.98 |   4.00    3.82 |  5.75    0.96
                 0.75    0.96 |  2.50   43.98 |   4.25    1.91 |  6.00    0.96
                 1.00    0.96 |  2.75   12.43 |   4.50    1.91 |
                 1.25    5.74 |  3.00   12.43 |   4.75    0.96 |
                 1.50    5.74 |  3.25    6.69 |   5.00    0.96 |

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

--------------------
| CALIB             |
| NASHYD   (  0002) |   Area    (ha)=   5.48   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min  |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=   0.58

         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
```

```
             1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
             1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
             1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
             1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Unit Hyd Qpeak  (cms)=    0.361

     PEAK FLOW       (cms)=    0.137 (i)
     TIME TO PEAK    (hrs)=    3.333
     RUNOFF VOLUME    (mm)=   16.611
     TOTAL RAINFALL   (mm)=   47.810
     RUNOFF COEFFICIENT   =    0.347

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=    5.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.93          0.55
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    191.14         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
             0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
             0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
             0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
             0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
             0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
             0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
             0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
             0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
             0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
             0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
             1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
             1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
             1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
             1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
             1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
             1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
             1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         27.63
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        5.23 (ii)     9.30 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.21          0.12
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.60          0.04         0.638 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=       46.81         23.53         44.48
     TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
     RUNOFF COEFFICIENT   =        0.98          0.49          0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0058)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.9860     0.0802

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
```

```
   INFLOW : ID= 2 (  0001)       5.480       0.638       2.75       44.48
   OUTFLOW: ID= 1 (  0058)       5.480       0.556       2.75       44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.20
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0465

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0003)|    Area     (ha)=  11.09
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       9.98         1.11
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     271.91        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98        27.63
                over (min)        5.00        15.00
     Storage Coeff.  (min)=        6.47 (ii)   10.54 (ii)
     Unit Hyd. Tpeak (min)=        5.00        15.00
     Unit Hyd. peak  (cms)=        0.18         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.21         0.07        1.279 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.83         2.75
     RUNOFF VOLUME    (mm)=       46.81        23.53        44.48
     TOTAL RAINFALL   (mm)=       47.81        47.81        47.81
     RUNOFF COEFFICIENT   =        0.98         0.49         0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0057)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   1.9960     0.1535

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0003)      11.090     1.279       2.75       44.48
   OUTFLOW: ID= 1 (  0057)      11.090     1.114       2.75       44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.09
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0882

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| CALIB              |
| STANDHYD (  0004)|    Area    (ha)=   1.43
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.29         0.14
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     97.64        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 | 1.667    5.74 | 3.250   12.43 |  4.83   0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92   0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00   0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08   0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17   0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25   0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33   0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42   0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50   0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58   0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67   0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75   0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83   0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92   0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00   0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08   0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17   0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25   0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98        27.63
               over (min)          5.00        10.00
     Storage Coeff.  (min)=        3.50 (ii)    7.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.26         0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.16         0.01          0.167 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.75           2.75
     RUNOFF VOLUME     (mm)=      46.81        23.53          44.48
     TOTAL RAINFALL    (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =        0.98         0.49           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0201)|    Area    (ha)=   0.74
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.73         0.01
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     70.24        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 | 1.667    5.74 | 3.250   12.43 |  4.83   0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92   0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00   0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08   0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17   0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25   0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33   0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42   0.96
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             0.750     0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833     0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917     0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000     0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083     0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167     0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250     0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333     5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417     5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500     5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583     5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         17.87
                over (min)        5.00          5.00
     Storage Coeff.  (min)=       2.87 (ii)     4.43 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.28          0.23
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.00          0.090 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=      45.81         14.38          45.49
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.96          0.30           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0202)|    Area     (ha)=   0.49
|ID= 1 DT= 5.0 min |    Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.25          0.25
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      57.15         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167     0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250     0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333     0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417     0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500     0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583     0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667     0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750     0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833     0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917     0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000     0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083     0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167     0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250     0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333     5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417     5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500     5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583     5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         16.94
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       2.54 (ii)    16.90 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.29          0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.01          0.036 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=      45.81         14.38          30.07
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.96          0.30           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0203)|    Area    (ha)=   2.95
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.92          0.03
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     140.24         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 | 1.667    5.74 | 3.250  12.43 |  4.83   0.96
               0.167    0.00 | 1.750    5.74 | 3.333   6.69 |  4.92   0.96
               0.250    0.00 | 1.833   16.25 | 3.417   6.69 |  5.00   0.96
               0.333    0.96 | 1.917   16.25 | 3.500   6.69 |  5.08   0.96
               0.417    0.96 | 2.000   16.25 | 3.583   6.69 |  5.17   0.96
               0.500    0.96 | 2.083   16.25 | 3.667   6.69 |  5.25   0.96
               0.583    0.96 | 2.167   16.25 | 3.750   6.69 |  5.33   0.96
               0.667    0.96 | 2.250   16.25 | 3.833   3.82 |  5.42   0.96
               0.750    0.96 | 2.333   43.98 | 3.917   3.82 |  5.50   0.96
               0.833    0.96 | 2.417   43.98 | 4.000   3.82 |  5.58   0.96
               0.917    0.96 | 2.500   43.98 | 4.083   3.82 |  5.67   0.96
               1.000    0.96 | 2.583   43.98 | 4.167   3.82 |  5.75   0.96
               1.083    0.96 | 2.667   43.98 | 4.250   3.82 |  5.83   0.96
               1.167    0.96 | 2.750   43.98 | 4.333   1.91 |  5.92   0.96
               1.250    0.96 | 2.833   12.43 | 4.417   1.91 |  6.00   0.96
               1.333    5.74 | 2.917   12.43 | 4.500   1.91 |  6.08   0.96
               1.417    5.74 | 3.000   12.43 | 4.583   1.91 |  6.17   0.96
               1.500    5.74 | 3.083   12.43 | 4.667   1.91 |  6.25   0.96
               1.583    5.74 | 3.167   12.43 | 4.750   1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         17.87
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       4.35 (ii)     5.91 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.23          0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.36          0.00        0.358 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      45.81         14.38        45.49
     TOTAL RAINFALL   (mm)=      47.81         47.81        47.81
     RUNOFF COEFFICIENT   =       0.96          0.30         0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  0204)|
| Inlet Cap.= 0.358|
| #of Inlets=     1|
| Total(cms)=   0.4|      AREA      QPEAK      TPEAK     R.V.
--------------------      (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):   2.95       0.36       2.75    45.49
     ========================================================
     MAJOR SYS.(ID= 2):   0.00       0.00       0.00     0.00
     MINOR SYS.(ID= 3):   2.95       0.36       2.75    45.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD   (  0205)|
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|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):      0.74   0.090     2.75    45.49
      + ID2= 2 (  0202):      0.49   0.036     2.75    30.07
        ==================================================
        ID = 3 (  0205):      1.23   0.126     2.75    39.35

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

--------------------
| ADD HYD  (  0205)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   0204 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0001 = HYDROGRAPH 0003
        ID1= 3 (  0205):      1.23   0.126     2.75    39.35
      + ID2= 2 (  0204):      0.00   0.000     0.00     0.00
        ==================================================
        ID = 1 (  0205):      1.23   0.126     2.75    39.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0206)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0500     0.0898
                          0.0280     0.0401   |   0.0830     0.2129
                          0.0410     0.0647   |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0205)      1.230      0.126       2.75       39.35
   OUTFLOW: ID= 1 (  0206)      1.230      0.023       3.50       39.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.85
                   TIME SHIFT OF PEAK FLOW         (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0323

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):      5.48   0.137     3.33    16.61
      + ID2= 2 (  0206):      1.23   0.023     3.50    39.06
        ==================================================
        ID = 3 (  0005):      6.71   0.160     3.33    20.73

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

--------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):      6.71   0.160     3.33    20.73
      + ID2= 2 (  0004):      1.43   0.167     2.75    44.48
        ==================================================
        ID = 1 (  0005):      8.14   0.256     2.75    24.90

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):      8.14   0.256     2.75    24.90
      + ID2= 2 (  0057):     11.09   1.114     2.75    44.48
        ==================================================
        ID = 3 (  0005):     19.23   1.370     2.75    36.19

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

--------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):     19.23   1.370     2.75    36.19
```

```
     + ID2= 2 (  0058):     5.48   0.556     2.75    44.48
       ==================================================
       ID = 1 (  0005):    24.71   1.927     2.75    38.03

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   1.3700     1.1250
                          0.7950     0.3050    |   2.1000     1.3480
                          0.9350     0.5080    |   3.0000     1.5700
                          1.0700     0.7100    |   4.5500     1.7980
                          1.1700     0.9180    |   6.6500     2.0250

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0005)     24.710     1.927      2.75       38.03
   OUTFLOW: ID= 1 (  0006)     24.710     0.842      3.33       38.03

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.70
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3740

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (  0011)|    Area     (ha)=    2.93   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.43

        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Unit Hyd Qpeak  (cms)=    0.260

    PEAK FLOW       (cms)=    0.087 (i)
    TIME TO PEAK    (hrs)=    3.083
    RUNOFF VOLUME    (mm)=   16.609
    TOTAL RAINFALL   (mm)=   47.810
    RUNOFF COEFFICIENT    =    0.347

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (  0401)|    Area     (ha)=    3.66   Curve Number    (CN)= 80.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    4.60   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.13

        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
```

```
            0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
            0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
            0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
            0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
            0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
            0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
            0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
            0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
            0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
            1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
            1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
            1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
            1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
            1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
            1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
            1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
            1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Unit Hyd Qpeak  (cms)=   1.075

     PEAK FLOW       (cms)=   0.198 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  17.324
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.362

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

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--------------------
| CALIB             |
| STANDHYD (  0408)|   Area    (ha)=   1.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.89          0.24
     Dep. Storage     (mm)=      2.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     86.79         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
            0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
            0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
            0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
            0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
            0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
            0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
            0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
            0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
            0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
            0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
            1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
            1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
            1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
            1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
            1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
            1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
            1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
            1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         16.94
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        3.26 (ii)    17.62 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.27          0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.11          0.01         0.115 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92          2.75
     RUNOFF VOLUME    (mm)=       45.81         14.38         39.20
     TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
     RUNOFF COEFFICIENT   =        0.96          0.30          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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          THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 4081)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)    (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.0856      0.0385

                               AREA      QPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0408)      1.130      0.115       2.75       39.20
  OUTFLOW: ID= 1 (  4081)      1.130      0.047       2.92       39.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.49
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0211

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0412)|   Area    (ha)=   0.58
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.46          0.12
    Dep. Storage     (mm)=      2.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     62.18         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=      43.98         16.94
              over (min)        5.00          20.00
    Storage Coeff.  (min)=      2.67 (ii)     17.03 (ii)
    Unit Hyd. Tpeak (min)=      5.00          20.00
    Unit Hyd. peak  (cms)=      0.29           0.06
                                                          *TOTALS*
    PEAK FLOW       (cms)=      0.06           0.00        0.059 (iii)
    TIME TO PEAK    (hrs)=      2.75           2.92         2.75
    RUNOFF VOLUME    (mm)=     45.81          14.38        39.19
    TOTAL RAINFALL   (mm)=     47.81          47.81        47.81
    RUNOFF COEFFICIENT   =      0.96           0.30         0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 4121)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
--------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            0.0000      0.0000   |   0.0440      0.0198

                                  AREA     QPEAK      TPEAK        R.V.
                                  (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0412)        0.580     0.059       2.75       39.19
   OUTFLOW: ID= 1 (  4121)        0.580     0.024       2.83       39.00

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.57
                   TIME SHIFT OF PEAK FLOW        (min)=  5.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0108

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--------------------
| CALIB              |
| STANDHYD (  0404)|    Area    (ha)=   0.51
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      0.50         0.01
     Dep. Storage      (mm)=      2.00         5.00
     Average Slope      (%)=      1.00         2.00
     Length             (m)=     58.31        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 | 1.667    5.74 | 3.250   12.43 |  4.83     0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92     0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00     0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08     0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17     0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25     0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33     0.96
                 0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42     0.96
                 0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50     0.96
                 0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58     0.96
                 0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67     0.96
                 1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75     0.96
                 1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83     0.96
                 1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92     0.96
                 1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00     0.96
                 1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08     0.96
                 1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17     0.96
                 1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25     0.96
                 1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98        17.87
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       2.57 (ii)    4.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.29         0.24
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.00         0.062 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      45.81        14.38         45.49
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.30          0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0409)|    Area    (ha)=   0.53
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      0.42         0.11
     Dep. Storage      (mm)=      2.00         5.00
     Average Slope      (%)=      1.00         2.00
     Length             (m)=     59.44        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
     0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
     0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
     0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
     0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
     0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
     0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
     0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
     0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
     0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
     0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
     1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
     1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
     1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
     1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
     1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
     1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
     1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
     1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

Max.Eff.Inten.(mm/hr)=       43.98          16.94
          over (min)          5.00          20.00
Storage Coeff.  (min)=        2.60 (ii)     16.96 (ii)
Unit Hyd. Tpeak (min)=        5.00          20.00
Unit Hyd. peak  (cms)=        0.29           0.06
                                                         *TOTALS*
PEAK FLOW       (cms)=        0.05           0.00          0.054 (iii)
TIME TO PEAK    (hrs)=        2.75           2.92          2.75
RUNOFF VOLUME    (mm)=       45.81          14.38         39.19
TOTAL RAINFALL   (mm)=       47.81          47.81         47.81
RUNOFF COEFFICIENT   =        0.96           0.30          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  75.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 4091)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0402     0.0179

                               AREA     QPEAK     TPEAK      R.V.
                               (ha)     (cms)     (hrs)      (mm)
  INFLOW : ID= 2 (  0409)     0.530     0.054      2.75      39.19
  OUTFLOW: ID= 1 (  4091)     0.530     0.022      2.83      38.98

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.89
               TIME SHIFT OF PEAK FLOW        (min)=  5.00
               MAXIMUM  STORAGE   USED      (ha.m.)=  0.0099

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

--------------------
| ADD HYD  (  0420)|
|  1 +  2 =  3     |      AREA    QPEAK     TPEAK     R.V.
--------------------      (ha)    (cms)     (hrs)     (mm)
       ID1= 1 (  0404):   0.51    0.062     2.75     45.49
     + ID2= 2 (  4081):   1.13    0.047     2.92     39.11
       ==================================================
       ID = 3 (  0420):   1.64    0.106     2.75     41.09

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

--------------------
| ADD HYD  (  0420)|
|  3 +  2 =  1     |      AREA    QPEAK     TPEAK     R.V.
--------------------      (ha)    (cms)     (hrs)     (mm)
       ID1= 3 (  0420):   1.64    0.106     2.75     41.09
     + ID2= 2 (  4091):   0.53    0.022     2.83     38.98
       ==================================================
```

```
        ID = 1 (  0420):      2.17   0.127      2.75    40.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0420)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0420):      2.17   0.127      2.75    40.58
      + ID2= 2 (  4121):      0.58   0.024      2.83    39.00
        ===============================================
        ID = 3 (  0420):      2.75   0.150      2.75    40.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0410)|   Area    (ha)=   1.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  36.00   Dir. Conn.(%)=  27.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        0.40         0.71
     Dep. Storage      (mm)=        2.00         5.00
     Average Slope      (%)=        1.00         2.00
     Length             (m)=       86.02        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
                 0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
                 0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                 0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                 0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                 0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                 0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                 0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                 0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                 0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                 0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                 1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                 1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                 1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                 1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                 1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                 1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
                 1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
                 1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         21.47
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        3.24 (ii)    16.30 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.27          0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.04          0.03         0.061 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92          2.75
     RUNOFF VOLUME    (mm)=       45.81         16.03         24.06
     TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
     RUNOFF COEFFICIENT   =        0.96          0.34          0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  4101)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0841      0.0375

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
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   INFLOW : ID= 2 (  0410)       1.110      0.061       2.75       24.06
   OUTFLOW: ID= 1 (  4101)       1.110      0.025       3.33       23.96

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.27
                  TIME SHIFT OF PEAK FLOW        (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0113

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--------------------
| CALIB            |
| STANDHYD (  0411)|   Area    (ha)=   0.75
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.59         0.16
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     70.71        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        16.94
                over (min)       5.00        20.00
     Storage Coeff.  (min)=      2.88 (ii)   17.24 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.28         0.06
                                                       *TOTALS*
     PEAK FLOW      (cms)=      0.07         0.00         0.077 (iii)
     TIME TO PEAK   (hrs)=      2.75         2.92          2.75
     RUNOFF VOLUME    (mm)=     45.81        14.38         39.19
     TOTAL RAINFALL   (mm)=     47.81        47.81         47.81
     RUNOFF COEFFICIENT   =      0.96         0.30          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  4111)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.0568     0.0258

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0411)      0.750     0.077       2.75       39.19
   OUTFLOW: ID= 1 (  4111)      0.750     0.031       2.83       39.05

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.24
                  TIME SHIFT OF PEAK FLOW        (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0140

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| CALIB            |
| STANDHYD ( 0406) |   Area     (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.14         0.00
     Dep. Storage      (mm)=       2.00         5.00
     Average Slope      (%)=       1.00         2.00
     Length             (m)=      30.55        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                 0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                 0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                 0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                 0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                 1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                 1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                 1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                 1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                 1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                 1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                 1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                 1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        17.87
                over (min)       5.00         5.00
     Storage Coeff.  (min)=       1.74 (ii)    3.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.27
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00         0.017 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      45.81        14.38         45.49
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.96         0.30          0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0403) |   Area     (ha)=   1.84
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.82         0.02
     Dep. Storage      (mm)=       2.00         5.00
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     110.75        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
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              0.667     0.96 | 2.250    16.25 | 3.833     3.82 |   5.42     0.96
              0.750     0.96 | 2.333    43.98 | 3.917     3.82 |   5.50     0.96
              0.833     0.96 | 2.417    43.98 | 4.000     3.82 |   5.58     0.96
              0.917     0.96 | 2.500    43.98 | 4.083     3.82 |   5.67     0.96
              1.000     0.96 | 2.583    43.98 | 4.167     3.82 |   5.75     0.96
              1.083     0.96 | 2.667    43.98 | 4.250     3.82 |   5.83     0.96
              1.167     0.96 | 2.750    43.98 | 4.333     1.91 |   5.92     0.96
              1.250     0.96 | 2.833    12.43 | 4.417     1.91 |   6.00     0.96
              1.333     5.74 | 2.917    12.43 | 4.500     1.91 |   6.08     0.96
              1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17     0.96
              1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
              1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         17.87
                over (min)         5.00         10.00
     Storage Coeff.  (min)=         3.77 (ii)     5.33 (ii)
     Unit Hyd. Tpeak (min)=         5.00         10.00
     Unit Hyd. peak  (cms)=         0.25          0.16
                                                           *TOTALS*
     PEAK FLOW      (cms)=          0.22          0.00       0.223 (iii)
     TIME TO PEAK   (hrs)=          2.75          2.75        2.75
     RUNOFF VOLUME    (mm)=        45.81         14.38       45.49
     TOTAL RAINFALL   (mm)=        47.81         47.81       47.81
     RUNOFF COEFFICIENT   =         0.96          0.30        0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0405)|   Area    (ha)=   0.35
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.35         0.00
     Dep. Storage     (mm)=     2.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=    48.30        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 | 1.667     5.74 | 3.250    12.43 |   4.83     0.96
              0.167     0.00 | 1.750     5.74 | 3.333     6.69 |   4.92     0.96
              0.250     0.00 | 1.833    16.25 | 3.417     6.69 |   5.00     0.96
              0.333     0.96 | 1.917    16.25 | 3.500     6.69 |   5.08     0.96
              0.417     0.96 | 2.000    16.25 | 3.583     6.69 |   5.17     0.96
              0.500     0.96 | 2.083    16.25 | 3.667     6.69 |   5.25     0.96
              0.583     0.96 | 2.167    16.25 | 3.750     6.69 |   5.33     0.96
              0.667     0.96 | 2.250    16.25 | 3.833     3.82 |   5.42     0.96
              0.750     0.96 | 2.333    43.98 | 3.917     3.82 |   5.50     0.96
              0.833     0.96 | 2.417    43.98 | 4.000     3.82 |   5.58     0.96
              0.917     0.96 | 2.500    43.98 | 4.083     3.82 |   5.67     0.96
              1.000     0.96 | 2.583    43.98 | 4.167     3.82 |   5.75     0.96
              1.083     0.96 | 2.667    43.98 | 4.250     3.82 |   5.83     0.96
              1.167     0.96 | 2.750    43.98 | 4.333     1.91 |   5.92     0.96
              1.250     0.96 | 2.833    12.43 | 4.417     1.91 |   6.00     0.96
              1.333     5.74 | 2.917    12.43 | 4.500     1.91 |   6.08     0.96
              1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17     0.96
              1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
              1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         17.87
                over (min)         5.00          5.00
     Storage Coeff.  (min)=         2.29 (ii)     3.85 (ii)
     Unit Hyd. Tpeak (min)=         5.00          5.00
     Unit Hyd. peak  (cms)=         0.30          0.25
                                                           *TOTALS*
     PEAK FLOW      (cms)=          0.04          0.00       0.043 (iii)
     TIME TO PEAK   (hrs)=          2.75          2.75        2.75
     RUNOFF VOLUME    (mm)=        45.81         14.38       45.49
     TOTAL RAINFALL   (mm)=        47.81         47.81       47.81
     RUNOFF COEFFICIENT   =         0.96          0.30        0.95
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0407)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14         0.00
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      30.55        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        17.87
                over (min)        5.00         5.00
     Storage Coeff.  (min)=       1.74 (ii)    3.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.27
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.017 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      45.81        14.38          45.49
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.96         0.30           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  4071)|
| Inlet Cap.= 0.060|
| #of Inlets=    10|
| Total(cms)=   0.6|       AREA      QPEAK      TPEAK     R.V.
--------------------       (ha)      (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):    0.14       0.02       2.75    45.49
     ========================================================
     MAJOR SYS.(ID= 2):    0.00       0.00       0.00     0.00
     MINOR SYS.(ID= 3):    0.14       0.02       2.75    45.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0421)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0403):      1.84    0.223     2.75     45.49
      + ID2= 2 (  0405):      0.35    0.043     2.75     45.49
        ==================================================
        ID = 3 (  0421):      2.19    0.266     2.75     45.49

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

--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0421):      2.19    0.266     2.75     45.49
      + ID2= 2 (  0406):      0.14    0.017     2.75     45.49
        ==================================================
        ID = 1 (  0421):      2.33    0.283     2.75     45.49

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

--------------------
| ADD HYD  (  0421)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
*** W A R N I N G :  HYDROGRAPH   4071 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
        ID1= 1 (  0421):      2.33    0.283     2.75     45.49
      + ID2= 2 (  4071):      0.00    0.000     0.00      0.00
        ==================================================
        ID = 3 (  0421):      2.33    0.283     2.75     45.49

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

--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0421):      2.33    0.283     2.75     45.49
      + ID2= 2 (  4101):      1.11    0.025     3.33     23.96
        ==================================================
        ID = 1 (  0421):      3.44    0.301     2.75     38.55

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

--------------------
| ADD HYD  (  0421)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0421):      3.44    0.301     2.75     38.55
      + ID2= 2 (  4111):      0.75    0.031     2.83     39.05
        ==================================================
        ID = 3 (  0421):      4.19    0.331     2.75     38.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0421):      4.19    0.331     2.75     38.64
      + ID2= 2 (  0420):      2.75    0.150     2.75     40.25
        ==================================================
        ID = 1 (  0421):      6.94    0.480     2.75     39.27

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

--------------------
| ADD HYD  (  0422)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0401):      3.66    0.198     2.75     17.32
      + ID2= 2 (  0421):      6.94    0.480     2.75     39.27
        ==================================================
        ID = 3 (  0422):     10.60    0.678     2.75     31.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 --------------------
 | RESERVOIR( 0423)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |   0.1751     0.4332
                           0.0074     0.0401    |   0.2276     0.4910
                           0.0211     0.1264    |   0.2601     0.5266
                           0.0289     0.2209    |   0.4822     0.5507
                           0.0350     0.3233    |   2.0944     0.6374
                           0.0509     0.3774    |   0.0000     0.0000

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0422)      10.600      0.678       2.75       31.69
   OUTFLOW: ID= 1 (  0423)      10.600      0.033       6.33       31.56

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  4.80
                TIME SHIFT OF PEAK FLOW          (min)=215.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.2823

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 --------------------
 | CALIB            |
 | STANDHYD ( 0067)|   Area    (ha)=   5.46
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      4.91          0.55
      Dep. Storage      (mm)=      1.00          1.50
      Average Slope      (%)=      1.00          2.00
      Length             (m)=    190.79         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
              0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
              0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
              0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
              0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
              0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
              0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
              0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
              0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
              0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
              1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
              1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
              1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
              1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
              1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
              1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
              1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
              1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

      Max.Eff.Inten.(mm/hr)=       43.98         27.63
                 over (min)         5.00         10.00
      Storage Coeff.  (min)=        5.23 (ii)     9.30 (ii)
      Unit Hyd. Tpeak (min)=        5.00         10.00
      Unit Hyd. peak  (cms)=        0.21          0.12
                                                          *TOTALS*
      PEAK FLOW       (cms)=        0.60          0.04      0.636 (iii)
      TIME TO PEAK    (hrs)=        2.75          2.75       2.75
      RUNOFF VOLUME    (mm)=       46.81         23.53      44.48
      TOTAL RAINFALL   (mm)=       47.81         47.81      47.81
      RUNOFF COEFFICIENT   =        0.98          0.49       0.93

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | CALIB            |
 | STANDHYD ( 0069)|   Area    (ha)=   0.88
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
```

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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.79          0.09
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=      76.59         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.02 (ii)     7.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.14
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.10          0.01       0.103 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75        2.75
     RUNOFF VOLUME    (mm)=      46.81         23.53       44.48
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.49        0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0070)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0770     0.0323

                               AREA     QPEAK      TPEAK      R.V.
                               (ha)     (cms)      (hrs)      (mm)
   INFLOW : ID= 2 (  0069)     0.880     0.103       2.75      44.48
   OUTFLOW: ID= 1 (  0070)     0.880     0.045       2.83      44.36

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.30
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0187

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--------------------
| CALIB            |
| STANDHYD ( 0071)|    Area     (ha)=    1.36
|ID= 1 DT= 5.0 min |    Total Imp(%)=   90.00    Dir. Conn.(%)=   90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.22          0.14
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=      95.22         40.00
     Mannings n           =       0.013         0.250
```

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        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          27.63
               over (min)         5.00          10.00
     Storage Coeff.  (min)=        3.45 (ii)      7.52 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.26           0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.15           0.01        0.159 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75         2.75
     RUNOFF VOLUME    (mm)=       46.81          23.53        44.48
     TOTAL RAINFALL   (mm)=       47.81          47.81        47.81
     RUNOFF COEFFICIENT   =        0.98           0.49         0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0072)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2450     0.0209

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0071)       1.360     0.159       2.75       44.48
   OUTFLOW: ID= 1 (  0072)       1.360     0.140       2.75       44.47

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.84
                  TIME SHIFT OF PEAK FLOW        (min)=  0.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0122

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0502)|    Area     (ha)=   0.73
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.58          0.15
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      69.76         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
```

```
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         16.94
              over (min)          5.00          20.00
     Storage Coeff.  (min)=       2.86 (ii)     17.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00          20.00
     Unit Hyd. peak  (cms)=       0.28           0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.07           0.00         0.074 (iii)
     TIME TO PEAK    (hrs)=       2.75           2.92          2.75
     RUNOFF VOLUME    (mm)=      45.81          14.38         39.19
     TOTAL RAINFALL   (mm)=      47.81          47.81         47.81
     RUNOFF COEFFICIENT   =       0.96           0.30          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 5021)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                         0.0000     0.0000     |   0.0110     0.0323
                         0.0050     0.0176     |   0.0130     0.0364
                         0.0070     0.0232     |   0.0150     0.0393
                         0.0090     0.0277     |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0502)       0.730     0.074       2.75       39.19
   OUTFLOW: ID= 1 (  5021)       0.730     0.007       4.25       37.97

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.14
                TIME SHIFT OF PEAK FLOW        (min)= 90.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0227

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0501)|    Area     (ha)=    0.38
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.38          0.00
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      50.33         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
```

```
            0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
            0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
            0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
            0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
            1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
            1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
            1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
            1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
            1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          17.87
                over (min)         5.00           5.00
     Storage Coeff.   (min)=       2.35 (ii)      3.91 (ii)
     Unit Hyd. Tpeak  (min)=       5.00           5.00
     Unit Hyd. peak   (cms)=       0.30           0.25
                                                              *TOTALS*
     PEAK FLOW        (cms)=       0.05           0.00          0.046 (iii)
     TIME TO PEAK     (hrs)=       2.75           2.75           2.75
     RUNOFF VOLUME     (mm)=      45.81          14.38          45.49
     TOTAL RAINFALL    (mm)=      47.81          47.81          47.81
     RUNOFF COEFFICIENT   =        0.96           0.30           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0503)|    Area    (ha)=   0.91
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.72           0.19
     Dep. Storage     (mm)=       2.00           5.00
     Average Slope     (%)=       1.00           2.00
     Length            (m)=      77.89          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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
            0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
            0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
            0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
            0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
            0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
            0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
            0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
            0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
            0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
            0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
            1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
            1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
            1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
            1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
            1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          16.94
                over (min)         5.00          20.00
     Storage Coeff.   (min)=       3.05 (ii)     17.41 (ii)
     Unit Hyd. Tpeak  (min)=       5.00          20.00
     Unit Hyd. peak   (cms)=       0.27           0.06
                                                              *TOTALS*
     PEAK FLOW        (cms)=       0.09           0.01          0.093 (iii)
     TIME TO PEAK     (hrs)=       2.75           2.92           2.75
     RUNOFF VOLUME     (mm)=      45.81          14.38          39.20
     TOTAL RAINFALL    (mm)=      47.81          47.81          47.81
     RUNOFF COEFFICIENT   =        0.96           0.30           0.82
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 5031)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)  |   (cms)     (ha.m.)
                          0.0000     0.0000  |   0.0140     0.0404
                          0.0060     0.0221  |   0.0160     0.0456
                          0.0090     0.0290  |   0.0180     0.0492
                          0.0110     0.0347  |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0503)      0.910     0.093       2.75       39.20
   OUTFLOW: ID= 1 (  5031)      0.910     0.009       4.25       38.17

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.34
                  TIME SHIFT OF PEAK FLOW         (min)= 90.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0283

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

--------------------
| ADD HYD  (  0504)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0501):      0.38    0.046    2.75     45.49
      + ID2= 2 (  5021):      0.73    0.007    4.25     37.97
        ===================================================
        ID = 3 (  0504):      1.11    0.051    2.75     40.55

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

--------------------
| ADD HYD  (  0504)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0504):      1.11    0.051    2.75     40.55
      + ID2= 2 (  5031):      0.91    0.009    4.25     38.17
        ===================================================
        ID = 1 (  0504):      2.02    0.056    2.75     39.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0505)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)  |   (cms)     (ha.m.)
                          0.0000     0.0000  |   0.0330     0.0308
                          0.0150     0.0145  |   0.0370     0.0345
                          0.0180     0.0224  |   0.0420     0.0383
                          0.0250     0.0268  |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0504)      2.020     0.056       2.75       39.48
   OUTFLOW: ID= 1 (  0505)      2.020     0.016       5.00       39.36

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 27.82
                  TIME SHIFT OF PEAK FLOW         (min)=135.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0164

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):      2.93    0.087    3.08     16.61
      + ID2= 2 (  0423):     10.60    0.033    6.33     31.56
        ===================================================
        ID = 3 (  0009):     13.53    0.112    3.08     28.33

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

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

 --------------------
 | ADD HYD  (  0009)|
 |   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
 --------------------          (ha)    (cms)     (hrs)     (mm)
          ID1= 3 (  0009):    13.53   0.112      3.08     28.33
        + ID2= 2 (  0505):     2.02   0.016      5.00     39.36
          ===============================================
          ID = 1 (  0009):    15.55   0.125      3.08     29.76

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

 --------------------
 | ADD HYD  (  0009)|
 |   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
 --------------------          (ha)    (cms)     (hrs)     (mm)
          ID1= 1 (  0009):    15.55   0.125      3.08     29.76
        + ID2= 2 (  0006):    24.71   0.842      3.33     38.03
          ===============================================
          ID = 3 (  0009):    40.26   0.963      3.25     34.83

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

 --------------------
 | ADD HYD  (  0009)|
 |   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
 --------------------          (ha)    (cms)     (hrs)     (mm)
          ID1= 3 (  0009):    40.26   0.963      3.25     34.83
        + ID2= 2 (  0067):     5.46   0.636      2.75     44.48
          ===============================================
          ID = 1 (  0009):    45.72   1.389      2.75     35.99

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

 --------------------
 | ADD HYD  (  0009)|
 |   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
 --------------------          (ha)    (cms)     (hrs)     (mm)
          ID1= 1 (  0009):    45.72   1.389      2.75     35.99
        + ID2= 2 (  0070):     0.88   0.045      2.83     44.36
          ===============================================
          ID = 3 (  0009):    46.60   1.431      2.75     36.14

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

 --------------------
 | ADD HYD  (  0009)|
 |   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
 --------------------          (ha)    (cms)     (hrs)     (mm)
          ID1= 3 (  0009):    46.60   1.431      2.75     36.14
        + ID2= 2 (  0072):     1.36   0.140      2.75     44.47
          ===============================================
          ID = 1 (  0009):    47.96   1.571      2.75     36.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN(  0013)|
 | IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 --------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance      Elevation        Manning
                   0.00        101.50          0.0500
                   1.00        100.70          0.0500
                   1.50        100.55      0.0500 /0.0300  Main Channel
                   2.00         99.50          0.0300      Main Channel
                   3.50         99.60          0.0300      Main Channel
                   4.50        100.65      0.0300 /0.0500  Main Channel
                   6.00        101.45          0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)        (m/s)        (min)
       0.10    99.60    .353E+02       0.0          0.19        43.69
       0.19    99.69    .112E+03       0.1          0.37        22.76
       0.29    99.79    .195E+03       0.2          0.49        17.03
       0.38    99.88    .285E+03       0.3          0.59        14.23
       0.48    99.98    .381E+03       0.5          0.67        12.51
       0.57   100.07    .484E+03       0.7          0.74        11.32
```

```
      0.67    100.17     .594E+03        0.9            0.80       10.43
      0.76    100.26     .710E+03        1.2            0.86        9.74
      0.86    100.36     .832E+03        1.5            0.91        9.18
      0.95    100.45     .961E+03        1.8            0.96        8.72
      1.05    100.55     .110E+04        2.2            1.00        8.32
      1.16    100.66     .127E+04        2.7            1.07        7.80
      1.28    100.78     .148E+04        3.4            1.14        7.31
      1.39    100.89     .170E+04        4.1            1.20        6.94
      1.50    101.00     .195E+04        4.9            1.25        6.65
      1.61    101.11     .221E+04        5.8            1.30        6.41
      1.72    101.22     .250E+04        6.7            1.34        6.22
      1.84    101.34     .280E+04        7.7            1.38        6.04
      1.95    101.45     .313E+04        8.8            1.41        5.90

                                  <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                            (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0009)  47.96    1.57    2.75  36.38     0.88       0.92
   OUTFLOW: ID= 1 (  0013)  47.96    1.41    2.83  36.38     0.83       0.89


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (  0018)|    Area      (ha)=    1.85   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min  |    Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    0.24

        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Unit Hyd Qpeak  (cms)=    0.294

    PEAK FLOW        (cms)=    0.076 (i)
    TIME TO PEAK     (hrs)=    2.833
    RUNOFF VOLUME     (mm)=   16.595
    TOTAL RAINFALL    (mm)=   47.810
    RUNOFF COEFFICIENT   =    0.347

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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0019)|    Area     (ha)=    3.97
|ID= 1 DT= 5.0 min |    Total Imp(%)=   90.00   Dir. Conn.(%)=   90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      3.57          0.40
    Dep. Storage      (mm)=      1.00          1.50
    Average Slope      (%)=      1.00          2.00
    Length             (m)=    162.69         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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       4.75 (ii)     8.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.22          0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.44          0.03        0.463 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      46.81         23.53        44.48
     TOTAL RAINFALL   (mm)=      47.81         47.81        47.81
     RUNOFF COEFFICIENT   =       0.98          0.49         0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0043)|   Area     (ha)=  11.15
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     10.03         1.12
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    272.64        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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       6.48 (ii)    10.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.18          0.09
```

```
                                                                *TOTALS*
     PEAK FLOW        (cms)=        1.22           0.07           1.286 (iii)
     TIME TO PEAK     (hrs)=        2.75           2.83            2.75
     RUNOFF VOLUME     (mm)=       46.81          23.53           44.48
     TOTAL RAINFALL    (mm)=       47.81          47.81           47.81
     RUNOFF COEFFICIENT    =        0.98           0.49            0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0045)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.1000     0.3830

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0043)      11.150      1.286       2.75       44.48
   OUTFLOW: ID= 1 (  0045)      11.150      0.615       2.92       44.47

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 47.78
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2143

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0044)|   Area    (ha)=  36.51
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      32.86          3.65
     Dep. Storage     (mm)=       1.00          1.50
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     493.36         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          27.63
                over (min)        10.00          15.00
     Storage Coeff.  (min)=        9.25 (ii)     13.32 (ii)
     Unit Hyd. Tpeak (min)=       10.00          15.00
     Unit Hyd. peak  (cms)=        0.12           0.08
                                                                *TOTALS*
     PEAK FLOW        (cms)=        3.87           0.21           4.079 (iii)
     TIME TO PEAK     (hrs)=        2.75           2.83            2.75
     RUNOFF VOLUME     (mm)=       46.81          23.53           44.48
     TOTAL RAINFALL    (mm)=       47.81          47.81           47.81
     RUNOFF COEFFICIENT    =        0.98           0.49            0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0046)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)    (ha.m.)
                         0.0000     0.0000   |  6.5700     0.4019

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0044)     36.510     4.079      2.75      44.48
   OUTFLOW: ID= 1 (  0046)     36.510     3.665      2.83      44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 89.84
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2244

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0018):      1.85   0.076     2.83     16.60
      + ID2= 2 (  0019):      3.97   0.463     2.75     44.48
        ==================================================
        ID = 3 (  0016):      5.82   0.534     2.75     35.62

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

--------------------
| ADD HYD  (  0016)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0016):      5.82   0.534     2.75     35.62
      + ID2= 2 (  0045):     11.15   0.615     2.92     44.47
        ==================================================
        ID = 1 (  0016):     16.97   1.100     2.75     41.44

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0016):     16.97   1.100     2.75     41.44
      + ID2= 2 (  0046):     36.51   3.665     2.83     44.48
        ==================================================
        ID = 3 (  0016):     53.48   4.635     2.75     43.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)    (ha.m.)
                         0.0000     0.0000   |  0.4100     1.6169
                         0.2000     0.2102   |  2.5600     2.5701
                         0.3200     0.8386   |  3.1500     3.1183
                         0.3900     1.4070   |  3.4200     3.4107

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0016)     53.480     4.635      2.75      43.52
   OUTFLOW: ID= 1 (  0015)     53.480     0.666      4.50      43.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.36
                  TIME SHIFT OF PEAK FLOW          (min)=105.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.7307

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--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
```

```
      ID1= 1 (  0013):     47.96   1.409     2.83    36.38
    + ID2= 2 (  0015):     53.48   0.666     4.50    43.51
      ===================================================
      ID = 3 (  0064):    101.44   1.733     2.83    40.14

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2259)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                  28.50          210.02        0.0600
                  47.35          209.86        0.0450      Main Channel
                  51.00          209.76        0.0450      Main Channel
                  60.44          209.54        0.0450      Main Channel
                  65.44          209.60        0.0450      Main Channel
                  72.65          209.41        0.0450      Main Channel
                  95.97          208.53        0.0450      Main Channel
                 103.18          208.38        0.0450      Main Channel
                 108.18          208.33        0.0450      Main Channel
                 116.25          208.08        0.0450      Main Channel
                 122.09          207.92        0.0450      Main Channel
                 131.52          207.65        0.0450      Main Channel
                 149.56          208.22        0.0450      Main Channel
                 155.39          208.49        0.0450      Main Channel
                 177.88          208.58        0.0450      Main Channel
                 190.96          208.73        0.0450      Main Channel
                 195.96          208.72        0.0450      Main Channel
                 226.50          209.32        0.0450      Main Channel
                 238.71          209.46    0.0450 /0.0600  Main Channel
                 251.40          209.70        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)        (cms)         (m/s)       (min)
       0.11   207.75    .601E+03         0.0           0.12      222.56
       0.21   207.86    .241E+04         0.3           0.19      140.20
       0.32   207.97    .542E+04         0.8           0.25      107.47
       0.43   208.07    .969E+04         1.8           0.30       89.07
       0.53   208.18    .152E+05         3.3           0.35       76.07
       0.64   208.29    .218E+05         5.5           0.40       66.47
       0.75   208.39    .296E+05         8.0           0.43       61.92
       0.85   208.50    .389E+05        11.2           0.46       58.04
       0.96   208.61    .519E+05        14.2           0.44       60.79
       1.07   208.71    .677E+05        20.3           0.48       55.45
       1.17   208.82    .861E+05        27.7           0.52       51.74
       1.28   208.93    .106E+06        37.5           0.57       47.20
       1.39   209.03    .128E+06        48.7           0.61       43.64
       1.49   209.14    .150E+06        61.5           0.66       40.75
       1.60   209.25    .175E+06        76.0           0.70       38.35
       1.71   209.35    .201E+06        91.6           0.73       36.50
       1.81   209.46    .228E+06       107.8           0.76       35.28
       1.93   209.58    .262E+06       130.3           0.80       33.51
       2.05   209.70    .299E+06       156.6           0.84       31.84

                                      <---- hydrograph ---->    <-pipe / channel->
                              AREA    QPEAK   TPEAK    R.V.    MAX DEPTH   MAX VEL
                              (ha)    (cms)   (hrs)    (mm)       (m)       (m/s)
     INFLOW : ID= 2 (  0064)  101.44    1.73    2.83   40.14      0.42       0.30
     OUTFLOW: ID= 1 (  2259)  101.44    1.22    4.75   40.13      0.36       0.27


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0025)|    Area     (ha)=    8.34   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.84

       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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
               0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
               0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
               0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
               0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
               0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
```

```
             0.583     0.96 | 2.167    16.25 | 3.750     6.69 |   5.33     0.96
             0.667     0.96 | 2.250    16.25 | 3.833     3.82 |   5.42     0.96
             0.750     0.96 | 2.333    43.98 | 3.917     3.82 |   5.50     0.96
             0.833     0.96 | 2.417    43.98 | 4.000     3.82 |   5.58     0.96
             0.917     0.96 | 2.500    43.98 | 4.083     3.82 |   5.67     0.96
             1.000     0.96 | 2.583    43.98 | 4.167     3.82 |   5.75     0.96
             1.083     0.96 | 2.667    43.98 | 4.250     3.82 |   5.83     0.96
             1.167     0.96 | 2.750    43.98 | 4.333     1.91 |   5.92     0.96
             1.250     0.96 | 2.833    12.43 | 4.417     1.91 |   6.00     0.96
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |   6.08     0.96
             1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17     0.96
             1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
             1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Unit Hyd Qpeak  (cms)=   0.379

     PEAK FLOW        (cms)=   0.166 (i)
     TIME TO PEAK     (hrs)=   3.667
     RUNOFF VOLUME     (mm)=  16.611
     TOTAL RAINFALL    (mm)=  47.810
     RUNOFF COEFFICIENT   =    0.347

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0024)|    Area     (ha)=    9.55
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        8.59         0.96
     Dep. Storage     (mm)=        1.00         1.50
     Average Slope     (%)=        1.00         2.00
     Length             (m)=     252.32        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 | 1.667     5.74 | 3.250    12.43 |   4.83     0.96
             0.167     0.00 | 1.750     5.74 | 3.333     6.69 |   4.92     0.96
             0.250     0.00 | 1.833    16.25 | 3.417     6.69 |   5.00     0.96
             0.333     0.96 | 1.917    16.25 | 3.500     6.69 |   5.08     0.96
             0.417     0.96 | 2.000    16.25 | 3.583     6.69 |   5.17     0.96
             0.500     0.96 | 2.083    16.25 | 3.667     6.69 |   5.25     0.96
             0.583     0.96 | 2.167    16.25 | 3.750     6.69 |   5.33     0.96
             0.667     0.96 | 2.250    16.25 | 3.833     3.82 |   5.42     0.96
             0.750     0.96 | 2.333    43.98 | 3.917     3.82 |   5.50     0.96
             0.833     0.96 | 2.417    43.98 | 4.000     3.82 |   5.58     0.96
             0.917     0.96 | 2.500    43.98 | 4.083     3.82 |   5.67     0.96
             1.000     0.96 | 2.583    43.98 | 4.167     3.82 |   5.75     0.96
             1.083     0.96 | 2.667    43.98 | 4.250     3.82 |   5.83     0.96
             1.167     0.96 | 2.750    43.98 | 4.333     1.91 |   5.92     0.96
             1.250     0.96 | 2.833    12.43 | 4.417     1.91 |   6.00     0.96
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |   6.08     0.96
             1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17     0.96
             1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
             1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         27.63
                over (min)        5.00         15.00
     Storage Coeff.   (min)=       6.18 (ii)    10.25 (ii)
     Unit Hyd. Tpeak  (min)=       5.00         15.00
     Unit Hyd. peak   (cms)=       0.19          0.09
                                                              *TOTALS*
     PEAK FLOW        (cms)=       1.04          0.06          1.103 (iii)
     TIME TO PEAK     (hrs)=       2.75          2.83           2.75
     RUNOFF VOLUME     (mm)=      46.81         23.53          44.48
     TOTAL RAINFALL    (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.49           0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD (  0047)  |   Area     (ha)=  23.02
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=     20.72          2.30
     Dep. Storage      (mm)=      1.00          1.50
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    391.75         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)       10.00         15.00
     Storage Coeff.  (min)=       8.05 (ii)    12.12 (ii)
     Unit Hyd. Tpeak (min)=      10.00         15.00
     Unit Hyd. peak  (cms)=       0.13          0.09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       2.47          0.14         2.607 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83          2.75
     RUNOFF VOLUME     (mm)=     46.81         23.53         44.48
     TOTAL RAINFALL    (mm)=     47.81         47.81         47.81
     RUNOFF COEFFICIENT   =       0.98          0.49          0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| RESERVOIR(  0049)  |     OVERFLOW IS OFF
| IN= 2---> OUT= 1   |
| DT=  5.0 min       |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |  3.4700     0.0040

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0047)     23.020     2.607      2.75       44.48
   OUTFLOW: ID= 1 (  0049)     23.020     2.600      2.75       44.48

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 99.73
                    TIME SHIFT OF PEAK FLOW         (min)=  0.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0031

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| CALIB              |
| STANDHYD (  0048)  |   Area     (ha)=  31.36
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=     28.22          3.14
     Dep. Storage      (mm)=      1.00          1.50
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    457.24         40.00
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 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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
            0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
            0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
            0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
            0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
            0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
            0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
            0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
            0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
            0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
            0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
            1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
            1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
            1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
            1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
            1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
            1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
            1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
            1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

 Max.Eff.Inten.(mm/hr)=      43.98       27.63
            over (min)       10.00       15.00
 Storage Coeff.  (min)=       8.83 (ii)   12.90 (ii)
 Unit Hyd. Tpeak (min)=      10.00       15.00
 Unit Hyd. peak  (cms)=       0.12        0.08
                                                        *TOTALS*
 PEAK FLOW       (cms)=       3.34        0.19           3.521 (iii)
 TIME TO PEAK    (hrs)=       2.75        2.83           2.75
 RUNOFF VOLUME    (mm)=      46.81       23.53          44.48
 TOTAL RAINFALL   (mm)=      47.81       47.81          47.81
 RUNOFF COEFFICIENT   =       0.98        0.49           0.93


   (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  85.0    Ia = Dep. Storage  (Above)
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0050)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  5.6500     0.3682

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0048)     31.360     3.521       2.75      44.48
   OUTFLOW: ID= 1 (  0050)     31.360     3.135       2.83      44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 89.03
                  TIME SHIFT OF PEAK FLOW        (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2043

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--------------------
| CALIB            |
| STANDHYD (  0093)|    Area    (ha)=  88.14
|ID= 1 DT= 5.0 min |    Total Imp(%)=  28.90    Dir. Conn.(%)=  28.20
--------------------
                              IMPERVIOUS    PERVIOUS (i)
 Surface Area      (ha)=       25.47        62.67
 Dep. Storage      (mm)=        2.00         5.00
 Average Slope      (%)=        2.28         2.28
 Length             (m)=      766.55        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
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               0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
               0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
               0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
               0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
               0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
               0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
               0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
               0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
               0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
               0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
               1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
               1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
               1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
               1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
               1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
               1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
               1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
               1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          21.60
               over (min)         10.00          25.00
     Storage Coeff.   (min)=       9.41 (ii)     21.93 (ii)
     Unit Hyd. Tpeak  (min)=      10.00          25.00
     Unit Hyd. peak   (cms)=       0.12           0.05
                                                              *TOTALS*
     PEAK FLOW        (cms)=       2.92           2.25          4.584 (iii)
     TIME TO PEAK     (hrs)=       2.75           3.00          2.75
     RUNOFF VOLUME     (mm)=      45.81          18.03         25.87
     TOTAL RAINFALL    (mm)=      47.81          47.81         47.81
     RUNOFF COEFFICIENT    =       0.96           0.38          0.54


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD (  0088)|    Area     (ha)= 181.61
|ID= 1 DT= 5.0 min |    Total Imp(%)=  58.40   Dir. Conn.(%)=  54.10
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     106.06         75.55
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       2.50          2.50
     Length            (m)=    1100.33         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
               0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
               0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
               0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
               0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
               0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
               0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
               0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
               0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
               0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
               0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
               1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
               1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
               1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
               1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
               1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
               1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
               1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
               1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          26.05
               over (min)         10.00          25.00
     Storage Coeff.   (min)=      11.37 (ii)     22.67 (ii)
     Unit Hyd. Tpeak  (min)=      10.00          25.00
     Unit Hyd. peak   (cms)=       0.10           0.05
                                                              *TOTALS*
     PEAK FLOW        (cms)=      11.27           3.26         13.714 (iii)
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     TIME TO PEAK     (hrs)=       2.75          3.00           2.75
     RUNOFF VOLUME     (mm)=      45.81         19.97          33.95
     TOTAL RAINFALL    (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT    =       0.96          0.42           0.71

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  82.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0089)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.5600     7.7340
                          0.6870     3.6492   |   2.0400     9.8037
                          1.0220     5.2831   |  40.8000    10.8930

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0088)     181.610    13.714      2.75      33.95
   OUTFLOW: ID= 1 (  0089)     181.610     0.991      4.83      33.94

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.23
                  TIME SHIFT OF PEAK FLOW         (min)=125.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  5.1343

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| CALIB            |
| STANDHYD (  0091)|   Area    (ha)=  19.40
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.30   Dir. Conn.(%)=  59.80
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     12.67          6.73
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      2.40          2.00
     Length             (m)=    359.63         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         31.48
                over (min)        5.00         20.00
     Storage Coeff.   (min)=      5.88 (ii)    17.09 (ii)
     Unit Hyd. Tpeak  (min)=      5.00         20.00
     Unit Hyd. peak   (cms)=      0.19          0.06
                                                            *TOTALS*
     PEAK FLOW        (cms)=      1.41          0.41          1.770 (iii)
     TIME TO PEAK     (hrs)=      2.75          2.92           2.75
     RUNOFF VOLUME     (mm)=     45.81         23.02          36.65
     TOTAL RAINFALL    (mm)=     47.81         47.81          47.81
     RUNOFF COEFFICIENT    =      0.96          0.48           0.77

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
          CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

 --------------------
| ADD HYD  (  0092)|
|  1 +  2 =  3     |           AREA    QPEAK    TPEAK     R.V.
 --------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0089):    181.61   0.991     4.83     33.94
      + ID2= 2 (  0091):     19.40   1.770     2.75     36.65
        ==================================================
        ID = 3 (  0092):    201.01   2.201     2.75     34.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
 --------------------
| ROUTE CHN(  2252)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
 --------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation        Manning
                  28.50         210.02         0.0600
                  47.35         209.86         0.0450       Main Channel
                  51.00         209.76         0.0450       Main Channel
                  60.44         209.54         0.0450       Main Channel
                  65.44         209.60         0.0450       Main Channel
                  72.65         209.41         0.0450       Main Channel
                  95.97         208.53         0.0450       Main Channel
                 103.18         208.38         0.0450       Main Channel
                 108.18         208.33         0.0450       Main Channel
                 116.25         208.08         0.0450       Main Channel
                 122.09         207.92         0.0450       Main Channel
                 131.52         207.65         0.0450       Main Channel
                 149.56         208.22         0.0450       Main Channel
                 155.39         208.49         0.0450       Main Channel
                 177.88         208.58         0.0450       Main Channel
                 190.96         208.73         0.0450       Main Channel
                 195.96         208.72         0.0450       Main Channel
                 226.50         209.32         0.0450       Main Channel
                 238.71         209.46     0.0450 /0.0600   Main Channel
                 251.40         209.70         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)      (cms)        (m/s)       (min)
       0.11   207.75    .531E+03        0.1          0.20      119.24
       0.21   207.86    .213E+04        0.5          0.32       75.12
       0.32   207.97    .479E+04        1.4          0.41       57.58
       0.43   208.07    .856E+04        3.0          0.50       47.72
       0.53   208.18    .134E+05        5.5          0.58       40.76
       0.64   208.29    .193E+05        9.0          0.67       35.61
       0.75   208.39    .261E+05       13.1          0.71       33.18
       0.85   208.50    .344E+05       18.4          0.76       31.10
       0.96   208.61    .458E+05       23.5          0.73       32.57
       1.07   208.71    .598E+05       33.6          0.80       29.71
       1.17   208.82    .761E+05       45.8          0.85       27.72
       1.28   208.93    .938E+05       61.8          0.94       25.29
       1.39   209.03    .113E+06       80.4          1.01       23.38
       1.49   209.14    .133E+06      101.5          1.09       21.84
       1.60   209.25    .154E+06      125.3          1.15       20.55
       1.71   209.35    .177E+06      151.0          1.21       19.56
       1.81   209.46    .202E+06      177.9          1.25       18.90
       1.93   209.58    .232E+06      214.9          1.32       17.96
       2.05   209.70    .264E+06      258.3          1.39       17.06

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0092)  201.01    2.20    2.75  34.20      0.37       0.45
   OUTFLOW: ID= 1 (  2252)  201.01    1.18    3.83  34.20      0.30       0.38


--------------------------------------------------------------------------------
 --------------------
| CALIB            |
| STANDHYD (  0096)|   Area    (ha)=  42.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  72.00   Dir. Conn.(%)=  72.00
 --------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    30.36         11.81
```

```
Dep. Storage      (mm)=        2.00          5.00
Average Slope      (%)=        2.04          2.04
Length             (m)=      530.22         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
          0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
          0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
          0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
          0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
          0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
          0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
          0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
          0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
          0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
          0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
          1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
          1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
          1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
          1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
          1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
          1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
          1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
          1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

Max.Eff.Inten.(mm/hr)=       43.98         22.08
           over (min)        10.00         25.00
Storage Coeff.  (min)=        7.80 (ii)    20.63 (ii)
Unit Hyd. Tpeak (min)=       10.00         25.00
Unit Hyd. peak  (cms)=        0.13          0.05
                                                        *TOTALS*
PEAK FLOW       (cms)=        3.63          0.44          3.964 (iii)
TIME TO PEAK    (hrs)=        2.75          3.00           2.75
RUNOFF VOLUME    (mm)=       45.81         18.59          38.19
TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
RUNOFF COEFFICIENT   =        0.96          0.39           0.80

  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  82.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0095)|
|   1 +  2 =  3    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  2252):   201.01     1.184      3.83     34.20
      + ID2= 2 (  0093):    88.14     4.584      2.75     25.87
        ==================================================
        ID = 3 (  0095):   289.15     5.502      2.83     31.66

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

--------------------
| ADD HYD  (  0095)|
|   3 +  2 =  1    |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0095):   289.15     5.502      2.83     31.66
      + ID2= 2 (  0096):    42.17     3.964      2.75     38.19
        ==================================================
        ID = 1 (  0095):   331.32     9.387      2.75     32.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2257)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                  28.50          210.02        0.0600
                  47.35          209.86        0.0450      Main Channel
                  51.00          209.76        0.0450      Main Channel
```

60.44	209.54	0.0450	Main Channel
65.44	209.60	0.0450	Main Channel
72.65	209.41	0.0450	Main Channel
95.97	208.53	0.0450	Main Channel
103.18	208.38	0.0450	Main Channel
108.18	208.33	0.0450	Main Channel
116.25	208.08	0.0450	Main Channel
122.09	207.92	0.0450	Main Channel
131.52	207.65	0.0450	Main Channel
149.56	208.22	0.0450	Main Channel
155.39	208.49	0.0450	Main Channel
177.88	208.58	0.0450	Main Channel
190.96	208.73	0.0450	Main Channel
195.96	208.72	0.0450	Main Channel
226.50	209.32	0.0450	Main Channel
238.71	209.46	0.0450 /0.0600	Main Channel
251.40	209.70	0.0600	

<--------------------- TRAVEL TIME TABLE --------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.11	207.75	.143E+03	0.1	0.15	43.07
0.21	207.86	.574E+03	0.4	0.24	27.13
0.32	207.97	.129E+04	1.0	0.31	20.80
0.43	208.07	.231E+04	2.2	0.37	17.24
0.53	208.18	.362E+04	4.1	0.43	14.72
0.64	208.29	.520E+04	6.7	0.50	12.86
0.75	208.39	.706E+04	9.8	0.53	11.98
0.85	208.50	.929E+04	13.8	0.57	11.23
0.96	208.61	.124E+05	17.5	0.54	11.76
1.07	208.71	.162E+05	25.1	0.60	10.73
1.17	208.82	.206E+05	34.2	0.64	10.01
1.28	208.93	.253E+05	46.2	0.70	9.13
1.39	209.03	.305E+05	60.1	0.76	8.45
1.49	209.14	.359E+05	75.9	0.81	7.89
1.60	209.25	.417E+05	93.7	0.86	7.42
1.71	209.35	.479E+05	112.9	0.91	7.06
1.81	209.46	.545E+05	133.0	0.94	6.83
1.93	209.58	.625E+05	160.7	0.99	6.49
2.05	209.70	.714E+05	193.1	1.04	6.16

	AREA	<---- hydrograph	---->		<-pipe / channel->	
		QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (0095)	331.32	9.39	2.75	32.49	0.73	0.53
OUTFLOW: ID= 1 (2257)	331.32	8.14	2.83	32.49	0.69	0.51

| CALIB |
| STANDHYD (0100) | Area (ha)= 36.92
|ID= 1 DT= 5.0 min | Total Imp(%)= 58.10 Dir. Conn.(%)= 58.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.45	15.47
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	3.42	3.42
Length	(m)=	496.12	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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96

```
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17    0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25    0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         21.23
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        6.41 (ii)    17.58 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.18          0.06
                                                              *TOTALS*
     PEAK FLOW       (cms)=        2.61          0.61           3.122 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=       45.81         17.90          34.12
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.96          0.37           0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0102)|    Area     (ha)=  71.88
|ID= 1 DT= 5.0 min |    Total Imp(%)=  83.70   Dir. Conn.(%)=  83.70
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     60.16         11.72
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      2.22          2.22
     Length             (m)=    692.24         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
            0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
            0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
            0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
            0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
            0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
            0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
            0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
            0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
            0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
            0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
            1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
            1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
            1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
            1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
            1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         22.26
                over (min)        10.00         15.00
     Storage Coeff.  (min)=        8.92 (ii)    13.86 (ii)
     Unit Hyd. Tpeak (min)=       10.00         15.00
     Unit Hyd. peak  (cms)=        0.12          0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=        7.12          0.52           7.604 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83           2.75
     RUNOFF VOLUME    (mm)=       45.81         17.90          41.26
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.96          0.37           0.86


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0103)|     OVERFLOW IS OFF
```

```
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
---------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   4.6900     2.1905
                           1.3100     1.3639   |   6.2900     2.4799
                           2.6500     1.7635   |  62.9000     2.7554

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0102)      71.880     7.604      2.75      41.26
   OUTFLOW: ID= 1 (  0103)      71.880     2.466      3.33      41.26

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.44
                 TIME SHIFT OF PEAK FLOW         (min)= 35.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.7109

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

--------------------
| ADD HYD  (  0099)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
       ID1= 1 (  0100):      36.92    3.122      2.75     34.12
     + ID2= 2 (  0103):      71.88    2.466      3.33     41.26
       ===================================================
       ID = 3 (  0099):     108.80    4.352      2.75     38.83

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

--------------------
| ADD HYD  (  0099)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
       ID1= 3 (  0099):     108.80    4.352      2.75     38.83
     + ID2= 2 (  2257):     331.32    8.144      2.83     32.49
       ===================================================
       ID = 1 (  0099):     440.12   11.935      2.83     34.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2255)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                  28.50         210.02          0.0600
                  47.35         209.86          0.0450      Main Channel
                  51.00         209.76          0.0450      Main Channel
                  60.44         209.54          0.0450      Main Channel
                  65.44         209.60          0.0450      Main Channel
                  72.65         209.41          0.0450      Main Channel
                  95.97         208.53          0.0450      Main Channel
                 103.18         208.38          0.0450      Main Channel
                 108.18         208.33          0.0450      Main Channel
                 116.25         208.08          0.0450      Main Channel
                 122.09         207.92          0.0450      Main Channel
                 131.52         207.65          0.0450      Main Channel
                 149.56         208.22          0.0450      Main Channel
                 155.39         208.49          0.0450      Main Channel
                 177.88         208.58          0.0450      Main Channel
                 190.96         208.73          0.0450      Main Channel
                 195.96         208.72          0.0450      Main Channel
                 226.50         209.32          0.0450      Main Channel
                 238.71         209.46      0.0450 /0.0600  Main Channel
                 251.40         209.70          0.0600

       <--------------------- TRAVEL TIME TABLE --------------------->
        DEPTH     ELEV      VOLUME      FLOW RATE      VELOCITY    TRAV.TIME
         (m)       (m)     (cu.m.)       (cms)          (m/s)        (min)
        0.11    207.75    .601E+03        0.0            0.12       222.56
        0.21    207.86    .241E+04        0.3            0.19       140.20
        0.32    207.97    .542E+04        0.8            0.25       107.47
        0.43    208.07    .969E+04        1.8            0.30        89.07
        0.53    208.18    .152E+05        3.3            0.35        76.07
        0.64    208.29    .218E+05        5.5            0.40        66.47
        0.75    208.39    .296E+05        8.0            0.43        61.92
        0.85    208.50    .389E+05       11.2            0.46        58.04
        0.96    208.61    .519E+05       14.2            0.44        60.79
        1.07    208.71    .677E+05       20.3            0.48        55.45
        1.17    208.82    .861E+05       27.7            0.52        51.74
        1.28    208.93    .106E+06       37.5            0.57        47.20
        1.39    209.03    .128E+06       48.7            0.61        43.64
```

```
      1.49   209.14    .150E+06      61.5           0.66      40.75
      1.60   209.25    .175E+06      76.0           0.70      38.35
      1.71   209.35    .201E+06      91.6           0.73      36.50
      1.81   209.46    .228E+06     107.8           0.76      35.28
      1.93   209.58    .262E+06     130.3           0.80      33.51
      2.05   209.70    .299E+06     156.6           0.84      31.84

                                 <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0099)  440.12   11.94    2.83  34.06      0.88      0.46
  OUTFLOW: ID= 1 (  2255)  440.12    7.05    3.58  34.06      0.71      0.42


-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2296)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                   0.00          204.60        0.0600
                   2.24          204.58        0.0450      Main Channel
                  10.30          203.90        0.0450      Main Channel
                  36.31          203.83        0.0450      Main Channel
                  47.49          204.24        0.0450      Main Channel
                  59.15          204.34        0.0450      Main Channel
                  65.86          204.04        0.0450      Main Channel
                  81.51          203.05        0.0450      Main Channel
                  93.18          202.84        0.0450      Main Channel
                 104.40          202.89        0.0450      Main Channel
                 117.82          202.66        0.0450      Main Channel
                 126.76          202.26        0.0450      Main Channel
                 138.43          200.25        0.0450      Main Channel
                 149.61          199.94        0.0450      Main Channel
                 172.61          203.72        0.0450      Main Channel
                 194.97          203.80        0.0450      Main Channel
                 217.87          204.71        0.0450      Main Channel
                 229.05          205.01        0.0450      Main Channel
                 240.71          205.02    0.0450 /0.0600  Main Channel
                 284.60          205.56        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
       0.23   200.17    .403E+03       0.2           0.17      35.38
       0.47   200.40    .149E+04       1.3           0.30      19.71
       0.70   200.64    .284E+04       3.3           0.41      14.37
       0.93   200.87    .443E+04       6.2           0.50      11.80
       1.17   201.10    .624E+04      10.2           0.58      10.22
       1.40   201.34    .828E+04      15.1           0.65       9.13
       1.63   201.57    .106E+05      21.2           0.71       8.31
       1.87   201.80    .131E+05      28.4           0.77       7.67
       2.10   202.04    .158E+05      36.8           0.83       7.15
       2.33   202.27    .188E+05      46.4           0.88       6.75
       2.57   202.50    .221E+05      54.8           0.88       6.73
       2.80   202.74    .261E+05      63.4           0.86       6.87
       3.03   202.97    .317E+05      65.8           0.74       8.03
       3.27   203.20    .389E+05      87.1           0.80       7.45
       3.50   203.44    .467E+05     113.5           0.87       6.85
       3.73   203.67    .548E+05     143.4           0.93       6.37
       3.97   203.90    .650E+05     141.2           0.77       7.67
       4.20   204.14    .788E+05     182.1           0.82       7.22
       4.55   204.49    .103E+06     256.5           0.88       6.70

                                 <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  2255)  440.12    7.05    3.58  34.06      0.98      0.52
  OUTFLOW: ID= 1 (  2296)  440.12    6.86    3.75  34.06      0.97      0.51


-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0106)|   Area    (ha)= 281.15
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.50   Dir. Conn.(%)=  79.40
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=    223.51        57.64
    Dep. Storage     (mm)=      2.00         5.00
    Average Slope     (%)=      1.63         1.63
```

```
     Length           (m)=    1369.06        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
                  0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
                  0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                  0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                  0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                  0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                  0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                  0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                  0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                  0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                  0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                  1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                  1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                  1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                  1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                  1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                  1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
                  1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
                  1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        21.41
               over (min)        15.00        30.00
     Storage Coeff.  (min)=      14.73 (ii)   28.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=      23.64         1.79       24.748 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.08         2.75
     RUNOFF VOLUME    (mm)=      45.81        17.97        40.07
     TOTAL RAINFALL   (mm)=      47.81        47.81        47.81
     RUNOFF COEFFICIENT   =       0.96         0.38         0.84


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0107)|
|   1 +  2 =  3    |           AREA    QPEAK     TPEAK      R.V.
--------------------           (ha)    (cms)     (hrs)      (mm)
          ID1= 1 (  0106):   281.15  24.748      2.75      40.07
        + ID2= 2 (  2296):   440.12   6.856      3.75      34.06
          ===============================================
          ID = 3 (  0107):   721.27  27.705      2.83      36.40

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2300)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                 <------ DATA FOR SECTION (    1.1) ------>
                 Distance        Elevation        Manning
                     0.00          204.60          0.0600
                     2.24          204.58          0.0450       Main Channel
                    10.30          203.90          0.0450       Main Channel
                    36.31          203.83          0.0450       Main Channel
                    47.49          204.24          0.0450       Main Channel
                    59.15          204.34          0.0450       Main Channel
                    65.86          204.04          0.0450       Main Channel
                    81.51          203.05          0.0450       Main Channel
                    93.18          202.84          0.0450       Main Channel
                   104.40          202.89          0.0450       Main Channel
                   117.82          202.66          0.0450       Main Channel
                   126.76          202.26          0.0450       Main Channel
                   138.43          200.25          0.0450       Main Channel
                   149.61          199.94          0.0450       Main Channel
                   172.61          203.72          0.0450       Main Channel
                   194.97          203.80          0.0450       Main Channel
                   217.87          204.71          0.0450       Main Channel
```

```
             229.05          205.01          0.0450      Main Channel
             240.71          205.02      0.0450 /0.0600  Main Channel
             284.60          205.56          0.0600

     <--------------------- TRAVEL TIME TABLE ---------------------->
      DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
       (m)      (m)      (cu.m.)      (cms)        (m/s)      (min)
      0.23    200.17    .588E+03       0.2          0.17      51.42
      0.47    200.40    .217E+04       1.3          0.30      28.64
      0.70    200.64    .415E+04       3.3          0.41      20.89
      0.93    200.87    .646E+04       6.3          0.50      17.15
      1.17    201.10    .910E+04      10.2          0.58      14.86
      1.40    201.34    .121E+05      15.2          0.65      13.27
      1.63    201.57    .154E+05      21.3          0.72      12.08
      1.87    201.80    .191E+05      28.5          0.78      11.15
      2.10    202.04    .231E+05      37.0          0.83      10.39
      2.33    202.27    .274E+05      46.6          0.88       9.80
      2.57    202.50    .323E+05      55.0          0.88       9.79
      2.80    202.74    .381E+05      63.6          0.87       9.98
      3.03    202.97    .462E+05      66.1          0.74      11.66
      3.27    203.20    .568E+05      87.4          0.80      10.83
      3.50    203.44    .681E+05     114.0          0.87       9.96
      3.73    203.67    .800E+05     143.9          0.93       9.26
      3.97    203.90    .948E+05     141.7          0.78      11.14
      4.20    204.14    .115E+06     182.8          0.82      10.49
      4.55    204.49    .150E+06     257.5          0.89       9.74

                                    <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)    (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0107)  721.27   27.71     2.83  36.40     1.84      0.77
   OUTFLOW: ID= 1 (  2300)  721.27   24.63     2.92  36.40     1.75      0.74


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--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  2300):    721.27  24.626      2.92     36.40
      + ID2= 2 (  0024):      9.55   1.103      2.75     44.48
        ==================================================
        ID = 3 (  0023):    730.82  25.125      2.92     36.51

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0023):    730.82  25.125      2.92     36.51
      + ID2= 2 (  0025):      8.34   0.166      3.67     16.61
        ==================================================
        ID = 1 (  0023):    739.16  25.214      2.92     36.28

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0023):    739.16  25.214      2.92     36.28
      + ID2= 2 (  0049):     23.02   2.600      2.75     44.48
        ==================================================
        ID = 3 (  0023):    762.18  27.349      2.83     36.53

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0023):    762.18  27.349      2.83     36.53
      + ID2= 2 (  0050):     31.36   3.135      2.83     44.48
        ==================================================
        ID = 1 (  0023):    793.54  30.484      2.83     36.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
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--------------------
| RESERVOIR( 0042)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |    OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)  |   (cms)      (ha.m.)
                          0.0000      0.0000  |  45.9000     15.6510
                          3.5700      5.9180  |  *******     16.6510
                         15.7400     10.6460  |   0.0000      0.0000

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0023)    793.540    30.484      2.83       36.85
   OUTFLOW: ID= 1 (  0042)    793.540    13.155      4.08       36.84

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.15
                    TIME SHIFT OF PEAK FLOW         (min)= 75.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  9.6418

------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2297)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00          204.60         0.0600
                   2.24          204.58         0.0450      Main Channel
                  10.30          203.90         0.0450      Main Channel
                  36.31          203.83         0.0450      Main Channel
                  47.49          204.24         0.0450      Main Channel
                  59.15          204.34         0.0450      Main Channel
                  65.86          204.04         0.0450      Main Channel
                  81.51          203.05         0.0450      Main Channel
                  93.18          202.84         0.0450      Main Channel
                 104.40          202.89         0.0450      Main Channel
                 117.82          202.66         0.0450      Main Channel
                 126.76          202.26         0.0450      Main Channel
                 138.43          200.25         0.0450      Main Channel
                 149.61          199.94         0.0450      Main Channel
                 172.61          203.72         0.0450      Main Channel
                 194.97          203.80         0.0450      Main Channel
                 217.87          204.71         0.0450      Main Channel
                 229.05          205.01         0.0450      Main Channel
                 240.71          205.02     0.0450 /0.0600  Main Channel
                 284.60          205.56         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)      (cms)         (m/s)       (min)
       0.23    200.17    .921E+03        0.2          0.20        68.84
       0.47    200.40    .341E+04        1.5          0.35        38.35
       0.70    200.64    .650E+04        3.9          0.48        27.97
       0.93    200.87    .101E+05        7.3          0.59        22.96
       1.17    201.10    .143E+05       11.9          0.68        19.89
       1.40    201.34    .189E+05       17.8          0.76        17.77
       1.63    201.57    .241E+05       24.9          0.84        16.18
       1.87    201.80    .299E+05       33.3          0.91        14.93
       2.10    202.04    .361E+05       43.3          0.97        13.92
       2.33    202.27    .429E+05       54.5          1.03        13.12
       2.57    202.50    .506E+05       64.4          1.03        13.10
       2.80    202.74    .597E+05       74.4          1.01        13.37
       3.03    202.97    .724E+05       77.3          0.87        15.62
       3.27    203.20    .890E+05      102.3          0.93        14.50
       3.50    203.44    .107E+06      133.4          1.02        13.33
       3.73    203.67    .125E+06      168.4          1.09        12.40
       3.97    203.90    .148E+06      165.8          0.91        14.92
       4.20    204.14    .180E+06      213.9          0.97        14.04
       4.55    204.49    .236E+06      301.3          1.04        13.04

                                         <---- hydrograph ---->  <-pipe / channel->
                              AREA     QPEAK    TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)     (cms)    (hrs)    (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0042)   793.54    13.15     4.08   36.84      1.22      0.70
   OUTFLOW: ID= 1 (  2297)   793.54    12.65     4.42   36.84      1.19      0.69


------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area     (ha)=  10.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00    Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
```

```
     Surface Area      (ha)=       9.57          1.06
     Dep. Storage      (mm)=       1.00          1.50
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     266.21         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
               0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
               0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
               0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
               0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
               0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
               0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
               0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
               0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
               0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
               0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
               1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
               1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
               1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
               1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
               1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
               1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
               1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
               1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       6.39 (ii)    10.46 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.18          0.09
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.16          0.07       1.227 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83        2.75
     RUNOFF VOLUME    (mm)=      46.81         23.53       44.48
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.49        0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0039)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.6400     0.4866
                          0.1200     0.3419   |   0.9300     0.5544
                          0.3000     0.3912   |   9.3000     0.6160

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0021)     10.630     1.227       2.75       44.48
   OUTFLOW: ID= 1 (  0039)     10.630     0.175       3.75       44.41

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.23
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3572

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--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  2297):    793.54  12.645     4.42     36.84
      + ID2= 2 (  0039):     10.63   0.175     3.75     44.41
        =================================================
        ID = 3 (  0022):    804.17  12.784     4.42     36.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| CALIB               |
| NASHYD    (  0030)|    Area     (ha)=    5.65   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min  |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    0.99

        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Unit Hyd Qpeak  (cms)=   0.218

    PEAK FLOW       (cms)=   0.101 (i)
    TIME TO PEAK    (hrs)=   3.833
    RUNOFF VOLUME    (mm)=  16.611
    TOTAL RAINFALL   (mm)=  47.810
    RUNOFF COEFFICIENT   =   0.347

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

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--------------------
| CALIB               |
| STANDHYD (  0029)|    Area     (ha)=    9.43
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area    (ha)=      8.49         0.94
    Dep. Storage    (mm)=      1.00         1.50
    Average Slope    (%)=      1.00         2.00
    Length           (m)=    250.73        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=      43.98        27.63
               over (min)       5.00        15.00
    Storage Coeff.  (min)=      6.16 (ii)   10.23 (ii)
    Unit Hyd. Tpeak (min)=      5.00        15.00
```

```
     Unit Hyd. peak  (cms)=       0.19          0.09
                                                              *TOTALS*
     PEAK FLOW       (cms)=       1.03          0.06            1.090 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83            2.75
     RUNOFF VOLUME    (mm)=      46.81         23.53           44.48
     TOTAL RAINFALL   (mm)=      47.81         47.81           47.81
     RUNOFF COEFFICIENT   =       0.98          0.49            0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0031)|   Area    (ha)=  39.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=     35.79         3.98
     Dep. Storage    (mm)=      1.00         1.50
     Average Slope    (%)=      1.00         2.00
     Length           (m)=    514.91        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
                0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
                0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
                1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
                1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         27.63
                over (min)       10.00         15.00
     Storage Coeff.  (min)=       9.49 (ii)    13.56 (ii)
     Unit Hyd. Tpeak (min)=      10.00         15.00
     Unit Hyd. peak  (cms)=       0.12          0.08
                                                              *TOTALS*
     PEAK FLOW       (cms)=       4.21          0.23            4.430 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83            2.75
     RUNOFF VOLUME    (mm)=      46.81         23.53           44.48
     TOTAL RAINFALL   (mm)=      47.81         47.81           47.81
     RUNOFF COEFFICIENT   =       0.98          0.49            0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0061)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   7.1600     0.3940

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0031)     39.770     4.430      2.75      44.48
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   OUTFLOW: ID= 1 (  0061)     39.770      4.038      2.83      44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 91.14
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2232

 ------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0051)|    Area    (ha)=  11.41
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=     10.27         1.14
      Dep. Storage      (mm)=      1.00         5.00
      Average Slope      (%)=      1.00         2.00
      Length             (m)=    275.80        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

      Max.Eff.Inten.(mm/hr)=       43.98         24.02
                 over (min)        5.00         15.00
      Storage Coeff.  (min)=        6.52 (ii)    10.59 (ii)
      Unit Hyd. Tpeak (min)=        5.00         15.00
      Unit Hyd. peak  (cms)=        0.18          0.09
                                                              *TOTALS*
      PEAK FLOW       (cms)=        1.25          0.06          1.304 (iii)
      TIME TO PEAK    (hrs)=        2.75          2.83           2.75
      RUNOFF VOLUME    (mm)=       46.81         19.33          44.06
      TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
      RUNOFF COEFFICIENT   =        0.98          0.40           0.92

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  83.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR(  0053)|      OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |  1.4100     0.4103

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0051)     11.410     1.304       2.75       44.06
   OUTFLOW: ID= 1 (  0053)     11.410     0.688       2.92       44.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 52.78
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2015

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 | CALIB              |
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 | STANDHYD (  0052)|    Area     (ha)=  25.67
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     23.10         2.57
     Dep. Storage     (mm)=      1.00         1.50
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    413.68        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=     43.98        27.63
                over (min)      10.00        15.00
     Storage Coeff.  (min)=      8.32 (ii)   12.39 (ii)
     Unit Hyd. Tpeak (min)=     10.00        15.00
     Unit Hyd. peak  (cms)=      0.13         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=      2.75         0.15        2.899 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.83         2.75
     RUNOFF VOLUME    (mm)=     46.81        23.53        44.48
     TOTAL RAINFALL   (mm)=     47.81        47.81        47.81
     RUNOFF COEFFICIENT   =      0.98         0.49         0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 --------------------
 | RESERVOIR(  0054)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  4.6210     0.3130

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0052)     25.670     2.899      2.75       44.48
   OUTFLOW: ID= 1 (  0054)     25.670     2.568      2.83       44.48

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.57
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1740

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 --------------------
 | ADD HYD  (  0032)|
 |   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
 --------------------         (ha)    (cms)     (hrs)     (mm)
         ID1= 1 (  0022):   804.17  12.784      4.42     36.94
       + ID2= 2 (  0029):     9.43   1.090      2.75     44.48
         ================================================
         ID = 3 (  0032):   813.60  12.845      4.42     37.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0032):    813.60  12.845      4.42     37.03
      + ID2= 2 (  0030):      5.65   0.101      3.83     16.61
        ==================================================
        ID = 1 (  0032):    819.25  12.933      4.42     36.89

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0032):    819.25  12.933      4.42     36.89
      + ID2= 2 (  0053):     11.41   0.688      2.92     44.06
        ==================================================
        ID = 3 (  0032):    830.66  13.206      4.33     36.99

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

--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0032):    830.66  13.206      4.33     36.99
      + ID2= 2 (  0054):     25.67   2.568      2.83     44.48
        ==================================================
        ID = 1 (  0032):    856.33  13.511      4.33     37.21

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0032):    856.33  13.511      4.33     37.21
      + ID2= 2 (  0061):     39.77   4.038      2.83     44.48
        ==================================================
        ID = 3 (  0032):    896.10  14.005      4.25     37.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| CALIB            |
| STANDHYD (  0068)|   Area    (ha)=   6.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       5.40         0.60
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     200.00        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
                  0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
                  0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                  0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                  0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                  0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                  0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                  0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                  0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                  0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                  0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                  1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                  1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                  1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                  1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                  1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                  1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
```

```
            1.500      5.74 | 3.083     12.43 | 4.667      1.91 |   6.25     0.96
            1.583      5.74 | 3.167     12.43 | 4.750      1.91 |

     Max.Eff.Inten.(mm/hr)=        43.98           27.63
                over (min)          5.00           10.00
     Storage Coeff.   (min)=        5.38 (ii)       9.45 (ii)
     Unit Hyd. Tpeak  (min)=        5.00           10.00
     Unit Hyd. peak   (cms)=        0.21            0.12
                                                                *TOTALS*
     PEAK FLOW        (cms)=        0.66            0.04          0.698 (iii)
     TIME TO PEAK     (hrs)=        2.75            2.75           2.75
     RUNOFF VOLUME     (mm)=       46.81           23.53          44.48
     TOTAL RAINFALL    (mm)=       47.81           47.81          47.81
     RUNOFF COEFFICIENT   =         0.98            0.49           0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0032):    896.10  14.005     4.25    37.54
      + ID2= 2 (  0068):      6.00   0.698     2.75    44.48
        ==================================================
        ID = 3 (  0066):    902.10  14.068     4.25    37.58

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

--------------------
| ROUTE CHN(  2875)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00          204.68         0.0600
                   3.24          204.67         0.0450        Main Channel
                  51.26          203.93         0.0450        Main Channel
                  66.07          203.18         0.0450        Main Channel
                  87.42          203.39         0.0450        Main Channel
                 132.09          202.47         0.0450        Main Channel
                 165.30          201.66         0.0450        Main Channel
                 213.87          200.24         0.0450        Main Channel
                 259.32          199.43         0.0450        Main Channel
                 266.86          197.71         0.0450        Main Channel
                 276.16          196.93         0.0450        Main Channel
                 304.50          197.16         0.0450        Main Channel
                 307.31          197.98         0.0450        Main Channel
                 311.09          198.45         0.0450        Main Channel
                 329.41          198.06         0.0450        Main Channel
                 371.71          200.22         0.0450        Main Channel
                 378.80          200.32         0.0450        Main Channel
                 411.13          199.51         0.0450        Main Channel
                 421.51          202.47     0.0450 /0.0600    Main Channel
                 461.76          202.80         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)        (cms)         (m/s)       (min)
       0.31    197.24    .601E+04          3.8          0.64        26.05
       0.62    197.55    .166E+05         19.1          1.14        14.50
       0.92    197.85    .286E+05         44.3          1.54        10.76
       1.23    198.16    .419E+05         72.2          1.72         9.67
       1.54    198.47    .611E+05        105.3          1.72         9.67
       1.85    198.78    .849E+05        171.0          2.01         8.27
       2.15    199.08    .111E+06        252.0          2.26         7.34
       2.46    199.39    .139E+06        348.9          2.50         6.65
       2.77    199.70    .172E+06        416.9          2.41         6.89
       3.08    200.01    .217E+06        514.0          2.36         7.02
       3.39    200.32    .272E+06        649.5          2.38         6.98
       3.69    200.62    .336E+06        888.1          2.63         6.31
       4.00    200.93    .403E+06       1163.0          2.87         5.78
       4.31    201.24    .474E+06       1473.8          3.09         5.37
       4.62    201.55    .549E+06       1820.8          3.30         5.03
       4.92    201.85    .627E+06       2198.2          3.49         4.76
       5.23    202.16    .710E+06       2610.1          3.66         4.53
       5.54    202.47    .796E+06       3061.7          3.83         4.34
       5.87    202.80    .901E+06       3585.6          3.96         4.19
```

	AREA	QPEAK	TPEAK	R.V.	MAX DEPTH	MAX VEL
		<---- hydrograph ---->			<-pipe / channel->	
	(ha)	(cms)	(hrs)	(mm)	(m)	(m/s)
INFLOW : ID= 2 (0066)	902.10	14.07	4.25	37.58	0.51	0.91
OUTFLOW: ID= 1 (2875)	902.10	13.88	4.42	37.58	0.51	0.90

VMC - 5yr- 6hr Storm- Proposed Condition

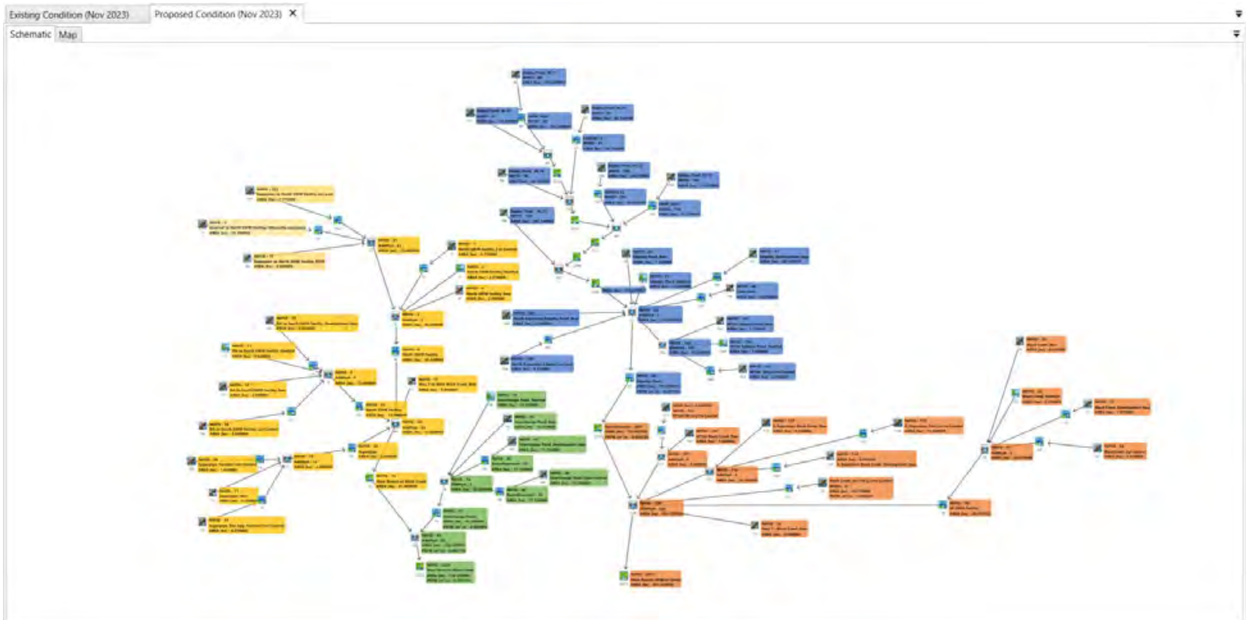

Figure 4. VMC - 5yr- 6hr Storm- Proposed Condition.

```
==================================================================================================

       V    V   I    SSSSS  U   U    A    L            (v 6.2.2013)
       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
Developed and Distributed by Smart City Water Inc
```



```
                   *****  D E T A I L E D   O U T P U T *****


  Input   filename: D:\Program Files (x86)\Visual OTTHYMO 6.2\V02\voin.dat
  Output  filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\b93b33f7-7f16-4
  Summary filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\b93b33f7-7f16-4


DATE: 06/18/2024                             TIME: 08:23:31

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5yr                           **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\rhe\AppData\
|                  |              Local\Temp\
|                  |              51a56c8c-3579-4d4b-b5ff-1a77600eda50\10b1293c
| Ptotal= 47.81 mm |    Comments: 5 Year 6 Hour AES (Bloor, TRCA)
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    0.00 |  1.75   16.25 |   3.50    6.69 |  5.25    0.96
                 0.25    0.96 |  2.00   16.25 |   3.75    3.82 |  5.50    0.96
                 0.50    0.96 |  2.25   43.98 |   4.00    3.82 |  5.75    0.96
                 0.75    0.96 |  2.50   43.98 |   4.25    1.91 |  6.00    0.96
                 1.00    0.96 |  2.75   12.43 |   4.50    1.91 |
                 1.25    5.74 |  3.00   12.43 |   4.75    0.96 |
                 1.50    5.74 |  3.25    6.69 |   5.00    0.96 |

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


--------------------
| CALIB            |
| NASHYD   (  0025)|   Area    (ha)=  11.16   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.70

         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
```

1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
Unit Hyd Qpeak  (cms)=   0.609

PEAK FLOW       (cms)=   0.249 (i)
TIME TO PEAK    (hrs)=   3.417
RUNOFF VOLUME    (mm)=  16.611
TOTAL RAINFALL   (mm)=  47.810
RUNOFF COEFFICIENT   =   0.347

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

```
--------------------
| CALIB              |
| NASHYD   (  0164)|    Area       (ha)=    1.00   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia         (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.85

    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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
Unit Hyd Qpeak  (cms)=   0.045

PEAK FLOW       (cms)=   0.020 (i)
TIME TO PEAK    (hrs)=   3.667
RUNOFF VOLUME    (mm)=  16.609
TOTAL RAINFALL   (mm)=  47.810
RUNOFF COEFFICIENT   =   0.347

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

```
--------------------
| CALIB              |
| STANDHYD (  0163)|    Area     (ha)=    8.73
|ID= 1 DT= 5.0 min |    Total Imp(%)=   61.00   Dir. Conn.(%)=   61.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=        5.33         3.40
Dep. Storage     (mm)=        1.00         5.00
Average Slope     (%)=        1.00         1.00
Length            (m)=      241.25        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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96

```
            0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
            0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
            0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
            0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
            0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
            1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
            1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
            1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
            1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
            1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
            1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
            1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
            1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         21.81
                over (min)         5.00         25.00
     Storage Coeff.  (min)=        6.02 (ii)    22.00 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=        0.19          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.65          0.13       0.745 (iii)
     TIME TO PEAK    (hrs)=        2.75          3.00        2.75
     RUNOFF VOLUME    (mm)=       46.81         19.33       36.09
     TOTAL RAINFALL   (mm)=       47.81         47.81       47.81
     RUNOFF COEFFICIENT   =        0.98          0.40        0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0168)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  1.5700     0.1040

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0163)     8.730     0.745      2.75       36.09
   OUTFLOW: ID= 1 (  0168)     8.730     0.648      2.75       36.09

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.06
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0444

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0165)|   Area    (ha)=    1.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     1.00         0.11
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=    86.02        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
            0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
            0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
            0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
            0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
            0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
            0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
            0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
            0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
            0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
            0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
            1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
            1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
            1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
            1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
```

```
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08    0.96
             1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17    0.96
             1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25    0.96
             1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.24 (ii)     7.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.13
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.12          0.01         0.129 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33         44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81         47.81
     RUNOFF COEFFICIENT   =       0.98          0.40          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0162)|
|   1 + 2 =  3     |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0164):     1.00    0.020      3.67    16.61
      + ID2= 2 (  0165):     1.11    0.129      2.75    44.06
        ===================================================
        ID = 3 (  0162):     2.11    0.135      2.75    31.05

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

--------------------
| ADD HYD  (  0162)|
|   3 + 2 =  1     |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0162):     2.11    0.135      2.75    31.05
      + ID2= 2 (  0168):     8.73    0.648      2.75    36.09
        ===================================================
        ID = 1 (  0162):    10.84    0.783      2.75    35.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|    Area    (ha)=    7.52
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00    Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      6.77          0.75
     Dep. Storage      (mm)=      1.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    223.90         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 | 1.667     5.74 | 3.250    12.43 |  4.83    0.96
             0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92    0.96
             0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00    0.96
             0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08    0.96
             0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17    0.96
             0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25    0.96
             0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33    0.96
             0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42    0.96
             0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50    0.96
             0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58    0.96
             0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67    0.96
             1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75    0.96
             1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83    0.96
             1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92    0.96
             1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00    0.96
             1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08    0.96
```

```
          1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17    0.96
          1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25    0.96
          1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

  Max.Eff.Inten.(mm/hr)=       43.98         24.02
             over (min)         5.00         10.00
  Storage Coeff.  (min)=        5.76 (ii)     9.83 (ii)
  Unit Hyd. Tpeak (min)=        5.00         10.00
  Unit Hyd. peak  (cms)=        0.20          0.11
                                                         *TOTALS*
  PEAK FLOW       (cms)=        0.82          0.04         0.866 (iii)
  TIME TO PEAK    (hrs)=        2.75          2.75          2.75
  RUNOFF VOLUME    (mm)=       46.81         19.33         44.06
  TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
  RUNOFF COEFFICIENT   =        0.98          0.40          0.92


    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  83.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0047)|   Area    (ha)=  23.15
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
  Surface Area      (ha)=      20.83         2.32
  Dep. Storage      (mm)=       1.00         5.00
  Average Slope      (%)=       1.00         2.00
  Length             (m)=     392.85        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
          0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
          0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
          0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
          0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
          0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
          0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
          0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
          0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
          0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
          0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
          1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
          1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
          1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
          1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
          1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
          1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
          1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
          1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

  Max.Eff.Inten.(mm/hr)=       43.98         24.02
             over (min)        10.00         15.00
  Storage Coeff.  (min)=        8.06 (ii)    12.14 (ii)
  Unit Hyd. Tpeak (min)=       10.00         15.00
  Unit Hyd. peak  (cms)=        0.13          0.09
                                                         *TOTALS*
  PEAK FLOW       (cms)=        2.49          0.12         2.597 (iii)
  TIME TO PEAK    (hrs)=        2.75          2.83          2.75
  RUNOFF VOLUME    (mm)=       46.81         19.33         44.06
  TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
  RUNOFF COEFFICIENT   =        0.98          0.40          0.92


    (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
         CN*  =  83.0    Ia = Dep. Storage  (Above)
   (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
        THAN THE STORAGE COEFFICIENT.
  (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| RESERVOIR(  0049)|     OVERFLOW IS OFF
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| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |   3.4880     0.0000

                              AREA      QPEAK      TPEAK        R.V.
                              (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0047)    23.150     2.597       2.75        44.06
   OUTFLOW: ID= 1 (  0049)    23.150     2.597       2.75        44.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.00
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0000
                   MAXIMUM  STORAGE   USED       (cu.m.)=  0.000146

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                     CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0048)|   Area    (ha)=  10.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       6.28         4.01
     Dep. Storage      (mm)=       1.00         5.00
     Average Slope      (%)=       1.00         1.00
     Length             (m)=     261.92        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                 0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                 0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                 0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                 0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                 1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                 1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                 1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                 1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                 1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                 1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                 1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                 1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98        21.81
                over (min)        5.00         25.00
     Storage Coeff.  (min)=       6.32 (ii)    22.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=       0.19         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.76         0.15         0.876 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00         2.75
     RUNOFF VOLUME    (mm)=      46.81        19.33        36.09
     TOTAL RAINFALL   (mm)=      47.81        47.81        47.81
     RUNOFF COEFFICIENT   =       0.98         0.40         0.75

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0050)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.6200     0.3247

                              AREA      QPEAK      TPEAK        R.V.
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```
                              (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0048)    10.290     0.876       2.75      36.09
  OUTFLOW: ID= 1 (  0050)    10.290     0.329       3.25      36.08

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.51
                 TIME SHIFT OF PEAK FLOW        (min)= 30.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.1724

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0088)|   Area    (ha)= 181.61
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.40   Dir. Conn.(%)=  54.10
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=     106.06        75.55
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       2.50         2.50
    Length            (m)=    1100.33        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
              0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
              0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
              0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
              0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
              0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
              0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
              0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
              0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
              0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
              1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
              1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
              1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
              1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
              1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
              1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
              1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
              1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=       43.98        26.05
               over (min)        10.00        25.00
    Storage Coeff.  (min)=       11.37 (ii)   22.67 (ii)
    Unit Hyd. Tpeak (min)=       10.00        25.00
    Unit Hyd. peak  (cms)=        0.10         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       11.27         3.26        13.714 (iii)
    TIME TO PEAK    (hrs)=        2.75         3.00          2.75
    RUNOFF VOLUME    (mm)=       45.81        19.97         33.95
    TOTAL RAINFALL   (mm)=       47.81        47.81         47.81
    RUNOFF COEFFICIENT   =        0.96         0.42          0.71

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  82.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0089)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.5600     7.7340
                          0.6870     3.6492   |   2.0400     9.8037
                          1.0220     5.2831   |  *******    10.8930

                              AREA      QPEAK      TPEAK       R.V.
                              (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0088)   181.610    13.714       2.75      33.95
  OUTFLOW: ID= 1 (  0089)   181.610     0.991       4.83      33.94

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.23
                 TIME SHIFT OF PEAK FLOW        (min)=125.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  5.1343
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--------------------
| CALIB              |
| STANDHYD (  0091)|    Area     (ha)=  19.40
|ID= 1 DT= 5.0 min |    Total Imp(%)=  72.50   Dir. Conn.(%)=  66.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     14.07          5.33
     Dep. Storage     (mm)=      2.00          5.00
     Average Slope     (%)=      2.42          2.42
     Length            (m)=    359.63         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 | 1.667     5.74 | 3.250    12.43 |  4.83    0.96
                0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92    0.96
                0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00    0.96
                0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08    0.96
                0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17    0.96
                0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25    0.96
                0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33    0.96
                0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42    0.96
                0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50    0.96
                0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58    0.96
                0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67    0.96
                1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75    0.96
                1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83    0.96
                1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92    0.96
                1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00    0.96
                1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08    0.96
                1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17    0.96
                1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25    0.96
                1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         34.01
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       5.87 (ii)    16.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.19          0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       1.57          0.36         1.888 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.92          2.75
     RUNOFF VOLUME    (mm)=      45.81         23.73         38.41
     TOTAL RAINFALL   (mm)=      47.81         47.81         47.81
     RUNOFF COEFFICIENT   =       0.96          0.50          0.80


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD   (  0092)|
|   1 +  2 =  3     |            AREA    QPEAK     TPEAK     R.V.
--------------------             (ha)    (cms)     (hrs)     (mm)
         ID1= 1 (  0089):      181.61    0.991      4.83    33.94
       + ID2= 2 (  0091):       19.40    1.888      2.75    38.41
         ==================================================
         ID = 3 (  0092):      201.01    2.319      2.75    34.37

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ROUTE CHN(  2252)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance        Elevation        Manning
                   28.50          210.02         0.0600
                   47.35          209.86         0.0450       Main Channel
                   51.00          209.76         0.0450       Main Channel
                   60.44          209.54         0.0450       Main Channel
                   65.44          209.60         0.0450       Main Channel
                   72.65          209.41         0.0450       Main Channel
```

95.97	208.53	0.0450	Main Channel
103.18	208.38	0.0450	Main Channel
108.18	208.33	0.0450	Main Channel
116.25	208.08	0.0450	Main Channel
122.09	207.92	0.0450	Main Channel
131.52	207.65	0.0450	Main Channel
149.56	208.22	0.0450	Main Channel
155.39	208.49	0.0450	Main Channel
177.88	208.58	0.0450	Main Channel
190.96	208.73	0.0450	Main Channel
195.96	208.72	0.0450	Main Channel
226.50	209.32	0.0450	Main Channel
238.71	209.46	0.0450 /0.0600	Main Channel
251.40	209.70	0.0600	

<--------------------- TRAVEL TIME TABLE --------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.11	207.75	.531E+03	0.1	0.20	119.24
0.21	207.86	.213E+04	0.5	0.32	75.12
0.32	207.97	.479E+04	1.4	0.41	57.58
0.43	208.07	.856E+04	3.0	0.50	47.72
0.53	208.18	.134E+05	5.5	0.58	40.76
0.64	208.29	.193E+05	9.0	0.67	35.61
0.75	208.39	.261E+05	13.1	0.71	33.18
0.85	208.50	.344E+05	18.4	0.76	31.10
0.96	208.61	.458E+05	23.5	0.73	32.57
1.07	208.71	.598E+05	33.6	0.80	29.71
1.17	208.82	.761E+05	45.8	0.85	27.72
1.28	208.93	.938E+05	61.8	0.94	25.29
1.39	209.03	.113E+06	80.4	1.01	23.38
1.49	209.14	.133E+06	101.5	1.09	21.84
1.60	209.25	.154E+06	125.3	1.15	20.55
1.71	209.35	.177E+06	151.0	1.21	19.56
1.81	209.46	.202E+06	177.9	1.25	18.90
1.93	209.58	.232E+06	214.9	1.32	17.96
2.05	209.70	.264E+06	258.3	1.39	17.06

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0092)	201.01	2.32	2.75	34.37	0.38	0.46
OUTFLOW: ID= 1 (2252)	201.01	1.21	3.75	34.37	0.30	0.39

```
--------------------
| CALIB              |
| STANDHYD (  0093)  |   Area    (ha)=  88.14
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  76.00    Dir. Conn.(%)=  76.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	66.99	21.15
Dep. Storage	(mm)=	2.28	5.00
Average Slope	(%)=	2.00	2.28
Length	(m)=	766.55	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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
    Max.Eff.Inten.(mm/hr)=      43.98        21.23
              over (min)        10.00        25.00
    Storage Coeff.  (min)=       9.78 (ii)   22.39 (ii)
    Unit Hyd. Tpeak (min)=      10.00        25.00
    Unit Hyd. peak  (cms)=       0.11         0.05
                                                         *TOTALS*
    PEAK FLOW       (cms)=       7.84         0.74         8.387 (iii)
    TIME TO PEAK    (hrs)=       2.75         3.00         2.75
    RUNOFF VOLUME    (mm)=      45.53        17.90        38.90
    TOTAL RAINFALL   (mm)=      47.81        47.81        47.81
    RUNOFF COEFFICIENT   =       0.95         0.37         0.81

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  81.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0097)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  0.8650      3.7180
                          0.3820     1.8340    |  0.9980      4.2030
                          0.5670     2.5650    |  1.1340      4.6850
                          0.6930     3.0750    |  0.0000      0.0000

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0093)     88.140      8.387       2.75       38.90
   OUTFLOW: ID= 1 (  0097)     88.140      0.631       4.50       38.88

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.52
                  TIME SHIFT OF PEAK FLOW         (min)=105.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.8226

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0096)|    Area    (ha)=  42.17
|ID= 1 DT= 5.0 min |    Total Imp(%)=  72.00   Dir. Conn.(%)=  72.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      30.36        11.81
    Dep. Storage     (mm)=       2.00         5.00
    Average Slope     (%)=       2.04         2.04
    Length            (m)=     530.22        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=      43.98        22.08
              over (min)        10.00        25.00
    Storage Coeff.  (min)=       7.80 (ii)   20.63 (ii)
    Unit Hyd. Tpeak (min)=      10.00        25.00
    Unit Hyd. peak  (cms)=       0.13         0.05
```

```
                                                             *TOTALS*
     PEAK FLOW       (cms)=        3.63          0.44          3.964 (iii)
     TIME TO PEAK    (hrs)=        2.75          3.00           2.75
     RUNOFF VOLUME    (mm)=       45.81         18.59          38.19
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.96          0.39           0.80

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  82.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0095)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  2252):     201.01   1.207     3.75     34.37
      + ID2= 2 (  0096):      42.17   3.964     2.75     38.19
        ==================================================
        ID = 3 (  0095):     243.18   4.879     2.75     35.03

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

--------------------
| ADD HYD  (  0095)|
|   3 +  2 =  1    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0095):     243.18   4.879     2.75     35.03
      + ID2= 2 (  0097):      88.14   0.631     4.50     38.88
        ==================================================
        ID = 1 (  0095):     331.32   5.193     2.75     36.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2257)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation       Manning
                  28.50         210.02         0.0600
                  47.35         209.86         0.0450     Main Channel
                  51.00         209.76         0.0450     Main Channel
                  60.44         209.54         0.0450     Main Channel
                  65.44         209.60         0.0450     Main Channel
                  72.65         209.41         0.0450     Main Channel
                  95.97         208.53         0.0450     Main Channel
                 103.18         208.38         0.0450     Main Channel
                 108.18         208.33         0.0450     Main Channel
                 116.25         208.08         0.0450     Main Channel
                 122.09         207.92         0.0450     Main Channel
                 131.52         207.65         0.0450     Main Channel
                 149.56         208.22         0.0450     Main Channel
                 155.39         208.49         0.0450     Main Channel
                 177.88         208.58         0.0450     Main Channel
                 190.96         208.73         0.0450     Main Channel
                 195.96         208.72         0.0450     Main Channel
                 226.50         209.32         0.0450     Main Channel
                 238.71         209.46     0.0450 /0.0600 Main Channel
                 251.40         209.70         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)        (m/s)         (min)
       0.11    207.75    .143E+03        0.1          0.15         43.07
       0.21    207.86    .574E+03        0.4          0.24         27.13
       0.32    207.97    .129E+04        1.0          0.31         20.80
       0.43    208.07    .231E+04        2.2          0.37         17.24
       0.53    208.18    .362E+04        4.1          0.43         14.72
       0.64    208.29    .520E+04        6.7          0.50         12.86
       0.75    208.39    .706E+04        9.8          0.53         11.98
       0.85    208.50    .929E+04       13.8          0.57         11.23
       0.96    208.61    .124E+05       17.5          0.54         11.76
       1.07    208.71    .162E+05       25.1          0.60         10.73
       1.17    208.82    .206E+05       34.2          0.64         10.01
       1.28    208.93    .253E+05       46.2          0.70          9.13
       1.39    209.03    .305E+05       60.1          0.76          8.45
       1.49    209.14    .359E+05       75.9          0.81          7.89
       1.60    209.25    .417E+05       93.7          0.86          7.42
```

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     1.71    209.35     .479E+05      112.9            0.91        7.06
     1.81    209.46     .545E+05      133.0            0.94        6.83
     1.93    209.58     .625E+05      160.7            0.99        6.49
     2.05    209.70     .714E+05      193.1            1.04        6.16

                                 <---- hydrograph ---->  <-pipe / channel->
                           AREA    QPEAK   TPEAK   R.V.  MAX DEPTH  MAX VEL
                           (ha)    (cms)   (hrs)   (mm)     (m)      (m/s)
 INFLOW : ID= 2 (  0095)  331.32    5.19    2.75  36.06     0.58      0.46
 OUTFLOW: ID= 1 (  2257)  331.32    4.42    2.83  36.06     0.55      0.44


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--------------------
| CALIB              |
| STANDHYD (  0100)|    Area     (ha)=  36.92
|ID= 1 DT= 5.0 min |    Total Imp(%)=  64.90   Dir. Conn.(%)=  64.90
--------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     23.96          12.96
     Dep. Storage     (mm)=      2.00           5.00
     Average Slope     (%)=      2.42           2.42
     Length            (m)=    496.12          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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          21.23
                over (min)        5.00          20.00
     Storage Coeff.  (min)=        7.12 (ii)     19.50 (ii)
     Unit Hyd. Tpeak (min)=        5.00          20.00
     Unit Hyd. peak  (cms)=        0.17           0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        2.90           0.49       3.311 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.92        2.75
     RUNOFF VOLUME    (mm)=       45.81          17.90       36.01
     TOTAL RAINFALL   (mm)=       47.81          47.81       47.81
     RUNOFF COEFFICIENT   =        0.96           0.37        0.75

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)   |    (cms)      (ha.m.)
                           0.0000      0.0000   |    0.4170      1.7520
                           0.1840      0.9170   |    0.4820      1.9610
                           0.2740      1.2500   |    0.5480      2.1660
                           0.3340      1.4720   |    0.0000      0.0000

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
```

```
 INFLOW : ID= 2 (  0100)      36.920      3.311       2.75       36.01
 OUTFLOW: ID= 1 (  0101)      36.920      0.234       4.50       35.98

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.06
                TIME SHIFT OF PEAK FLOW          (min)=105.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  1.1007

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--------------------
| CALIB             |
| STANDHYD (  0102)|   Area     (ha)=  71.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  93.00   Dir. Conn.(%)=  93.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     66.85         5.03
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.22         2.20
     Length            (m)=    692.24        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                 0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                 0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                 0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                 0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                 1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                 1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                 1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                 1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                 1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                 1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                 1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                 1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         22.26
                over (min)        10.00         15.00
     Storage Coeff.  (min)=        8.92 (ii)    12.30 (ii)
     Unit Hyd. Tpeak (min)=       10.00         15.00
     Unit Hyd. peak  (cms)=        0.12          0.09
                                                             *TOTALS*
     PEAK FLOW       (cms)=        7.91          0.23          8.125 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83           2.75
     RUNOFF VOLUME    (mm)=       45.81         17.90          43.86
     TOTAL RAINFALL   (mm)=       47.81         47.81          47.81
     RUNOFF COEFFICIENT   =        0.96          0.37           0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0103)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                          0.0000     0.0000   |    4.6900     2.1905
                          1.3100     1.3639   |    6.2900     2.4799
                          2.6500     1.7635   |   84.9300     2.7554

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
 INFLOW : ID= 2 (  0102)      71.880      8.125       2.75       43.86
 OUTFLOW: ID= 1 (  0103)      71.880      2.804       3.25       43.85

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.51
                TIME SHIFT OF PEAK FLOW          (min)= 30.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  1.7972
```

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

--------------------
| ADD HYD  (  0099)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0101):     36.92    0.234      4.50     35.98
      + ID2= 2 (  0103):     71.88    2.804      3.25     43.85
        ==================================================
        ID = 3 (  0099):    108.80    2.995      3.25     41.18

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

--------------------
| ADD HYD  (  0099)|
|   3 +  2 =  1    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0099):    108.80    2.995      3.25     41.18
      + ID2= 2 (  2257):    331.32    4.418      2.83     36.06
        ==================================================
        ID = 1 (  0099):    440.12    6.905      2.92     37.32

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0173)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  28.50         210.02        0.0600
                  47.35         209.86        0.0450      Main Channel
                  51.00         209.76        0.0450      Main Channel
                  60.44         209.54        0.0450      Main Channel
                  65.44         209.60        0.0450      Main Channel
                  72.65         209.41        0.0450      Main Channel
                  95.97         208.53        0.0450      Main Channel
                 103.18         208.38        0.0450      Main Channel
                 108.18         208.33        0.0450      Main Channel
                 116.25         208.08        0.0450      Main Channel
                 122.09         207.92        0.0450      Main Channel
                 131.52         207.65        0.0450      Main Channel
                 149.56         208.22        0.0450      Main Channel
                 155.39         208.49        0.0450      Main Channel
                 177.88         208.58        0.0450      Main Channel
                 190.96         208.73        0.0450      Main Channel
                 195.96         208.72        0.0450      Main Channel
                 226.50         209.32        0.0450      Main Channel
                 238.71         209.46    0.0450 /0.0600  Main Channel
                 251.40         209.70        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)        (m/s)       (min)
       0.11   207.75    .601E+03        0.0          0.12      222.56
       0.21   207.86    .241E+04        0.3          0.19      140.20
       0.32   207.97    .542E+04        0.8          0.25      107.47
       0.43   208.07    .969E+04        1.8          0.30       89.07
       0.53   208.18    .152E+05        3.3          0.35       76.07
       0.64   208.29    .218E+05        5.5          0.40       66.47
       0.75   208.39    .296E+05        8.0          0.43       61.92
       0.85   208.50    .389E+05       11.2          0.46       58.04
       0.96   208.61    .519E+05       14.2          0.44       60.79
       1.07   208.71    .677E+05       20.3          0.48       55.45
       1.17   208.82    .861E+05       27.7          0.52       51.74
       1.28   208.93    .106E+06       37.5          0.57       47.20
       1.39   209.03    .128E+06       48.7          0.61       43.64
       1.49   209.14    .150E+06       61.5          0.66       40.75
       1.60   209.25    .175E+06       76.0          0.70       38.35
       1.71   209.35    .201E+06       91.6          0.73       36.50
       1.81   209.46    .228E+06      107.8          0.76       35.28
       1.93   209.58    .262E+06      130.3          0.80       33.51
       2.05   209.70    .299E+06      156.6          0.84       31.84

                                     <---- hydrograph ---->    <-pipe / channel->
                               AREA    QPEAK   TPEAK    R.V.   MAX DEPTH   MAX VEL
                               (ha)    (cms)   (hrs)    (mm)      (m)       (m/s)
   INFLOW : ID= 2 (  0099)   440.12     6.90    2.92   37.32      0.70       0.42
   OUTFLOW: ID= 1 (  0173)   440.12     4.32    4.00   37.32      0.58       0.37


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--------------------
| ROUTE CHN(  2296)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance         Elevation         Manning
                   0.00           204.60           0.0600
                   2.24           204.58           0.0450       Main Channel
                  10.30           203.90           0.0450       Main Channel
                  36.31           203.83           0.0450       Main Channel
                  47.49           204.24           0.0450       Main Channel
                  59.15           204.34           0.0450       Main Channel
                  65.86           204.04           0.0450       Main Channel
                  81.51           203.05           0.0450       Main Channel
                  93.18           202.84           0.0450       Main Channel
                 104.40           202.89           0.0450       Main Channel
                 117.82           202.66           0.0450       Main Channel
                 126.76           202.26           0.0450       Main Channel
                 138.43           200.25           0.0450       Main Channel
                 149.61           199.94           0.0450       Main Channel
                 172.61           203.72           0.0450       Main Channel
                 194.97           203.80           0.0450       Main Channel
                 217.87           204.71           0.0450       Main Channel
                 229.05           205.01           0.0450       Main Channel
                 240.71           205.02       0.0450 /0.0600   Main Channel
                 284.60           205.56           0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)      (cms)          (m/s)       (min)
       0.23    200.17     .403E+03       0.2           0.17        35.38
       0.47    200.40     .149E+04       1.3           0.30        19.71
       0.70    200.64     .284E+04       3.3           0.41        14.37
       0.93    200.87     .443E+04       6.2           0.50        11.80
       1.17    201.10     .624E+04      10.2           0.58        10.22
       1.40    201.34     .828E+04      15.1           0.65         9.13
       1.63    201.57     .106E+05      21.2           0.71         8.31
       1.87    201.80     .131E+05      28.4           0.77         7.67
       2.10    202.04     .158E+05      36.8           0.83         7.15
       2.33    202.27     .188E+05      46.4           0.88         6.75
       2.57    202.50     .221E+05      54.8           0.88         6.73
       2.80    202.74     .261E+05      63.4           0.86         6.87
       3.03    202.97     .317E+05      65.8           0.74         8.03
       3.27    203.20     .389E+05      87.1           0.80         7.45
       3.50    203.44     .467E+05     113.5           0.87         6.85
       3.73    203.67     .548E+05     143.4           0.93         6.37
       3.97    203.90     .650E+05     141.2           0.77         7.67
       4.20    204.14     .788E+05     182.1           0.82         7.22
       4.55    204.49     .103E+06     256.5           0.88         6.70

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                              (ha)     (cms)    (hrs)   (mm)      (m)      (m/s)
    INFLOW : ID= 2 (  0173)  440.12     4.32     4.00  37.32     0.78      0.44
    OUTFLOW: ID= 1 (  2296)  440.12     4.24     4.25  37.32     0.77      0.44


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--------------------
| CALIB              |
| STANDHYD (  0106)|    Area     (ha)= 281.15
|ID= 1 DT= 5.0 min |    Total Imp(%)=  87.70   Dir. Conn.(%)=  87.50
--------------------
                               IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=     246.57         34.58
     Dep. Storage      (mm)=       2.00          5.00
     Average Slope      (%)=       1.63          1.63
     Length             (m)=    1369.06         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
              0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
              0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
              0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
              0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
              0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
              0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
```

```
              0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
              0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
              0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
              0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
              1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
              1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
              1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
              1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
              1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
              1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
              1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
              1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         22.87
                over (min)        15.00         20.00
     Storage Coeff.   (min)=      14.73 (ii)    19.49 (ii)
     Unit Hyd. Tpeak  (min)=      15.00         20.00
     Unit Hyd. peak   (cms)=       0.08          0.06
                                                            *TOTALS*
     PEAK FLOW        (cms)=      26.05          1.35         27.186 (iii)
     TIME TO PEAK     (hrs)=       2.75          2.92          2.75
     RUNOFF VOLUME     (mm)=      45.81         18.12         42.35
     TOTAL RAINFALL    (mm)=      47.81         47.81         47.81
     RUNOFF COEFFICIENT   =        0.96          0.38          0.89


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0107)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
         ID1= 1 (  0106):   281.15  27.186      2.75     42.35
       + ID2= 2 (  2296):   440.12   4.235      4.25     37.32
         ==================================================
         ID = 3 (  0107):   721.27  27.779      2.75     39.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2300)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00         204.60          0.0600
                   2.24         204.58          0.0450       Main Channel
                  10.30         203.90          0.0450       Main Channel
                  36.31         203.83          0.0450       Main Channel
                  47.49         204.24          0.0450       Main Channel
                  59.15         204.34          0.0450       Main Channel
                  65.86         204.04          0.0450       Main Channel
                  81.51         203.05          0.0450       Main Channel
                  93.18         202.84          0.0450       Main Channel
                 104.40         202.89          0.0450       Main Channel
                 117.82         202.66          0.0450       Main Channel
                 126.76         202.26          0.0450       Main Channel
                 138.43         200.25          0.0450       Main Channel
                 149.61         199.94          0.0450       Main Channel
                 172.61         203.72          0.0450       Main Channel
                 194.97         203.80          0.0450       Main Channel
                 217.87         204.71          0.0450       Main Channel
                 229.05         205.01          0.0450       Main Channel
                 240.71         205.02      0.0450 /0.0600   Main Channel
                 284.60         205.56          0.0600

        <--------------------- TRAVEL TIME TABLE ---------------------->
         DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
          (m)       (m)     (cu.m.)       (cms)         (m/s)        (min)
         0.23    200.17    .588E+03        0.2           0.17        51.42
         0.47    200.40    .217E+04        1.3           0.30        28.64
         0.70    200.64    .415E+04        3.3           0.41        20.89
         0.93    200.87    .646E+04        6.3           0.50        17.15
         1.17    201.10    .910E+04       10.2           0.58        14.86
         1.40    201.34    .121E+05       15.2           0.65        13.27
         1.63    201.57    .154E+05       21.3           0.72        12.08
         1.87    201.80    .191E+05       28.5           0.78        11.15
         2.10    202.04    .231E+05       37.0           0.83        10.39
```

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     2.33    202.27     .274E+05       46.6            0.88        9.80
     2.57    202.50     .323E+05       55.0            0.88        9.79
     2.80    202.74     .381E+05       63.6            0.87        9.98
     3.03    202.97     .462E+05       66.1            0.74       11.66
     3.27    203.20     .568E+05       87.4            0.80       10.83
     3.50    203.44     .681E+05      114.0            0.87        9.96
     3.73    203.67     .800E+05      143.9            0.93        9.26
     3.97    203.90     .948E+05      141.7            0.78       11.14
     4.20    204.14     .115E+06      182.8            0.82       10.49
     4.55    204.49     .150E+06      257.5            0.89        9.74

                                   <---- hydrograph ---->   <-pipe / channel->
                            AREA     QPEAK    TPEAK   R.V.   MAX DEPTH  MAX VEL
                            (ha)     (cms)    (hrs)   (mm)     (m)      (m/s)
 INFLOW : ID= 2 (  0107)   721.27    27.78     2.75  39.28     1.84      0.77
 OUTFLOW: ID= 1 (  2300)   721.27    24.79     2.83  39.28     1.75      0.74


------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0166)|    Area     (ha)=    9.33
|ID= 1 DT= 5.0 min  |    Total Imp(%)=  61.00    Dir. Conn.(%)=  61.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     5.69         3.64
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=     1.00         1.00
     Length            (m)=   249.40        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 | 1.667   5.74 | 3.250  12.43 | 4.83    0.96
               0.167    0.00 | 1.750   5.74 | 3.333   6.69 | 4.92    0.96
               0.250    0.00 | 1.833  16.25 | 3.417   6.69 | 5.00    0.96
               0.333    0.96 | 1.917  16.25 | 3.500   6.69 | 5.08    0.96
               0.417    0.96 | 2.000  16.25 | 3.583   6.69 | 5.17    0.96
               0.500    0.96 | 2.083  16.25 | 3.667   6.69 | 5.25    0.96
               0.583    0.96 | 2.167  16.25 | 3.750   6.69 | 5.33    0.96
               0.667    0.96 | 2.250  16.25 | 3.833   3.82 | 5.42    0.96
               0.750    0.96 | 2.333  43.98 | 3.917   3.82 | 5.50    0.96
               0.833    0.96 | 2.417  43.98 | 4.000   3.82 | 5.58    0.96
               0.917    0.96 | 2.500  43.98 | 4.083   3.82 | 5.67    0.96
               1.000    0.96 | 2.583  43.98 | 4.167   3.82 | 5.75    0.96
               1.083    0.96 | 2.667  43.98 | 4.250   3.82 | 5.83    0.96
               1.167    0.96 | 2.750  43.98 | 4.333   1.91 | 5.92    0.96
               1.250    0.96 | 2.833  12.43 | 4.417   1.91 | 6.00    0.96
               1.333    5.74 | 2.917  12.43 | 4.500   1.91 | 6.08    0.96
               1.417    5.74 | 3.000  12.43 | 4.583   1.91 | 6.17    0.96
               1.500    5.74 | 3.083  12.43 | 4.667   1.91 | 6.25    0.96
               1.583    5.74 | 3.167  12.43 | 4.750   1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         21.81
                over (min)         5.00         25.00
     Storage Coeff.  (min)=        6.14 (ii)    22.12 (ii)
     Unit Hyd. Tpeak (min)=        5.00         25.00
     Unit Hyd. peak  (cms)=        0.19          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.69          0.14        0.795 (iii)
     TIME TO PEAK    (hrs)=        2.75          3.00         2.75
     RUNOFF VOLUME    (mm)=       46.81         19.33        36.09
     TOTAL RAINFALL   (mm)=       47.81         47.81        47.81
     RUNOFF COEFFICIENT   =        0.98          0.40         0.75


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  83.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0167)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1  |
| DT=  5.0 min      |      OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            0.0000      0.0000   |   0.7030      0.3085
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                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0166)        9.330     0.795      2.75      36.09
   OUTFLOW: ID= 1 (  0167)        9.330     0.329      3.17      36.08

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.35
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1443

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0169)|    Area     (ha)=   2.34
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       2.11          0.23
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     124.90         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         24.02
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        4.05 (ii)     8.13 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.24          0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=        0.26          0.01         0.271 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=       46.81         19.33         44.06
     TOTAL RAINFALL   (mm)=       47.81         47.81         47.81
     RUNOFF COEFFICIENT   =        0.98          0.40          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------           (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0162):      10.84   0.783      2.75     35.11
      + ID2= 2 (  0167):       9.33   0.329      3.17     36.08
        ==================================================
        ID = 3 (  0023):      20.17   1.066      2.75     35.56

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

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```
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):     20.17   1.066     2.75    35.56
      + ID2= 2 (  0169):      2.34   0.271     2.75    44.06
        ==================================================
        ID = 1 (  0023):     22.51   1.337     2.75    36.44

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     22.51   1.337     2.75    36.44
      + ID2= 2 (  2300):    721.27  24.792     2.83    39.28
        ==================================================
        ID = 3 (  0023):    743.78  25.947     2.83    39.20

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    743.78  25.947     2.83    39.20
      + ID2= 2 (  0024):      7.52   0.866     2.75    44.06
        ==================================================
        ID = 1 (  0023):    751.30  26.468     2.83    39.24

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):    751.30  26.468     2.83    39.24
      + ID2= 2 (  0025):     11.16   0.249     3.42    16.61
        ==================================================
        ID = 3 (  0023):    762.46  26.602     2.83    38.91

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    762.46  26.602     2.83    38.91
      + ID2= 2 (  0049):     23.15   2.597     2.75    44.06
        ==================================================
        ID = 1 (  0023):    785.61  28.889     2.83    39.06

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):    785.61  28.889     2.83    39.06
      + ID2= 2 (  0050):     10.29   0.329     3.25    36.08
        ==================================================
        ID = 3 (  0023):    795.90  29.187     2.83    39.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0042)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |  24.8000    11.7715
                           3.0000     0.7487   |  58.0000    13.1395
                           3.6000     1.0973   |  *******    14.5671
                           4.5000     1.7943   |  *******    15.1408
                           5.3000     2.1670   |  *******    16.0822
                           5.9000     4.3060   |  *******    16.8383
                           6.4000     5.5883   |  *******    17.6711
                           7.0000     7.5770   |  *******    18.4932
                           7.7000     8.6849   |  *******    19.3351
```

```
                  11.2000     10.4726    |    0.0000       0.0000

                              AREA      QPEAK      TPEAK       R.V.
                              (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0023)    795.900     29.187      2.83       39.03
  OUTFLOW: ID= 1 (  0042)    795.900      8.507      4.50       39.03

              PEAK    FLOW   REDUCTION [Qout/Qin](%)= 29.15
              TIME SHIFT OF PEAK FLOW         (min)=100.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  9.0979

----------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2297)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance      Elevation       Manning
                 0.00         204.60        0.0600
                 2.24         204.58        0.0450      Main Channel
                10.30         203.90        0.0450      Main Channel
                36.31         203.83        0.0450      Main Channel
                47.49         204.24        0.0450      Main Channel
                59.15         204.34        0.0450      Main Channel
                65.86         204.04        0.0450      Main Channel
                81.51         203.05        0.0450      Main Channel
                93.18         202.84        0.0450      Main Channel
               104.40         202.89        0.0450      Main Channel
               117.82         202.66        0.0450      Main Channel
               126.76         202.26        0.0450      Main Channel
               138.43         200.25        0.0450      Main Channel
               149.61         199.94        0.0450      Main Channel
               172.61         203.72        0.0450      Main Channel
               194.97         203.80        0.0450      Main Channel
               217.87         204.71        0.0450      Main Channel
               229.05         205.01        0.0450      Main Channel
               240.71         205.02    0.0450 /0.0600  Main Channel
               284.60         205.56        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)       (m/s)       (min)
       0.23    200.17    .921E+03        0.2         0.20       68.84
       0.47    200.40    .341E+04        1.5         0.35       38.35
       0.70    200.64    .650E+04        3.9         0.48       27.97
       0.93    200.87    .101E+05        7.3         0.59       22.96
       1.17    201.10    .143E+05       11.9         0.68       19.89
       1.40    201.34    .189E+05       17.8         0.76       17.77
       1.63    201.57    .241E+05       24.9         0.84       16.18
       1.87    201.80    .299E+05       33.3         0.91       14.93
       2.10    202.04    .361E+05       43.3         0.97       13.92
       2.33    202.27    .429E+05       54.5         1.03       13.12
       2.57    202.50    .506E+05       64.4         1.03       13.10
       2.80    202.74    .597E+05       74.4         1.01       13.37
       3.03    202.97    .724E+05       77.3         0.87       15.62
       3.27    203.20    .890E+05      102.3         0.93       14.50
       3.50    203.44    .107E+06      133.4         1.02       13.33
       3.73    203.67    .125E+06      168.4         1.09       12.40
       3.97    203.90    .148E+06      165.8         0.91       14.92
       4.20    204.14    .180E+06      213.9         0.97       14.04
       4.55    204.49    .236E+06      301.3         1.04       13.04

                                      <---- hydrograph ---->   <-pipe / channel->
                            AREA    QPEAK    TPEAK    R.V.    MAX DEPTH   MAX VEL
                            (ha)    (cms)    (hrs)    (mm)       (m)       (m/s)
  INFLOW : ID= 2 (  0042)  795.90     8.51     4.50   39.03      0.99        0.61
  OUTFLOW: ID= 1 (  2297)  795.90     8.30     4.75   39.03      0.98        0.61


----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area     (ha)=    6.79   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.76

        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
```

```
            0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
            0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
            0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
            0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
            0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
            0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
            0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
            0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
            0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
            0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
            1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
            1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
            1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
            1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
            1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Unit Hyd Qpeak  (cms)=   0.341

     PEAK FLOW       (cms)=   0.144 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=  16.611
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.347

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

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--------------------
| CALIB              |
| STANDHYD (  0029)|    Area     (ha)=    8.01
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.21         0.80
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     231.08        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
            0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
            0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
            0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
            0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
            0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
            0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
            0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
            0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
            0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
            0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
            1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
            1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
            1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
            1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
            1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
            1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
            1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
            1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        24.02
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.87 (ii)    9.94 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.19         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.88         0.04          0.922 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81        19.33          44.06
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.40           0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
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```
        THAN THE STORAGE COEFFICIENT.
   (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0051)|    Area    (ha)=    7.81
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.03          0.78
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope    (%)=        1.00          2.00
     Length           (m)=      228.18         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       5.82 (ii)     9.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.20          0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.86          0.04        0.899 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33        44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81        47.81
     RUNOFF COEFFICIENT   =       0.98          0.40         0.92

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0053)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |  0.3770     0.2845

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0051)    7.810     0.899       2.75        44.06
   OUTFLOW: ID= 1 (  0053)    7.810     0.259       3.25        44.04

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.78
                  TIME SHIFT OF PEAK FLOW          (min)= 30.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1953

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0052)|    Area    (ha)=    6.47
|ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
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```
                        IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=      3.95          2.52
Dep. Storage     (mm)=      1.00          5.00
Average Slope     (%)=      1.00          1.00
Length            (m)=    207.69         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
          0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
          0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
          0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
          0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
          0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
          0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
          0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
          0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
          0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
          0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
          1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
          1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
          1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
          1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
          1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
          1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
          1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
          1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

Max.Eff.Inten.(mm/hr)=     43.98         21.81
           over (min)       5.00         25.00
Storage Coeff.  (min)=      5.50 (ii)    21.48 (ii)
Unit Hyd. Tpeak (min)=      5.00         25.00
Unit Hyd. peak  (cms)=      0.20          0.05
                                                     *TOTALS*
PEAK FLOW       (cms)=      0.48          0.10         0.554 (iii)
TIME TO PEAK    (hrs)=      2.75          3.00          2.75
RUNOFF VOLUME    (mm)=     46.81         19.33         36.09
TOTAL RAINFALL   (mm)=     47.81         47.81         47.81
RUNOFF COEFFICIENT   =      0.98          0.40          0.75


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  83.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0054)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |  0.4900     0.2144

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0052)      6.470     0.554      2.75      36.09
  OUTFLOW: ID= 1 (  0054)      6.470     0.229      3.17      36.07

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.28
               TIME SHIFT OF PEAK FLOW         (min)= 25.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  0.1001

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--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
       ID1= 1 (  0029):      8.01    0.922     2.75     44.06
     + ID2= 2 (  0030):      6.79    0.144     3.50     16.61
       ==================================================
       ID = 3 (  0032):     14.80    0.975     2.75     31.47

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0032):     14.80   0.975     2.75     31.47
      + ID2= 2 (  0053):      7.81   0.259     3.25     44.04
        ==================================================
        ID = 1 (  0032):     22.61   1.199     2.75     35.81

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0032):     22.61   1.199     2.75     35.81
      + ID2= 2 (  0054):      6.47   0.229     3.17     36.07
        ==================================================
        ID = 3 (  0032):     29.08   1.398     2.75     35.87

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0078)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2940     1.1158
                          0.0520     0.5230   |   0.3680     1.3234
                          0.1630     0.7202   |   0.4250     1.4787
                          0.2420     0.9521   |   0.4830     1.6325

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0032)     29.080     1.398      2.75       35.87
   OUTFLOW: ID= 1 (  0078)     29.080     0.183      6.25       35.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.05
                  TIME SHIFT OF PEAK FLOW         (min)=210.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.7775

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--------------------
| CALIB            |
| STANDHYD (  0130)|   Area    (ha)=   1.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=      1.69          0.19
     Dep. Storage    (mm)=      1.00          5.00
     Average Slope    (%)=      1.00          2.00
     Length           (m)=    111.95         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
              0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
              0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
              0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
              0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
              0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
              0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
              0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
              0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
              0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
              1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
              1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
              1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
              1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
              1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
              1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
              1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
              1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        3.80 (ii)     7.87 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
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     Unit Hyd. peak  (cms)=       0.25          0.13
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.21          0.01          0.218 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33          44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.40           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD ( 0133) |    Area    (ha)=   2.46
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         2.21          0.25
     Dep. Storage     (mm)=         1.00          5.00
     Average Slope     (%)=         1.00          2.00
     Length            (m)=       128.06         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 | 1.667   5.74 | 3.250  12.43 | 4.83    0.96
                 0.167    0.00 | 1.750   5.74 | 3.333   6.69 | 4.92    0.96
                 0.250    0.00 | 1.833  16.25 | 3.417   6.69 | 5.00    0.96
                 0.333    0.96 | 1.917  16.25 | 3.500   6.69 | 5.08    0.96
                 0.417    0.96 | 2.000  16.25 | 3.583   6.69 | 5.17    0.96
                 0.500    0.96 | 2.083  16.25 | 3.667   6.69 | 5.25    0.96
                 0.583    0.96 | 2.167  16.25 | 3.750   6.69 | 5.33    0.96
                 0.667    0.96 | 2.250  16.25 | 3.833   3.82 | 5.42    0.96
                 0.750    0.96 | 2.333  43.98 | 3.917   3.82 | 5.50    0.96
                 0.833    0.96 | 2.417  43.98 | 4.000   3.82 | 5.58    0.96
                 0.917    0.96 | 2.500  43.98 | 4.083   3.82 | 5.67    0.96
                 1.000    0.96 | 2.583  43.98 | 4.167   3.82 | 5.75    0.96
                 1.083    0.96 | 2.667  43.98 | 4.250   3.82 | 5.83    0.96
                 1.167    0.96 | 2.750  43.98 | 4.333   1.91 | 5.92    0.96
                 1.250    0.96 | 2.833  12.43 | 4.417   1.91 | 6.00    0.96
                 1.333    5.74 | 2.917  12.43 | 4.500   1.91 | 6.08    0.96
                 1.417    5.74 | 3.000  12.43 | 4.583   1.91 | 6.17    0.96
                 1.500    5.74 | 3.083  12.43 | 4.667   1.91 | 6.25    0.96
                 1.583    5.74 | 3.167  12.43 | 4.750   1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       4.12 (ii)     8.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.24          0.13
                                                             *TOTALS*
     PEAK FLOW       (cms)=       0.27          0.01          0.285 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33          44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.40           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0170) |     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000      0.0000   |  0.4428      0.0364

                                AREA     QPEAK      TPEAK        R.V.
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                                   (ha)      (cms)     (hrs)        (mm)
  INFLOW : ID= 2 (  0133)          2.460      0.285      2.75       44.06
  OUTFLOW: ID= 1 (  0170)          2.460      0.250      2.75       44.05

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.98
                TIME SHIFT OF PEAK FLOW        (min)=  0.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0211

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--------------------
| ADD HYD  (  0171)|
|  1 +  2 =  3     |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0130):    1.88    0.218     2.75    44.06
      + ID2= 2 (  0170):    2.46    0.250     2.75    44.05
        ===================================================
        ID = 3 (  0171):    4.34    0.468     2.75    44.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0135)|   Area    (ha)=   0.95
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.86        0.10
    Dep. Storage     (mm)=      1.00        5.00
    Average Slope     (%)=      1.00        2.00
    Length            (m)=     79.58       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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=      43.98         24.02
               over (min)        5.00         10.00
    Storage Coeff.  (min)=       3.09 (ii)     7.16 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.27          0.14
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.10          0.01         0.110 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.75          2.75
    RUNOFF VOLUME    (mm)=      46.81         19.33         44.06
    TOTAL RAINFALL   (mm)=      47.81         47.81         47.81
    RUNOFF COEFFICIENT   =       0.98          0.40          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0136)|   Area    (ha)=  15.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       13.60        1.51
     Dep. Storage     (mm)=        1.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=      317.39       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 | 1.667   5.74 | 3.250  12.43 |  4.83    0.96
                0.167    0.00 | 1.750   5.74 | 3.333   6.69 |  4.92    0.96
                0.250    0.00 | 1.833  16.25 | 3.417   6.69 |  5.00    0.96
                0.333    0.96 | 1.917  16.25 | 3.500   6.69 |  5.08    0.96
                0.417    0.96 | 2.000  16.25 | 3.583   6.69 |  5.17    0.96
                0.500    0.96 | 2.083  16.25 | 3.667   6.69 |  5.25    0.96
                0.583    0.96 | 2.167  16.25 | 3.750   6.69 |  5.33    0.96
                0.667    0.96 | 2.250  16.25 | 3.833   3.82 |  5.42    0.96
                0.750    0.96 | 2.333  43.98 | 3.917   3.82 |  5.50    0.96
                0.833    0.96 | 2.417  43.98 | 4.000   3.82 |  5.58    0.96
                0.917    0.96 | 2.500  43.98 | 4.083   3.82 |  5.67    0.96
                1.000    0.96 | 2.583  43.98 | 4.167   3.82 |  5.75    0.96
                1.083    0.96 | 2.667  43.98 | 4.250   3.82 |  5.83    0.96
                1.167    0.96 | 2.750  43.98 | 4.333   1.91 |  5.92    0.96
                1.250    0.96 | 2.833  12.43 | 4.417   1.91 |  6.00    0.96
                1.333    5.74 | 2.917  12.43 | 4.500   1.91 |  6.08    0.96
                1.417    5.74 | 3.000  12.43 | 4.583   1.91 |  6.17    0.96
                1.500    5.74 | 3.083  12.43 | 4.667   1.91 |  6.25    0.96
                1.583    5.74 | 3.167  12.43 | 4.750   1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98       24.02
                over (min)         5.00       15.00
     Storage Coeff.  (min)=        7.10 (ii)   11.17 (ii)
     Unit Hyd. Tpeak (min)=        5.00       15.00
     Unit Hyd. peak  (cms)=        0.17        0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.65        0.08         1.720 (iii)
     TIME TO PEAK    (hrs)=        2.75        2.83          2.75
     RUNOFF VOLUME    (mm)=       46.81       19.33         44.06
     TOTAL RAINFALL   (mm)=       47.81       47.81         47.81
     RUNOFF COEFFICIENT   =        0.98        0.40          0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| RESERVOIR(  0137)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   2.7200     0.2000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0136)    15.110     1.720       2.75      44.06
   OUTFLOW: ID= 1 (  0137)    15.110     1.504       2.75      44.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 87.42
                  TIME SHIFT OF PEAK FLOW        (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1138

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0138)|   Area    (ha)=    0.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        0.26        0.03
     Dep. Storage     (mm)=        1.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=       43.97       40.00
     Mannings n          =        0.013       0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                        ---- 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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
          0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
          0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
          0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
          0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
          0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
          0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
          0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
          0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
          0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
          0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
          1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
          1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
          1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
          1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
          1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
          1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
          1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
          1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.17 (ii)     6.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.31          0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.00        0.034 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75        2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33       44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.40        0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0139)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |  0.4390     0.0003

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0138)      0.290     0.034       2.75      44.06
   OUTFLOW: ID= 1 (  0139)      0.290     0.034       2.75      44.06

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)=101.69
                 TIME SHIFT OF PEAK FLOW          (min)=  0.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0000
                 MAXIMUM  STORAGE   USED        (cu.m.)=  0.148338

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                     CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0172)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0135):     0.95    0.110      2.75    44.06
      + ID2= 2 (  0137):    15.11    1.504      2.75    44.06
        ==================================================
        ID = 3 (  0172):    16.06    1.614      2.75    44.06

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

--------------------
| ADD HYD  (  0172)|
|   3 +  2 =  1    |         AREA    QPEAK     TPEAK     R.V.
--------------------         (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0172):    16.06    1.614      2.75    44.06
```

```
    + ID2= 2 (  0139):     0.29   0.034     2.75    44.06
      ===================================================
      ID = 1 (  0172):    16.35   1.648     2.75    44.06

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0076)|   Area    (ha)=   6.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=       5.40          0.60
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     200.00         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
              0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
              0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
              0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
              0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
              0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
              0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
              0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
              0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
              0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
              1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
              1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
              1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
              1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
              1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
              1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
              1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
              1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

    Max.Eff.Inten.(mm/hr)=      43.98         24.02
               over (min)       5.00         10.00
    Storage Coeff.  (min)=       5.38 (ii)     9.45 (ii)
    Unit Hyd. Tpeak (min)=       5.00         10.00
    Unit Hyd. peak  (cms)=       0.21          0.12
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.66          0.03         0.692 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.75          2.75
    RUNOFF VOLUME    (mm)=      46.81         19.33         44.06
    TOTAL RAINFALL   (mm)=      47.81         47.81         47.81
    RUNOFF COEFFICIENT   =       0.98          0.40          0.92

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|   Area    (ha)=  39.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area      (ha)=      35.79          3.98
    Dep. Storage      (mm)=       1.00          5.00
    Average Slope      (%)=       1.00          2.00
    Length             (m)=     514.91         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
```

```
                0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
                1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
                1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        24.02
                over (min)       10.00        15.00
     Storage Coeff.  (min)=       9.49 (ii)   13.56 (ii)
     Unit Hyd. Tpeak (min)=      10.00        15.00
     Unit Hyd. peak  (cms)=       0.12         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.21         0.19         4.388 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83          2.75
     RUNOFF VOLUME    (mm)=      46.81        19.33         44.06
     TOTAL RAINFALL   (mm)=      47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.40          0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
 --------------------
| RESERVOIR( 0061)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   7.1560     0.3940

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0031)     39.770     4.388       2.75        44.06
   OUTFLOW: ID= 1 (  0061)     39.770     3.998       2.83        44.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 91.11
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2211

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

--------------------
| ADD HYD  (  0128)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0171):     4.34    0.468     2.75     44.06
      + ID2= 2 (  0172):    16.35    1.648     2.75     44.06
        ==================================================
        ID = 3 (  0128):    20.69    2.116     2.75     44.06

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

--------------------
| ADD HYD  (  0128)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0128):    20.69    2.116     2.75     44.06
      + ID2= 2 (  2297):   795.90    8.304     4.75     39.03
        ==================================================
        ID = 1 (  0128):   816.59    8.431     4.75     39.15

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

--------------------
| ADD HYD  (  0128)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
         ID1= 1 (  0128):   816.59   8.431      4.75     39.15
       + ID2= 2 (  0061):    39.77   3.998      2.83     44.06
         ===============================================
         ID = 3 (  0128):   856.36  10.026      2.83     39.38

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

--------------------
| ADD HYD  (  0128)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
         ID1= 3 (  0128):   856.36  10.026      2.83     39.38
       + ID2= 2 (  0076):     6.00   0.692      2.75     44.06
         ===============================================
         ID = 1 (  0128):   862.36  10.430      2.83     39.41

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

--------------------
| ADD HYD  (  0128)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
         ID1= 1 (  0128):   862.36  10.430      2.83     39.41
       + ID2= 2 (  0078):    29.08   0.183      6.25     35.78
         ===============================================
         ID = 3 (  0128):   891.44  10.461      2.83     39.30

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2875)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation        Manning
                   0.00        204.68         0.0600
                   3.24        204.67         0.0450       Main Channel
                  51.26        203.93         0.0450       Main Channel
                  66.07        203.18         0.0450       Main Channel
                  87.42        203.39         0.0450       Main Channel
                 132.09        202.47         0.0450       Main Channel
                 165.30        201.66         0.0450       Main Channel
                 213.87        200.24         0.0450       Main Channel
                 259.32        199.43         0.0450       Main Channel
                 266.86        197.71         0.0450       Main Channel
                 276.16        196.93         0.0450       Main Channel
                 304.50        197.16         0.0450       Main Channel
                 307.31        197.98         0.0450       Main Channel
                 311.09        198.45         0.0450       Main Channel
                 329.41        198.06         0.0450       Main Channel
                 371.71        200.22         0.0450       Main Channel
                 378.80        200.32         0.0450       Main Channel
                 411.13        199.51         0.0450       Main Channel
                 421.51        202.47     0.0450 /0.0600   Main Channel
                 461.76        202.80         0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)        (m/s)       (min)
       0.31   197.24    .601E+04        3.8          0.64       26.05
       0.62   197.55    .166E+05       19.1          1.14       14.50
       0.92   197.85    .286E+05       44.3          1.54       10.76
       1.23   198.16    .419E+05       72.2          1.72        9.67
       1.54   198.47    .611E+05      105.3          1.72        9.67
       1.85   198.78    .849E+05      171.0          2.01        8.27
       2.15   199.08    .111E+06      252.0          2.26        7.34
       2.46   199.39    .139E+06      348.9          2.50        6.65
       2.77   199.70    .172E+06      416.9          2.41        6.89
       3.08   200.01    .217E+06      514.0          2.36        7.02
       3.39   200.32    .272E+06      649.5          2.38        6.98
       3.69   200.62    .336E+06      888.1          2.63        6.31
       4.00   200.93    .403E+06     1163.0          2.87        5.78
       4.31   201.24    .474E+06     1473.8          3.09        5.37
       4.62   201.55    .549E+06     1820.8          3.30        5.03
       4.92   201.85    .627E+06     2198.2          3.49        4.76
       5.23   202.16    .710E+06     2610.1          3.66        4.53
       5.54   202.47    .796E+06     3061.7          3.83        4.34
       5.87   202.80    .901E+06     3585.6          3.96        4.19

                                   <---- hydrograph ---->   <-pipe / channel->
                           AREA    QPEAK    TPEAK    R.V.   MAX DEPTH   MAX VEL
                           (ha)    (cms)    (hrs)    (mm)      (m)       (m/s)
```

```
  INFLOW : ID= 2 (  0128)  891.44     10.46      2.83  39.30       0.44       0.79
  OUTFLOW: ID= 1 (  2875)  891.44      8.85      4.75  39.30       0.41       0.74


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area     (ha)=    2.27   Curve Number   (CN)= 83.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.35

        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 | 1.667    5.74 | 3.250   12.43 |  4.83   0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92   0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00   0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08   0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17   0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25   0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33   0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42   0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50   0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58   0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67   0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75   0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83   0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92   0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00   0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08   0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17   0.96
             1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25   0.96
             1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Unit Hyd Qpeak  (cms)=    0.248

     PEAK FLOW       (cms)=    0.089 (i)
     TIME TO PEAK    (hrs)=    2.917
     RUNOFF VOLUME    (mm)=   19.321
     TOTAL RAINFALL   (mm)=   47.810
     RUNOFF COEFFICIENT   =    0.404

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0001)|   Area     (ha)=    6.71
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      4.09         2.62
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         1.00
     Length            (m)=    211.50        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 | 1.667    5.74 | 3.250   12.43 |  4.83   0.96
             0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92   0.96
             0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00   0.96
             0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08   0.96
             0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17   0.96
             0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25   0.96
             0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33   0.96
             0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42   0.96
             0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50   0.96
             0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58   0.96
             0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67   0.96
             1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75   0.96
             1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83   0.96
             1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92   0.96
             1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00   0.96
             1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08   0.96
             1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17   0.96
```

```
          1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
          1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

    Max.Eff.Inten.(mm/hr)=       43.98          21.81
               over (min)         5.00          25.00
    Storage Coeff.  (min)=        5.56 (ii)     21.54 (ii)
    Unit Hyd. Tpeak (min)=        5.00          25.00
    Unit Hyd. peak  (cms)=        0.20           0.05
                                                             *TOTALS*
    PEAK FLOW       (cms)=        0.50           0.10          0.574 (iii)
    TIME TO PEAK    (hrs)=        2.75           3.00           2.75
    RUNOFF VOLUME    (mm)=       46.81          19.33          36.09
    TOTAL RAINFALL   (mm)=       47.81          47.81          47.81
    RUNOFF COEFFICIENT   =        0.98           0.40           0.75

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  83.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0070)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000      0.0000   |   0.5080     0.2222

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0001)      6.710     0.574       2.75      36.09
  OUTFLOW: ID= 1 (  0070)      6.710     0.237       3.17      36.07

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.30
                TIME SHIFT OF PEAK FLOW        (min)= 25.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1037

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0004)|    Area     (ha)=    2.00
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.80          0.20
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     115.47         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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
          0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
          0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
          0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
          0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
          0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
          0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
          0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
          0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
          0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
          0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
          1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
          1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
          1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
          1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
          1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
          1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
          1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
          1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

    Max.Eff.Inten.(mm/hr)=       43.98          24.02
               over (min)         5.00          10.00
    Storage Coeff.  (min)=        3.87 (ii)      7.94 (ii)
    Unit Hyd. Tpeak (min)=        5.00          10.00
    Unit Hyd. peak  (cms)=        0.25           0.13
                                                             *TOTALS*
```

```
     PEAK FLOW       (cms)=       0.22          0.01            0.231 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75            2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33           44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81           47.81
     RUNOFF COEFFICIENT   =       0.98          0.40            0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0079)|   Area    (ha)=   0.60
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.54          0.06
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      63.25         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                 0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                 0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                 0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                 0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                 0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                 0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                 0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                 0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                 0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                 0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                 1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                 1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                 1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                 1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                 1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                 1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                 1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                 1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.70 (ii)     6.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.29          0.14
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.07          0.00            0.070 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75            2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33           44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81           47.81
     RUNOFF COEFFICIENT   =       0.98          0.40            0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0003)|   Area    (ha)=  11.10
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.99          1.11
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     272.03         40.00
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     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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                   0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                   0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                   0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                   0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                   0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                   0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                   0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                   0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                   0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                   0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                   1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                   1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                   1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                   1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                   1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                   1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                   1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                   1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        24.02
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       6.47 (ii)   10.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.18         0.09
                                                            *TOTALS*
     PEAK FLOW      (cms)=        1.21         0.06          1.269 (iii)
     TIME TO PEAK   (hrs)=        2.75         2.83          2.75
     RUNOFF VOLUME   (mm)=       46.81        19.33         44.06
     TOTAL RAINFALL  (mm)=       47.81        47.81         47.81
     RUNOFF COEFFICIENT   =       0.98         0.40          0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0083)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.9980     0.1569

                                    AREA     QPEAK      TPEAK       R.V.
                                    (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0003)        11.100     1.269       2.75       44.06
   OUTFLOW: ID= 1 (  0083)        11.100     1.099       2.75       44.06

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 86.66
                   TIME SHIFT OF PEAK FLOW        (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0889

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0151)|    Area     (ha)=    7.77
|ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.74         3.03
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     227.60        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
```

```
                0.167     0.00 | 1.750     5.74 | 3.333     6.69 |   4.92     0.96
                0.250     0.00 | 1.833    16.25 | 3.417     6.69 |   5.00     0.96
                0.333     0.96 | 1.917    16.25 | 3.500     6.69 |   5.08     0.96
                0.417     0.96 | 2.000    16.25 | 3.583     6.69 |   5.17     0.96
                0.500     0.96 | 2.083    16.25 | 3.667     6.69 |   5.25     0.96
                0.583     0.96 | 2.167    16.25 | 3.750     6.69 |   5.33     0.96
                0.667     0.96 | 2.250    16.25 | 3.833     3.82 |   5.42     0.96
                0.750     0.96 | 2.333    43.98 | 3.917     3.82 |   5.50     0.96
                0.833     0.96 | 2.417    43.98 | 4.000     3.82 |   5.58     0.96
                0.917     0.96 | 2.500    43.98 | 4.083     3.82 |   5.67     0.96
                1.000     0.96 | 2.583    43.98 | 4.167     3.82 |   5.75     0.96
                1.083     0.96 | 2.667    43.98 | 4.250     3.82 |   5.83     0.96
                1.167     0.96 | 2.750    43.98 | 4.333     1.91 |   5.92     0.96
                1.250     0.96 | 2.833    12.43 | 4.417     1.91 |   6.00     0.96
                1.333     5.74 | 2.917    12.43 | 4.500     1.91 |   6.08     0.96
                1.417     5.74 | 3.000    12.43 | 4.583     1.91 |   6.17     0.96
                1.500     5.74 | 3.083    12.43 | 4.667     1.91 |   6.25     0.96
                1.583     5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         21.81
                over (min)        5.00         25.00
     Storage Coeff.  (min)=       5.81 (ii)    21.79 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=       0.20          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.58          0.12        0.664 (iii)
     TIME TO PEAK    (hrs)=       2.75          3.00        2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33       36.09
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.40        0.75

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0152)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.5870     0.2573

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0151)        7.770     0.664      2.75      36.09
   OUTFLOW: ID= 1 (  0152)        7.770     0.274      3.17      36.08

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.31
               TIME SHIFT OF PEAK FLOW         (min)= 25.00
               MAXIMUM  STORAGE   USED        (ha.m.)=  0.1202

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--------------------
| ADD HYD  (  0081)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0152):      7.77     0.274     3.17      36.08
      + ID2= 2 (  0079):      0.60     0.070     2.75      44.06
        ==================================================
        ID = 3 (  0081):      8.37     0.307     2.75      36.65

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

--------------------
| ADD HYD  (  0081)|
|  3 +  2 =  1     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0081):      8.37     0.307     2.75      36.65
      + ID2= 2 (  0083):     11.10     1.099     2.75      44.06
        ==================================================
        ID = 1 (  0081):     19.47     1.407     2.75      40.87

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
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```
---------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0002):       2.27    0.089      2.92     19.32
      + ID2= 2 (  0004):       2.00    0.231      2.75     44.06
        ==================================================
        ID = 3 (  0005):       4.27    0.304      2.75     30.91

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

---------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |            AREA     QPEAK     TPEAK      R.V.
---------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0005):       4.27    0.304      2.75     30.91
      + ID2= 2 (  0070):       6.71    0.237      3.17     36.07
        ==================================================
        ID = 1 (  0005):      10.98    0.511      2.75     34.07

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

---------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |            AREA     QPEAK     TPEAK      R.V.
---------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0005):      10.98    0.511      2.75     34.07
      + ID2= 2 (  0081):      19.47    1.407      2.75     40.87
        ==================================================
        ID = 3 (  0005):      30.45    1.917      2.75     38.42

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
---------------------
| RESERVOIR(  0006)|       OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
---------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |   0.3320     1.0067
                           0.1470     0.5184    |   0.3840     1.1307
                           0.2180     0.7112    |   0.4370     1.2536
                           0.2660     0.8419    |   0.0000     0.0000

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0005)    30.450     1.917       2.75      38.42
   OUTFLOW: ID= 1 (  0006)    30.450     0.264       5.17      38.39

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.79
                  TIME SHIFT OF PEAK FLOW        (min)=145.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8377

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---------------------
| CALIB            |
| NASHYD   (  0011)|    Area     (ha)=    4.52   Curve Number    (CN)= 83.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
---------------------    U.H. Tp(hrs)=    0.43

        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 | 1.667     5.74 | 3.250    12.43 |  4.83     0.96
                  0.167     0.00 | 1.750     5.74 | 3.333     6.69 |  4.92     0.96
                  0.250     0.00 | 1.833    16.25 | 3.417     6.69 |  5.00     0.96
                  0.333     0.96 | 1.917    16.25 | 3.500     6.69 |  5.08     0.96
                  0.417     0.96 | 2.000    16.25 | 3.583     6.69 |  5.17     0.96
                  0.500     0.96 | 2.083    16.25 | 3.667     6.69 |  5.25     0.96
                  0.583     0.96 | 2.167    16.25 | 3.750     6.69 |  5.33     0.96
                  0.667     0.96 | 2.250    16.25 | 3.833     3.82 |  5.42     0.96
                  0.750     0.96 | 2.333    43.98 | 3.917     3.82 |  5.50     0.96
                  0.833     0.96 | 2.417    43.98 | 4.000     3.82 |  5.58     0.96
                  0.917     0.96 | 2.500    43.98 | 4.083     3.82 |  5.67     0.96
                  1.000     0.96 | 2.583    43.98 | 4.167     3.82 |  5.75     0.96
                  1.083     0.96 | 2.667    43.98 | 4.250     3.82 |  5.83     0.96
                  1.167     0.96 | 2.750    43.98 | 4.333     1.91 |  5.92     0.96
                  1.250     0.96 | 2.833    12.43 | 4.417     1.91 |  6.00     0.96
                  1.333     5.74 | 2.917    12.43 | 4.500     1.91 |  6.08     0.96
                  1.417     5.74 | 3.000    12.43 | 4.583     1.91 |  6.17     0.96
                  1.500     5.74 | 3.083    12.43 | 4.667     1.91 |  6.25     0.96
                  1.583     5.74 | 3.167    12.43 | 4.750     1.91 |
```

```
     Unit Hyd Qpeak  (cms)=   0.401

     PEAK FLOW       (cms)=   0.158 (i)
     TIME TO PEAK    (hrs)=   3.083
     RUNOFF VOLUME    (mm)=  19.323
     TOTAL RAINFALL   (mm)=  47.810
     RUNOFF COEFFICIENT   =   0.404

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

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0010)|   Area    (ha)=   0.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.79          0.09
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      76.59         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
              0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
              0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
              0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
              0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
              0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
              0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
              0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
              0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
              0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
              0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
              1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
              1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
              1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
              1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
              1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
              1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
              1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
              1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.02 (ii)     7.09 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.14
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.10          0.01         0.102 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33         44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81         47.81
     RUNOFF COEFFICIENT   =       0.98          0.40          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0055)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1933     0.0000

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0010)       0.880     0.102      2.75        44.06
   OUTFLOW: ID= 1 (  0055)       0.880     0.102      2.75        44.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.20
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
```

```
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0000
                 MAXIMUM  STORAGE   USED        (cu.m.)=  0.021707

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|    Area     (ha)=    2.19
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.97          0.22
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     120.83         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         24.02
               over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.98 (ii)     8.05 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.24          0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.24          0.01          0.253 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33          44.06
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.40           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0056)|    Area     (ha)=    5.50
|ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.36          2.14
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     191.49         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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
```

```
              0.167     0.00 | 1.750    5.74 | 3.333     6.69 |  4.92     0.96
              0.250     0.00 | 1.833   16.25 | 3.417     6.69 |  5.00     0.96
              0.333     0.96 | 1.917   16.25 | 3.500     6.69 |  5.08     0.96
              0.417     0.96 | 2.000   16.25 | 3.583     6.69 |  5.17     0.96
              0.500     0.96 | 2.083   16.25 | 3.667     6.69 |  5.25     0.96
              0.583     0.96 | 2.167   16.25 | 3.750     6.69 |  5.33     0.96
              0.667     0.96 | 2.250   16.25 | 3.833     3.82 |  5.42     0.96
              0.750     0.96 | 2.333   43.98 | 3.917     3.82 |  5.50     0.96
              0.833     0.96 | 2.417   43.98 | 4.000     3.82 |  5.58     0.96
              0.917     0.96 | 2.500   43.98 | 4.083     3.82 |  5.67     0.96
              1.000     0.96 | 2.583   43.98 | 4.167     3.82 |  5.75     0.96
              1.083     0.96 | 2.667   43.98 | 4.250     3.82 |  5.83     0.96
              1.167     0.96 | 2.750   43.98 | 4.333     1.91 |  5.92     0.96
              1.250     0.96 | 2.833   12.43 | 4.417     1.91 |  6.00     0.96
              1.333     5.74 | 2.917   12.43 | 4.500     1.91 |  6.08     0.96
              1.417     5.74 | 3.000   12.43 | 4.583     1.91 |  6.17     0.96
              1.500     5.74 | 3.083   12.43 | 4.667     1.91 |  6.25     0.96
              1.583     5.74 | 3.167   12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         21.81
               over (min)         5.00         25.00
     Storage Coeff.  (min)=       5.24 (ii)    21.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00         25.00
     Unit Hyd. peak  (cms)=       0.21          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.41          0.08        0.471 (iii)
     TIME TO PEAK    (hrs)=       2.75          3.00        2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33       36.09
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.40        0.75

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0057)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.4170     0.1822

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0056)       5.500     0.471      2.75      36.09
   OUTFLOW: ID= 1 (  0057)       5.500     0.195      3.17      36.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.26
                  TIME SHIFT OF PEAK FLOW        (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0850

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0011):     4.52    0.158    3.08     19.32
      + ID2= 2 (  0012):     2.19    0.253    2.75     44.06
        ===================================================
        ID = 3 (  0009):     6.71    0.365    2.75     27.40

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0009):     6.71    0.365    2.75     27.40
      + ID2= 2 (  0055):     0.88    0.102    2.75     44.06
        ===================================================
        ID = 1 (  0009):     7.59    0.467    2.75     29.33

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
```

```
--------------------             (ha)     (cms)      (hrs)      (mm)
        ID1= 1 (  0009):         7.59    0.467       2.75     29.33
      + ID2= 2 (  0057):         5.50    0.195       3.17     36.07
        =================================================
        ID = 3 (  0009):        13.09    0.637       2.75     32.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0063)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000     |  0.1600      0.2188
                          0.0700     0.1180     |  0.1800      0.2432
                          0.1000     0.1585     |  0.2080      0.2682
                          0.1300     0.1851     |  0.0000      0.0000

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0009)      13.090       0.637       2.75       32.16
   OUTFLOW: ID= 1 (  0063)      13.090       0.176       4.50       32.13

                   PEAK    FLOW    REDUCTION [Qout/Qin](%)= 27.62
                   TIME SHIFT OF PEAK FLOW          (min)=105.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  0.2384

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0058)|    Area     (ha)=    1.63
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00    Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      1.47           0.16
     Dep. Storage      (mm)=      1.00           5.00
     Average Slope     (%)=       1.00           1.00
     Length            (m)=     104.24          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  | 1.667     5.74  | 3.250    12.43  |  4.83     0.96
               0.167     0.00  | 1.750     5.74  | 3.333     6.69  |  4.92     0.96
               0.250     0.00  | 1.833    16.25  | 3.417     6.69  |  5.00     0.96
               0.333     0.96  | 1.917    16.25  | 3.500     6.69  |  5.08     0.96
               0.417     0.96  | 2.000    16.25  | 3.583     6.69  |  5.17     0.96
               0.500     0.96  | 2.083    16.25  | 3.667     6.69  |  5.25     0.96
               0.583     0.96  | 2.167    16.25  | 3.750     6.69  |  5.33     0.96
               0.667     0.96  | 2.250    16.25  | 3.833     3.82  |  5.42     0.96
               0.750     0.96  | 2.333    43.98  | 3.917     3.82  |  5.50     0.96
               0.833     0.96  | 2.417    43.98  | 4.000     3.82  |  5.58     0.96
               0.917     0.96  | 2.500    43.98  | 4.083     3.82  |  5.67     0.96
               1.000     0.96  | 2.583    43.98  | 4.167     3.82  |  5.75     0.96
               1.083     0.96  | 2.667    43.98  | 4.250     3.82  |  5.83     0.96
               1.167     0.96  | 2.750    43.98  | 4.333     1.91  |  5.92     0.96
               1.250     0.96  | 2.833    12.43  | 4.417     1.91  |  6.00     0.96
               1.333     5.74  | 2.917    12.43  | 4.500     1.91  |  6.08     0.96
               1.417     5.74  | 3.000    12.43  | 4.583     1.91  |  6.17     0.96
               1.500     5.74  | 3.083    12.43  | 4.667     1.91  |  6.25     0.96
               1.583     5.74  | 3.167    12.43  | 4.750     1.91  |

     Max.Eff.Inten.(mm/hr)=       43.98          21.81
                over (min)         5.00          20.00
     Storage Coeff.  (min)=        3.64 (ii)     19.62 (ii)
     Unit Hyd. Tpeak (min)=        5.00          20.00
     Unit Hyd. peak  (cms)=        0.25           0.06
                                                              *TOTALS*
     PEAK FLOW        (cms)=       0.18           0.01          0.185 (iii)
     TIME TO PEAK     (hrs)=       2.75           2.92           2.75
     RUNOFF VOLUME     (mm)=      46.81          19.33          44.05
     TOTAL RAINFALL    (mm)=      47.81          47.81          47.81
     RUNOFF COEFFICIENT   =        0.98           0.40           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
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     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0073)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0270     0.0780
                          0.0120     0.0426   |   0.0313     0.0880
                          0.0178     0.0560   |   0.0356     0.0949
                          0.0216     0.0670   |   0.0000     0.0000

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0058)       1.630      0.185      2.75       44.05
   OUTFLOW: ID= 1 (  0073)       1.630      0.018      4.00       43.50

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.73
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0565

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--------------------
| CALIB            |
| STANDHYD ( 0071)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.22         0.03
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope    (%)=        1.00         2.00
     Length           (m)=       40.82        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98        24.02
               over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.07 (ii)    6.14 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.31         0.15
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.029 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      46.81        19.33          44.05
     TOTAL RAINFALL   (mm)=      47.81        47.81          47.81
     RUNOFF COEFFICIENT   =       0.98         0.40           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
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| STANDHYD (  0074)|    Area     (ha)=    0.21
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      0.19         0.02
     Dep. Storage      (mm)=      1.00         5.00
     Average Slope      (%)=      1.00         2.00
     Length             (m)=     37.42        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 | 1.667    5.74 | 3.250   12.43 |  4.83    0.96
                0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92    0.96
                0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00    0.96
                0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08    0.96
                0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17    0.96
                0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25    0.96
                0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33    0.96
                0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42    0.96
                0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50    0.96
                0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58    0.96
                0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67    0.96
                1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75    0.96
                1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83    0.96
                1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92    0.96
                1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00    0.96
                1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08    0.96
                1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17    0.96
                1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25    0.96
                1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=     43.98        24.02
                over (min)      5.00        10.00
     Storage Coeff.  (min)=     1.97 (ii)    6.04 (ii)
     Unit Hyd. Tpeak (min)=     5.00        10.00
     Unit Hyd. peak  (cms)=     0.31         0.15
                                                        *TOTALS*
     PEAK FLOW       (cms)=     0.02         0.00         0.024 (iii)
     TIME TO PEAK    (hrs)=     2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=    46.81        19.33         44.05
     TOTAL RAINFALL   (mm)=    47.81        47.81         47.81
     RUNOFF COEFFICIENT   =     0.98         0.40          0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0075)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0042     0.0100
                          0.0019     0.0055   |   0.0049     0.0113
                          0.0028     0.0072   |   0.0056     0.0122
                          0.0034     0.0086   |   0.0000     0.0000

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0074)    0.210      0.024       2.75      44.05
   OUTFLOW: ID= 1 (  0075)    0.210      0.003       3.83      40.58

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.25
                  TIME SHIFT OF PEAK FLOW        (min)= 65.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0071

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

--------------------
| ADD HYD  (  0072)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK      R.V.
--------------------         (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0071):     0.25    0.029    2.75      44.05
      + ID2= 2 (  0073):     1.63    0.018    4.00      43.50
```

```
        ===================================================
        ID = 3 (  0072):      1.88   0.041      2.75    43.57

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

--------------------
| ADD HYD  (  0072)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0072):      1.88   0.041      2.75    43.57
      + ID2= 2 (  0075):      0.21   0.003      3.83    40.58
        ===================================================
        ID = 1 (  0072):      2.09   0.043      2.75    43.27

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0065)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  0.0330     0.0305
                          0.0150     0.0159    |  0.0380     0.0340
                          0.0220     0.0216    |  0.0430     0.0377
                          0.0260     0.0256    |  0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0072)     2.090     0.043      2.75      43.27
   OUTFLOW: ID= 1 (  0065)     2.090     0.017      6.25      43.15

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.41
                TIME SHIFT OF PEAK FLOW        (min)=210.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0178

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--------------------
| CALIB            |
| STANDHYD (  0077)|   Area    (ha)=   5.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         0.55
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     190.79        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 | 1.667    5.74 | 3.250  12.43 |  4.83    0.96
               0.167    0.00 | 1.750    5.74 | 3.333   6.69 |  4.92    0.96
               0.250    0.00 | 1.833   16.25 | 3.417   6.69 |  5.00    0.96
               0.333    0.96 | 1.917   16.25 | 3.500   6.69 |  5.08    0.96
               0.417    0.96 | 2.000   16.25 | 3.583   6.69 |  5.17    0.96
               0.500    0.96 | 2.083   16.25 | 3.667   6.69 |  5.25    0.96
               0.583    0.96 | 2.167   16.25 | 3.750   6.69 |  5.33    0.96
               0.667    0.96 | 2.250   16.25 | 3.833   3.82 |  5.42    0.96
               0.750    0.96 | 2.333   43.98 | 3.917   3.82 |  5.50    0.96
               0.833    0.96 | 2.417   43.98 | 4.000   3.82 |  5.58    0.96
               0.917    0.96 | 2.500   43.98 | 4.083   3.82 |  5.67    0.96
               1.000    0.96 | 2.583   43.98 | 4.167   3.82 |  5.75    0.96
               1.083    0.96 | 2.667   43.98 | 4.250   3.82 |  5.83    0.96
               1.167    0.96 | 2.750   43.98 | 4.333   1.91 |  5.92    0.96
               1.250    0.96 | 2.833   12.43 | 4.417   1.91 |  6.00    0.96
               1.333    5.74 | 2.917   12.43 | 4.500   1.91 |  6.08    0.96
               1.417    5.74 | 3.000   12.43 | 4.583   1.91 |  6.17    0.96
               1.500    5.74 | 3.083   12.43 | 4.667   1.91 |  6.25    0.96
               1.583    5.74 | 3.167   12.43 | 4.750   1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98        24.02
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        5.23 (ii)    9.30 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.21         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.60         0.03        0.630 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=       46.81        19.33        44.06
```

```
     TOTAL RAINFALL    (mm)=      47.81         47.81           47.81
     RUNOFF COEFFICIENT    =       0.98          0.40            0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
--------------------            (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0006):       30.45    0.264      5.17     38.39
      + ID2= 2 (  0063):       13.09    0.176      4.50     32.13
        ==================================================
        ID = 3 (  0064):       43.54    0.437      4.83     36.51

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

--------------------
| ADD HYD  (  0064)|
|   3 +  2 =  1    |            AREA     QPEAK     TPEAK      R.V.
--------------------            (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0064):       43.54    0.437      4.83     36.51
      + ID2= 2 (  0065):        2.09    0.017      6.25     43.15
        ==================================================
        ID = 1 (  0064):       45.63    0.453      4.83     36.81

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

--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |            AREA     QPEAK     TPEAK      R.V.
--------------------            (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0064):       45.63    0.453      4.83     36.81
      + ID2= 2 (  0077):        5.46    0.630      2.75     44.06
        ==================================================
        ID = 3 (  0064):       51.09    0.797      2.75     37.59

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0013)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance       Elevation        Manning
                    0.00          101.50          0.0500
                    1.00          100.70          0.0500
                    1.50          100.55     0.0500 /0.0300   Main Channel
                    2.00           99.50          0.0300      Main Channel
                    3.50           99.60          0.0300      Main Channel
                    4.50          100.65     0.0300 /0.0500   Main Channel
                    6.00          101.45          0.0500

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY     TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)         (m/s)        (min)
       0.10     99.60    .353E+02        0.0          0.19         43.69
       0.19     99.69    .112E+03        0.1          0.37         22.76
       0.29     99.79    .195E+03        0.2          0.49         17.03
       0.38     99.88    .285E+03        0.3          0.59         14.23
       0.48     99.98    .381E+03        0.5          0.67         12.51
       0.57    100.07    .484E+03        0.7          0.74         11.32
       0.67    100.17    .594E+03        0.9          0.80         10.43
       0.76    100.26    .710E+03        1.2          0.86          9.74
       0.86    100.36    .832E+03        1.5          0.91          9.18
       0.95    100.45    .961E+03        1.8          0.96          8.72
       1.05    100.55    .110E+04        2.2          1.00          8.32
       1.16    100.66    .127E+04        2.7          1.07          7.80
       1.28    100.78    .148E+04        3.4          1.14          7.31
       1.39    100.89    .170E+04        4.1          1.20          6.94
       1.50    101.00    .195E+04        4.9          1.25          6.65
       1.61    101.11    .221E+04        5.8          1.30          6.41
       1.72    101.22    .250E+04        6.7          1.34          6.22
       1.84    101.34    .280E+04        7.7          1.38          6.04
       1.95    101.45    .313E+04        8.8          1.41          5.90
```

```
                              <---- hydrograph ---->    <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0064)  51.09    0.80    2.75  37.59     0.61      0.76
  OUTFLOW: ID= 1 (  0013)  51.09    0.72    2.75  37.58     0.57      0.74


-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (  0018)|   Area     (ha)=  10.38   Curve Number   (CN)= 83.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=    0.89

        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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96
1.250	0.96	2.833	12.43	4.417	1.91	6.00	0.96
1.333	5.74	2.917	12.43	4.500	1.91	6.08	0.96
1.417	5.74	3.000	12.43	4.583	1.91	6.17	0.96
1.500	5.74	3.083	12.43	4.667	1.91	6.25	0.96
1.583	5.74	3.167	12.43	4.750	1.91		

```
    Unit Hyd Qpeak  (cms)=    0.445

    PEAK FLOW        (cms)=    0.234 (i)
    TIME TO PEAK     (hrs)=    3.667
    RUNOFF VOLUME     (mm)=   19.325
    TOTAL RAINFALL    (mm)=   47.810
    RUNOFF COEFFICIENT    =    0.404

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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0019)|   Area     (ha)=  12.41
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS     PERVIOUS (i)
    Surface Area     (ha)=     11.17          1.24
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    287.63         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	1.667	5.74	3.250	12.43	4.83	0.96
0.167	0.00	1.750	5.74	3.333	6.69	4.92	0.96
0.250	0.00	1.833	16.25	3.417	6.69	5.00	0.96
0.333	0.96	1.917	16.25	3.500	6.69	5.08	0.96
0.417	0.96	2.000	16.25	3.583	6.69	5.17	0.96
0.500	0.96	2.083	16.25	3.667	6.69	5.25	0.96
0.583	0.96	2.167	16.25	3.750	6.69	5.33	0.96
0.667	0.96	2.250	16.25	3.833	3.82	5.42	0.96
0.750	0.96	2.333	43.98	3.917	3.82	5.50	0.96
0.833	0.96	2.417	43.98	4.000	3.82	5.58	0.96
0.917	0.96	2.500	43.98	4.083	3.82	5.67	0.96
1.000	0.96	2.583	43.98	4.167	3.82	5.75	0.96
1.083	0.96	2.667	43.98	4.250	3.82	5.83	0.96
1.167	0.96	2.750	43.98	4.333	1.91	5.92	0.96

```
           1.250    0.96 | 2.833    12.43 | 4.417     1.91 |   6.00    0.96
           1.333    5.74 | 2.917    12.43 | 4.500     1.91 |   6.08    0.96
           1.417    5.74 | 3.000    12.43 | 4.583     1.91 |   6.17    0.96
           1.500    5.74 | 3.083    12.43 | 4.667     1.91 |   6.25    0.96
           1.583    5.74 | 3.167    12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          24.02
                over (min)         5.00          15.00
     Storage Coeff.  (min)=        6.69 (ii)     10.76 (ii)
     Unit Hyd. Tpeak (min)=        5.00          15.00
     Unit Hyd. peak  (cms)=        0.18           0.09
                                                               *TOTALS*
     PEAK FLOW       (cms)=        1.35           0.06           1.416 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.83            2.75
     RUNOFF VOLUME    (mm)=       46.81          19.33           44.06
     TOTAL RAINFALL   (mm)=       47.81          47.81           47.81
     RUNOFF COEFFICIENT   =        0.98           0.40            0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0043)|    Area    (ha)=  11.15
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.03          1.12
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     272.64         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 | 1.667    5.74 | 3.250    12.43 |   4.83    0.96
           0.167    0.00 | 1.750    5.74 | 3.333     6.69 |   4.92    0.96
           0.250    0.00 | 1.833   16.25 | 3.417     6.69 |   5.00    0.96
           0.333    0.96 | 1.917   16.25 | 3.500     6.69 |   5.08    0.96
           0.417    0.96 | 2.000   16.25 | 3.583     6.69 |   5.17    0.96
           0.500    0.96 | 2.083   16.25 | 3.667     6.69 |   5.25    0.96
           0.583    0.96 | 2.167   16.25 | 3.750     6.69 |   5.33    0.96
           0.667    0.96 | 2.250   16.25 | 3.833     3.82 |   5.42    0.96
           0.750    0.96 | 2.333   43.98 | 3.917     3.82 |   5.50    0.96
           0.833    0.96 | 2.417   43.98 | 4.000     3.82 |   5.58    0.96
           0.917    0.96 | 2.500   43.98 | 4.083     3.82 |   5.67    0.96
           1.000    0.96 | 2.583   43.98 | 4.167     3.82 |   5.75    0.96
           1.083    0.96 | 2.667   43.98 | 4.250     3.82 |   5.83    0.96
           1.167    0.96 | 2.750   43.98 | 4.333     1.91 |   5.92    0.96
           1.250    0.96 | 2.833   12.43 | 4.417     1.91 |   6.00    0.96
           1.333    5.74 | 2.917   12.43 | 4.500     1.91 |   6.08    0.96
           1.417    5.74 | 3.000   12.43 | 4.583     1.91 |   6.17    0.96
           1.500    5.74 | 3.083   12.43 | 4.667     1.91 |   6.25    0.96
           1.583    5.74 | 3.167   12.43 | 4.750     1.91 |

     Max.Eff.Inten.(mm/hr)=       43.98          24.02
                over (min)         5.00          15.00
     Storage Coeff.  (min)=        6.48 (ii)     10.55 (ii)
     Unit Hyd. Tpeak (min)=        5.00          15.00
     Unit Hyd. peak  (cms)=        0.18           0.09
                                                               *TOTALS*
     PEAK FLOW       (cms)=        1.22           0.06           1.274 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.83            2.75
     RUNOFF VOLUME    (mm)=       46.81          19.33           44.06
     TOTAL RAINFALL   (mm)=       47.81          47.81           47.81
     RUNOFF COEFFICIENT   =        0.98           0.40            0.92

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
--------------------
| RESERVOIR( 0045)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.0400     0.3830

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0043)     11.150     1.274       2.75        44.06
   OUTFLOW: ID= 1 (  0045)     11.150     0.589       2.92        44.05

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 46.20
                TIME SHIFT OF PEAK FLOW          (min)= 10.00
                MAXIMUM  STORAGE   USED         (ha.m.)=  0.2168

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0044)|   Area    (ha)=  31.33
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      19.11         12.22
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     457.02         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 | 1.667    5.74 | 3.250   12.43 |  4.83     0.96
               0.167    0.00 | 1.750    5.74 | 3.333    6.69 |  4.92     0.96
               0.250    0.00 | 1.833   16.25 | 3.417    6.69 |  5.00     0.96
               0.333    0.96 | 1.917   16.25 | 3.500    6.69 |  5.08     0.96
               0.417    0.96 | 2.000   16.25 | 3.583    6.69 |  5.17     0.96
               0.500    0.96 | 2.083   16.25 | 3.667    6.69 |  5.25     0.96
               0.583    0.96 | 2.167   16.25 | 3.750    6.69 |  5.33     0.96
               0.667    0.96 | 2.250   16.25 | 3.833    3.82 |  5.42     0.96
               0.750    0.96 | 2.333   43.98 | 3.917    3.82 |  5.50     0.96
               0.833    0.96 | 2.417   43.98 | 4.000    3.82 |  5.58     0.96
               0.917    0.96 | 2.500   43.98 | 4.083    3.82 |  5.67     0.96
               1.000    0.96 | 2.583   43.98 | 4.167    3.82 |  5.75     0.96
               1.083    0.96 | 2.667   43.98 | 4.250    3.82 |  5.83     0.96
               1.167    0.96 | 2.750   43.98 | 4.333    1.91 |  5.92     0.96
               1.250    0.96 | 2.833   12.43 | 4.417    1.91 |  6.00     0.96
               1.333    5.74 | 2.917   12.43 | 4.500    1.91 |  6.08     0.96
               1.417    5.74 | 3.000   12.43 | 4.583    1.91 |  6.17     0.96
               1.500    5.74 | 3.083   12.43 | 4.667    1.91 |  6.25     0.96
               1.583    5.74 | 3.167   12.43 | 4.750    1.91 |

     Max.Eff.Inten.(mm/hr)=      43.98         21.81
                over (min)       10.00         25.00
     Storage Coeff.  (min)=       8.83 (ii)    24.81 (ii)
     Unit Hyd. Tpeak (min)=      10.00         25.00
     Unit Hyd. peak  (cms)=       0.12          0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.26          0.44        2.587 (iii)
     TIME TO PEAK    (hrs)=       2.75          3.00        2.75
     RUNOFF VOLUME    (mm)=      46.81         19.33       36.09
     TOTAL RAINFALL   (mm)=      47.81         47.81       47.81
     RUNOFF COEFFICIENT   =       0.98          0.40        0.75


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0046)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   2.2770     1.0445

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
```

```
  INFLOW : ID= 2 (  0044)     31.330      2.587       2.75      36.09
  OUTFLOW: ID= 1 (  0046)     31.330      1.079       3.25      36.09

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.71
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4956

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

--------------------
| ADD HYD  (  0016)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0018):     10.38    0.234      3.67     19.33
      + ID2= 2 (  0019):     12.41    1.416      2.75     44.06
        ==================================================
        ID = 3 (  0016):     22.79    1.488      2.75     32.79

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

--------------------
| ADD HYD  (  0016)|
|  3 +  2 =  1     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0016):     22.79    1.488      2.75     32.79
      + ID2= 2 (  0045):     11.15    0.589      2.92     44.05
        ==================================================
        ID = 1 (  0016):     33.94    2.028      2.75     36.49

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

--------------------
| ADD HYD  (  0016)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0016):     33.94    2.028      2.75     36.49
      + ID2= 2 (  0046):     31.33    1.079      3.25     36.09
        ==================================================
        ID = 3 (  0016):     65.27    2.837      2.75     36.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          0.0000      0.0000   |   0.5430      2.2000
                          0.0690      0.8600   |   0.6780      2.6500
                          0.3000      1.2500   |   0.7830      3.0000
                          0.4450      1.8500   |   0.8900      3.3500

                               AREA      QPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0016)     65.270      2.837       2.75      36.30
  OUTFLOW: ID= 1 (  0015)     65.270      0.430       6.17      36.12

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.15
                  TIME SHIFT OF PEAK FLOW         (min)=205.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.7872

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

--------------------
| ADD HYD  (  0060)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0013):     51.09    0.718      2.75     37.58
      + ID2= 2 (  0015):     65.27    0.430      6.17     36.12
        ==================================================
        ID = 3 (  0060):    116.36    0.885      5.33     36.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2255)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance       Elevation        Manning
                   28.50         210.02         0.0600
                   47.35         209.86         0.0450      Main Channel
```

51.00	209.76	0.0450	Main Channel
60.44	209.54	0.0450	Main Channel
65.44	209.60	0.0450	Main Channel
72.65	209.41	0.0450	Main Channel
95.97	208.53	0.0450	Main Channel
103.18	208.38	0.0450	Main Channel
108.18	208.33	0.0450	Main Channel
116.25	208.08	0.0450	Main Channel
122.09	207.92	0.0450	Main Channel
131.52	207.65	0.0450	Main Channel
149.56	208.22	0.0450	Main Channel
155.39	208.49	0.0450	Main Channel
177.88	208.58	0.0450	Main Channel
190.96	208.73	0.0450	Main Channel
195.96	208.72	0.0450	Main Channel
226.50	209.32	0.0450	Main Channel
238.71	209.46	0.0450 /0.0600	Main Channel
251.40	209.70	0.0600	

<--------------------- TRAVEL TIME TABLE ---------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.11	207.75	.601E+03	0.0	0.12	222.56
0.21	207.86	.241E+04	0.3	0.19	140.20
0.32	207.97	.542E+04	0.8	0.25	107.47
0.43	208.07	.969E+04	1.8	0.30	89.07
0.53	208.18	.152E+05	3.3	0.35	76.07
0.64	208.29	.218E+05	5.5	0.40	66.47
0.75	208.39	.296E+05	8.0	0.43	61.92
0.85	208.50	.389E+05	11.2	0.46	58.04
0.96	208.61	.519E+05	14.2	0.44	60.79
1.07	208.71	.677E+05	20.3	0.48	55.45
1.17	208.82	.861E+05	27.7	0.52	51.74
1.28	208.93	.106E+06	37.5	0.57	47.20
1.39	209.03	.128E+06	48.7	0.61	43.64
1.49	209.14	.150E+06	61.5	0.66	40.75
1.60	209.25	.175E+06	76.0	0.70	38.35
1.71	209.35	.201E+06	91.6	0.73	36.50
1.81	209.46	.228E+06	107.8	0.76	35.28
1.93	209.58	.262E+06	130.3	0.80	33.51
2.05	209.70	.299E+06	156.6	0.84	31.84

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0060)	116.36	0.89	5.33	36.76	0.32	0.25
OUTFLOW: ID= 1 (2255)	116.36	0.78	6.92	36.75	0.31	0.24

VMC - 100yr- 6hr Storm- Existing Condition

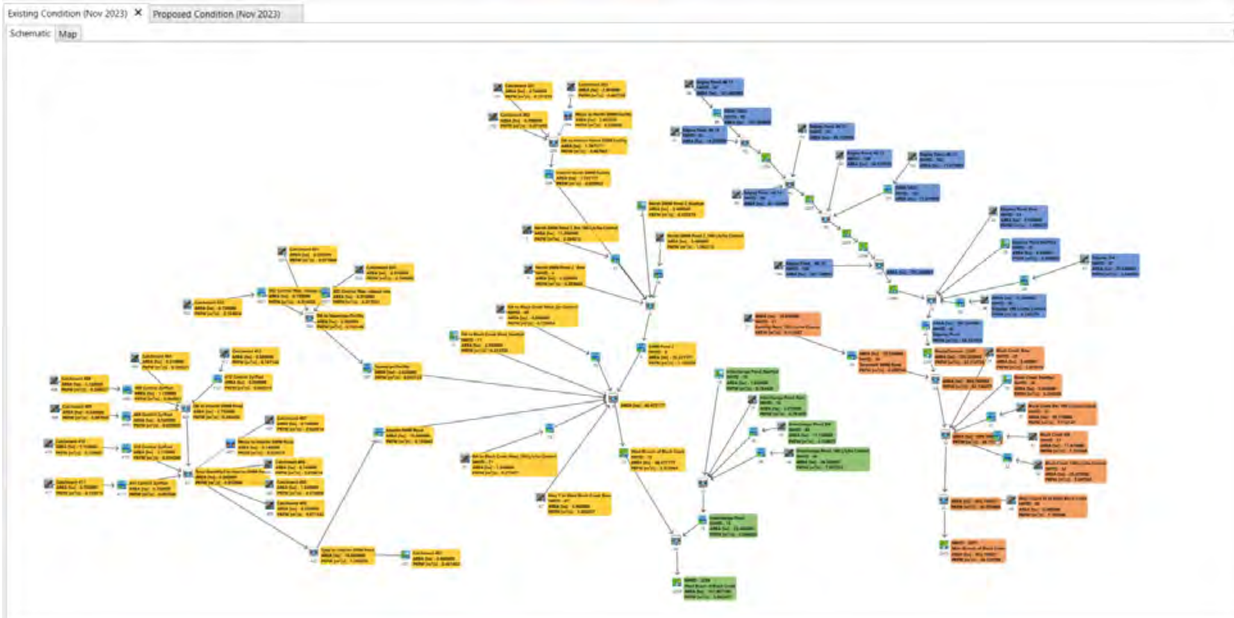

Figure 5. VMC - 100yr- 6hr Storm- Existing Condition.

```
===========================================================================================================

      V    V   I   SSSSS  U   U    A    L            (v 6.2.2013)
      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: D:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\32e850c8-7888-4
  Summary filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\32e850c8-7888-4


DATE: 06/18/2024                           TIME: 11:03:20

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------------------------------
  **************************************************
  ** SIMULATION : 100yr                           **
  **************************************************


--------------------
|    READ STORM     |     Filename: C:\Users\rhe\AppData\
|                   |               Local\Temp\
|                   |               5ba76906-13ea-4b66-90ff-302ac1cad32c\6808d89b
| Ptotal= 80.31 mm  |     Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    0.00 |  1.75   27.30 |   3.50   11.24 |  5.25    1.61
                  0.25    1.61 |  2.00   27.30 |   3.75    6.42 |  5.50    1.61
                  0.50    1.61 |  2.25   73.88 |   4.00    6.42 |  5.75    1.61
                  0.75    1.61 |  2.50   73.88 |   4.25    3.21 |  6.00    1.61
                  1.00    1.61 |  2.75   20.88 |   4.50    3.21 |
                  1.25    9.64 |  3.00   20.88 |   4.75    1.61 |
                  1.50    9.64 |  3.25   11.24 |   5.00    1.61 |

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


--------------------
| CALIB             |
| NASHYD   (  0002)|    Area     (ha)=    5.48   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.58

         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
```

```
           1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
           1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
           1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
           1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
           1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=    0.361

     PEAK FLOW       (cms)=    0.336 (i)
     TIME TO PEAK    (hrs)=    3.250
     RUNOFF VOLUME    (mm)=   39.708
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =    0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0001)|    Area    (ha)=    5.48
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area    (ha)=       4.93          0.55
     Dep. Storage    (mm)=       1.00          1.50
     Average Slope    (%)=       1.00          2.00
     Length           (m)=     191.14         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
           0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
           0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
           0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
           0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
           0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
           0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
           0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
           0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
           0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
           0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
           1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
           1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
           1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
           1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
           1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
           1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
           1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
           1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         57.08
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       4.25 (ii)     7.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.23          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.01          0.08        1.092 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31         50.24        76.40
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.99          0.63         0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0058)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           0.0000     0.0000   |   0.9860     0.0802

                                  AREA     QPEAK      TPEAK        R.V.
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                              (ha)      (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0001)     5.480     1.092      2.75      76.40
  OUTFLOW: ID= 1 (  0058)     5.480     0.962      2.75      76.40

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.10
                TIME SHIFT OF PEAK FLOW        (min)=  0.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0802

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area     (ha)=  11.09
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       9.98         1.11
    Dep. Storage     (mm)=       1.00         1.50
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     271.91        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

    Max.Eff.Inten.(mm/hr)=       73.88        57.08
               over (min)        5.00        10.00
    Storage Coeff.  (min)=       5.26 (ii)    8.56 (ii)
    Unit Hyd. Tpeak (min)=       5.00        10.00
    Unit Hyd. peak  (cms)=       0.21         0.12
                                                       *TOTALS*
    PEAK FLOW       (cms)=       2.04         0.16       2.204 (iii)
    TIME TO PEAK    (hrs)=       2.75         2.75        2.75
    RUNOFF VOLUME    (mm)=      79.31        50.24       76.40
    TOTAL RAINFALL   (mm)=      80.31        80.31       80.31
    RUNOFF COEFFICIENT   =       0.99         0.63        0.95


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0057)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.9960     0.1535

                              AREA      QPEAK     TPEAK       R.V.
                              (ha)      (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0003)    11.090     2.204      2.75      76.40
  OUTFLOW: ID= 1 (  0057)    11.090     1.946      2.75      76.40

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.29
                TIME SHIFT OF PEAK FLOW        (min)=  0.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1535

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| CALIB             |
| STANDHYD (  0004)|   Area    (ha)=   1.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      1.29          0.14
     Dep. Storage      (mm)=      1.00          1.50
     Average Slope      (%)=      1.00          2.00
     Length             (m)=     97.64         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 | 1.667    9.64 | 3.250   20.88 |  4.83     1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92     1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00     1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08     1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17     1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25     1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33     1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42     1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50     1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58     1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67     1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75     1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83     1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92     1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00     1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08     1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17     1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25     1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         57.08
               over (min)        5.00         10.00
     Storage Coeff.  (min)=        2.84 (ii)     6.15 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.28          0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=        0.26          0.02          0.286 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31         50.24          76.40
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.99          0.63           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0201)|   Area    (ha)=   0.74
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      0.73          0.01
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=     70.24         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 | 1.667    9.64 | 3.250   20.88 |  4.83     1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92     1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00     1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08     1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17     1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25     1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33     1.61
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            0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
            0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
            0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
            0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
            1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
            1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
            1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
            1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
            1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
            1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
            1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
            1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         42.73
                over (min)         5.00          5.00
     Storage Coeff.  (min)=        2.33 (ii)     3.60 (ii)
     Unit Hyd. Tpeak (min)=        5.00          5.00
     Unit Hyd. peak  (cms)=        0.30          0.26
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.15          0.00          0.151 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       78.31         35.45          77.88
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.98          0.44           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB             |
| STANDHYD (  0202)|    Area    (ha)=   0.49
|ID= 1 DT= 5.0 min |    Total Imp(%)=  50.00   Dir. Conn.(%)=  50.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.25          0.25
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      57.15         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
            0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
            0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
            0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
            0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
            0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
            0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
            0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
            0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
            0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
            0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
            1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
            1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
            1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
            1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
            1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
            1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
            1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
            1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         42.73
                over (min)         5.00         15.00
     Storage Coeff.  (min)=        2.06 (ii)    11.98 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.31          0.09
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.05          0.02          0.072 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83           2.75
     RUNOFF VOLUME    (mm)=       78.31         35.45          56.87
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.98          0.44           0.71
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***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0203)|   Area    (ha)=   2.95
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.92         0.03
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     140.24        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88        42.73
                over (min)         5.00         5.00
     Storage Coeff.  (min)=        3.53 (ii)    4.80 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.26         0.22
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.60         0.00         0.603 (iii)
     TIME TO PEAK    (hrs)=        2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=       78.31        35.45         77.88
     TOTAL RAINFALL   (mm)=       80.31        80.31         80.31
     RUNOFF COEFFICIENT   =        0.98         0.44          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| DUHYD    (  0204)|
| Inlet Cap.= 0.358|
| #of Inlets=     1|
| Total(cms)=   0.4|       AREA     QPEAK      TPEAK     R.V.
--------------------       (ha)     (cms)      (hrs)     (mm)
     TOTAL HYD.(ID= 1):    2.95      0.60       2.75    77.88
     ========================================================
     MAJOR SYS.(ID= 2):    0.52      0.24       2.75    77.88
     MINOR SYS.(ID= 3):    2.43      0.36       2.33    77.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| ADD HYD  (  0205)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0201):     0.74   0.151     2.75    77.88
      + ID2= 2 (  0202):     0.49   0.072     2.75    56.87
        ===================================================
        ID = 3 (  0205):     1.23   0.223     2.75    69.51

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0205)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0205):     1.23   0.223     2.75    69.51
      + ID2= 2 (  0204):     0.52   0.245     2.75    77.88
        ===================================================
        ID = 1 (  0205):     1.75   0.468     2.75    71.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0206)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.0500     0.0898
                          0.0280     0.0401    |   0.0830     0.2129
                          0.0410     0.0647    |   0.0000     0.0000

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0205)      1.747      0.468       2.75       71.99
   OUTFLOW: ID= 1 (  0206)      1.747      0.051       3.33       71.78

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.88
                  TIME SHIFT OF PEAK FLOW          (min)= 35.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0933

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0002):     5.48   0.336     3.25    39.71
      + ID2= 2 (  0206):     1.75   0.051     3.33    71.78
        ===================================================
        ID = 3 (  0005):     7.23   0.386     3.25    47.46

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

--------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):     7.23   0.386     3.25    47.46
      + ID2= 2 (  0004):     1.43   0.286     2.75    76.40
        ===================================================
        ID = 1 (  0005):     8.66   0.528     2.75    52.24

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0005):     8.66   0.528     2.75    52.24
      + ID2= 2 (  0057):    11.09   1.946     2.75    76.40
        ===================================================
        ID = 3 (  0005):    19.75   2.474     2.75    65.81

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

--------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    19.75   2.474     2.75    65.81
      + ID2= 2 (  0058):     5.48   0.962     2.75    76.40
```

```
    ==================================================
    ID = 1 (  0005):    25.23   3.436     2.75    68.11

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                           0.0000      0.0000    |   1.3700      1.1250
                           0.7950      0.3050    |   2.1000      1.3480
                           0.9350      0.5080    |   3.0000      1.5700
                           1.0700      0.7100    |   4.5500      1.7980
                           1.1700      0.9180    |   6.6500      2.0250

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0005)       25.227     3.436      2.75      68.11
   OUTFLOW: ID= 1 (  0006)       25.227     1.104      3.58      68.11

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.12
                 TIME SHIFT OF PEAK FLOW          (min)= 50.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.7805

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (  0011)|    Area     (ha)=    2.93   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.43

        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak   (cms)=    0.260

     PEAK FLOW        (cms)=    0.214 (i)
     TIME TO PEAK     (hrs)=    3.000
     RUNOFF VOLUME     (mm)=   39.705
     TOTAL RAINFALL    (mm)=   80.310
     RUNOFF COEFFICIENT   =    0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD    (  0401)|    Area     (ha)=    3.66   Curve Number    (CN)= 80.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    4.60   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.13

        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
```

```
                0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=   1.075

     PEAK FLOW       (cms)=   0.461 (i)
     TIME TO PEAK    (hrs)=   2.750
     RUNOFF VOLUME    (mm)=  40.767
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.508

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0408)|    Area     (ha)=   1.13
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.89          0.24
     Dep. Storage     (mm)=      2.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     86.79         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         42.73
                over (min)       5.00         10.00
     Storage Coeff.  (min)=      2.65 (ii)     7.34 (ii)
     Unit Hyd. Tpeak (min)=      5.00         10.00
     Unit Hyd. peak  (cms)=      0.29          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.18          0.03         0.209 (iii)
     TIME TO PEAK    (hrs)=      2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=     78.31         35.45         69.31
     TOTAL RAINFALL   (mm)=     80.31         80.31         80.31
     RUNOFF COEFFICIENT   =      0.98          0.44          0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
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     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | RESERVOIR( 4081)|      OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            0.0000     0.0000   |   0.0856     0.0385

                                   AREA     QPEAK      TPEAK       R.V.
                                   (ha)     (cms)      (hrs)       (mm)
    INFLOW : ID= 2 (  0408)        1.130      0.209       2.75       69.31
    OUTFLOW: ID= 1 (  4081)        1.130      0.084       2.83       69.21

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.31
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0380

 --------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  0412)|   Area     (ha)=   0.58
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area      (ha)=      0.46          0.12
      Dep. Storage      (mm)=      2.00          5.00
      Average Slope      (%)=      1.00          2.00
      Length             (m)=     62.18         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

      Max.Eff.Inten.(mm/hr)=       73.88          42.73
                 over (min)         5.00          10.00
      Storage Coeff.  (min)=        2.17 (ii)      6.86 (ii)
      Unit Hyd. Tpeak (min)=        5.00          10.00
      Unit Hyd. peak  (cms)=        0.31           0.14
                                                                *TOTALS*
      PEAK FLOW       (cms)=        0.09           0.01          0.107 (iii)
      TIME TO PEAK    (hrs)=        2.75           2.75           2.75
      RUNOFF VOLUME    (mm)=       78.31          35.45          69.30
      TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
      RUNOFF COEFFICIENT   =        0.98           0.44           0.86

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 --------------------------------------------------------------------------------
 --------------------
 | RESERVOIR( 4121)|      OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
```

```
                    0.0000     0.0000    |   0.0440      0.0198

                         AREA      QPEAK      TPEAK       R.V.
                         (ha)      (cms)      (hrs)       (mm)
  INFLOW : ID= 2 (  0412)     0.580      0.107       2.75       69.30
  OUTFLOW: ID= 1 (  4121)     0.580      0.043       2.83       69.11

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.42
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM   STORAGE   USED       (ha.m.)=  0.0195

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--------------------
| CALIB              |
| STANDHYD (  0404)|   Area    (ha)=    0.51
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.50          0.01
    Dep. Storage     (mm)=      2.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     58.31         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 | 1.667     9.64 | 3.250    20.88 |  4.83    1.61
             0.167    0.00 | 1.750     9.64 | 3.333    11.24 |  4.92    1.61
             0.250    0.00 | 1.833    27.30 | 3.417    11.24 |  5.00    1.61
             0.333    1.61 | 1.917    27.30 | 3.500    11.24 |  5.08    1.61
             0.417    1.61 | 2.000    27.30 | 3.583    11.24 |  5.17    1.61
             0.500    1.61 | 2.083    27.30 | 3.667    11.24 |  5.25    1.61
             0.583    1.61 | 2.167    27.30 | 3.750    11.24 |  5.33    1.61
             0.667    1.61 | 2.250    27.30 | 3.833     6.42 |  5.42    1.61
             0.750    1.61 | 2.333    73.88 | 3.917     6.42 |  5.50    1.61
             0.833    1.61 | 2.417    73.88 | 4.000     6.42 |  5.58    1.61
             0.917    1.61 | 2.500    73.88 | 4.083     6.42 |  5.67    1.61
             1.000    1.61 | 2.583    73.88 | 4.167     6.42 |  5.75    1.61
             1.083    1.61 | 2.667    73.88 | 4.250     6.42 |  5.83    1.61
             1.167    1.61 | 2.750    73.88 | 4.333     3.21 |  5.92    1.61
             1.250    1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
             1.333    9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
             1.417    9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
             1.500    9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
             1.583    9.64 | 3.167    20.88 | 4.750     3.21 |

    Max.Eff.Inten.(mm/hr)=       73.88         42.73
               over (min)        5.00          5.00
    Storage Coeff.   (min)=       2.09 (ii)     3.35 (ii)
    Unit Hyd. Tpeak  (min)=       5.00          5.00
    Unit Hyd. peak   (cms)=       0.31          0.26
                                                           *TOTALS*
    PEAK FLOW       (cms)=       0.10          0.00          0.104 (iii)
    TIME TO PEAK    (hrs)=       2.75          2.75           2.75
    RUNOFF VOLUME     (mm)=      78.31         35.45          77.88
    TOTAL RAINFALL    (mm)=      80.31         80.31          80.31
    RUNOFF COEFFICIENT    =       0.98          0.44           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0     Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0409)|   Area    (ha)=    0.53
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      0.42          0.11
    Dep. Storage     (mm)=      2.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=     59.44         40.00
    Mannings n          =      0.013         0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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                         ---- 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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
             0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
             0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
             0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
             0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
             0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
             0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
             0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
             0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
             0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
             0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
             1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
             1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
             1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
             1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
             1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
             1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
             1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
             1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         42.73
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        2.11 (ii)     6.80 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.31          0.14
                                                             *TOTALS*
     PEAK FLOW       (cms)=        0.09          0.01          0.098 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       78.31         35.45          69.30
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.98          0.44           0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 4091)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |   0.0402     0.0179

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0409)      0.530      0.098       2.75      69.30
   OUTFLOW: ID= 1 (  4091)      0.530      0.040       2.83      69.10

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.73
                    TIME SHIFT OF PEAK FLOW         (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0178

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--------------------
| ADD HYD  (  0420)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0404):      0.51    0.104     2.75    77.88
      + ID2= 2 (  4081):      1.13    0.084     2.83    69.21
        ==================================================
        ID = 3 (  0420):      1.64    0.184     2.75    71.91

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

--------------------
| ADD HYD  (  0420)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0420):      1.64    0.184     2.75    71.91
      + ID2= 2 (  4091):      0.53    0.040     2.83    69.10
        ==================================================
        ID = 1 (  0420):      2.17    0.221     2.75    71.22
```

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     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0420)|
|  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0420):      2.17     0.221      2.75     71.22
      + ID2= 2 (  4121):      0.58     0.043      2.83     69.11
        ==================================================
        ID = 3 (  0420):      2.75     0.262      2.75     70.78

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0410)|    Area     (ha)=    1.11
|ID= 1 DT= 5.0 min |    Total Imp(%)=   36.00    Dir. Conn.(%)=   27.00
--------------------
                             IMPERVIOUS      PERVIOUS (i)
     Surface Area      (ha)=      0.40          0.71
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=     86.02         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                  0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                  0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                  0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                  0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                  0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                  0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                  0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                  0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                  0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                  0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                  1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                  1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                  1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                  1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                  1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                  1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                  1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                  1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          52.32
                over (min)         5.00          15.00
     Storage Coeff.   (min)=       2.63 (ii)     11.78 (ii)
     Unit Hyd. Tpeak  (min)=       5.00          15.00
     Unit Hyd. peak   (cms)=       0.29           0.09
                                                              *TOTALS*
     PEAK FLOW        (cms)=       0.06           0.08          0.140 (iii)
     TIME TO PEAK     (hrs)=       2.75           2.83           2.75
     RUNOFF VOLUME     (mm)=      78.31          38.39          49.16
     TOTAL RAINFALL    (mm)=      80.31          80.31          80.31
     RUNOFF COEFFICIENT    =       0.98           0.48           0.61

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  4101)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)    |   (cms)      (ha.m.)
                           0.0000      0.0000    |   0.0841      0.0375

                                  AREA     QPEAK      TPEAK       R.V.
                                  (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0410)       1.110      0.140       2.75      49.16
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   OUTFLOW: ID= 1 (  4101)      1.110      0.054      3.25      49.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 38.81
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0242

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--------------------
| CALIB             |
| STANDHYD (  0411)|    Area     (ha)=    0.75
|ID= 1 DT= 5.0 min |    Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       0.59         0.16
     Dep. Storage      (mm)=       2.00         5.00
     Average Slope      (%)=       1.00         2.00
     Length             (m)=      70.71        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                 1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                 1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                 1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                 1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                 1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        42.73
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.34 (ii)    7.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.02         0.139 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31        35.45         69.31
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.44          0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*   =  75.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  4111)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0568     0.0258

                                  AREA      QPEAK       TPEAK        R.V.
                                  (ha)      (cms)       (hrs)        (mm)
   INFLOW : ID= 2 (  0411)       0.750      0.139       2.75        69.31
   OUTFLOW: ID= 1 (  4111)       0.750      0.056       2.83        69.16

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.11
                  TIME SHIFT OF PEAK FLOW         (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0253

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| CALIB              |
| STANDHYD (  0406)|   Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.14         0.00
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     30.55        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        42.73
               over (min)        5.00         5.00
     Storage Coeff.  (min)=      1.42 (ii)    2.68 (ii)
     Unit Hyd. Tpeak (min)=      5.00         5.00
     Unit Hyd. peak  (cms)=      0.33         0.29
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.03         0.00          0.029 (iii)
     TIME TO PEAK    (hrs)=      2.67         2.75          2.75
     RUNOFF VOLUME    (mm)=     78.31        35.45         77.88
     TOTAL RAINFALL   (mm)=     80.31        80.31         80.31
     RUNOFF COEFFICIENT   =      0.98         0.44          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0403)|   Area    (ha)=   1.84
|ID= 1 DT= 5.0 min |   Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      1.82         0.02
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    110.75        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
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           0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
           0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
           0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
           1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
           1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
           1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
           1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
           1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
           1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
           1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
           1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        42.73
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       3.07 (ii)    4.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.27         0.23
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.00         0.376 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31        35.45         77.88
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.44          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0405)|    Area    (ha)=   0.35
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.35         0.00
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     48.30        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
           0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
           0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
           0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
           0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
           0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
           0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
           0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
           0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
           0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
           0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
           1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
           1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
           1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
           1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
           1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
           1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
           1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
           1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        42.73
               over (min)         5.00         5.00
     Storage Coeff.  (min)=       1.86 (ii)    3.13 (ii)
     Unit Hyd. Tpeak (min)=       5.00         5.00
     Unit Hyd. peak  (cms)=       0.32         0.27
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.07         0.00         0.072 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31        35.45         77.88
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.44          0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
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```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0407)|    Area    (ha)=   0.14
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.14          0.00
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      30.55         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         42.73
                over (min)       5.00          5.00
     Storage Coeff.  (min)=       1.42 (ii)     2.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.33          0.29
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.03          0.00        0.029 (iii)
     TIME TO PEAK    (hrs)=       2.67          2.75         2.75
     RUNOFF VOLUME    (mm)=      78.31         35.45        77.88
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.98          0.44         0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  75.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| DUHYD    (  4071)|
| Inlet Cap.= 0.060|
| #of Inlets=    10|
| Total(cms)=   0.6|      AREA     QPEAK     TPEAK     R.V.
--------------------      (ha)     (cms)     (hrs)     (mm)
     TOTAL HYD.(ID= 1):   0.14      0.03      2.75    77.88
     ====================================================
     MAJOR SYS.(ID= 2):   0.00      0.00      0.00     0.00
     MINOR SYS.(ID= 3):   0.14      0.03      2.75    77.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0421)|
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```
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0403):       1.84    0.376     2.75    77.88
     + ID2= 2 (  0405):       0.35    0.072     2.75    77.88
       ==================================================
       ID = 3 (  0421):       2.19    0.448     2.75    77.88

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

--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0421):       2.19    0.448     2.75    77.88
     + ID2= 2 (  0406):       0.14    0.029     2.75    77.88
       ==================================================
       ID = 1 (  0421):       2.33    0.476     2.75    77.88

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

--------------------
| ADD HYD  (  0421)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
*** W A R N I N G :  HYDROGRAPH   4071 <ID= 2> IS DRY.
*** W A R N I N G :  HYDROGRAPH   0003 = HYDROGRAPH 0001
       ID1= 1 (  0421):       2.33    0.476     2.75    77.88
     + ID2= 2 (  4071):       0.00    0.000     0.00     0.00
       ==================================================
       ID = 3 (  0421):       2.33    0.476     2.75    77.88

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0421):       2.33    0.476     2.75    77.88
     + ID2= 2 (  4101):       1.11    0.054     3.25    49.07
       ==================================================
       ID = 1 (  0421):       3.44    0.517     2.75    68.58

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0421)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0421):       3.44    0.517     2.75    68.58
     + ID2= 2 (  4111):       0.75    0.056     2.83    69.16
       ==================================================
       ID = 3 (  0421):       4.19    0.570     2.75    68.69

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

--------------------
| ADD HYD  (  0421)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0421):       4.19    0.570     2.75    68.69
     + ID2= 2 (  0420):       2.75    0.262     2.75    70.78
       ==================================================
       ID = 1 (  0421):       6.94    0.832     2.75    69.52

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0422)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0401):       3.66    0.461     2.75    40.77
     + ID2= 2 (  0421):       6.94    0.832     2.75    69.52
       ==================================================
       ID = 3 (  0422):      10.60    1.294     2.75    59.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| RESERVOIR( 0423)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1751     0.4332
                          0.0074     0.0401   |   0.2276     0.4910
                          0.0211     0.1264   |   0.2601     0.5266
                          0.0289     0.2209   |   0.4822     0.5507
                          0.0350     0.3233   |   2.0944     0.6374
                          0.0509     0.3774   |   0.0000     0.0000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0422)     10.600     1.294      2.75       59.59
   OUTFLOW: ID= 1 (  0423)     10.600     0.193      4.58       59.46

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 14.91
                  TIME SHIFT OF PEAK FLOW        (min)=110.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4528

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--------------------
| CALIB            |
| STANDHYD (  0067)|   Area    (ha)=   5.46
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     4.91         0.55
     Dep. Storage     (mm)=     1.00         1.50
     Average Slope     (%)=     1.00         2.00
     Length            (m)=   190.79        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167    0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250    0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333    1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417    1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500    1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583    1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667    1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750    1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833    1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917    1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000    1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083    1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167    1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250    1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333    9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417    9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500    9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583    9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          57.08
                over (min)        5.00          10.00
     Storage Coeff.  (min)=       4.25 (ii)      7.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00          10.00
     Unit Hyd. peak  (cms)=       0.24           0.13
                                                             *TOTALS*
     PEAK FLOW      (cms)=        1.01           0.08          1.088 (iii)
     TIME TO PEAK   (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME   (mm)=       79.31          50.24          76.40
     TOTAL RAINFALL  (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT  =        0.99           0.63           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0069)|   Area    (ha)=   0.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
```

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--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.79         0.09
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      76.59        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.46 (ii)    5.77 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.01         0.176 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24         76.40
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.63          0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0070)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0770     0.0323

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0069)     0.880     0.176      2.75      76.40
   OUTFLOW: ID= 1 (  0070)     0.880     0.077      2.83      76.29

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.62
                    TIME SHIFT OF PEAK FLOW        (min)=  5.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.0322

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0071)|   Area    (ha)=   1.36
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.22         0.14
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       1.00         2.00
     Length            (m)=      95.22        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

    Max.Eff.Inten.(mm/hr)=       73.88          57.08
               over (min)         5.00          10.00
    Storage Coeff.  (min)=        2.80 (ii)      6.11 (ii)
    Unit Hyd. Tpeak (min)=        5.00          10.00
    Unit Hyd. peak  (cms)=        0.28           0.15
                                                             *TOTALS*
    PEAK FLOW       (cms)=        0.25           0.02          0.272 (iii)
    TIME TO PEAK    (hrs)=        2.75           2.75           2.75
    RUNOFF VOLUME    (mm)=       79.31          50.24          76.40
    TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
    RUNOFF COEFFICIENT   =        0.99           0.63           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0072)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2450     0.0209

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0071)      1.360     0.272      2.75       76.40
   OUTFLOW: ID= 1 (  0072)      1.360     0.240      2.75       76.39

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.34
                  TIME SHIFT OF PEAK FLOW        (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0209

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0502)|   Area     (ha)=   0.73
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       0.58          0.15
    Dep. Storage     (mm)=       2.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=      69.76         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
```

```
            0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
            0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
            0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
            0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
            0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
            0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
            0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
            0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
            0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
            1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
            1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
            1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
            1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
            1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
            1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
            1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
            1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        42.73
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       2.32 (ii)    7.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.30         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.02         0.135 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      78.31        35.45         69.30
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.98         0.44          0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  5021)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)    |   (cms)     (ha.m.)
                           0.0000     0.0000    |   0.0110     0.0323
                           0.0050     0.0176    |   0.0130     0.0364
                           0.0070     0.0232    |   0.0150     0.0393
                           0.0090     0.0277    |   0.0000     0.0000

                                  AREA     QPEAK      TPEAK       R.V.
                                  (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0502)        0.730     0.135       2.75       69.30
   OUTFLOW: ID= 1 (  5021)        0.730     0.015       3.83       68.08

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.00
                  TIME SHIFT OF PEAK FLOW        (min)= 65.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0391

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0501)|    Area    (ha)=   0.38
|ID= 1 DT= 5.0 min |    Total Imp(%)=  99.00   Dir. Conn.(%)=  99.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.38         0.00
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     50.33        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
            0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
            0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
            0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
            0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
            0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
            0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
```

```
           0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
           0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
           0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
           0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
           1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
           1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
           1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
           1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
           1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
           1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
           1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
           1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         42.73
                over (min)        5.00          5.00
     Storage Coeff.  (min)=       1.91 (ii)     3.18 (ii)
     Unit Hyd. Tpeak (min)=       5.00          5.00
     Unit Hyd. peak  (cms)=       0.32          0.27
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.08          0.00        0.078 (iii)
     TIME TO PEAK   (hrs)=        2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      78.31         35.45        77.88
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.98          0.44         0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  75.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0503)|   Area    (ha)=   0.91
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.00   Dir. Conn.(%)=  79.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.72          0.19
     Dep. Storage     (mm)=       2.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      77.89         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
           0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
           0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
           0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
           0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
           0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
           0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
           0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
           0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
           0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
           0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
           1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
           1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
           1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
           1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
           1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
           1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
           1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
           1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         42.73
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       2.48 (ii)     7.17 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.29          0.14
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.15          0.02        0.168 (iii)
     TIME TO PEAK   (hrs)=        2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      78.31         35.45        69.31
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.98          0.44         0.86
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  75.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 5031)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0140      0.0404
                          0.0060     0.0221   |   0.0160      0.0456
                          0.0090     0.0290   |   0.0180      0.0492
                          0.0110     0.0347   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0503)       0.910     0.168      2.75      69.31
   OUTFLOW: ID= 1 (  5031)       0.910     0.018      3.83      68.28

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.60
                   TIME SHIFT OF PEAK FLOW          (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0489

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

--------------------
| ADD HYD  (  0504)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0501):       0.38    0.078    2.75    77.88
      + ID2= 2 (  5021):       0.73    0.015    3.83    68.08
        ==================================================
        ID = 3 (  0504):       1.11    0.088    2.75    71.44

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

--------------------
| ADD HYD  (  0504)|
|   3 +  2 =  1    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0504):       1.11    0.088    2.75    71.44
      + ID2= 2 (  5031):       0.91    0.018    3.83    68.28
        ==================================================
        ID = 1 (  0504):       2.02    0.100    2.75    70.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0505)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0330      0.0308
                          0.0150     0.0145   |   0.0370      0.0345
                          0.0180     0.0224   |   0.0420      0.0383
                          0.0250     0.0268   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0504)       2.020     0.100      2.75      70.01
   OUTFLOW: ID= 1 (  0505)       2.020     0.033      4.75      69.90

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.09
                   TIME SHIFT OF PEAK FLOW          (min)=120.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0309

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0011):       2.93    0.214    3.00    39.71
      + ID2= 2 (  0423):      10.60    0.193    4.58    59.46
        ==================================================
        ID = 3 (  0009):      13.53    0.279    3.83    55.18

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

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0009):     13.53   0.279      3.83     55.18
      + ID2= 2 (  0505):      2.02   0.033      4.75     69.90
        ================================================
        ID = 1 (  0009):     15.55   0.309      3.83     57.09

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0009):     15.55   0.309      3.83     57.09
      + ID2= 2 (  0006):     25.23   1.104      3.58     68.11
        ================================================
        ID = 3 (  0009):     40.78   1.409      3.83     63.91

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0009):     40.78   1.409      3.83     63.91
      + ID2= 2 (  0067):      5.46   1.088      2.75     76.40
        ================================================
        ID = 1 (  0009):     46.24   2.201      2.75     65.38

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0009):     46.24   2.201      2.75     65.38
      + ID2= 2 (  0070):      0.88   0.077      2.83     76.29
        ================================================
        ID = 3 (  0009):     47.12   2.274      2.75     65.59

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0009):     47.12   2.274      2.75     65.59
      + ID2= 2 (  0072):      1.36   0.240      2.75     76.39
        ================================================
        ID = 1 (  0009):     48.48   2.514      2.75     65.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-----------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0013)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00          101.50         0.0500
                   1.00          100.70         0.0500
                   1.50          100.55     0.0500 /0.0300  Main Channel
                   2.00           99.50         0.0300      Main Channel
                   3.50           99.60         0.0300      Main Channel
                   4.50          100.65     0.0300 /0.0500  Main Channel
                   6.00          101.45         0.0500

      <---------------------- TRAVEL TIME TABLE ----------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)        (m/s)        (min)
       0.10    99.60    .353E+02        0.0          0.19        43.69
       0.19    99.69    .112E+03        0.1          0.37        22.76
       0.29    99.79    .195E+03        0.2          0.49        17.03
       0.38    99.88    .285E+03        0.3          0.59        14.23
       0.48    99.98    .381E+03        0.5          0.67        12.51
       0.57   100.07    .484E+03        0.7          0.74        11.32
```

```
      0.67    100.17    .594E+03        0.9            0.80       10.43
      0.76    100.26    .710E+03        1.2            0.86        9.74
      0.86    100.36    .832E+03        1.5            0.91        9.18
      0.95    100.45    .961E+03        1.8            0.96        8.72
      1.05    100.55    .110E+04        2.2            1.00        8.32
      1.16    100.66    .127E+04        2.7            1.07        7.80
      1.28    100.78    .148E+04        3.4            1.14        7.31
      1.39    100.89    .170E+04        4.1            1.20        6.94
      1.50    101.00    .195E+04        4.9            1.25        6.65
      1.61    101.11    .221E+04        5.8            1.30        6.41
      1.72    101.22    .250E+04        6.7            1.34        6.22
      1.84    101.34    .280E+04        7.7            1.38        6.04
      1.95    101.45    .313E+04        8.8            1.41        5.90

                                      <---- hydrograph ---->   <-pipe / channel->
                                 AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                                 (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
  INFLOW : ID= 2 (  0009)       48.48     2.51    2.75   65.89     1.12       1.04
  OUTFLOW: ID= 1 (  0013)       48.48     2.32    2.75   65.89     1.08       1.02


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--------------------
| CALIB              |
| NASHYD    (  0018)|    Area      (ha)=    1.85    Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min  |    Ia        (mm)=    5.00    # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=      0.24

       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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                 0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                 0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                 0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                 0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                 0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                 0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                 0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                 0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                 0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                 0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                 1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                 1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                 1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=     0.294

     PEAK FLOW        (cms)=    0.184 (i)
     TIME TO PEAK     (hrs)=    2.833
     RUNOFF VOLUME     (mm)=   39.672
     TOTAL RAINFALL    (mm)=   80.310
     RUNOFF COEFFICIENT    =    0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0019)|    Area      (ha)=    3.97
|ID= 1 DT= 5.0 min  |    Total Imp(%)=   90.00    Dir. Conn.(%)=   90.00
--------------------
                             IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=      3.57          0.40
     Dep. Storage      (mm)=      1.00          1.50
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    162.69         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
             0.167     0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
             0.250     0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
             0.333     1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
             0.417     1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
             0.500     1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
             0.583     1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
             0.667     1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
             0.750     1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
             0.833     1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
             0.917     1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
             1.000     1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
             1.083     1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
             1.167     1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
             1.250     1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
             1.333     9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
             1.417     9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
             1.500     9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
             1.583     9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          57.08
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        3.86 (ii)      7.17 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.25           0.14
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.73           0.06          0.792 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31          50.24          76.40
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =        0.99           0.63           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0043)|    Area    (ha)=  11.15
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     10.03          1.12
     Dep. Storage     (mm)=      1.00          1.50
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    272.64         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
             0.167     0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
             0.250     0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
             0.333     1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
             0.417     1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
             0.500     1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
             0.583     1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
             0.667     1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
             0.750     1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
             0.833     1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
             0.917     1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
             1.000     1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
             1.083     1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
             1.167     1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
             1.250     1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
             1.333     9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
             1.417     9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
             1.500     9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
             1.583     9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          57.08
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        5.26 (ii)      8.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.21           0.12
```

```
                                                              *TOTALS*
     PEAK FLOW       (cms)=       2.06          0.16            2.216 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75            2.75
     RUNOFF VOLUME    (mm)=      79.31         50.24           76.40
     TOTAL RAINFALL   (mm)=      80.31         80.31           80.31
     RUNOFF COEFFICIENT   =       0.99          0.63            0.95

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0045)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   1.1000     0.3830

                                AREA      QPEAK      TPEAK        R.V.
                                (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0043)     11.150     2.216       2.75       76.40
   OUTFLOW: ID= 1 (  0045)     11.150     1.065       2.92       76.39

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 48.04
                   TIME SHIFT OF PEAK FLOW          (min)= 10.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3731

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0044)|    Area    (ha)=  36.51
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=       32.86          3.65
     Dep. Storage    (mm)=        1.00          1.50
     Average Slope    (%)=        1.00          2.00
     Length           (m)=      493.36         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         57.08
                over (min)       10.00         15.00
     Storage Coeff.  (min)=       7.51 (ii)    10.82 (ii)
     Unit Hyd. Tpeak (min)=      10.00         15.00
     Unit Hyd. peak  (cms)=       0.13          0.09
                                                              *TOTALS*
     PEAK FLOW       (cms)=       6.62          0.48            7.097 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83            2.75
     RUNOFF VOLUME    (mm)=      79.31         50.24           76.40
     TOTAL RAINFALL   (mm)=      80.31         80.31           80.31
     RUNOFF COEFFICIENT   =       0.99          0.63            0.95

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```

```
         CN*  =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0046)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   6.5700     0.4019

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0044)     36.510     7.097       2.75      76.40
   OUTFLOW: ID= 1 (  0046)     36.510     6.401       2.83      76.40

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 90.19
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  0.3944

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK      R.V.
--------------------         (ha)    (cms)     (hrs)      (mm)
       ID1= 1 (  0018):      1.85   0.184      2.83     39.67
     + ID2= 2 (  0019):      3.97   0.792      2.75     76.40
       ====================================================
       ID = 3 (  0016):      5.82   0.969      2.75     64.73

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

--------------------
| ADD HYD  (  0016)|
|   3 +  2 =  1    |         AREA    QPEAK     TPEAK      R.V.
--------------------         (ha)    (cms)     (hrs)      (mm)
       ID1= 3 (  0016):      5.82   0.969      2.75     64.73
     + ID2= 2 (  0045):     11.15   1.065      2.92     76.39
       ====================================================
       ID = 1 (  0016):     16.97   1.968      2.75     72.39

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK      R.V.
--------------------         (ha)    (cms)     (hrs)      (mm)
       ID1= 1 (  0016):     16.97   1.968      2.75     72.39
     + ID2= 2 (  0046):     36.51   6.401      2.83     76.40
       ====================================================
       ID = 3 (  0016):     53.48   8.204      2.75     75.13

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0015)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4100     1.6169
                          0.2000     0.2102   |   2.5600     2.5701
                          0.3200     0.8386   |   3.1500     3.1183
                          0.3900     1.4070   |   3.4200     3.4107

                                 AREA     QPEAK      TPEAK       R.V.
                                 (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0016)     53.480     8.204       2.75      75.13
   OUTFLOW: ID= 1 (  0015)     53.480     2.365       3.75      75.13

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.82
                TIME SHIFT OF PEAK FLOW          (min)= 60.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  2.4845

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--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |         AREA    QPEAK     TPEAK      R.V.
--------------------         (ha)    (cms)     (hrs)      (mm)
```

```
       ID1= 1 (  0013):     48.48   2.316      2.75    65.89
     + ID2= 2 (  0015):     53.48   2.365      3.75    75.13
       ==================================================
       ID = 3 (  0064):    101.96   4.063      3.67    70.73

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

--------------------
| ROUTE CHN(  2259)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                  28.50          210.02        0.0600
                  47.35          209.86        0.0450      Main Channel
                  51.00          209.76        0.0450      Main Channel
                  60.44          209.54        0.0450      Main Channel
                  65.44          209.60        0.0450      Main Channel
                  72.65          209.41        0.0450      Main Channel
                  95.97          208.53        0.0450      Main Channel
                 103.18          208.38        0.0450      Main Channel
                 108.18          208.33        0.0450      Main Channel
                 116.25          208.08        0.0450      Main Channel
                 122.09          207.92        0.0450      Main Channel
                 131.52          207.65        0.0450      Main Channel
                 149.56          208.22        0.0450      Main Channel
                 155.39          208.49        0.0450      Main Channel
                 177.88          208.58        0.0450      Main Channel
                 190.96          208.73        0.0450      Main Channel
                 195.96          208.72        0.0450      Main Channel
                 226.50          209.32        0.0450      Main Channel
                 238.71          209.46    0.0450 /0.0600  Main Channel
                 251.40          209.70        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)     (cms)         (m/s)        (min)
       0.11   207.75    .601E+03      0.0           0.12       222.56
       0.21   207.86    .241E+04      0.3           0.19       140.20
       0.32   207.97    .542E+04      0.8           0.25       107.47
       0.43   208.07    .969E+04      1.8           0.30        89.07
       0.53   208.18    .152E+05      3.3           0.35        76.07
       0.64   208.29    .218E+05      5.5           0.40        66.47
       0.75   208.39    .296E+05      8.0           0.43        61.92
       0.85   208.50    .389E+05     11.2           0.46        58.04
       0.96   208.61    .519E+05     14.2           0.44        60.79
       1.07   208.71    .677E+05     20.3           0.48        55.45
       1.17   208.82    .861E+05     27.7           0.52        51.74
       1.28   208.93    .106E+06     37.5           0.57        47.20
       1.39   209.03    .128E+06     48.7           0.61        43.64
       1.49   209.14    .150E+06     61.5           0.66        40.75
       1.60   209.25    .175E+06     76.0           0.70        38.35
       1.71   209.35    .201E+06     91.6           0.73        36.50
       1.81   209.46    .228E+06    107.8           0.76        35.28
       1.93   209.58    .262E+06    130.3           0.80        33.51
       2.05   209.70    .299E+06    156.6           0.84        31.84

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA   QPEAK   TPEAK    R.V.    MAX DEPTH  MAX VEL
                              (ha)   (cms)   (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0064)  101.96    4.06    3.67   70.73      0.57      0.37
   OUTFLOW: ID= 1 (  2259)  101.96    3.06    4.67   70.73      0.51      0.34


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0025)|    Area     (ha)=    8.34   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.84

        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                0.167      0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                0.250      0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                0.333      1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417      1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500      1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
```

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             0.583     1.61 | 2.167    27.30 | 3.750    11.24 |   5.33     1.61
             0.667     1.61 | 2.250    27.30 | 3.833     6.42 |   5.42     1.61
             0.750     1.61 | 2.333    73.88 | 3.917     6.42 |   5.50     1.61
             0.833     1.61 | 2.417    73.88 | 4.000     6.42 |   5.58     1.61
             0.917     1.61 | 2.500    73.88 | 4.083     6.42 |   5.67     1.61
             1.000     1.61 | 2.583    73.88 | 4.167     6.42 |   5.75     1.61
             1.083     1.61 | 2.667    73.88 | 4.250     6.42 |   5.83     1.61
             1.167     1.61 | 2.750    73.88 | 4.333     3.21 |   5.92     1.61
             1.250     1.61 | 2.833    20.88 | 4.417     3.21 |   6.00     1.61
             1.333     9.64 | 2.917    20.88 | 4.500     3.21 |   6.08     1.61
             1.417     9.64 | 3.000    20.88 | 4.583     3.21 |   6.17     1.61
             1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
             1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=   0.379

     PEAK FLOW       (cms)=   0.405 (i)
     TIME TO PEAK    (hrs)=   3.583
     RUNOFF VOLUME    (mm)=  39.709
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.494

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

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--------------------
| CALIB              |
| STANDHYD (  0024)|    Area     (ha)=   9.55
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=       8.59         0.96
     Dep. Storage    (mm)=       1.00         1.50
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     252.32        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 | 1.667     9.64 | 3.250    20.88 |   4.83     1.61
             0.167     0.00 | 1.750     9.64 | 3.333    11.24 |   4.92     1.61
             0.250     0.00 | 1.833    27.30 | 3.417    11.24 |   5.00     1.61
             0.333     1.61 | 1.917    27.30 | 3.500    11.24 |   5.08     1.61
             0.417     1.61 | 2.000    27.30 | 3.583    11.24 |   5.17     1.61
             0.500     1.61 | 2.083    27.30 | 3.667    11.24 |   5.25     1.61
             0.583     1.61 | 2.167    27.30 | 3.750    11.24 |   5.33     1.61
             0.667     1.61 | 2.250    27.30 | 3.833     6.42 |   5.42     1.61
             0.750     1.61 | 2.333    73.88 | 3.917     6.42 |   5.50     1.61
             0.833     1.61 | 2.417    73.88 | 4.000     6.42 |   5.58     1.61
             0.917     1.61 | 2.500    73.88 | 4.083     6.42 |   5.67     1.61
             1.000     1.61 | 2.583    73.88 | 4.167     6.42 |   5.75     1.61
             1.083     1.61 | 2.667    73.88 | 4.250     6.42 |   5.83     1.61
             1.167     1.61 | 2.750    73.88 | 4.333     3.21 |   5.92     1.61
             1.250     1.61 | 2.833    20.88 | 4.417     3.21 |   6.00     1.61
             1.333     9.64 | 2.917    20.88 | 4.500     3.21 |   6.08     1.61
             1.417     9.64 | 3.000    20.88 | 4.583     3.21 |   6.17     1.61
             1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
             1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.02 (ii)    8.33 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.21         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.76         0.14         1.900 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24         76.40
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.63          0.95

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 | CALIB              |
 | STANDHYD (  0047)|    Area     (ha)=  23.02
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      20.72          2.30
      Dep. Storage     (mm)=       1.00          1.50
      Average Slope     (%)=       1.00          2.00
      Length            (m)=     391.75         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

      Max.Eff.Inten.(mm/hr)=       73.88         57.08
                 over (min)         5.00         10.00
      Storage Coeff.  (min)=        6.54 (ii)     9.85 (ii)
      Unit Hyd. Tpeak (min)=        5.00         10.00
      Unit Hyd. peak  (cms)=        0.18          0.11
                                                              *TOTALS*
      PEAK FLOW       (cms)=        4.22          0.32          4.549 (iii)
      TIME TO PEAK    (hrs)=        2.75          2.75           2.75
      RUNOFF VOLUME    (mm)=       79.31         50.24          76.40
      TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
      RUNOFF COEFFICIENT   =        0.99          0.63           0.95

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  85.0     Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR( 0049)|      OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000    |  3.4700     0.0040

                               AREA     QPEAK      TPEAK       R.V.
                               (ha)     (cms)      (hrs)       (mm)
    INFLOW : ID= 2 (  0047)   23.020     4.549       2.75      76.40
    OUTFLOW: ID= 1 (  0049)   23.020     4.583       2.75      76.40

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.75
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0048

      **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                     CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
 ------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0048)|    Area     (ha)=  31.36
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
 --------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      28.22          3.14
      Dep. Storage     (mm)=       1.00          1.50
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     Average Slope     (%)=       1.00          2.00
     Length            (m)=     457.24         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                 1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                 1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                 1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                 1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                 1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         57.08
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       7.18 (ii)    10.49 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.17          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.74          0.41        6.149 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31         50.24        76.40
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.99          0.63         0.95


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0050)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   5.6500     0.3682

                                  AREA     QPEAK      TPEAK        R.V.
                                  (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0048)      31.360     6.149       2.75       76.40
   OUTFLOW: ID= 1 (  0050)      31.360     5.501       2.75       76.40

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 89.47
                 TIME SHIFT OF PEAK FLOW        (min)=  0.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.3682

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--------------------
| CALIB            |
| STANDHYD (  0093)|   Area    (ha)=  88.14
|ID= 1 DT= 5.0 min |   Total Imp(%)=  28.90   Dir. Conn.(%)=  28.20
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      25.47         62.67
     Dep. Storage      (mm)=       2.00          5.00
     Average Slope     (%)=        2.28          2.28
     Length            (m)=      766.55         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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61
0.250	0.00	1.833	27.30	3.417	11.24	5.00	1.61
0.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
0.417	1.61	2.000	27.30	3.583	11.24	5.17	1.61
0.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
0.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
0.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
0.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
0.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
0.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083	1.61	2.667	73.88	4.250	6.42	5.83	1.61
1.167	1.61	2.750	73.88	4.333	3.21	5.92	1.61
1.250	1.61	2.833	20.88	4.417	3.21	6.00	1.61
1.333	9.64	2.917	20.88	4.500	3.21	6.08	1.61
1.417	9.64	3.000	20.88	4.583	3.21	6.17	1.61
1.500	9.64	3.083	20.88	4.667	3.21	6.25	1.61
1.583	9.64	3.167	20.88	4.750	3.21		

```
Max.Eff.Inten.(mm/hr)=       73.88         50.93
          over (min)         10.00         20.00
Storage Coeff.  (min)=        7.64 (ii)    16.53 (ii)
Unit Hyd. Tpeak (min)=       10.00         20.00
Unit Hyd. peak  (cms)=        0.13          0.06
                                                        *TOTALS*
PEAK FLOW       (cms)=        5.00          6.10         10.507 (iii)
TIME TO PEAK    (hrs)=        2.75          2.92           2.75
RUNOFF VOLUME    (mm)=       78.31         42.27          52.43
TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
RUNOFF COEFFICIENT   =        0.98          0.53           0.65


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  81.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD (  0088)|    Area     (ha)= 181.61
|ID= 1 DT= 5.0 min |    Total Imp(%)=  58.40   Dir. Conn.(%)=  54.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=    106.06        75.55
     Dep. Storage    (mm)=      2.00         5.00
     Average Slope    (%)=      2.50         2.50
     Length           (m)=   1100.33        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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61
0.250	0.00	1.833	27.30	3.417	11.24	5.00	1.61
0.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
0.417	1.61	2.000	27.30	3.583	11.24	5.17	1.61
0.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
0.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
0.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
0.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
0.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
0.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083	1.61	2.667	73.88	4.250	6.42	5.83	1.61
1.167	1.61	2.750	73.88	4.333	3.21	5.92	1.61
1.250	1.61	2.833	20.88	4.417	3.21	6.00	1.61
1.333	9.64	2.917	20.88	4.500	3.21	6.08	1.61
1.417	9.64	3.000	20.88	4.583	3.21	6.17	1.61
1.500	9.64	3.083	20.88	4.667	3.21	6.25	1.61
1.583	9.64	3.167	20.88	4.750	3.21		

```
Max.Eff.Inten.(mm/hr)=       73.88         59.24
          over (min)         10.00         20.00
Storage Coeff.  (min)=        9.24 (ii)    17.37 (ii)
Unit Hyd. Tpeak (min)=       10.00         20.00
Unit Hyd. peak  (cms)=        0.12          0.06
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                                                               *TOTALS*
     PEAK FLOW        (cms)=       19.45          8.54          27.190 (iii)
     TIME TO PEAK     (hrs)=        2.75          2.92            2.75
     RUNOFF VOLUME     (mm)=       78.31         45.46           63.23
     TOTAL RAINFALL    (mm)=       80.31         80.31           80.31
     RUNOFF COEFFICIENT   =         0.98          0.57            0.79

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  82.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0089)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |  OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |   (cms)      (ha.m.)
                          0.0000      0.0000   |   1.5600      7.7340
                          0.6870      3.6492   |   2.0400      9.8037
                          1.0220      5.2831   |  40.8000     10.8930

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0088)    181.610     27.190       2.75        63.23
   OUTFLOW: ID= 1 (  0089)    181.610      1.977       4.67        63.23

                   PEAK    FLOW   REDUCTION [Qout/Qin](%)=  7.27
                   TIME SHIFT OF PEAK FLOW        (min)=115.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  9.5344

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--------------------
| CALIB            |
| STANDHYD (  0091)|   Area    (ha)=  19.40
|ID= 1 DT= 5.0 min |   Total Imp(%)=  65.30   Dir. Conn.(%)=  59.80
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       12.67          6.73
     Dep. Storage      (mm)=        2.00          5.00
     Average Slope      (%)=        2.40          2.00
     Length             (m)=      359.63         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         67.86
                over (min)        5.00         15.00
     Storage Coeff.   (min)=        4.78 (ii)    13.02 (ii)
     Unit Hyd. Tpeak  (min)=        5.00         15.00
     Unit Hyd. peak   (cms)=        0.22          0.08
                                                               *TOTALS*
     PEAK FLOW        (cms)=        2.38          1.00           3.366 (iii)
     TIME TO PEAK     (hrs)=        2.75          2.83            2.75
     RUNOFF VOLUME     (mm)=       78.31         50.36           67.07
     TOTAL RAINFALL    (mm)=       80.31         80.31           80.31
     RUNOFF COEFFICIENT   =         0.98          0.63            0.84
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0092)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0089):    181.61    1.977     4.67    63.23
      + ID2= 2 (  0091):     19.40    3.366     2.75    67.07
        ==================================================
        ID = 3 (  0092):    201.01    4.250     2.75    63.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2252)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation        Manning
                  28.50          210.02         0.0600
                  47.35          209.86         0.0450      Main Channel
                  51.00          209.76         0.0450      Main Channel
                  60.44          209.54         0.0450      Main Channel
                  65.44          209.60         0.0450      Main Channel
                  72.65          209.41         0.0450      Main Channel
                  95.97          208.53         0.0450      Main Channel
                 103.18          208.38         0.0450      Main Channel
                 108.18          208.33         0.0450      Main Channel
                 116.25          208.08         0.0450      Main Channel
                 122.09          207.92         0.0450      Main Channel
                 131.52          207.65         0.0450      Main Channel
                 149.56          208.22         0.0450      Main Channel
                 155.39          208.49         0.0450      Main Channel
                 177.88          208.58         0.0450      Main Channel
                 190.96          208.73         0.0450      Main Channel
                 195.96          208.72         0.0450      Main Channel
                 226.50          209.32         0.0450      Main Channel
                 238.71          209.46     0.0450 /0.0600  Main Channel
                 251.40          209.70         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)      (min)
       0.11    207.75   .531E+03       0.1          0.20      119.24
       0.21    207.86   .213E+04       0.5          0.32       75.12
       0.32    207.97   .479E+04       1.4          0.41       57.58
       0.43    208.07   .856E+04       3.0          0.50       47.72
       0.53    208.18   .134E+05       5.5          0.58       40.76
       0.64    208.29   .193E+05       9.0          0.67       35.61
       0.75    208.39   .261E+05      13.1          0.71       33.18
       0.85    208.50   .344E+05      18.4          0.76       31.10
       0.96    208.61   .458E+05      23.5          0.73       32.57
       1.07    208.71   .598E+05      33.6          0.80       29.71
       1.17    208.82   .761E+05      45.8          0.85       27.72
       1.28    208.93   .938E+05      61.8          0.94       25.29
       1.39    209.03   .113E+06      80.4          1.01       23.38
       1.49    209.14   .133E+06     101.5          1.09       21.84
       1.60    209.25   .154E+06     125.3          1.15       20.55
       1.71    209.35   .177E+06     151.0          1.21       19.56
       1.81    209.46   .202E+06     177.9          1.25       18.90
       1.93    209.58   .232E+06     214.9          1.32       17.96
       2.05    209.70   .264E+06     258.3          1.39       17.06

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK    R.V.   MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)    (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0092)  201.01     4.25    2.75   63.60     0.48      0.54
   OUTFLOW: ID= 1 (  2252)  201.01     2.38    3.75   63.60     0.38      0.46


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--------------------
| CALIB            |
| STANDHYD (  0096)|   Area     (ha)=  42.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  72.00    Dir. Conn.(%)=  72.00
```

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--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       30.36         11.81
     Dep. Storage     (mm)=        2.00          5.00
     Average Slope     (%)=        2.04          2.04
     Length            (m)=      530.22         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                 1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                 1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                 1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                 1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                 1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         51.56
               over (min)          5.00         20.00
     Storage Coeff.  (min)=        6.33 (ii)    15.48 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.19          0.07
                                                            *TOTALS*
     PEAK FLOW       (cms)=        6.20          1.19          7.283 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=       78.31         43.27          68.50
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.98          0.54           0.85

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  82.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0095)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  2252):    201.01    2.382      3.75    63.60
      + ID2= 2 (  0093):     88.14   10.507      2.75    52.43
        ===================================================
        ID = 3 (  0095):    289.15   12.436      2.83    60.19

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

--------------------
| ADD HYD  (  0095)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0095):    289.15   12.436      2.83    60.19
      + ID2= 2 (  0096):     42.17    7.283      2.75    68.50
        ===================================================
        ID = 1 (  0095):    331.32   19.678      2.75    61.25

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
----------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2257)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
```

28.50	210.02	0.0600	
47.35	209.86	0.0450	Main Channel
51.00	209.76	0.0450	Main Channel
60.44	209.54	0.0450	Main Channel
65.44	209.60	0.0450	Main Channel
72.65	209.41	0.0450	Main Channel
95.97	208.53	0.0450	Main Channel
103.18	208.38	0.0450	Main Channel
108.18	208.33	0.0450	Main Channel
116.25	208.08	0.0450	Main Channel
122.09	207.92	0.0450	Main Channel
131.52	207.65	0.0450	Main Channel
149.56	208.22	0.0450	Main Channel
155.39	208.49	0.0450	Main Channel
177.88	208.58	0.0450	Main Channel
190.96	208.73	0.0450	Main Channel
195.96	208.72	0.0450	Main Channel
226.50	209.32	0.0450	Main Channel
238.71	209.46	0.0450 /0.0600	Main Channel
251.40	209.70	0.0600	

<--------------------- TRAVEL TIME TABLE --------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.11	207.75	.143E+03	0.1	0.15	43.07
0.21	207.86	.574E+03	0.4	0.24	27.13
0.32	207.97	.129E+04	1.0	0.31	20.80
0.43	208.07	.231E+04	2.2	0.37	17.24
0.53	208.18	.362E+04	4.1	0.43	14.72
0.64	208.29	.520E+04	6.7	0.50	12.86
0.75	208.39	.706E+04	9.8	0.53	11.98
0.85	208.50	.929E+04	13.8	0.57	11.23
0.96	208.61	.124E+05	17.5	0.54	11.76
1.07	208.71	.162E+05	25.1	0.60	10.73
1.17	208.82	.206E+05	34.2	0.64	10.01
1.28	208.93	.253E+05	46.2	0.70	9.13
1.39	209.03	.305E+05	60.1	0.76	8.45
1.49	209.14	.359E+05	75.9	0.81	7.89
1.60	209.25	.417E+05	93.7	0.86	7.42
1.71	209.35	.479E+05	112.9	0.91	7.06
1.81	209.46	.545E+05	133.0	0.94	6.83
1.93	209.58	.625E+05	160.7	0.99	6.49
2.05	209.70	.714E+05	193.1	1.04	6.16

	AREA (ha)	<---- hydrograph ----> QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	<-pipe / channel-> MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0095)	331.32	19.68	2.75	61.25	0.99	0.56
OUTFLOW: ID= 1 (2257)	331.32	16.42	2.83	61.25	0.93	0.55

| CALIB |
| STANDHYD (0100) | Area (ha)= 36.92
|ID= 1 DT= 5.0 min | Total Imp(%)= 58.10 Dir. Conn.(%)= 58.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	21.45	15.47
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	3.42	3.42
Length	(m)=	496.12	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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61
0.250	0.00	1.833	27.30	3.417	11.24	5.00	1.61
0.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
0.417	1.61	2.000	27.30	3.583	11.24	5.17	1.61
0.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
0.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
0.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
0.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
0.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
0.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083	1.61	2.667	73.88	4.250	6.42	5.83	1.61

```
            1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
            1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
            1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
            1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
            1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
            1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         50.21
                over (min)         5.00         15.00
     Storage Coeff.  (min)=        5.21 (ii)    13.13 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.21          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        4.39          1.66       5.996 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83        2.75
     RUNOFF VOLUME    (mm)=       78.31         42.05       63.12
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.98          0.52        0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0102)|    Area    (ha)=  71.88
|ID= 1 DT= 5.0 min |    Total Imp(%)=  83.70   Dir. Conn.(%)=  83.70
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     60.16         11.72
     Dep. Storage     (mm)=      2.00          5.00
     Average Slope     (%)=      2.22          2.22
     Length            (m)=    692.24         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
            0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
            0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
            0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
            0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
            0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
            0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
            0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
            0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
            0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
            0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
            1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
            1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
            1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
            1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
            1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
            1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
            1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
            1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         50.21
                over (min)         5.00         15.00
     Storage Coeff.  (min)=        7.25 (ii)    11.26 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.17          0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       12.22          1.30      13.496 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83        2.75
     RUNOFF VOLUME    (mm)=       78.31         42.05       72.40
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.98          0.52        0.90


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

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------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0103)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)    (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   4.6900     2.1905
                          1.3100     1.3639   |   6.2900     2.4799
                          2.6500     1.7635   |  62.9000     2.7554

                                AREA     QPEAK     TPEAK        R.V.
                                (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0102)     71.880    13.496      2.75        72.40
   OUTFLOW: ID= 1 (  0103)     71.880     8.676      2.83        72.40

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 64.29
                  TIME SHIFT OF PEAK FLOW          (min)=  5.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.4989

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

--------------------
| ADD HYD  (  0099)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0100):     36.92   5.996     2.75     63.12
      + ID2= 2 (  0103):     71.88   8.676     2.83     72.40
        ==================================================
        ID = 3 (  0099):    108.80  12.783     2.83     69.25

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

--------------------
| ADD HYD  (  0099)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0099):    108.80  12.783     2.83     69.25
      + ID2= 2 (  2257):    331.32  16.421     2.83     61.25
        ==================================================
        ID = 1 (  0099):    440.12  29.204     2.83     63.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2255)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                  28.50         210.02         0.0600
                  47.35         209.86         0.0450      Main Channel
                  51.00         209.76         0.0450      Main Channel
                  60.44         209.54         0.0450      Main Channel
                  65.44         209.60         0.0450      Main Channel
                  72.65         209.41         0.0450      Main Channel
                  95.97         208.53         0.0450      Main Channel
                 103.18         208.38         0.0450      Main Channel
                 108.18         208.33         0.0450      Main Channel
                 116.25         208.08         0.0450      Main Channel
                 122.09         207.92         0.0450      Main Channel
                 131.52         207.65         0.0450      Main Channel
                 149.56         208.22         0.0450      Main Channel
                 155.39         208.49         0.0450      Main Channel
                 177.88         208.58         0.0450      Main Channel
                 190.96         208.73         0.0450      Main Channel
                 195.96         208.72         0.0450      Main Channel
                 226.50         209.32         0.0450      Main Channel
                 238.71         209.46     0.0450 /0.0600  Main Channel
                 251.40         209.70         0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME      FLOW RATE     VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)         (m/s)        (min)
       0.11    207.75    .601E+03        0.0          0.12       222.56
       0.21    207.86    .241E+04        0.3          0.19       140.20
       0.32    207.97    .542E+04        0.8          0.25       107.47
       0.43    208.07    .969E+04        1.8          0.30        89.07
       0.53    208.18    .152E+05        3.3          0.35        76.07
       0.64    208.29    .218E+05        5.5          0.40        66.47
       0.75    208.39    .296E+05        8.0          0.43        61.92
       0.85    208.50    .389E+05       11.2          0.46        58.04
       0.96    208.61    .519E+05       14.2          0.44        60.79
       1.07    208.71    .677E+05       20.3          0.48        55.45
```

```
    1.17   208.82     .861E+05      27.7           0.52       51.74
    1.28   208.93     .106E+06      37.5           0.57       47.20
    1.39   209.03     .128E+06      48.7           0.61       43.64
    1.49   209.14     .150E+06      61.5           0.66       40.75
    1.60   209.25     .175E+06      76.0           0.70       38.35
    1.71   209.35     .201E+06      91.6           0.73       36.50
    1.81   209.46     .228E+06     107.8           0.76       35.28
    1.93   209.58     .262E+06     130.3           0.80       33.51
    2.05   209.70     .299E+06     156.6           0.84       31.84

                               <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0099)  440.12    29.20    2.83   63.23     1.19      0.53
  OUTFLOW: ID= 1 (  2255)  440.12    15.10    3.33   63.23     0.98      0.45


--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2296)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                   0.00          204.60        0.0600
                   2.24          204.58        0.0450      Main Channel
                  10.30          203.90        0.0450      Main Channel
                  36.31          203.83        0.0450      Main Channel
                  47.49          204.24        0.0450      Main Channel
                  59.15          204.34        0.0450      Main Channel
                  65.86          204.04        0.0450      Main Channel
                  81.51          203.05        0.0450      Main Channel
                  93.18          202.84        0.0450      Main Channel
                 104.40          202.89        0.0450      Main Channel
                 117.82          202.66        0.0450      Main Channel
                 126.76          202.26        0.0450      Main Channel
                 138.43          200.25        0.0450      Main Channel
                 149.61          199.94        0.0450      Main Channel
                 172.61          203.72        0.0450      Main Channel
                 194.97          203.80        0.0450      Main Channel
                 217.87          204.71        0.0450      Main Channel
                 229.05          205.01        0.0450      Main Channel
                 240.71          205.02    0.0450 /0.0600  Main Channel
                 284.60          205.56        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
    DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
     (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
    0.23   200.17     .403E+03       0.2           0.17       35.38
    0.47   200.40     .149E+04       1.3           0.30       19.71
    0.70   200.64     .284E+04       3.3           0.41       14.37
    0.93   200.87     .443E+04       6.2           0.50       11.80
    1.17   201.10     .624E+04      10.2           0.58       10.22
    1.40   201.34     .828E+04      15.1           0.65        9.13
    1.63   201.57     .106E+05      21.2           0.71        8.31
    1.87   201.80     .131E+05      28.4           0.77        7.67
    2.10   202.04     .158E+05      36.8           0.83        7.15
    2.33   202.27     .188E+05      46.4           0.88        6.75
    2.57   202.50     .221E+05      54.8           0.88        6.73
    2.80   202.74     .261E+05      63.4           0.86        6.87
    3.03   202.97     .317E+05      65.8           0.74        8.03
    3.27   203.20     .389E+05      87.1           0.80        7.45
    3.50   203.44     .467E+05     113.5           0.87        6.85
    3.73   203.67     .548E+05     143.4           0.93        6.37
    3.97   203.90     .650E+05     141.2           0.77        7.67
    4.20   204.14     .788E+05     182.1           0.82        7.22
    4.55   204.49     .103E+06     256.5           0.88        6.70

                               <---- hydrograph ---->   <-pipe / channel->
                        AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                        (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  2255)  440.12    15.10    3.33   63.23     1.40      0.65
  OUTFLOW: ID= 1 (  2296)  440.12    14.56    3.50   63.22     1.38      0.64


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0106)|   Area    (ha)= 281.15
|ID= 1 DT= 5.0 min |   Total Imp(%)=  79.50   Dir. Conn.(%)=  79.40
--------------------
                          IMPERVIOUS    PERVIOUS (i)
```

```
Surface Area       (ha)=      223.51          57.64
Dep. Storage       (mm)=        2.00           5.00
Average Slope       (%)=        1.63           1.63
Length              (m)=     1369.06          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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
            0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
            0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
            0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
            0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
            0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
            0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
            0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
            0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
            0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
            0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
            1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
            1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
            1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
            1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
            1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
            1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
            1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
            1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

Max.Eff.Inten.(mm/hr)=       73.88          50.57
           over (min)        10.00          20.00
Storage Coeff.  (min)=       11.97 (ii)     16.90 (ii)
Unit Hyd. Tpeak (min)=       10.00          20.00
Unit Hyd. peak  (cms)=        0.10           0.06
                                                       *TOTALS*
PEAK FLOW       (cms)=       42.66           5.53        47.631 (iii)
TIME TO PEAK    (hrs)=        2.75           2.92          2.75
RUNOFF VOLUME    (mm)=       78.31          42.16         70.86
TOTAL RAINFALL   (mm)=       80.31          80.31         80.31
RUNOFF COEFFICIENT   =        0.98           0.52          0.88


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
      CN*  =  81.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0107)|
|   1 + 2 =  3     |           AREA    QPEAK     TPEAK      R.V.
--------------------           (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0106):     281.15  47.631      2.75     70.86
      + ID2= 2 (  2296):     440.12  14.562      3.50     63.22
        ================================================
        ID = 3 (  0107):     721.27  54.622      2.75     66.20

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2300)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               &lt;------ DATA FOR SECTION (    1.1) ------&gt;
               Distance       Elevation       Manning
                   0.00         204.60        0.0600
                   2.24         204.58        0.0450     Main Channel
                  10.30         203.90        0.0450     Main Channel
                  36.31         203.83        0.0450     Main Channel
                  47.49         204.24        0.0450     Main Channel
                  59.15         204.34        0.0450     Main Channel
                  65.86         204.04        0.0450     Main Channel
                  81.51         203.05        0.0450     Main Channel
                  93.18         202.84        0.0450     Main Channel
                 104.40         202.89        0.0450     Main Channel
                 117.82         202.66        0.0450     Main Channel
                 126.76         202.26        0.0450     Main Channel
                 138.43         200.25        0.0450     Main Channel
                 149.61         199.94        0.0450     Main Channel
```

```
            172.61          203.72          0.0450      Main Channel
            194.97          203.80          0.0450      Main Channel
            217.87          204.71          0.0450      Main Channel
            229.05          205.01          0.0450      Main Channel
            240.71          205.02      0.0450 /0.0600  Main Channel
            284.60          205.56          0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY   TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)       (m/s)       (min)
       0.23    200.17   .588E+03       0.2         0.17       51.42
       0.47    200.40   .217E+04       1.3         0.30       28.64
       0.70    200.64   .415E+04       3.3         0.41       20.89
       0.93    200.87   .646E+04       6.3         0.50       17.15
       1.17    201.10   .910E+04      10.2         0.58       14.86
       1.40    201.34   .121E+05      15.2         0.65       13.27
       1.63    201.57   .154E+05      21.3         0.72       12.08
       1.87    201.80   .191E+05      28.5         0.78       11.15
       2.10    202.04   .231E+05      37.0         0.83       10.39
       2.33    202.27   .274E+05      46.6         0.88        9.80
       2.57    202.50   .323E+05      55.0         0.88        9.79
       2.80    202.74   .381E+05      63.6         0.87        9.98
       3.03    202.97   .462E+05      66.1         0.74       11.66
       3.27    203.20   .568E+05      87.4         0.80       10.83
       3.50    203.44   .681E+05     114.0         0.87        9.96
       3.73    203.67   .800E+05     143.9         0.93        9.26
       3.97    203.90   .948E+05     141.7         0.78       11.14
       4.20    204.14   .115E+06     182.8         0.82       10.49
       4.55    204.49   .150E+06     257.5         0.89        9.74

                                   <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
   INFLOW : ID= 2 (  0107)  721.27   54.62    2.75  66.20     2.56      0.88
   OUTFLOW: ID= 1 (  2300)  721.27   49.35    2.83  66.20     2.40      0.88


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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  2300):    721.27   49.352     2.83    66.20
      + ID2= 2 (  0024):      9.55    1.900     2.75    76.40
        ===================================================
        ID = 3 (  0023):    730.82   50.442     2.83    66.33

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    730.82   50.442     2.83    66.33
      + ID2= 2 (  0025):      8.34    0.405     3.58    39.71
        ===================================================
        ID = 1 (  0023):    739.16   50.641     2.83    66.03

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):    739.16   50.641     2.83    66.03
      + ID2= 2 (  0049):     23.02    4.583     2.75    76.40
        ===================================================
        ID = 3 (  0023):    762.18   54.041     2.75    66.35

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    762.18   54.041     2.75    66.35
      + ID2= 2 (  0050):     31.36    5.501     2.75    76.40
        ===================================================
        ID = 1 (  0023):    793.54   59.542     2.75    66.75
```

```
    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0042)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  45.9000    15.6510
                         3.5700     5.9180    |  *******    16.6510
                        15.7400    10.6460    |   0.0000     0.0000

                               AREA      QPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0023)   793.540    59.542       2.75       66.75
   OUTFLOW: ID= 1 (  0042)   793.540    34.582       3.42       66.74

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 58.08
                  TIME SHIFT OF PEAK FLOW          (min)= 40.00
                  MAXIMUM  STORAGE   USED        (ha.m.)= 13.7887

------------------------------------------------------------------------------
--------------------
| ROUTE CHN( 2297)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation        Manning
                   0.00         204.60         0.0600
                   2.24         204.58         0.0450       Main Channel
                  10.30         203.90         0.0450       Main Channel
                  36.31         203.83         0.0450       Main Channel
                  47.49         204.24         0.0450       Main Channel
                  59.15         204.34         0.0450       Main Channel
                  65.86         204.04         0.0450       Main Channel
                  81.51         203.05         0.0450       Main Channel
                  93.18         202.84         0.0450       Main Channel
                 104.40         202.89         0.0450       Main Channel
                 117.82         202.66         0.0450       Main Channel
                 126.76         202.26         0.0450       Main Channel
                 138.43         200.25         0.0450       Main Channel
                 149.61         199.94         0.0450       Main Channel
                 172.61         203.72         0.0450       Main Channel
                 194.97         203.80         0.0450       Main Channel
                 217.87         204.71         0.0450       Main Channel
                 229.05         205.01         0.0450       Main Channel
                 240.71         205.02     0.0450 /0.0600   Main Channel
                 284.60         205.56         0.0600

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)       (min)
       0.23   200.17   .921E+03        0.2         0.20        68.84
       0.47   200.40   .341E+04        1.5         0.35        38.35
       0.70   200.64   .650E+04        3.9         0.48        27.97
       0.93   200.87   .101E+05        7.3         0.59        22.96
       1.17   201.10   .143E+05       11.9         0.68        19.89
       1.40   201.34   .189E+05       17.8         0.76        17.77
       1.63   201.57   .241E+05       24.9         0.84        16.18
       1.87   201.80   .299E+05       33.3         0.91        14.93
       2.10   202.04   .361E+05       43.3         0.97        13.92
       2.33   202.27   .429E+05       54.5         1.03        13.12
       2.57   202.50   .506E+05       64.4         1.03        13.10
       2.80   202.74   .597E+05       74.4         1.01        13.37
       3.03   202.97   .724E+05       77.3         0.87        15.62
       3.27   203.20   .890E+05      102.3         0.93        14.50
       3.50   203.44   .107E+06      133.4         1.02        13.33
       3.73   203.67   .125E+06      168.4         1.09        12.40
       3.97   203.90   .148E+06      165.8         0.91        14.92
       4.20   204.14   .180E+06      213.9         0.97        14.04
       4.55   204.49   .236E+06      301.3         1.04        13.04

                                     <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK    R.V.    MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0042)  793.54   34.58    3.42   66.74      1.90       0.92
   OUTFLOW: ID= 1 (  2297)  793.54   32.21    3.75   66.74      1.83       0.90


------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|    Area    (ha)=  10.63
```

```
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       9.57         1.06
     Dep. Storage      (mm)=       1.00         1.50
     Average Slope      (%)=       1.00         2.00
     Length             (m)=     266.21        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       5.19 (ii)    8.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.21         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.96         0.15         2.113 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31        50.24         76.40
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.63          0.95

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR( 0039)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
--------------------      (cms)      (ha.m.)   |    (cms)      (ha.m.)
                          0.0000      0.0000   |    0.6400      0.4866
                          0.1200      0.3419   |    0.9300      0.5544
                          0.3000      0.3912   |    9.3000      0.6160

                                 AREA     QPEAK       TPEAK        R.V.
                                 (ha)     (cms)       (hrs)        (mm)
   INFLOW : ID= 2 (  0021)     10.630      2.113       2.75        76.40
   OUTFLOW: ID= 1 (  0039)     10.630      0.700       3.00        76.34

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 33.11
                   TIME SHIFT OF PEAK FLOW         (min)= 15.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.5007

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--------------------
| ADD HYD  (  0022)|
|   1 + 2 = 3      |         AREA    QPEAK     TPEAK       R.V.
--------------------         (ha)    (cms)     (hrs)       (mm)
        ID1= 1 (  2297):   793.54   32.215      3.75      66.74
      + ID2= 2 (  0039):    10.63    0.700      3.00      76.34
        ==================================================
        ID = 3 (  0022):   804.17   32.747      3.75      66.87
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (  0030)|    Area     (ha)=    5.65   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.99

         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=   0.218

     PEAK FLOW       (cms)=   0.246 (i)
     TIME TO PEAK    (hrs)=   3.750
     RUNOFF VOLUME    (mm)=  39.709
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0029)|    Area     (ha)=   9.43
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        8.49         0.94
     Dep. Storage     (mm)=        1.00         1.50
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      250.73        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        57.08
```

```
            over (min)          5.00          10.00
     Storage Coeff.  (min)=     5.01 (ii)      8.31 (ii)
     Unit Hyd. Tpeak (min)=     5.00          10.00
     Unit Hyd. peak  (cms)=     0.21           0.13
                                                           *TOTALS*
     PEAK FLOW       (cms)=     1.74           0.14          1.876 (iii)
     TIME TO PEAK    (hrs)=     2.75           2.75          2.75
     RUNOFF VOLUME    (mm)=    79.31          50.24         76.40
     TOTAL RAINFALL   (mm)=    80.31          80.31         80.31
     RUNOFF COEFFICIENT   =     0.99           0.63          0.95

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0031)|    Area     (ha)=  39.77
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=    35.79           3.98
     Dep. Storage     (mm)=     1.00           1.50
     Average Slope     (%)=     1.00           2.00
     Length            (m)=   514.91          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 | 1.667    9.64 | 3.250   20.88 | 4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 | 4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 | 5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 | 5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 | 5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 | 5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 | 5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 | 5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 | 5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 | 5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 | 5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 | 5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 | 5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 | 5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 | 6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 | 6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 | 6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 | 6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=    73.88          57.08
            over (min)         10.00          15.00
     Storage Coeff.  (min)=     7.71 (ii)     11.02 (ii)
     Unit Hyd. Tpeak (min)=    10.00          15.00
     Unit Hyd. peak  (cms)=     0.13           0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=     7.20           0.52          7.716 (iii)
     TIME TO PEAK    (hrs)=     2.75           2.83          2.75
     RUNOFF VOLUME    (mm)=    79.31          50.24         76.40
     TOTAL RAINFALL   (mm)=    80.31          80.31         80.31
     RUNOFF COEFFICIENT   =     0.99           0.63          0.95

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  85.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0061)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   7.1600     0.3940
```

```
                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0031)      39.770     7.716      2.75       76.40
   OUTFLOW: ID= 1 (  0061)      39.770     7.053      2.83       76.40

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 91.40
                   TIME SHIFT OF PEAK FLOW         (min)=  5.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3923

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0051)|    Area     (ha)=  11.41
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area       (ha)=      10.27         1.14
     Dep. Storage       (mm)=       1.00         5.00
     Average Slope       (%)=       1.00         2.00
     Length              (m)=     275.80        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                 0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                 0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                 0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                 0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                 0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                 0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                 0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                 0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                 0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                 0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                 1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                 1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                 1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        5.30 (ii)     8.61 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.21          0.12
                                                              *TOTALS*
     PEAK FLOW        (cms)=        2.10          0.15          2.253 (iii)
     TIME TO PEAK     (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME     (mm)=       79.31         44.54          75.83
     TOTAL RAINFALL    (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT    =        0.99          0.55           0.94


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0      Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0053)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW     STORAGE   |   OUTFLOW     STORAGE
--------------------       (cms)      (ha.m.)   |    (cms)      (ha.m.)
                           0.0000      0.0000   |    1.4100      0.4103

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0051)      11.410     2.253      2.75       75.83
   OUTFLOW: ID= 1 (  0053)      11.410     1.199      2.83       75.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 53.24
                   TIME SHIFT OF PEAK FLOW         (min)=  5.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3508
```

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-----------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0052)|    Area    (ha)=  25.67
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      23.10        2.57
     Dep. Storage      (mm)=       1.00        1.50
     Average Slope      (%)=       1.00        2.00
     Length             (m)=     413.68       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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          57.08
                over (min)        5.00          15.00
     Storage Coeff.  (min)=       6.76 (ii)     10.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00          15.00
     Unit Hyd. peak  (cms)=       0.18           0.10
                                                              *TOTALS*
     PEAK FLOW       (cms)=       4.71           0.34          5.047 (iii)
     TIME TO PEAK    (hrs)=       2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=      79.31          50.24          76.40
     TOTAL RAINFALL   (mm)=      80.31          80.31          80.31
     RUNOFF COEFFICIENT   =       0.99           0.63           0.95

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| RESERVOIR( 0054)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  4.6210     0.3130

                               AREA      QPEAK      TPEAK       R.V.
                               (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0052)    25.670      5.047       2.75      76.40
   OUTFLOW: ID= 1 (  0054)    25.670      4.499       2.75      76.40

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 89.14
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.3130

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3     |          AREA     QPEAK     TPEAK     R.V.
--------------------           (ha)     (cms)     (hrs)     (mm)
        ID1= 1 (  0022):     804.17   32.747      3.75     66.87
      + ID2= 2 (  0029):       9.43    1.876      2.75     76.40
        ===================================================
```

```
        ID = 3 (  0032):   813.60  33.038     3.75    66.98

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

--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0032):   813.60  33.038     3.75    66.98
      + ID2= 2 (  0030):     5.65   0.246     3.75    39.71
        ==================================================
        ID = 1 (  0032):   819.25  33.284     3.75    66.79

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0032):   819.25  33.284     3.75    66.79
      + ID2= 2 (  0053):    11.41   1.199     2.83    75.83
        ==================================================
        ID = 3 (  0032):   830.66  34.065     3.67    66.92

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

--------------------
| ADD HYD  (  0032)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0032):   830.66  34.065     3.67    66.92
      + ID2= 2 (  0054):    25.67   4.499     2.75    76.40
        ==================================================
        ID = 1 (  0032):   856.33  35.101     3.67    67.20

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0032):   856.33  35.101     3.67    67.20
      + ID2= 2 (  0061):    39.77   7.053     2.83    76.40
        ==================================================
        ID = 3 (  0032):   896.10  36.772     3.58    67.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0068)|   Area    (ha)=    6.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.40        0.60
     Dep. Storage     (mm)=      1.00        1.50
     Average Slope     (%)=      1.00        2.00
     Length            (m)=    200.00       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 | 1.667   9.64 | 3.250   20.88 | 4.83    1.61
              0.167    0.00 | 1.750   9.64 | 3.333   11.24 | 4.92    1.61
              0.250    0.00 | 1.833  27.30 | 3.417   11.24 | 5.00    1.61
              0.333    1.61 | 1.917  27.30 | 3.500   11.24 | 5.08    1.61
              0.417    1.61 | 2.000  27.30 | 3.583   11.24 | 5.17    1.61
              0.500    1.61 | 2.083  27.30 | 3.667   11.24 | 5.25    1.61
              0.583    1.61 | 2.167  27.30 | 3.750   11.24 | 5.33    1.61
              0.667    1.61 | 2.250  27.30 | 3.833    6.42 | 5.42    1.61
              0.750    1.61 | 2.333  73.88 | 3.917    6.42 | 5.50    1.61
              0.833    1.61 | 2.417  73.88 | 4.000    6.42 | 5.58    1.61
              0.917    1.61 | 2.500  73.88 | 4.083    6.42 | 5.67    1.61
              1.000    1.61 | 2.583  73.88 | 4.167    6.42 | 5.75    1.61
              1.083    1.61 | 2.667  73.88 | 4.250    6.42 | 5.83    1.61
              1.167    1.61 | 2.750  73.88 | 4.333    3.21 | 5.92    1.61
```

```
            1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
            1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
            1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
            1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
            1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88          57.08
                over (min)        5.00          10.00
     Storage Coeff.  (min)=       4.37 (ii)      7.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00          10.00
     Unit Hyd. peak  (cms)=       0.23           0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=       1.11           0.09         1.196 (iii)
     TIME TO PEAK    (hrs)=       2.75           2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31          50.24         76.40
     TOTAL RAINFALL   (mm)=      80.31          80.31         80.31
     RUNOFF COEFFICIENT   =       0.99           0.63          0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0066)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0032):    896.10  36.772     3.58    67.61
      + ID2= 2 (  0068):      6.00   1.196     2.75    76.40
        ==================================================
        ID = 3 (  0066):    902.10  36.960     3.58    67.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2875)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                   0.00        204.68         0.0600
                   3.24        204.67         0.0450      Main Channel
                  51.26        203.93         0.0450      Main Channel
                  66.07        203.18         0.0450      Main Channel
                  87.42        203.39         0.0450      Main Channel
                 132.09        202.47         0.0450      Main Channel
                 165.30        201.66         0.0450      Main Channel
                 213.87        200.24         0.0450      Main Channel
                 259.32        199.43         0.0450      Main Channel
                 266.86        197.71         0.0450      Main Channel
                 276.16        196.93         0.0450      Main Channel
                 304.50        197.16         0.0450      Main Channel
                 307.31        197.98         0.0450      Main Channel
                 311.09        198.45         0.0450      Main Channel
                 329.41        198.06         0.0450      Main Channel
                 371.71        200.22         0.0450      Main Channel
                 378.80        200.32         0.0450      Main Channel
                 411.13        199.51         0.0450      Main Channel
                 421.51        202.47     0.0450 /0.0600  Main Channel
                 461.76        202.80         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
       0.31   197.24    .601E+04        3.8           0.64       26.05
       0.62   197.55    .166E+05       19.1           1.14       14.50
       0.92   197.85    .286E+05       44.3           1.54       10.76
       1.23   198.16    .419E+05       72.2           1.72        9.67
       1.54   198.47    .611E+05      105.3           1.72        9.67
       1.85   198.78    .849E+05      171.0           2.01        8.27
       2.15   199.08    .111E+06      252.0           2.26        7.34
       2.46   199.39    .139E+06      348.9           2.50        6.65
       2.77   199.70    .172E+06      416.9           2.41        6.89
       3.08   200.01    .217E+06      514.0           2.36        7.02
       3.39   200.32    .272E+06      649.5           2.38        6.98
       3.69   200.62    .336E+06      888.1           2.63        6.31
       4.00   200.93    .403E+06     1163.0           2.87        5.78
       4.31   201.24    .474E+06     1473.8           3.09        5.37
       4.62   201.55    .549E+06     1820.8           3.30        5.03
```

```
      4.92   201.85    .627E+06   2198.2          3.49       4.76
      5.23   202.16    .710E+06   2610.1          3.66       4.53
      5.54   202.47    .796E+06   3061.7          3.83       4.34
      5.87   202.80    .901E+06   3585.6          3.96       4.19

                                   <---- hydrograph ---->   <-pipe / channel->
                             AREA   QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)   (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0066)  902.10   36.96    3.58  67.67     0.83      1.40
  OUTFLOW: ID= 1 (  2875)  902.10   36.53    3.75  67.67     0.83      1.39


-------------------------------------------------------------------------------
```

VMC - 100yr- 6hr Storm- Proposed Condition

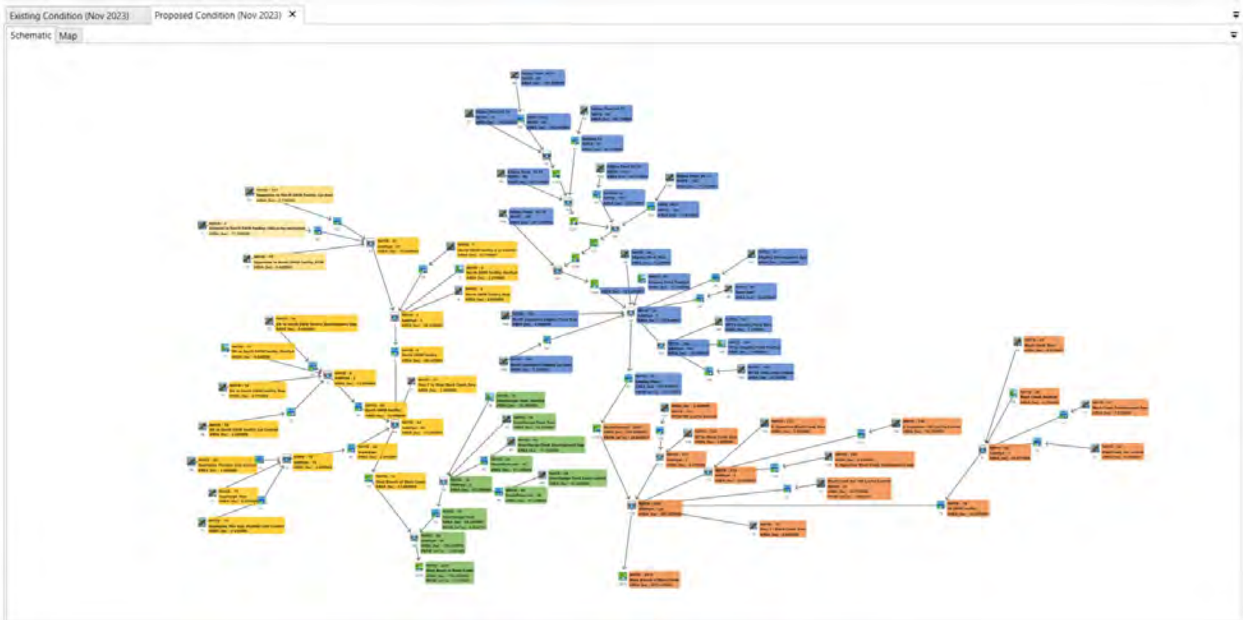

Figure 6. VMC - 100yr- 6hr Storm- Proposed Condition.

```
=====================================================================================================

      V    V   I    SSSSS  U   U    A    L           (v 6.2.2013)
      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
Developed and Distributed by Smart City Water Inc
```


```
                   *****  D E T A I L E D   O U T P U T  *****

  Input   filename: D:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\c67ebbb9-9662-4
  Summary filename: C:\Users\rhe\AppData\Local\Civica\VH5\562b9aa2-0cdc-4391-a1f5-d8b11ec718d4\c67ebbb9-9662-4

DATE: 06/18/2024                          TIME: 08:23:33

USER:


COMMENTS: ____________________________________________________________

-----------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 100yr                         **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\rhe\AppData\
|                  |              Local\Temp\
|                  |              51a56c8c-3579-4d4b-b5ff-1a77600eda50\6808d89b
| Ptotal= 80.31 mm |    Comments: 100 Year 6 Hour AES (Bloor, TRCA)
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    0.00 |  1.75   27.30 |   3.50   11.24 |  5.25    1.61
                  0.25    1.61 |  2.00   27.30 |   3.75    6.42 |  5.50    1.61
                  0.50    1.61 |  2.25   73.88 |   4.00    6.42 |  5.75    1.61
                  0.75    1.61 |  2.50   73.88 |   4.25    3.21 |  6.00    1.61
                  1.00    1.61 |  2.75   20.88 |   4.50    3.21 |
                  1.25    9.64 |  3.00   20.88 |   4.75    1.61 |
                  1.50    9.64 |  3.25   11.24 |   5.00    1.61 |

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

--------------------
| CALIB            |
| NASHYD   (  0025)|   Area    (ha)=  11.16   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.70

        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 | 1.667    9.64 |  3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 |  3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 |  3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 |  3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 |  3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 |  3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 |  3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 |  3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 |  3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 |  4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 |  4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 |  4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 |  4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 |  4.333    3.21 |  5.92    1.61
```

```
           1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
           1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
           1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
           1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
           1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=   0.609

     PEAK FLOW       (cms)=   0.610 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  39.708
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0164)|    Area      (ha)=    1.00   Curve Number    (CN)= 79.0
|ID= 1 DT= 5.0 min |    Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------    U.H. Tp(hrs)=    0.85

         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 | 1.667     9.64 | 3.250    20.88 |  4.83    1.61
           0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92    1.61
           0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00    1.61
           0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08    1.61
           0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17    1.61
           0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25    1.61
           0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33    1.61
           0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42    1.61
           0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50    1.61
           0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58    1.61
           0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67    1.61
           1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75    1.61
           1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83    1.61
           1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92    1.61
           1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
           1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
           1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
           1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
           1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=   0.045

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   3.583
     RUNOFF VOLUME    (mm)=  39.707
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0163)|    Area     (ha)=    8.73
|ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=      5.33         3.40
     Dep. Storage    (mm)=      1.00         5.00
     Average Slope    (%)=      1.00         1.00
     Length           (m)=    241.25        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 | 1.667     9.64 | 3.250    20.88 |  4.83    1.61
           0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92    1.61
           0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00    1.61
           0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08    1.61
           0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17    1.61
           0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25    1.61
```

```
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88        51.42
                over (min)        5.00         20.00
     Storage Coeff.  (min)=        4.89 (ii)    16.23 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.22          0.06
                                                          *TOTALS*
     PEAK FLOW        (cms)=        1.09          0.35        1.409 (iii)
     TIME TO PEAK     (hrs)=        2.75          2.92         2.75
     RUNOFF VOLUME     (mm)=       79.31         44.54        65.75
     TOTAL RAINFALL    (mm)=       80.31         80.31        80.31
     RUNOFF COEFFICIENT    =        0.99          0.55         0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0168)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   1.5700     0.1040

                               AREA     QPEAK      TPEAK        R.V.
                               (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0163)     8.730     1.409       2.75        65.75
   OUTFLOW: ID= 1 (  0168)     8.730     1.217       2.75        65.75

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 86.36
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0835

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0165)|   Area    (ha)=   1.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.00          0.11
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      86.02         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
```

```
         1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
         1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
         1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
         1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
         1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

   Max.Eff.Inten.(mm/hr)=      73.88          52.93
             over (min)         5.00          10.00
   Storage Coeff.  (min)=       2.63 (ii)      5.94 (ii)
   Unit Hyd. Tpeak (min)=       5.00          10.00
   Unit Hyd. peak  (cms)=       0.29           0.15
                                                          *TOTALS*
   PEAK FLOW       (cms)=       0.21           0.02         0.220 (iii)
   TIME TO PEAK    (hrs)=       2.75           2.75          2.75
   RUNOFF VOLUME    (mm)=      79.31          44.54         75.83
   TOTAL RAINFALL   (mm)=      80.31          80.31         80.31
   RUNOFF COEFFICIENT   =       0.99           0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0162)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
        ID1= 1 (  0164):       1.00    0.048    3.58      39.71
      + ID2= 2 (  0165):       1.11    0.220    2.75      75.83
        ==================================================
        ID = 3 (  0162):       2.11    0.239    2.75      58.71

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

--------------------
| ADD HYD  (  0162)|
|   3 +  2 =  1    |           AREA    QPEAK    TPEAK      R.V.
--------------------           (ha)    (cms)    (hrs)      (mm)
        ID1= 3 (  0162):       2.11    0.239    2.75      58.71
      + ID2= 2 (  0168):       8.73    1.217    2.75      65.75
        ==================================================
        ID = 1 (  0162):      10.84    1.456    2.75      64.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0024)|    Area    (ha)=   7.52
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00    Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      6.77          0.75
     Dep. Storage      (mm)=      1.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    223.90         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
         0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
         0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
         0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
         0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
         0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
         0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
         0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
         0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
         0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
         0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
         1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
         1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
         1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
         1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
```

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              1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        4.68 (ii)     7.98 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.22          0.13
                                                            *TOTALS*
     PEAK FLOW       (cms)=        1.39          0.10         1.488 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54         75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31         80.31
     RUNOFF COEFFICIENT   =        0.99          0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0047)|    Area     (ha)=  23.15
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      20.83          2.32
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     392.85         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
              0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
              0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
              0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
              0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
              0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
              0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
              0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
              0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
              0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
              0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
              1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
              1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
              1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
              1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
              1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
              1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
              1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
              1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        6.55 (ii)     9.86 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.18          0.11
                                                            *TOTALS*
     PEAK FLOW       (cms)=        4.25          0.30         4.544 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54         75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31         80.31
     RUNOFF COEFFICIENT   =        0.99          0.55          0.94

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | RESERVOIR( 0049)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   3.4880     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 2 (  0047)     23.150     4.544      2.75      75.83
    OUTFLOW: ID= 1 (  0049)     23.150     4.544      2.75      75.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.00
                  TIME SHIFT OF PEAK FLOW        (min)=  0.00
                  MAXIMUM  STORAGE  USED       (ha.m.)=  0.0000
                  MAXIMUM  STORAGE  USED       (cu.m.)=  0.000130

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
 ------------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD ( 0048)|   Area    (ha)=  10.29
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
 --------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.28         4.01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     261.92        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         51.42
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        5.14 (ii)    16.48 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.21          0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=        1.29          0.41         1.658 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92          2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54         65.75
     TOTAL RAINFALL   (mm)=       80.31         80.31         80.31
     RUNOFF COEFFICIENT   =        0.99          0.55          0.82

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR( 0050)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.6200     0.3247
```

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                              AREA     QPEAK      TPEAK        R.V.
                              (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0048)   10.290     1.658       2.75       65.75
   OUTFLOW: ID= 1 (  0050)   10.290     0.613       3.25       65.74

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.94
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3211

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--------------------
| CALIB              |
| STANDHYD (  0088)|   Area    (ha)= 181.61
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.40   Dir. Conn.(%)=  54.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=   106.06        75.55
     Dep. Storage     (mm)=     2.00         5.00
     Average Slope    (%)=     2.50         2.50
     Length           (m)=  1100.33        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         59.24
                over (min)        10.00         20.00
     Storage Coeff.  (min)=        9.24 (ii)    17.37 (ii)
     Unit Hyd. Tpeak (min)=       10.00         20.00
     Unit Hyd. peak  (cms)=        0.12          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       19.45          8.54      27.190 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92        2.75
     RUNOFF VOLUME    (mm)=       78.31         45.46       63.23
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.98          0.57        0.79


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  82.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0089)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   1.5600     7.7340
                           0.6870     3.6492   |   2.0400     9.8037
                           1.0220     5.2831   |  *******    10.8930

                              AREA     QPEAK      TPEAK        R.V.
                              (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0088)  181.610    27.190       2.75       63.23
   OUTFLOW: ID= 1 (  0089)  181.610     1.977       4.67       63.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.27
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               TIME SHIFT OF PEAK FLOW         (min)=115.00
               MAXIMUM  STORAGE   USED        (ha.m.)=  9.5344

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0091)|   Area     (ha)=  19.40
|ID= 1 DT= 5.0 min |   Total Imp(%)=  72.50   Dir. Conn.(%)=  66.50
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     14.07         5.33
     Dep. Storage      (mm)=      2.00         5.00
     Average Slope      (%)=      2.42         2.42
     Length             (m)=    359.63        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         72.45
                over (min)         5.00         15.00
     Storage Coeff.  (min)=        4.77 (ii)    12.35 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.22          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        2.64          0.86       3.499 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83        2.75
     RUNOFF VOLUME    (mm)=       78.31         51.39       69.29
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.98          0.64        0.86

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0092)|
|   1 +  2 =  3    |           AREA    QPEAK     TPEAK     R.V.
--------------------           (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0089):     181.61   1.977      4.67     63.23
      + ID2= 2 (  0091):      19.40   3.499      2.75     69.29
        ================================================
        ID = 3 (  0092):     201.01   4.383      2.75     63.81

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2252)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
              <------ DATA FOR SECTION (   1.1) ------>
              Distance       Elevation       Manning
                 28.50          210.02        0.0600
                 47.35          209.86        0.0450        Main Channel
                 51.00          209.76        0.0450        Main Channel
```

60.44	209.54	0.0450	Main Channel
65.44	209.60	0.0450	Main Channel
72.65	209.41	0.0450	Main Channel
95.97	208.53	0.0450	Main Channel
103.18	208.38	0.0450	Main Channel
108.18	208.33	0.0450	Main Channel
116.25	208.08	0.0450	Main Channel
122.09	207.92	0.0450	Main Channel
131.52	207.65	0.0450	Main Channel
149.56	208.22	0.0450	Main Channel
155.39	208.49	0.0450	Main Channel
177.88	208.58	0.0450	Main Channel
190.96	208.73	0.0450	Main Channel
195.96	208.72	0.0450	Main Channel
226.50	209.32	0.0450	Main Channel
238.71	209.46	0.0450 /0.0600	Main Channel
251.40	209.70	0.0600	

<--------------------- TRAVEL TIME TABLE ---------------------->

DEPTH (m)	ELEV (m)	VOLUME (cu.m.)	FLOW RATE (cms)	VELOCITY (m/s)	TRAV.TIME (min)
0.11	207.75	.531E+03	0.1	0.20	119.24
0.21	207.86	.213E+04	0.5	0.32	75.12
0.32	207.97	.479E+04	1.4	0.41	57.58
0.43	208.07	.856E+04	3.0	0.50	47.72
0.53	208.18	.134E+05	5.5	0.58	40.76
0.64	208.29	.193E+05	9.0	0.67	35.61
0.75	208.39	.261E+05	13.1	0.71	33.18
0.85	208.50	.344E+05	18.4	0.76	31.10
0.96	208.61	.458E+05	23.5	0.73	32.57
1.07	208.71	.598E+05	33.6	0.80	29.71
1.17	208.82	.761E+05	45.8	0.85	27.72
1.28	208.93	.938E+05	61.8	0.94	25.29
1.39	209.03	.113E+06	80.4	1.01	23.38
1.49	209.14	.133E+06	101.5	1.09	21.84
1.60	209.25	.154E+06	125.3	1.15	20.55
1.71	209.35	.177E+06	151.0	1.21	19.56
1.81	209.46	.202E+06	177.9	1.25	18.90
1.93	209.58	.232E+06	214.9	1.32	17.96
2.05	209.70	.264E+06	258.3	1.39	17.06

		<---- hydrograph	---->		<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0092)	201.01	4.38	2.75	63.81	0.49	0.54
OUTFLOW: ID= 1 (2252)	201.01	2.40	3.75	63.81	0.39	0.46

| CALIB |
| STANDHYD (0093) | Area (ha)= 88.14
| ID= 1 DT= 5.0 min | Total Imp(%)= 76.00 Dir. Conn.(%)= 76.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	66.99	21.15
Dep. Storage	(mm)=	2.28	5.00
Average Slope	(%)=	2.00	2.28
Length	(m)=	766.55	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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61
0.250	0.00	1.833	27.30	3.417	11.24	5.00	1.61
0.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
0.417	1.61	2.000	27.30	3.583	11.24	5.17	1.61
0.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
0.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
0.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
0.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
0.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
0.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083	1.61	2.667	73.88	4.250	6.42	5.83	1.61
1.167	1.61	2.750	73.88	4.333	3.21	5.92	1.61
1.250	1.61	2.833	20.88	4.417	3.21	6.00	1.61
1.333	9.64	2.917	20.88	4.500	3.21	6.08	1.61

```
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          50.21
                over (min)        10.00          15.00
     Storage Coeff.   (min)=       7.95 (ii)     12.78 (ii)
     Unit Hyd. Tpeak (min)=       10.00          15.00
     Unit Hyd. peak   (cms)=       0.13           0.08
                                                             *TOTALS*
     PEAK FLOW        (cms)=      13.44           2.28        15.653 (iii)
     TIME TO PEAK     (hrs)=       2.75           2.83          2.75
     RUNOFF VOLUME     (mm)=      78.03          42.05         69.39
     TOTAL RAINFALL    (mm)=      80.31          80.31         80.31
     RUNOFF COEFFICIENT   =        0.97           0.52          0.86


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0097)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.8650     3.7180
                          0.3820     1.8340    |   0.9980     4.2030
                          0.5670     2.5650    |   1.1340     4.6850
                          0.6930     3.0750    |   0.0000     0.0000

                                 AREA      QPEAK      TPEAK        R.V.
                                 (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0093)      88.140     15.653       2.75       69.39
   OUTFLOW: ID= 1 (  0097)      88.140      1.224       4.42       69.38

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.82
                  TIME SHIFT OF PEAK FLOW          (min)=100.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  5.0043

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD ( 0096)|    Area    (ha)=  42.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  72.00   Dir. Conn.(%)=  72.00
--------------------
                             IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=     30.36          11.81
     Dep. Storage     (mm)=      2.00           5.00
     Average Slope     (%)=      2.04           2.04
     Length            (m)=    530.22          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 | 1.667     9.64 | 3.250    20.88 |  4.83    1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92    1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00    1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08    1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17    1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25    1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33    1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42    1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50    1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58    1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67    1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75    1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83    1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92    1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          51.56
                over (min)         5.00          20.00
```

```
     Storage Coeff.   (min)=       6.33 (ii)   15.48 (ii)
     Unit Hyd. Tpeak  (min)=       5.00        20.00
     Unit Hyd. peak   (cms)=       0.19         0.07
                                                          *TOTALS*
     PEAK FLOW        (cms)=       6.20         1.19        7.283 (iii)
     TIME TO PEAK     (hrs)=       2.75         2.92         2.75
     RUNOFF VOLUME     (mm)=      78.31        43.27        68.50
     TOTAL RAINFALL    (mm)=      80.31        80.31        80.31
     RUNOFF COEFFICIENT   =        0.98         0.54         0.85

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*   =  82.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| ADD HYD  (  0095)|
|   1 +  2 =  3    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  2252):     201.01    2.400     3.75    63.81
      + ID2= 2 (  0096):      42.17    7.283     2.75    68.50
        ==================================================
        ID = 3 (  0095):     243.18    9.288     2.75    64.62

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

--------------------
| ADD HYD  (  0095)|
|   3 +  2 =  1    |           AREA    QPEAK    TPEAK     R.V.
--------------------           (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0095):     243.18    9.288     2.75    64.62
      + ID2= 2 (  0097):      88.14    1.224     4.42    69.38
        ==================================================
        ID = 1 (  0095):     331.32    9.940     2.75    65.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2257)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance       Elevation        Manning
                   28.50         210.02         0.0600
                   47.35         209.86         0.0450      Main Channel
                   51.00         209.76         0.0450      Main Channel
                   60.44         209.54         0.0450      Main Channel
                   65.44         209.60         0.0450      Main Channel
                   72.65         209.41         0.0450      Main Channel
                   95.97         208.53         0.0450      Main Channel
                  103.18         208.38         0.0450      Main Channel
                  108.18         208.33         0.0450      Main Channel
                  116.25         208.08         0.0450      Main Channel
                  122.09         207.92         0.0450      Main Channel
                  131.52         207.65         0.0450      Main Channel
                  149.56         208.22         0.0450      Main Channel
                  155.39         208.49         0.0450      Main Channel
                  177.88         208.58         0.0450      Main Channel
                  190.96         208.73         0.0450      Main Channel
                  195.96         208.72         0.0450      Main Channel
                  226.50         209.32         0.0450      Main Channel
                  238.71         209.46     0.0450 /0.0600  Main Channel
                  251.40         209.70         0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
       0.11   207.75    .143E+03        0.1           0.15       43.07
       0.21   207.86    .574E+03        0.4           0.24       27.13
       0.32   207.97    .129E+04        1.0           0.31       20.80
       0.43   208.07    .231E+04        2.2           0.37       17.24
       0.53   208.18    .362E+04        4.1           0.43       14.72
       0.64   208.29    .520E+04        6.7           0.50       12.86
       0.75   208.39    .706E+04        9.8           0.53       11.98
       0.85   208.50    .929E+04       13.8           0.57       11.23
       0.96   208.61    .124E+05       17.5           0.54       11.76
       1.07   208.71    .162E+05       25.1           0.60       10.73
       1.17   208.82    .206E+05       34.2           0.64       10.01
       1.28   208.93    .253E+05       46.2           0.70        9.13
```

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      1.39    209.03     .305E+05      60.1           0.76        8.45
      1.49    209.14     .359E+05      75.9           0.81        7.89
      1.60    209.25     .417E+05      93.7           0.86        7.42
      1.71    209.35     .479E+05     112.9           0.91        7.06
      1.81    209.46     .545E+05     133.0           0.94        6.83
      1.93    209.58     .625E+05     160.7           0.99        6.49
      2.05    209.70     .714E+05     193.1           1.04        6.16

                                   <---- hydrograph ---->   <-pipe / channel->
                             AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                             (ha)    (cms)   (hrs)   (mm)      (m)      (m/s)
  INFLOW : ID= 2 (  0095)  331.32    9.94    2.75   65.89     0.75      0.54
  OUTFLOW: ID= 1 (  2257)  331.32    8.37    2.83   65.89     0.70      0.52


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--------------------
| CALIB              |
| STANDHYD (  0100)|     Area     (ha)=  36.92
|ID= 1 DT= 5.0 min |     Total Imp(%)=  64.90    Dir. Conn.(%)=  64.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     23.96         12.96
     Dep. Storage      (mm)=      2.00          5.00
     Average Slope      (%)=      2.42          2.42
     Length             (m)=    496.12         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         50.21
               over (min)         5.00         15.00
     Storage Coeff.  (min)=        5.78 (ii)    14.56 (ii)
     Unit Hyd. Tpeak (min)=        5.00         15.00
     Unit Hyd. peak  (cms)=        0.20          0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=        4.90          1.35       6.193 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.83        2.75
     RUNOFF VOLUME    (mm)=       78.31         42.05       65.58
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.98          0.52        0.82


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0101)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |    (cms)     (ha.m.)
                          0.0000      0.0000   |   0.4170      1.7520
                          0.1840      0.9170   |   0.4820      1.9610
                          0.2740      1.2500   |   0.5480      2.1660
                          0.3340      1.4720   |   0.0000      0.0000
```

```
                         AREA      QPEAK      TPEAK        R.V.
                         (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0100)   36.920     6.193       2.75       65.58
   OUTFLOW: ID= 1 (  0101)   36.920     0.487       4.33       65.55

               PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.87
               TIME SHIFT OF PEAK FLOW          (min)= 95.00
               MAXIMUM  STORAGE   USED         (ha.m.)=  1.9775

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0102)|   Area     (ha)=  71.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  93.00   Dir. Conn.(%)=  93.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=    66.85          5.03
     Dep. Storage     (mm)=     2.00          5.00
     Average Slope     (%)=     2.22          2.20
     Length            (m)=   692.24         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88          50.21
                over (min)        5.00          10.00
     Storage Coeff.  (min)=       7.25 (ii)     10.00 (ii)
     Unit Hyd. Tpeak (min)=       5.00          10.00
     Unit Hyd. peak  (cms)=       0.17           0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=      13.58           0.60      14.184 (iii)
     TIME TO PEAK    (hrs)=       2.75           2.75        2.75
     RUNOFF VOLUME    (mm)=      78.31          42.05       75.77
     TOTAL RAINFALL   (mm)=      80.31          80.31       80.31
     RUNOFF COEFFICIENT   =       0.98           0.52        0.94


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*   =  81.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0103)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE  |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)  |   (cms)     (ha.m.)
                          0.0000     0.0000   |   4.6900     2.1905
                          1.3100     1.3639   |   6.2900     2.4799
                          2.6500     1.7635   |  84.9300     2.7554

                         AREA      QPEAK      TPEAK        R.V.
                         (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0102)   71.880    14.184       2.75       75.77
   OUTFLOW: ID= 1 (  0103)   71.880    13.779       2.83       75.77

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 97.14
```

```
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM  STORAGE   USED        (ha.m.)=  2.5732

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

--------------------
| ADD HYD  (  0099)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0101):     36.92   0.487     4.33    65.55
      + ID2= 2 (  0103):     71.88  13.779     2.83    75.77
        ===============================================
        ID = 3 (  0099):    108.80  14.089     2.83    72.30

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

--------------------
| ADD HYD  (  0099)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0099):    108.80  14.089     2.83    72.30
      + ID2= 2 (  2257):    331.32   8.374     2.83    65.89
        ===============================================
        ID = 1 (  0099):    440.12  22.463     2.83    67.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0173)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance      Elevation       Manning
                  28.50        210.02        0.0600
                  47.35        209.86        0.0450      Main Channel
                  51.00        209.76        0.0450      Main Channel
                  60.44        209.54        0.0450      Main Channel
                  65.44        209.60        0.0450      Main Channel
                  72.65        209.41        0.0450      Main Channel
                  95.97        208.53        0.0450      Main Channel
                 103.18        208.38        0.0450      Main Channel
                 108.18        208.33        0.0450      Main Channel
                 116.25        208.08        0.0450      Main Channel
                 122.09        207.92        0.0450      Main Channel
                 131.52        207.65        0.0450      Main Channel
                 149.56        208.22        0.0450      Main Channel
                 155.39        208.49        0.0450      Main Channel
                 177.88        208.58        0.0450      Main Channel
                 190.96        208.73        0.0450      Main Channel
                 195.96        208.72        0.0450      Main Channel
                 226.50        209.32        0.0450      Main Channel
                 238.71        209.46    0.0450 /0.0600  Main Channel
                 251.40        209.70        0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH    ELEV      VOLUME    FLOW RATE    VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)      (cms)        (m/s)       (min)
       0.11   207.75    .601E+03       0.0         0.12       222.56
       0.21   207.86    .241E+04       0.3         0.19       140.20
       0.32   207.97    .542E+04       0.8         0.25       107.47
       0.43   208.07    .969E+04       1.8         0.30        89.07
       0.53   208.18    .152E+05       3.3         0.35        76.07
       0.64   208.29    .218E+05       5.5         0.40        66.47
       0.75   208.39    .296E+05       8.0         0.43        61.92
       0.85   208.50    .389E+05      11.2         0.46        58.04
       0.96   208.61    .519E+05      14.2         0.44        60.79
       1.07   208.71    .677E+05      20.3         0.48        55.45
       1.17   208.82    .861E+05      27.7         0.52        51.74
       1.28   208.93    .106E+06      37.5         0.57        47.20
       1.39   209.03    .128E+06      48.7         0.61        43.64
       1.49   209.14    .150E+06      61.5         0.66        40.75
       1.60   209.25    .175E+06      76.0         0.70        38.35
       1.71   209.35    .201E+06      91.6         0.73        36.50
       1.81   209.46    .228E+06     107.8         0.76        35.28
       1.93   209.58    .262E+06     130.3         0.80        33.51
       2.05   209.70    .299E+06     156.6         0.84        31.84

                                       <---- hydrograph ---->   <-pipe / channel->
                               AREA    QPEAK   TPEAK    R.V.    MAX DEPTH  MAX VEL
                               (ha)    (cms)   (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0099)   440.12    22.46    2.83   67.47       1.10      0.49
   OUTFLOW: ID= 1 (  0173)   440.12     9.25    3.58   67.47       0.79      0.44
```

```
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN( 2296)|
| IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance        Elevation        Manning
                  0.00          204.60           0.0600
                  2.24          204.58           0.0450     Main Channel
                 10.30          203.90           0.0450     Main Channel
                 36.31          203.83           0.0450     Main Channel
                 47.49          204.24           0.0450     Main Channel
                 59.15          204.34           0.0450     Main Channel
                 65.86          204.04           0.0450     Main Channel
                 81.51          203.05           0.0450     Main Channel
                 93.18          202.84           0.0450     Main Channel
                104.40          202.89           0.0450     Main Channel
                117.82          202.66           0.0450     Main Channel
                126.76          202.26           0.0450     Main Channel
                138.43          200.25           0.0450     Main Channel
                149.61          199.94           0.0450     Main Channel
                172.61          203.72           0.0450     Main Channel
                194.97          203.80           0.0450     Main Channel
                217.87          204.71           0.0450     Main Channel
                229.05          205.01           0.0450     Main Channel
                240.71          205.02       0.0450 /0.0600 Main Channel
                284.60          205.56           0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)       (m)     (cu.m.)       (cms)        (m/s)       (min)
        0.23    200.17    .403E+03        0.2         0.17       35.38
        0.47    200.40    .149E+04        1.3         0.30       19.71
        0.70    200.64    .284E+04        3.3         0.41       14.37
        0.93    200.87    .443E+04        6.2         0.50       11.80
        1.17    201.10    .624E+04       10.2         0.58       10.22
        1.40    201.34    .828E+04       15.1         0.65        9.13
        1.63    201.57    .106E+05       21.2         0.71        8.31
        1.87    201.80    .131E+05       28.4         0.77        7.67
        2.10    202.04    .158E+05       36.8         0.83        7.15
        2.33    202.27    .188E+05       46.4         0.88        6.75
        2.57    202.50    .221E+05       54.8         0.88        6.73
        2.80    202.74    .261E+05       63.4         0.86        6.87
        3.03    202.97    .317E+05       65.8         0.74        8.03
        3.27    203.20    .389E+05       87.1         0.80        7.45
        3.50    203.44    .467E+05      113.5         0.87        6.85
        3.73    203.67    .548E+05      143.4         0.93        6.37
        3.97    203.90    .650E+05      141.2         0.77        7.67
        4.20    204.14    .788E+05      182.1         0.82        7.22
        4.55    204.49    .103E+06      256.5         0.88        6.70

                                     <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK    TPEAK   R.V.    MAX DEPTH  MAX VEL
                              (ha)    (cms)    (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0173)  440.12     9.25     3.58   67.47      1.11      0.56
   OUTFLOW: ID= 1 (  2296)  440.12     9.04     3.75   67.47      1.10      0.56


--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0106)  |   Area     (ha)= 281.15
|ID= 1 DT= 5.0 min   |   Total Imp(%)=  87.70   Dir. Conn.(%)=  87.50
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     246.57        34.58
     Dep. Storage      (mm)=       2.00         5.00
     Average Slope      (%)=       1.63         1.63
     Length             (m)=    1369.06        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
```

```
           0.417     1.61 | 2.000    27.30 | 3.583    11.24 |   5.17     1.61
           0.500     1.61 | 2.083    27.30 | 3.667    11.24 |   5.25     1.61
           0.583     1.61 | 2.167    27.30 | 3.750    11.24 |   5.33     1.61
           0.667     1.61 | 2.250    27.30 | 3.833     6.42 |   5.42     1.61
           0.750     1.61 | 2.333    73.88 | 3.917     6.42 |   5.50     1.61
           0.833     1.61 | 2.417    73.88 | 4.000     6.42 |   5.58     1.61
           0.917     1.61 | 2.500    73.88 | 4.083     6.42 |   5.67     1.61
           1.000     1.61 | 2.583    73.88 | 4.167     6.42 |   5.75     1.61
           1.083     1.61 | 2.667    73.88 | 4.250     6.42 |   5.83     1.61
           1.167     1.61 | 2.750    73.88 | 4.333     3.21 |   5.92     1.61
           1.250     1.61 | 2.833    20.88 | 4.417     3.21 |   6.00     1.61
           1.333     9.64 | 2.917    20.88 | 4.500     3.21 |   6.08     1.61
           1.417     9.64 | 3.000    20.88 | 4.583     3.21 |   6.17     1.61
           1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
           1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          51.40
                over (min)        10.00          20.00
     Storage Coeff.  (min)=       11.97 (ii)     15.84 (ii)
     Unit Hyd. Tpeak (min)=       10.00          20.00
     Unit Hyd. peak  (cms)=        0.10           0.07
                                                             *TOTALS*
     PEAK FLOW       (cms)=       47.01           3.44         50.134 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.92           2.75
     RUNOFF VOLUME    (mm)=       78.31          42.41          73.82
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =        0.98           0.53           0.92


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN*   =  81.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

 --------------------
 | ADD HYD  (  0107)|
 |  1 +  2 =  3     |          AREA     QPEAK     TPEAK      R.V.
 --------------------          (ha)     (cms)     (hrs)      (mm)
         ID1= 1 (  0106):    281.15   50.134      2.75     73.82
       + ID2= 2 (  2296):    440.12    9.035      3.75     67.47
         ====================================================
         ID = 3 (  0107):    721.27   52.737      2.75     69.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 --------------------
 | ROUTE CHN(  2300)|
 | IN= 2---> OUT= 1 |      Routing time step (min)'=  5.00
 --------------------
              <------ DATA FOR SECTION (    1.1) ------>
              Distance         Elevation         Manning
                  0.00          204.60          0.0600
                  2.24          204.58          0.0450       Main Channel
                 10.30          203.90          0.0450       Main Channel
                 36.31          203.83          0.0450       Main Channel
                 47.49          204.24          0.0450       Main Channel
                 59.15          204.34          0.0450       Main Channel
                 65.86          204.04          0.0450       Main Channel
                 81.51          203.05          0.0450       Main Channel
                 93.18          202.84          0.0450       Main Channel
                104.40          202.89          0.0450       Main Channel
                117.82          202.66          0.0450       Main Channel
                126.76          202.26          0.0450       Main Channel
                138.43          200.25          0.0450       Main Channel
                149.61          199.94          0.0450       Main Channel
                172.61          203.72          0.0450       Main Channel
                194.97          203.80          0.0450       Main Channel
                217.87          204.71          0.0450       Main Channel
                229.05          205.01          0.0450       Main Channel
                240.71          205.02      0.0450 /0.0600   Main Channel
                284.60          205.56          0.0600

       <--------------------- TRAVEL TIME TABLE --------------------->
        DEPTH      ELEV       VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
         (m)        (m)      (cu.m.)       (cms)         (m/s)       (min)
        0.23     200.17     .588E+03        0.2           0.17       51.42
        0.47     200.40     .217E+04        1.3           0.30       28.64
        0.70     200.64     .415E+04        3.3           0.41       20.89
        0.93     200.87     .646E+04        6.3           0.50       17.15
        1.17     201.10     .910E+04       10.2           0.58       14.86
        1.40     201.34     .121E+05       15.2           0.65       13.27
```

```
        1.63    201.57    .154E+05      21.3          0.72      12.08
        1.87    201.80    .191E+05      28.5          0.78      11.15
        2.10    202.04    .231E+05      37.0          0.83      10.39
        2.33    202.27    .274E+05      46.6          0.88       9.80
        2.57    202.50    .323E+05      55.0          0.88       9.79
        2.80    202.74    .381E+05      63.6          0.87       9.98
        3.03    202.97    .462E+05      66.1          0.74      11.66
        3.27    203.20    .568E+05      87.4          0.80      10.83
        3.50    203.44    .681E+05     114.0          0.87       9.96
        3.73    203.67    .800E+05     143.9          0.93       9.26
        3.97    203.90    .948E+05     141.7          0.78      11.14
        4.20    204.14    .115E+06     182.8          0.82      10.49
        4.55    204.49    .150E+06     257.5          0.89       9.74

                                    <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.   MAX DEPTH   MAX VEL
                              (ha)    (cms)   (hrs)   (mm)      (m)       (m/s)
    INFLOW : ID= 2 (  0107)  721.27   52.74    2.75  69.95     2.50       0.88
    OUTFLOW: ID= 1 (  2300)  721.27   47.16    2.83  69.95     2.36       0.88


 --------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0166)|    Area    (ha)=    9.33
 |ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      5.69         3.64
     Dep. Storage      (mm)=      1.00         5.00
     Average Slope      (%)=      1.00         1.00
     Length             (m)=    249.40        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)        5.00        20.00
     Storage Coeff.  (min)=      4.99 (ii)   16.33 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.22         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=      1.17         0.37          1.505 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.92           2.75
     RUNOFF VOLUME    (mm)=     79.31        44.54          65.75
     TOTAL RAINFALL   (mm)=     80.31        80.31          80.31
     RUNOFF COEFFICIENT   =      0.99         0.55           0.82

 ***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  83.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
             THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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 --------------------
 | RESERVOIR(  0167)|     OVERFLOW IS OFF
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```
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |       OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                            0.0000     0.0000   |   0.7030     0.3085

                                   AREA     QPEAK     TPEAK       R.V.
                                   (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0166)         9.330     1.505      2.75      65.75
   OUTFLOW: ID= 1 (  0167)         9.330     0.614      3.17      65.74

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.80
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2697

-----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0169)|   Area    (ha)=   2.34
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.11         0.23
     Dep. Storage     (mm)=        1.00         5.00
     Average Slope     (%)=        1.00         2.00
     Length            (m)=      124.90        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
               over (min)          5.00         10.00
     Storage Coeff.  (min)=        3.30 (ii)     6.60 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.27          0.14
                                                             *TOTALS*
     PEAK FLOW       (cms)=        0.43          0.03          0.464 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54          75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31          80.31
     RUNOFF COEFFICIENT   =        0.99          0.55           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------
--------------------
| ADD HYD  (  0023)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0162):     10.84    1.456      2.75     64.38
      + ID2= 2 (  0167):      9.33    0.614      3.17     65.74
        ==================================================
        ID = 3 (  0023):     20.17    1.983      2.75     65.01
```

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):     20.17   1.983     2.75     65.01
      + ID2= 2 (  0169):      2.34   0.464     2.75     75.83
        ==================================================
        ID = 1 (  0023):     22.51   2.447     2.75     66.13

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     22.51   2.447     2.75     66.13
      + ID2= 2 (  2300):    721.27  47.162     2.83     69.95
        ==================================================
        ID = 3 (  0023):    743.78  49.273     2.83     69.83

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    743.78  49.273     2.83     69.83
      + ID2= 2 (  0024):      7.52   1.488     2.75     75.83
        ==================================================
        ID = 1 (  0023):    751.30  50.403     2.75     69.89

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):    751.30  50.403     2.75     69.89
      + ID2= 2 (  0025):     11.16   0.610     3.42     39.71
        ==================================================
        ID = 3 (  0023):    762.46  50.693     2.75     69.45

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

--------------------
| ADD HYD  (  0023)|
|  3 +  2 =  1     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0023):    762.46  50.693     2.75     69.45
      + ID2= 2 (  0049):     23.15   4.544     2.75     75.83
        ==================================================
        ID = 1 (  0023):    785.61  55.237     2.75     69.64

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

--------------------
| ADD HYD  (  0023)|
|  1 +  2 =  3     |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):    785.61  55.237     2.75     69.64
      + ID2= 2 (  0050):     10.29   0.613     3.25     65.74
        ==================================================
        ID = 3 (  0023):    795.90  55.745     2.75     69.59

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0042)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |   OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |    (cms)     (ha.m.)
                          0.0000     0.0000   |   24.8000    11.7715
                          3.0000     0.7487   |   58.0000    13.1395
                          3.6000     1.0973   |   *******    14.5671
                          4.5000     1.7943   |   *******    15.1408
                          5.3000     2.1670   |   *******    16.0822
```

```
                          5.9000      4.3060   |   *******      16.8383
                          6.4000      5.5883   |   *******      17.6711
                          7.0000      7.5770   |   *******      18.4932
                          7.7000      8.6849   |   *******      19.3351
                         11.2000     10.4726   |    0.0000       0.0000

                                AREA      QPEAK      TPEAK        R.V.
                                (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0023)   795.900     55.745       2.75       69.59
   OUTFLOW: ID= 1 (  0042)   795.900     34.345       3.25       69.59

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 61.61
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)= 12.1745

--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2297)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (   1.1) ------>
               Distance       Elevation       Manning
                   0.00         204.60         0.0600
                   2.24         204.58         0.0450     Main Channel
                  10.30         203.90         0.0450     Main Channel
                  36.31         203.83         0.0450     Main Channel
                  47.49         204.24         0.0450     Main Channel
                  59.15         204.34         0.0450     Main Channel
                  65.86         204.04         0.0450     Main Channel
                  81.51         203.05         0.0450     Main Channel
                  93.18         202.84         0.0450     Main Channel
                 104.40         202.89         0.0450     Main Channel
                 117.82         202.66         0.0450     Main Channel
                 126.76         202.26         0.0450     Main Channel
                 138.43         200.25         0.0450     Main Channel
                 149.61         199.94         0.0450     Main Channel
                 172.61         203.72         0.0450     Main Channel
                 194.97         203.80         0.0450     Main Channel
                 217.87         204.71         0.0450     Main Channel
                 229.05         205.01         0.0450     Main Channel
                 240.71         205.02     0.0450 /0.0600  Main Channel
                 284.60         205.56         0.0600

      <--------------------- TRAVEL TIME TABLE ---------------------->
       DEPTH     ELEV       VOLUME     FLOW RATE      VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)       (cms)          (m/s)       (min)
       0.23    200.17     .921E+03        0.2           0.20        68.84
       0.47    200.40     .341E+04        1.5           0.35        38.35
       0.70    200.64     .650E+04        3.9           0.48        27.97
       0.93    200.87     .101E+05        7.3           0.59        22.96
       1.17    201.10     .143E+05       11.9           0.68        19.89
       1.40    201.34     .189E+05       17.8           0.76        17.77
       1.63    201.57     .241E+05       24.9           0.84        16.18
       1.87    201.80     .299E+05       33.3           0.91        14.93
       2.10    202.04     .361E+05       43.3           0.97        13.92
       2.33    202.27     .429E+05       54.5           1.03        13.12
       2.57    202.50     .506E+05       64.4           1.03        13.10
       2.80    202.74     .597E+05       74.4           1.01        13.37
       3.03    202.97     .724E+05       77.3           0.87        15.62
       3.27    203.20     .890E+05      102.3           0.93        14.50
       3.50    203.44     .107E+06      133.4           1.02        13.33
       3.73    203.67     .125E+06      168.4           1.09        12.40
       3.97    203.90     .148E+06      165.8           0.91        14.92
       4.20    204.14     .180E+06      213.9           0.97        14.04
       4.55    204.49     .236E+06      301.3           1.04        13.04

                                         <---- hydrograph ---->   <-pipe / channel->
                               AREA     QPEAK    TPEAK    R.V.    MAX DEPTH  MAX VEL
                               (ha)     (cms)    (hrs)    (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0042)   795.90     34.34     3.25   69.59       1.89      0.91
   OUTFLOW: ID= 1 (  2297)   795.90     28.84     3.50   69.59       1.74      0.87


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area     (ha)=    6.79   Curve Number   (CN)= 79.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=     0.76

         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Unit Hyd Qpeak  (cms)=    0.341

     PEAK FLOW       (cms)=    0.352 (i)
     TIME TO PEAK    (hrs)=    3.500
     RUNOFF VOLUME    (mm)=   39.708
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT   =    0.494

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0029)|    Area     (ha)=    8.01
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      7.21         0.80
     Dep. Storage      (mm)=      1.00         5.00
     Average Slope      (%)=      1.00         2.00
     Length             (m)=    231.08        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
              0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
              1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
              1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
              1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
              1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
              1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
              1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
              1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
              1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        52.93
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.77 (ii)    8.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.13
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.48         0.11        1.584 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31        44.54        75.83
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.31
     RUNOFF COEFFICIENT   =       0.99         0.55         0.94
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0051)|   Area    (ha)=   7.81
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.03          0.78
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     228.18         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       4.73 (ii)     8.04 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.22          0.13
                                                           *TOTALS*
     PEAK FLOW      (cms)=        1.44          0.10         1.545 (iii)
     TIME TO PEAK   (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME   (mm)=       79.31         44.54         75.83
     TOTAL RAINFALL  (mm)=       80.31         80.31         80.31
     RUNOFF COEFFICIENT   =       0.99          0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0053)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000      0.0000   |   0.3770     0.2845

                                  AREA     QPEAK     TPEAK        R.V.
                                  (ha)     (cms)     (hrs)        (mm)
   INFLOW : ID= 2 (  0051)       7.810     1.545      2.75       75.83
   OUTFLOW: ID= 1 (  0053)       7.810     0.445      3.25       75.81

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.79
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  0.3357
```

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-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0052)|   Area    (ha)=   6.47
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      3.95          2.52
     Dep. Storage      (mm)=      1.00          5.00
     Average Slope      (%)=      1.00          1.00
     Length             (m)=    207.69         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         51.42
                over (min)        5.00         20.00
     Storage Coeff.  (min)=       4.47 (ii)    15.81 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.23          0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.81          0.26        1.048 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.92         2.75
     RUNOFF VOLUME    (mm)=      79.31         44.54        65.75
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.99          0.55         0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0054)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4900     0.2144

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0052)      6.470     1.048      2.75      65.75
   OUTFLOW: ID= 1 (  0054)      6.470     0.427      3.17      65.73

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.76
                    TIME SHIFT OF PEAK FLOW        (min)= 25.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.1870

-------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3     |        AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0029):      8.01     1.584      2.75     75.83
      + ID2= 2 (  0030):      6.79     0.352      3.50     39.71
```

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      ================================================
      ID = 3 (  0032):    14.80   1.736     2.75    59.26

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0032)|
|  3 +  2 =  1     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
      ID1= 3 (  0032):       14.80   1.736      2.75     59.26
    + ID2= 2 (  0053):        7.81   0.445      3.25     75.81
      ================================================
      ID = 1 (  0032):       22.61   2.131      2.75     64.98

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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--------------------
| ADD HYD  (  0032)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
      ID1= 1 (  0032):       22.61   2.131      2.75     64.98
    + ID2= 2 (  0054):        6.47   0.427      3.17     65.73
      ================================================
      ID = 3 (  0032):       29.08   2.501      2.75     65.14

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0078)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  0.2940      1.1158
                          0.0520     0.5230    |  0.3680      1.3234
                          0.1630     0.7202    |  0.4250      1.4787
                          0.2420     0.9521    |  0.4830      1.6325

                                  AREA     QPEAK      TPEAK        R.V.
                                  (ha)     (cms)      (hrs)        (mm)
  INFLOW : ID= 2 (  0032)       29.080      2.501       2.75        65.14
  OUTFLOW: ID= 1 (  0078)       29.080      0.374       5.92        65.05

                 PEAK    FLOW   REDUCTION [Qout/Qin](%)= 14.94
                 TIME SHIFT OF PEAK FLOW         (min)=190.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  1.3389

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--------------------
| CALIB            |
| STANDHYD (  0130)|   Area    (ha)=   1.88
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=      1.69          0.19
    Dep. Storage     (mm)=      1.00          5.00
    Average Slope     (%)=      1.00          2.00
    Length            (m)=    111.95         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
          0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
          0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
          0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
          0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
          0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
          0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
          0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
          0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
          0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
          0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
          1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
          1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
          1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
          1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
          1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
          1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
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             1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
             1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          52.93
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        3.09 (ii)      6.39 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.27           0.15
                                                               *TOTALS*
     PEAK FLOW       (cms)=        0.35           0.03           0.373 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75            2.75
     RUNOFF VOLUME    (mm)=       79.31          44.54           75.83
     TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
     RUNOFF COEFFICIENT   =        0.99           0.55            0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0133)|    Area     (ha)=    2.46
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.21           0.25
     Dep. Storage     (mm)=        1.00           5.00
     Average Slope     (%)=        1.00           2.00
     Length            (m)=      128.06          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 | 1.667     9.64 | 3.250    20.88 |   4.83     1.61
             0.167     0.00 | 1.750     9.64 | 3.333    11.24 |   4.92     1.61
             0.250     0.00 | 1.833    27.30 | 3.417    11.24 |   5.00     1.61
             0.333     1.61 | 1.917    27.30 | 3.500    11.24 |   5.08     1.61
             0.417     1.61 | 2.000    27.30 | 3.583    11.24 |   5.17     1.61
             0.500     1.61 | 2.083    27.30 | 3.667    11.24 |   5.25     1.61
             0.583     1.61 | 2.167    27.30 | 3.750    11.24 |   5.33     1.61
             0.667     1.61 | 2.250    27.30 | 3.833     6.42 |   5.42     1.61
             0.750     1.61 | 2.333    73.88 | 3.917     6.42 |   5.50     1.61
             0.833     1.61 | 2.417    73.88 | 4.000     6.42 |   5.58     1.61
             0.917     1.61 | 2.500    73.88 | 4.083     6.42 |   5.67     1.61
             1.000     1.61 | 2.583    73.88 | 4.167     6.42 |   5.75     1.61
             1.083     1.61 | 2.667    73.88 | 4.250     6.42 |   5.83     1.61
             1.167     1.61 | 2.750    73.88 | 4.333     3.21 |   5.92     1.61
             1.250     1.61 | 2.833    20.88 | 4.417     3.21 |   6.00     1.61
             1.333     9.64 | 2.917    20.88 | 4.500     3.21 |   6.08     1.61
             1.417     9.64 | 3.000    20.88 | 4.583     3.21 |   6.17     1.61
             1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
             1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          52.93
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        3.34 (ii)      6.65 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.26           0.14
                                                               *TOTALS*
     PEAK FLOW       (cms)=        0.45           0.03           0.488 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75            2.75
     RUNOFF VOLUME    (mm)=       79.31          44.54           75.83
     TOTAL RAINFALL   (mm)=       80.31          80.31           80.31
     RUNOFF COEFFICIENT   =        0.99           0.55            0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| RESERVOIR( 0170)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |  0.4428      0.0364

                                 AREA      QPEAK      TPEAK       R.V.
                                 (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0133)      2.460      0.488       2.75      75.83
   OUTFLOW: ID= 1 (  0170)      2.460      0.432       2.75      75.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.58
                   TIME SHIFT OF PEAK FLOW          (min)=  0.00
                   MAXIMUM  STORAGE   USED        (ha.m.)=  0.0364

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--------------------
| ADD HYD  (  0171)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0130):      1.88     0.373      2.75     75.83
      + ID2= 2 (  0170):      2.46     0.432      2.75     75.83
        ==================================================
        ID = 3 (  0171):      4.34     0.805      2.75     75.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0135)|   Area     (ha)=   0.95
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.86          0.10
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     79.58         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
                 0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
                 0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
                 0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
                 0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
                 0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
                 0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
                 0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
                 0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
                 0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
                 0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
                 1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
                 1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
                 1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
                 1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
                 1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
                 1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
                 1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
                 1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88          52.93
                over (min)       5.00          10.00
     Storage Coeff.  (min)=      2.51 (ii)      5.82 (ii)
     Unit Hyd. Tpeak (min)=      5.00          10.00
     Unit Hyd. peak  (cms)=      0.29           0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.18           0.01        0.189 (iii)
     TIME TO PEAK    (hrs)=      2.75           2.75         2.75
     RUNOFF VOLUME    (mm)=     79.31          44.54        75.83
     TOTAL RAINFALL   (mm)=     80.31          80.31        80.31
     RUNOFF COEFFICIENT   =      0.99           0.55         0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
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    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0136)|   Area     (ha)=  15.11
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=     13.60         1.51
     Dep. Storage      (mm)=      1.00         5.00
     Average Slope      (%)=      1.00         2.00
     Length             (m)=    317.39        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        52.93
                over (min)       5.00        10.00
     Storage Coeff.  (min)=       5.77 (ii)    9.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.20         0.12
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.78         0.20        2.978 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31        44.54        75.83
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.31
     RUNOFF COEFFICIENT   =       0.99         0.55         0.94


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| RESERVOIR(  0137)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   2.7200     0.2000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0136)     15.110     2.978       2.75      75.83
   OUTFLOW: ID= 1 (  0137)     15.110     2.638       2.75      75.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 88.61
                   TIME SHIFT OF PEAK FLOW         (min)=  0.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1991

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0138)|   Area     (ha)=   0.29
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area      (ha)=        0.26          0.03
     Dep. Storage      (mm)=        1.00          5.00
     Average Slope      (%)=        1.00          2.00
     Length             (m)=       43.97         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)        5.00         10.00
     Storage Coeff.  (min)=        1.76 (ii)     5.07 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.32          0.16
                                                           *TOTALS*
     PEAK FLOW       (cms)=        0.05          0.00         0.058 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75          2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54         75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31         80.31
     RUNOFF COEFFICIENT   =        0.99          0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0139)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)    |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.4390     0.0003

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0138)       0.290     0.058       2.75       75.83
   OUTFLOW: ID= 1 (  0139)       0.290     0.059       2.75       75.83

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=101.81
                  TIME SHIFT OF PEAK FLOW          (min)=  0.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.0000
                  MAXIMUM  STORAGE   USED        (cu.m.)=  0.244628

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0172)|
|  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
--------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0135):      0.95    0.189      2.75     75.83
      + ID2= 2 (  0137):     15.11    2.638      2.75     75.83
        ==================================================
        ID = 3 (  0172):     16.06    2.827      2.75     75.83

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

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

--------------------
| ADD HYD  (  0172)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0172):    16.06   2.827     2.75    75.83
      + ID2= 2 (  0139):     0.29   0.059     2.75    75.83
        ==================================================
        ID = 1 (  0172):    16.35   2.886     2.75    75.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0076)|   Area     (ha)=   6.00
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      5.40         0.60
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    200.00        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         52.93
                over (min)         5.00         10.00
     Storage Coeff.  (min)=        4.37 (ii)     7.68 (ii)
     Unit Hyd. Tpeak (min)=        5.00         10.00
     Unit Hyd. peak  (cms)=        0.23          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=        1.11          0.08       1.188 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.75        2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54       75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31       80.31
     RUNOFF COEFFICIENT   =        0.99          0.55        0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0031)|   Area     (ha)=  39.77
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     35.79         3.98
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=    514.91        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167      0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250      0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333      1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417      1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500      1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583      1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667      1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750      1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833      1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917      1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000      1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083      1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167      1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250      1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333      9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417      9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500      9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583      9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88           52.93
                over (min)        10.00           15.00
     Storage Coeff.  (min)=        7.71 (ii)      11.02 (ii)
     Unit Hyd. Tpeak (min)=       10.00           15.00
     Unit Hyd. peak  (cms)=        0.13            0.09
                                                              *TOTALS*
     PEAK FLOW       (cms)=        7.20            0.47          7.663 (iii)
     TIME TO PEAK    (hrs)=        2.75            2.83           2.75
     RUNOFF VOLUME    (mm)=       79.31           44.54          75.83
     TOTAL RAINFALL   (mm)=       80.31           80.31          80.31
     RUNOFF COEFFICIENT   =        0.99            0.55           0.94

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0061)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
--------------------       (cms)     (ha.m.)    |    (cms)     (ha.m.)
                          0.0000      0.0000    |   7.1560      0.3940

                                  AREA     QPEAK      TPEAK        R.V.
                                  (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0031)      39.770     7.663       2.75        75.83
   OUTFLOW: ID= 1 (  0061)      39.770     7.001       2.83        75.83

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 91.36
                    TIME SHIFT OF PEAK FLOW          (min)=  5.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.3896

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

--------------------
| ADD HYD  (  0128)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0171):      4.34    0.805      2.75     75.83
      + ID2= 2 (  0172):     16.35    2.886      2.75     75.83
        ===================================================
        ID = 3 (  0128):     20.69    3.691      2.75     75.83

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

--------------------
| ADD HYD  (  0128)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0128):     20.69    3.691      2.75     75.83
      + ID2= 2 (  2297):    795.90   28.844      3.50     69.59
        ===================================================
        ID = 1 (  0128):    816.59   29.831      3.50     69.75
```

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

--------------------
| ADD HYD  (  0128)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0128):    816.59  29.831      3.50     69.75
      + ID2= 2 (  0061):     39.77   7.001      2.83     75.83
        ===================================================
        ID = 3 (  0128):    856.36  32.284      3.42     70.03

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

--------------------
| ADD HYD  (  0128)|
|   3 +  2 =  1    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 3 (  0128):    856.36  32.284      3.42     70.03
      + ID2= 2 (  0076):      6.00   1.188      2.75     75.83
        ===================================================
        ID = 1 (  0128):    862.36  32.488      3.42     70.07

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

--------------------
| ADD HYD  (  0128)|
|   1 +  2 =  3    |          AREA    QPEAK     TPEAK     R.V.
--------------------          (ha)    (cms)     (hrs)     (mm)
        ID1= 1 (  0128):    862.36  32.488      3.42     70.07
      + ID2= 2 (  0078):     29.08   0.374      5.92     65.05
        ===================================================
        ID = 3 (  0128):    891.44  32.704      3.42     69.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2875)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00          204.68         0.0600
                   3.24          204.67         0.0450     Main Channel
                  51.26          203.93         0.0450     Main Channel
                  66.07          203.18         0.0450     Main Channel
                  87.42          203.39         0.0450     Main Channel
                 132.09          202.47         0.0450     Main Channel
                 165.30          201.66         0.0450     Main Channel
                 213.87          200.24         0.0450     Main Channel
                 259.32          199.43         0.0450     Main Channel
                 266.86          197.71         0.0450     Main Channel
                 276.16          196.93         0.0450     Main Channel
                 304.50          197.16         0.0450     Main Channel
                 307.31          197.98         0.0450     Main Channel
                 311.09          198.45         0.0450     Main Channel
                 329.41          198.06         0.0450     Main Channel
                 371.71          200.22         0.0450     Main Channel
                 378.80          200.32         0.0450     Main Channel
                 411.13          199.51         0.0450     Main Channel
                 421.51          202.47     0.0450 /0.0600 Main Channel
                 461.76          202.80         0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)      (cu.m.)      (cms)         (m/s)        (min)
       0.31    197.24    .601E+04        3.8           0.64       26.05
       0.62    197.55    .166E+05       19.1           1.14       14.50
       0.92    197.85    .286E+05       44.3           1.54       10.76
       1.23    198.16    .419E+05       72.2           1.72        9.67
       1.54    198.47    .611E+05      105.3           1.72        9.67
       1.85    198.78    .849E+05      171.0           2.01        8.27
       2.15    199.08    .111E+06      252.0           2.26        7.34
       2.46    199.39    .139E+06      348.9           2.50        6.65
       2.77    199.70    .172E+06      416.9           2.41        6.89
       3.08    200.01    .217E+06      514.0           2.36        7.02
       3.39    200.32    .272E+06      649.5           2.38        6.98
       3.69    200.62    .336E+06      888.1           2.63        6.31
       4.00    200.93    .403E+06     1163.0           2.87        5.78
       4.31    201.24    .474E+06     1473.8           3.09        5.37
       4.62    201.55    .549E+06     1820.8           3.30        5.03
```

```
    4.92   201.85    .627E+06    2198.2          3.49       4.76
    5.23   202.16    .710E+06    2610.1          3.66       4.53
    5.54   202.47    .796E+06    3061.7          3.83       4.34
    5.87   202.80    .901E+06    3585.6          3.96       4.19

                                <---- hydrograph ---->   <-pipe / channel->
                          AREA    QPEAK   TPEAK   R.V.   MAX DEPTH  MAX VEL
                          (ha)    (cms)   (hrs)   (mm)     (m)       (m/s)
 INFLOW : ID= 2 (  0128)  891.44  32.70    3.42  69.90     0.78      1.33
 OUTFLOW: ID= 1 (  2875)  891.44  31.07    3.58  69.90     0.76      1.30
```

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--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD    (  0002)|    Area      (ha)=    2.27   Curve Number    (CN)= 83.0
|ID= 1 DT= 5.0 min  |    Ia        (mm)=    5.00   # of Linear Res.(N)= 3.00
--------------------     U.H. Tp(hrs)=    0.35

         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Unit Hyd Qpeak  (cms)=    0.248

     PEAK FLOW       (cms)=    0.212 (i)
     TIME TO PEAK    (hrs)=    2.917
     RUNOFF VOLUME    (mm)=   44.531
     TOTAL RAINFALL   (mm)=   80.310
     RUNOFF COEFFICIENT    =    0.554

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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--------------------
| CALIB              |
| STANDHYD (  0001)|    Area     (ha)=    6.71
|ID= 1 DT= 5.0 min |    Total Imp(%)=   61.00    Dir. Conn.(%)=   61.00
--------------------
                              IMPERVIOUS     PERVIOUS (i)
     Surface Area      (ha)=       4.09          2.62
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.00          1.00
     Length             (m)=     211.50         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
```

```
             0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58    1.61
             0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67    1.61
             1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75    1.61
             1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83    1.61
             1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92    1.61
             1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
             1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
             1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
             1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25    1.61
             1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          51.42
                over (min)        5.00          20.00
     Storage Coeff.  (min)=        4.52 (ii)     15.86 (ii)
     Unit Hyd. Tpeak (min)=        5.00          20.00
     Unit Hyd. peak  (cms)=        0.23           0.07
                                                              *TOTALS*
     PEAK FLOW        (cms)=        0.84           0.27          1.086 (iii)
     TIME TO PEAK     (hrs)=        2.75           2.92           2.75
     RUNOFF VOLUME     (mm)=       79.31          44.54          65.75
     TOTAL RAINFALL    (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT    =        0.99           0.55           0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0070)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.5080     0.2222

                               AREA      QPEAK      TPEAK        R.V.
                               (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0001)     6.710     1.086       2.75        65.75
   OUTFLOW: ID= 1 (  0070)     6.710     0.443       3.17        65.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.77
                  TIME SHIFT OF PEAK FLOW          (min)= 25.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1939

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--------------------
| CALIB              |
| STANDHYD (  0004)|    Area    (ha)=   2.00
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=       1.80          0.20
     Dep. Storage      (mm)=       1.00          5.00
     Average Slope      (%)=       1.00          2.00
     Length             (m)=     115.47         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 | 1.667     9.64 | 3.250    20.88 |  4.83    1.61
             0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92    1.61
             0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00    1.61
             0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08    1.61
             0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17    1.61
             0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25    1.61
             0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33    1.61
             0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42    1.61
             0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50    1.61
             0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58    1.61
             0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67    1.61
             1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75    1.61
             1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83    1.61
             1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92    1.61
             1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00    1.61
             1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08    1.61
             1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17    1.61
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             1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
             1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         52.93
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       3.14 (ii)     6.45 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.27          0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.37          0.03        0.397 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31         44.54        75.83
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.99          0.55         0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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--------------------
| CALIB              |
| STANDHYD (  0079)|    Area     (ha)=   0.60
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.54          0.06
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=      63.25         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
             0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
             0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
             0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
             0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
             0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
             0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
             0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
             0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
             0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
             0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
             1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
             1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
             1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
             1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
             1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
             1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
             1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
             1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         52.93
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       2.19 (ii)     5.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.31          0.16
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11          0.01        0.119 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31         44.54        75.83
     TOTAL RAINFALL   (mm)=      80.31         80.31        80.31
     RUNOFF COEFFICIENT   =       0.99          0.55         0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB              |
| STANDHYD (  0003)|    Area     (ha)=  11.10
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        9.99        1.11
     Dep. Storage     (mm)=        1.00        5.00
     Average Slope     (%)=        1.00        2.00
     Length            (m)=      272.03       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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88       52.93
               over (min)          5.00       10.00
     Storage Coeff.  (min)=        5.26 (ii)   8.56 (ii)
     Unit Hyd. Tpeak (min)=        5.00       10.00
     Unit Hyd. peak  (cms)=        0.21        0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=        2.05        0.15        2.192 (iii)
     TIME TO PEAK    (hrs)=        2.75        2.75         2.75
     RUNOFF VOLUME    (mm)=       79.31       44.54        75.83
     TOTAL RAINFALL   (mm)=       80.31       80.31        80.31
     RUNOFF COEFFICIENT   =        0.99        0.55         0.94


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0083)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   1.9980     0.1569

                               AREA      QPEAK      TPEAK        R.V.
                               (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0003)   11.100      2.192       2.75       75.83
   OUTFLOW: ID= 1 (  0083)   11.100      1.924       2.75       75.83

                  PEAK    FLOW   REDUCTION [Qout/Qin](%)= 87.79
                  TIME SHIFT OF PEAK FLOW         (min)=  0.00
                  MAXIMUM   STORAGE   USED       (ha.m.)=  0.1551

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0151)|    Area     (ha)=   7.77
|ID= 1 DT= 5.0 min |    Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        4.74        3.03
     Dep. Storage     (mm)=        1.00        5.00
     Average Slope     (%)=        1.00        1.00
     Length            (m)=      227.60       40.00
```

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     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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.72 (ii)   16.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.97         0.31         1.256 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.92          2.75
     RUNOFF VOLUME    (mm)=      79.31        44.54         65.75
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.55          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0152)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------        (cms)    (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.5870     0.2573

                                AREA      QPEAK      TPEAK        R.V.
                                (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0151)      7.770      1.256       2.75       65.75
   OUTFLOW: ID= 1 (  0152)      7.770      0.512       3.17       65.74

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.77
                  TIME SHIFT OF PEAK FLOW         (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2247

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

--------------------
| ADD HYD  (  0081)|
|  1 +  2 =  3     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0152):     7.77     0.512     3.17     65.74
      + ID2= 2 (  0079):     0.60     0.119     2.75     75.83
        ===============================================
        ID = 3 (  0081):     8.37     0.561     2.75     66.46

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

--------------------
| ADD HYD  (  0081)|
|  3 +  2 =  1     |         AREA     QPEAK     TPEAK      R.V.
--------------------         (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0081):     8.37     0.561     2.75     66.46
```

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     + ID2= 2 (  0083):     11.10   1.924      2.75    75.83
       ==================================================
       ID = 1 (  0081):     19.47   2.485      2.75    71.80

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0002):        2.27    0.212      2.92     44.53
     + ID2= 2 (  0004):        2.00    0.397      2.75     75.83
       ==================================================
       ID = 3 (  0005):        4.27    0.578      2.75     59.19

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

--------------------
| ADD HYD  (  0005)|
|  3 +  2 =  1     |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 3 (  0005):        4.27    0.578      2.75     59.19
     + ID2= 2 (  0070):        6.71    0.443      3.17     65.73
       ==================================================
       ID = 1 (  0005):       10.98    0.962      2.75     63.19

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

--------------------
| ADD HYD  (  0005)|
|  1 +  2 =  3     |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0005):       10.98    0.962      2.75     63.19
     + ID2= 2 (  0081):       19.47    2.485      2.75     71.80
       ==================================================
       ID = 3 (  0005):       30.45    3.447      2.75     68.70

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0006)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3320     1.0067
                          0.1470     0.5184   |   0.3840     1.1307
                          0.2180     0.7112   |   0.4370     1.2536
                          0.2660     0.8419   |   0.0000     0.0000

                              AREA      QPEAK      TPEAK        R.V.
                              (ha)      (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0005)   30.450      3.447       2.75       68.70
   OUTFLOW: ID= 1 (  0006)   30.450      0.526       5.00       68.67

               PEAK    FLOW   REDUCTION [Qout/Qin](%)= 15.27
               TIME SHIFT OF PEAK FLOW         (min)=135.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  1.4610

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0011)|   Area    (ha)=   4.52   Curve Number   (CN)= 83.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.43

        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
              0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
              0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
              0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
              0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
              0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
              0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
              0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
              0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
              0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
```

```
              0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
              1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
              1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
              1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
              1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
              1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
              1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
              1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
              1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Unit Hyd Qpeak  (cms)=   0.401

     PEAK FLOW       (cms)=   0.375 (i)
     TIME TO PEAK    (hrs)=   3.000
     RUNOFF VOLUME    (mm)=  44.537
     TOTAL RAINFALL   (mm)=  80.310
     RUNOFF COEFFICIENT   =   0.555

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0010)|    Area    (ha)=   0.88
|ID= 1 DT= 5.0 min |    Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.79         0.09
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         2.00
     Length            (m)=     76.59        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
              0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
              0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
              0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
              0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
              0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
              0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
              0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
              0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
              0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
              0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
              1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
              1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
              1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
              1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
              1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
              1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
              1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
              1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        52.93
               over (min)        5.00        10.00
     Storage Coeff.  (min)=      2.46 (ii)    5.77 (ii)
     Unit Hyd. Tpeak (min)=      5.00        10.00
     Unit Hyd. peak  (cms)=      0.30         0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.16         0.01          0.175 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=     79.31        44.54          75.83
     TOTAL RAINFALL   (mm)=     80.31        80.31          80.31
     RUNOFF COEFFICIENT   =      0.99         0.55           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0055)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   | OUTFLOW    STORAGE
```

```
--------------------        (cms)      (ha.m.)   |   (cms)      (ha.m.)
                            0.0000     0.0000    |   0.1933      0.0000

                                  AREA     QPEAK      TPEAK       R.V.
                                  (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0010)        0.880     0.175       2.75       75.83
   OUTFLOW: ID= 1 (  0055)        0.880     0.175       2.75       75.83

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=100.23
                   TIME SHIFT OF PEAK FLOW        (min)=  0.00
                   MAXIMUM  STORAGE   USED      (ha.m.)=  0.0000
                   MAXIMUM  STORAGE   USED      (cu.m.)=  0.031448

     **** WARNING : HYDROGRAPH PEAK WAS NOT REDUCED.
                    CHECK OUTFLOW/STORAGE TABLE  OR REDUCE DT.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0012)|   Area     (ha)=    2.19
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        1.97         0.22
     Dep. Storage      (mm)=        1.00         5.00
     Average Slope      (%)=        1.00         2.00
     Length             (m)=      120.83        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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                 0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                 0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                 0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                 0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                 0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                 0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                 0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                 0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                 0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                 0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                 1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                 1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                 1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88        52.93
                over (min)        5.00        10.00
     Storage Coeff.  (min)=        3.23 (ii)    6.54 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.27         0.14
                                                           *TOTALS*
     PEAK FLOW        (cms)=        0.40         0.03        0.434 (iii)
     TIME TO PEAK     (hrs)=        2.75         2.75         2.75
     RUNOFF VOLUME     (mm)=       79.31        44.54        75.83
     TOTAL RAINFALL    (mm)=       80.31        80.31        80.31
     RUNOFF COEFFICIENT   =        0.99         0.55         0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0056)|   Area     (ha)=    5.50
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        3.36         2.14
     Dep. Storage      (mm)=        1.00         5.00
     Average Slope      (%)=        1.00         1.00
```

```
     Length           (m)=     191.49        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        51.42
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.26 (ii)   15.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.23         0.07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.22         0.892 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.92          2.75
     RUNOFF VOLUME    (mm)=      79.31        44.54         65.75
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.55          0.82

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0     Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0057)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW     STORAGE    |  OUTFLOW    STORAGE
--------------------      (cms)      (ha.m.)    |   (cms)     (ha.m.)
                          0.0000      0.0000    |   0.4170     0.1822

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0056)      5.500      0.892       2.75        65.75
   OUTFLOW: ID= 1 (  0057)      5.500      0.363       3.08        65.73

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.75
                  TIME SHIFT OF PEAK FLOW         (min)= 20.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1590

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
          ID1= 1 (  0011):    4.52   0.375     3.00     44.54
        + ID2= 2 (  0012):    2.19   0.434     2.75     75.83
          ==================================================
          ID = 3 (  0009):    6.71   0.720     2.75     54.75

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK      R.V.
--------------------          (ha)    (cms)    (hrs)      (mm)
```

```
       ID1= 3 (  0009):      6.71   0.720      2.75     54.75
     + ID2= 2 (  0055):      0.88   0.175      2.75     75.83
       ==================================================
       ID = 1 (  0009):      7.59   0.895      2.75     57.19

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

--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0009):      7.59   0.895      2.75     57.19
     + ID2= 2 (  0057):      5.50   0.363      3.08     65.73
       ==================================================
       ID = 3 (  0009):     13.09   1.212      2.75     60.78

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0063)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.1600     0.2188
                          0.0700     0.1180   |   0.1800     0.2432
                          0.1000     0.1585   |   0.2080     0.2682
                          0.1300     0.1851   |   0.0000     0.0000

                                AREA     QPEAK      TPEAK       R.V.
                                (ha)     (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0009)     13.090     1.212       2.75       60.78
   OUTFLOW: ID= 1 (  0063)     13.090     0.386       4.33       60.75

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.83
                 TIME SHIFT OF PEAK FLOW        (min)= 95.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.4270

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0058)|   Area     (ha)=   1.63
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.47          0.16
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          1.00
    Length            (m)=     104.24         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
              0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
              0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
              0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
              0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
              0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
              0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
              0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
              0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
              0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
              0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
              1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
              1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
              1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
              1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
              1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
              1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
              1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
              1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

    Max.Eff.Inten.(mm/hr)=       73.88         52.93
               over (min)         5.00         10.00
    Storage Coeff.  (min)=        2.96 (ii)     7.03 (ii)
    Unit Hyd. Tpeak (min)=        5.00         10.00
    Unit Hyd. peak  (cms)=        0.28          0.14
                                                            *TOTALS*
    PEAK FLOW       (cms)=        0.30          0.02          0.323 (iii)
```

```
     TIME TO PEAK     (hrs)=       2.75          2.75            2.75
     RUNOFF VOLUME     (mm)=      79.31         44.54           75.83
     TOTAL RAINFALL    (mm)=      80.31         80.31           80.31
     RUNOFF COEFFICIENT    =       0.99          0.55            0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0073)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000    |  0.0270     0.0780
                         0.0120     0.0426    |  0.0313     0.0880
                         0.0178     0.0560    |  0.0356     0.0949
                         0.0216     0.0670    |  0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0058)      1.630     0.323      2.75      75.83
   OUTFLOW: ID= 1 (  0073)      1.630     0.036      3.83      75.28

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 11.14
                  TIME SHIFT OF PEAK FLOW        (min)= 65.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0956

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0071)|   Area    (ha)=   0.25
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.22          0.03
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=     40.82         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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
              0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
              0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
              0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
              0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
              0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
              0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
              0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
              0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
              0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
              0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
              1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
              1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
              1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
              1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
              1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
              1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
              1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
              1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88         52.93
                over (min)        5.00          5.00
     Storage Coeff.   (min)=      1.68 (ii)     4.99 (ii)
     Unit Hyd. Tpeak  (min)=      5.00          5.00
     Unit Hyd. peak   (cms)=      0.32          0.22
                                                            *TOTALS*
     PEAK FLOW        (cms)=      0.05          0.00           0.050 (iii)
     TIME TO PEAK     (hrs)=      2.75          2.75            2.75
     RUNOFF VOLUME     (mm)=     79.31         44.54           75.82
     TOTAL RAINFALL    (mm)=     80.31         80.31           80.31
     RUNOFF COEFFICIENT    =      0.99          0.55            0.94
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0074)|   Area    (ha)=   0.21
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     0.19         0.02
     Dep. Storage     (mm)=     1.00         5.00
     Average Slope     (%)=     1.00         2.00
     Length            (m)=    37.42        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 | 1.667    9.64 | 3.250   20.88 |  4.83    1.61
               0.167    0.00 | 1.750    9.64 | 3.333   11.24 |  4.92    1.61
               0.250    0.00 | 1.833   27.30 | 3.417   11.24 |  5.00    1.61
               0.333    1.61 | 1.917   27.30 | 3.500   11.24 |  5.08    1.61
               0.417    1.61 | 2.000   27.30 | 3.583   11.24 |  5.17    1.61
               0.500    1.61 | 2.083   27.30 | 3.667   11.24 |  5.25    1.61
               0.583    1.61 | 2.167   27.30 | 3.750   11.24 |  5.33    1.61
               0.667    1.61 | 2.250   27.30 | 3.833    6.42 |  5.42    1.61
               0.750    1.61 | 2.333   73.88 | 3.917    6.42 |  5.50    1.61
               0.833    1.61 | 2.417   73.88 | 4.000    6.42 |  5.58    1.61
               0.917    1.61 | 2.500   73.88 | 4.083    6.42 |  5.67    1.61
               1.000    1.61 | 2.583   73.88 | 4.167    6.42 |  5.75    1.61
               1.083    1.61 | 2.667   73.88 | 4.250    6.42 |  5.83    1.61
               1.167    1.61 | 2.750   73.88 | 4.333    3.21 |  5.92    1.61
               1.250    1.61 | 2.833   20.88 | 4.417    3.21 |  6.00    1.61
               1.333    9.64 | 2.917   20.88 | 4.500    3.21 |  6.08    1.61
               1.417    9.64 | 3.000   20.88 | 4.583    3.21 |  6.17    1.61
               1.500    9.64 | 3.083   20.88 | 4.667    3.21 |  6.25    1.61
               1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88        52.93
               over (min)          5.00         5.00
     Storage Coeff.  (min)=        1.60 (ii)    4.91 (ii)
     Unit Hyd. Tpeak (min)=        5.00         5.00
     Unit Hyd. peak  (cms)=        0.32         0.22
                                                           *TOTALS*
     PEAK FLOW      (cms)=         0.04         0.00         0.042 (iii)
     TIME TO PEAK   (hrs)=         2.75         2.75          2.75
     RUNOFF VOLUME   (mm)=        79.31        44.54         75.82
     TOTAL RAINFALL  (mm)=        80.31        80.31         80.31
     RUNOFF COEFFICIENT   =        0.99         0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0075)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0042     0.0100
                          0.0019     0.0055   |   0.0049     0.0113
                          0.0028     0.0072   |   0.0056     0.0122
                          0.0034     0.0086   |   0.0000     0.0000

                                AREA     QPEAK      TPEAK        R.V.
                                (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0074)      0.210     0.042       2.75       75.82
   OUTFLOW: ID= 1 (  0075)      0.210     0.005       3.75       72.35

                 PEAK    FLOW    REDUCTION [Qout/Qin](%)= 12.87
```

```
                 TIME SHIFT OF PEAK FLOW        (min)= 60.00
                 MAXIMUM  STORAGE   USED      (ha.m.)=  0.0119

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

 --------------------
 | ADD HYD  (  0072)|
 |   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0071):       0.25   0.050     2.75    75.82
      + ID2= 2 (  0073):       1.63   0.036     3.83    75.28
        ===============================================
        ID = 3 (  0072):       1.88   0.075     2.75    75.35

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

 --------------------
 | ADD HYD  (  0072)|
 |   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
 --------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0072):       1.88   0.075     2.75    75.35
      + ID2= 2 (  0075):       0.21   0.005     3.75    72.35
        ===============================================
        ID = 1 (  0072):       2.09   0.079     2.75    75.05

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ----------------------------------------------------------------------------
 --------------------
 | RESERVOIR(  0065)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.0330     0.0305
                           0.0150     0.0159   |   0.0380     0.0340
                           0.0220     0.0216   |   0.0430     0.0377
                           0.0260     0.0256   |   0.0000     0.0000

                                 AREA     QPEAK      TPEAK        R.V.
                                 (ha)     (cms)      (hrs)        (mm)
   INFLOW : ID= 2 (  0072)      2.090      0.079       2.75       75.05
   OUTFLOW: ID= 1 (  0065)      2.090      0.034       5.75       74.92

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.19
                 TIME SHIFT OF PEAK FLOW        (min)=180.00
                 MAXIMUM  STORAGE   USED      (ha.m.)=  0.0314

 ----------------------------------------------------------------------------
 --------------------
 | CALIB            |
 | STANDHYD (  0077)|    Area     (ha)=    5.46
 |ID= 1 DT= 5.0 min |    Total Imp(%)=   90.00    Dir. Conn.(%)=  90.00
 --------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=      4.91          0.55
     Dep. Storage      (mm)=      1.00          5.00
     Average Slope      (%)=      1.00          2.00
     Length             (m)=    190.79         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 | 1.667     9.64 | 3.250    20.88 |   4.83     1.61
        0.167     0.00 | 1.750     9.64 | 3.333    11.24 |   4.92     1.61
        0.250     0.00 | 1.833    27.30 | 3.417    11.24 |   5.00     1.61
        0.333     1.61 | 1.917    27.30 | 3.500    11.24 |   5.08     1.61
        0.417     1.61 | 2.000    27.30 | 3.583    11.24 |   5.17     1.61
        0.500     1.61 | 2.083    27.30 | 3.667    11.24 |   5.25     1.61
        0.583     1.61 | 2.167    27.30 | 3.750    11.24 |   5.33     1.61
        0.667     1.61 | 2.250    27.30 | 3.833     6.42 |   5.42     1.61
        0.750     1.61 | 2.333    73.88 | 3.917     6.42 |   5.50     1.61
        0.833     1.61 | 2.417    73.88 | 4.000     6.42 |   5.58     1.61
        0.917     1.61 | 2.500    73.88 | 4.083     6.42 |   5.67     1.61
        1.000     1.61 | 2.583    73.88 | 4.167     6.42 |   5.75     1.61
        1.083     1.61 | 2.667    73.88 | 4.250     6.42 |   5.83     1.61
        1.167     1.61 | 2.750    73.88 | 4.333     3.21 |   5.92     1.61
        1.250     1.61 | 2.833    20.88 | 4.417     3.21 |   6.00     1.61
        1.333     9.64 | 2.917    20.88 | 4.500     3.21 |   6.08     1.61
        1.417     9.64 | 3.000    20.88 | 4.583     3.21 |   6.17     1.61
        1.500     9.64 | 3.083    20.88 | 4.667     3.21 |   6.25     1.61
```

```
           1.583    9.64 | 3.167   20.88 | 4.750    3.21 |

     Max.Eff.Inten.(mm/hr)=      73.88        52.93
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.25 (ii)    7.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.01         0.07         1.081 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75          2.75
     RUNOFF VOLUME    (mm)=      79.31        44.54         75.83
     TOTAL RAINFALL   (mm)=      80.31        80.31         80.31
     RUNOFF COEFFICIENT   =       0.99         0.55          0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0006):      30.45    0.526      5.00     68.67
      + ID2= 2 (  0063):      13.09    0.386      4.33     60.75
        ===============================================================
        ID = 3 (  0064):      43.54    0.900      4.58     66.29

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

--------------------
| ADD HYD  (  0064)|
|   3 +  2 =  1    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 3 (  0064):      43.54    0.900      4.58     66.29
      + ID2= 2 (  0065):       2.09    0.034      5.75     74.92
        ===============================================================
        ID = 1 (  0064):      45.63    0.933      4.67     66.68

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

--------------------
| ADD HYD  (  0064)|
|   1 +  2 =  3    |           AREA     QPEAK     TPEAK      R.V.
--------------------           (ha)     (cms)     (hrs)      (mm)
        ID1= 1 (  0064):      45.63    0.933      4.67     66.68
      + ID2= 2 (  0077):       5.46    1.081      2.75     75.83
        ===============================================================
        ID = 3 (  0064):      51.09    1.422      2.75     67.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  0013)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
               <------ DATA FOR SECTION (    1.1) ------>
               Distance       Elevation        Manning
                   0.00          101.50          0.0500
                   1.00          100.70          0.0500
                   1.50          100.55     0.0500 /0.0300  Main Channel
                   2.00           99.50          0.0300     Main Channel
                   3.50           99.60          0.0300     Main Channel
                   4.50          100.65     0.0300 /0.0500  Main Channel
                   6.00          101.45          0.0500

      <-------------------- TRAVEL TIME TABLE --------------------->
       DEPTH     ELEV      VOLUME     FLOW RATE    VELOCITY    TRAV.TIME
        (m)       (m)      (cu.m.)      (cms)        (m/s)       (min)
       0.10     99.60     .353E+02       0.0          0.19       43.69
       0.19     99.69     .112E+03       0.1          0.37       22.76
       0.29     99.79     .195E+03       0.2          0.49       17.03
       0.38     99.88     .285E+03       0.3          0.59       14.23
       0.48     99.98     .381E+03       0.5          0.67       12.51
       0.57    100.07     .484E+03       0.7          0.74       11.32
       0.67    100.17     .594E+03       0.9          0.80       10.43
       0.76    100.26     .710E+03       1.2          0.86        9.74
```

0.86	100.36	.832E+03	1.5	0.91	9.18
0.95	100.45	.961E+03	1.8	0.96	8.72
1.05	100.55	.110E+04	2.2	1.00	8.32
1.16	100.66	.127E+04	2.7	1.07	7.80
1.28	100.78	.148E+04	3.4	1.14	7.31
1.39	100.89	.170E+04	4.1	1.20	6.94
1.50	101.00	.195E+04	4.9	1.25	6.65
1.61	101.11	.221E+04	5.8	1.30	6.41
1.72	101.22	.250E+04	6.7	1.34	6.22
1.84	101.34	.280E+04	7.7	1.38	6.04
1.95	101.45	.313E+04	8.8	1.41	5.90

		<---- hydrograph	---->		<-pipe / channel->	
	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)	MAX DEPTH (m)	MAX VEL (m/s)
INFLOW : ID= 2 (0064)	51.09	1.42	2.75	67.66	0.83	0.89
OUTFLOW: ID= 1 (0013)	51.09	1.30	2.75	67.66	0.79	0.87

| CALIB |
| NASHYD (0018) |
| ID= 1 DT= 5.0 min |

Area (ha)= 10.38 Curve Number (CN)= 83.0
Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.89

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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61
0.250	0.00	1.833	27.30	3.417	11.24	5.00	1.61
0.333	1.61	1.917	27.30	3.500	11.24	5.08	1.61
0.417	1.61	2.000	27.30	3.583	11.24	5.17	1.61
0.500	1.61	2.083	27.30	3.667	11.24	5.25	1.61
0.583	1.61	2.167	27.30	3.750	11.24	5.33	1.61
0.667	1.61	2.250	27.30	3.833	6.42	5.42	1.61
0.750	1.61	2.333	73.88	3.917	6.42	5.50	1.61
0.833	1.61	2.417	73.88	4.000	6.42	5.58	1.61
0.917	1.61	2.500	73.88	4.083	6.42	5.67	1.61
1.000	1.61	2.583	73.88	4.167	6.42	5.75	1.61
1.083	1.61	2.667	73.88	4.250	6.42	5.83	1.61
1.167	1.61	2.750	73.88	4.333	3.21	5.92	1.61
1.250	1.61	2.833	20.88	4.417	3.21	6.00	1.61
1.333	9.64	2.917	20.88	4.500	3.21	6.08	1.61
1.417	9.64	3.000	20.88	4.583	3.21	6.17	1.61
1.500	9.64	3.083	20.88	4.667	3.21	6.25	1.61
1.583	9.64	3.167	20.88	4.750	3.21		

Unit Hyd Qpeak (cms)= 0.445

PEAK FLOW (cms)= 0.547 (i)
TIME TO PEAK (hrs)= 3.583
RUNOFF VOLUME (mm)= 44.541
TOTAL RAINFALL (mm)= 80.310
RUNOFF COEFFICIENT = 0.555

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

| CALIB |
| STANDHYD (0019) |
| ID= 1 DT= 5.0 min |

Area (ha)= 12.41
Total Imp(%)= 90.00 Dir. Conn.(%)= 90.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	11.17	1.24
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	287.63	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	1.667	9.64	3.250	20.88	4.83	1.61
0.167	0.00	1.750	9.64	3.333	11.24	4.92	1.61

```
                 0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                 0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                 0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                 0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                 0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                 0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                 0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                 0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                 0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                 1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                 1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                 1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          52.93
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        5.44 (ii)      8.74 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.20           0.12
                                                              *TOTALS*
     PEAK FLOW       (cms)=        2.29           0.16          2.449 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
     RUNOFF VOLUME    (mm)=       79.31          44.54          75.83
     TOTAL RAINFALL   (mm)=       80.31          80.31          80.31
     RUNOFF COEFFICIENT   =        0.99           0.55           0.94


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0043)|   Area    (ha)=  11.15
|ID= 1 DT= 5.0 min |   Total Imp(%)=  90.00   Dir. Conn.(%)=  90.00
--------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        10.03           1.12
     Dep. Storage     (mm)=         1.00           5.00
     Average Slope     (%)=         1.00           2.00
     Length            (m)=       272.64          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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
                 0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
                 0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
                 0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
                 0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
                 0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
                 0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
                 0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
                 0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
                 0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
                 0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
                 1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
                 1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
                 1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
                 1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
                 1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
                 1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
                 1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
                 1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88          52.93
                over (min)         5.00          10.00
     Storage Coeff.  (min)=        5.26 (ii)      8.57 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.21           0.12
                                                              *TOTALS*
     PEAK FLOW       (cms)=        2.06           0.15          2.202 (iii)
     TIME TO PEAK    (hrs)=        2.75           2.75           2.75
```

```
     RUNOFF VOLUME    (mm)=       79.31         44.54           75.83
     TOTAL RAINFALL   (mm)=       80.31         80.31           80.31
     RUNOFF COEFFICIENT   =        0.99          0.55            0.94

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0045)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   1.0400     0.3830

                                AREA      QPEAK      TPEAK       R.V.
                                (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0043)     11.150     2.202      2.75       75.83
   OUTFLOW: ID= 1 (  0045)     11.150     1.022      2.92       75.82

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 46.42
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3782

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0044)|   Area    (ha)=  31.33
|ID= 1 DT= 5.0 min |   Total Imp(%)=  61.00   Dir. Conn.(%)=  61.00
--------------------
                           IMPERVIOUS     PERVIOUS (i)
     Surface Area     (ha)=      19.11         12.22
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     457.02         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 | 1.667     9.64 | 3.250    20.88 |  4.83     1.61
               0.167     0.00 | 1.750     9.64 | 3.333    11.24 |  4.92     1.61
               0.250     0.00 | 1.833    27.30 | 3.417    11.24 |  5.00     1.61
               0.333     1.61 | 1.917    27.30 | 3.500    11.24 |  5.08     1.61
               0.417     1.61 | 2.000    27.30 | 3.583    11.24 |  5.17     1.61
               0.500     1.61 | 2.083    27.30 | 3.667    11.24 |  5.25     1.61
               0.583     1.61 | 2.167    27.30 | 3.750    11.24 |  5.33     1.61
               0.667     1.61 | 2.250    27.30 | 3.833     6.42 |  5.42     1.61
               0.750     1.61 | 2.333    73.88 | 3.917     6.42 |  5.50     1.61
               0.833     1.61 | 2.417    73.88 | 4.000     6.42 |  5.58     1.61
               0.917     1.61 | 2.500    73.88 | 4.083     6.42 |  5.67     1.61
               1.000     1.61 | 2.583    73.88 | 4.167     6.42 |  5.75     1.61
               1.083     1.61 | 2.667    73.88 | 4.250     6.42 |  5.83     1.61
               1.167     1.61 | 2.750    73.88 | 4.333     3.21 |  5.92     1.61
               1.250     1.61 | 2.833    20.88 | 4.417     3.21 |  6.00     1.61
               1.333     9.64 | 2.917    20.88 | 4.500     3.21 |  6.08     1.61
               1.417     9.64 | 3.000    20.88 | 4.583     3.21 |  6.17     1.61
               1.500     9.64 | 3.083    20.88 | 4.667     3.21 |  6.25     1.61
               1.583     9.64 | 3.167    20.88 | 4.750     3.21 |

     Max.Eff.Inten.(mm/hr)=       73.88         51.42
                over (min)         5.00         20.00
     Storage Coeff.  (min)=        7.18 (ii)    18.51 (ii)
     Unit Hyd. Tpeak (min)=        5.00         20.00
     Unit Hyd. peak  (cms)=        0.17          0.06
                                                               *TOTALS*
     PEAK FLOW       (cms)=        3.88          1.20            4.960 (iii)
     TIME TO PEAK    (hrs)=        2.75          2.92             2.75
     RUNOFF VOLUME    (mm)=       79.31         44.54            65.75
     TOTAL RAINFALL   (mm)=       80.31         80.31            80.31
     RUNOFF COEFFICIENT   =        0.99          0.55             0.82

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  83.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
```

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

 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR( 0046)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   2.2770     1.0445

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 2 (  0044)      31.330     4.960      2.75      65.75
    OUTFLOW: ID= 1 (  0046)      31.330     2.000      3.25      65.75

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.33
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.9182

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

 --------------------
 | ADD HYD  (  0016)|
 |  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
 --------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0018):      10.38   0.547      3.58     44.54
      + ID2= 2 (  0019):      12.41   2.449      2.75     75.83
        ====================================================
        ID = 3 (  0016):      22.79   2.651      2.75     61.58

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

 --------------------
 | ADD HYD  (  0016)|
 |  3 +  2 =  1     |          AREA    QPEAK     TPEAK      R.V.
 --------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 3 (  0016):      22.79   2.651      2.75     61.58
      + ID2= 2 (  0045):      11.15   1.022      2.92     75.82
        ====================================================
        ID = 1 (  0016):      33.94   3.605      2.75     66.26

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

 --------------------
 | ADD HYD  (  0016)|
 |  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
 --------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0016):      33.94   3.605      2.75     66.26
      + ID2= 2 (  0046):      31.33   2.000      3.25     65.75
        ====================================================
        ID = 3 (  0016):      65.27   5.237      2.75     66.01

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 ------------------------------------------------------------------------------
 --------------------
 | RESERVOIR( 0015)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.5430     2.2000
                           0.0690     0.8600   |   0.6780     2.6500
                           0.3000     1.2500   |   0.7830     3.0000
                           0.4450     1.8500   |   0.8900     3.3500

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 2 (  0016)      65.270     5.237      2.75      66.01
    OUTFLOW: ID= 1 (  0015)      65.270     0.837      5.92      65.80

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.98
                  TIME SHIFT OF PEAK FLOW         (min)=190.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  3.1762

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

 --------------------
 | ADD HYD  (  0060)|
 |  1 +  2 =  3     |          AREA    QPEAK     TPEAK      R.V.
 --------------------          (ha)    (cms)     (hrs)      (mm)
        ID1= 1 (  0013):      51.09   1.296      2.75     67.66
      + ID2= 2 (  0015):      65.27   0.837      5.92     65.80
        ====================================================
```

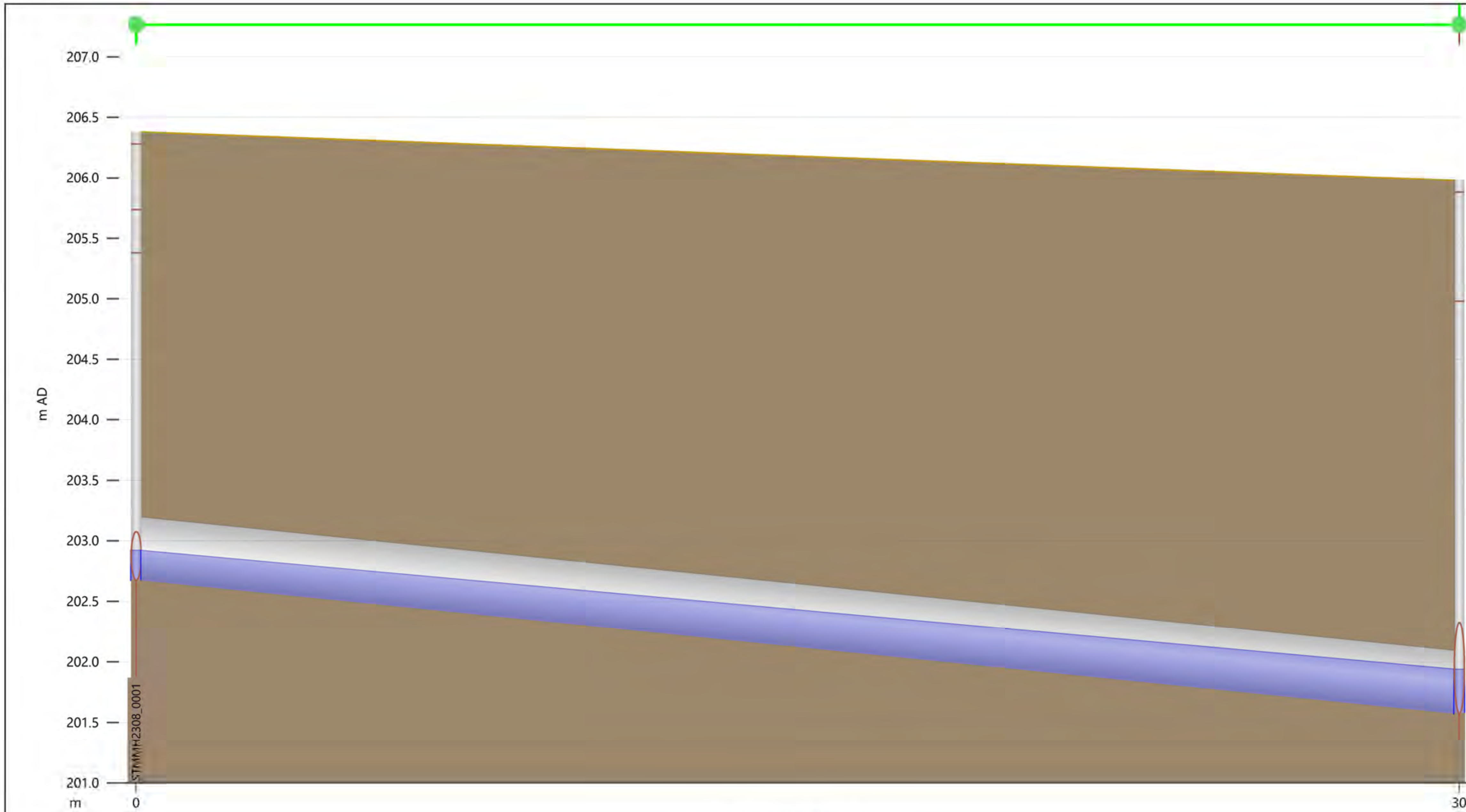
```
       ID = 3 (  0060):   116.36   1.761     4.83    66.61

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| ROUTE CHN(  2255)|
| IN= 2---> OUT= 1 |     Routing time step (min)'=  5.00
--------------------
                <------ DATA FOR SECTION (   1.1) ------>
                Distance      Elevation       Manning
                   28.50        210.02        0.0600
                   47.35        209.86        0.0450      Main Channel
                   51.00        209.76        0.0450      Main Channel
                   60.44        209.54        0.0450      Main Channel
                   65.44        209.60        0.0450      Main Channel
                   72.65        209.41        0.0450      Main Channel
                   95.97        208.53        0.0450      Main Channel
                  103.18        208.38        0.0450      Main Channel
                  108.18        208.33        0.0450      Main Channel
                  116.25        208.08        0.0450      Main Channel
                  122.09        207.92        0.0450      Main Channel
                  131.52        207.65        0.0450      Main Channel
                  149.56        208.22        0.0450      Main Channel
                  155.39        208.49        0.0450      Main Channel
                  177.88        208.58        0.0450      Main Channel
                  190.96        208.73        0.0450      Main Channel
                  195.96        208.72        0.0450      Main Channel
                  226.50        209.32        0.0450      Main Channel
                  238.71        209.46    0.0450 /0.0600  Main Channel
                  251.40        209.70        0.0600

      <--------------------- TRAVEL TIME TABLE --------------------->
       DEPTH    ELEV      VOLUME     FLOW RATE     VELOCITY    TRAV.TIME
        (m)      (m)     (cu.m.)       (cms)         (m/s)       (min)
       0.11   207.75    .601E+03        0.0          0.12       222.56
       0.21   207.86    .241E+04        0.3          0.19       140.20
       0.32   207.97    .542E+04        0.8          0.25       107.47
       0.43   208.07    .969E+04        1.8          0.30        89.07
       0.53   208.18    .152E+05        3.3          0.35        76.07
       0.64   208.29    .218E+05        5.5          0.40        66.47
       0.75   208.39    .296E+05        8.0          0.43        61.92
       0.85   208.50    .389E+05       11.2          0.46        58.04
       0.96   208.61    .519E+05       14.2          0.44        60.79
       1.07   208.71    .677E+05       20.3          0.48        55.45
       1.17   208.82    .861E+05       27.7          0.52        51.74
       1.28   208.93    .106E+06       37.5          0.57        47.20
       1.39   209.03    .128E+06       48.7          0.61        43.64
       1.49   209.14    .150E+06       61.5          0.66        40.75
       1.60   209.25    .175E+06       76.0          0.70        38.35
       1.71   209.35    .201E+06       91.6          0.73        36.50
       1.81   209.46    .228E+06      107.8          0.76        35.28
       1.93   209.58    .262E+06      130.3          0.80        33.51
       2.05   209.70    .299E+06      156.6          0.84        31.84

                                      <---- hydrograph ---->   <-pipe / channel->
                              AREA    QPEAK   TPEAK   R.V.    MAX DEPTH  MAX VEL
                              (ha)    (cms)   (hrs)   (mm)       (m)      (m/s)
   INFLOW : ID= 2 (  0060)   116.36    1.76    4.83   66.61      0.42      0.30
   OUTFLOW: ID= 1 (  2255)   116.36    1.57    6.50   66.60      0.40      0.29

-------------------------------------------------------------------------------
```

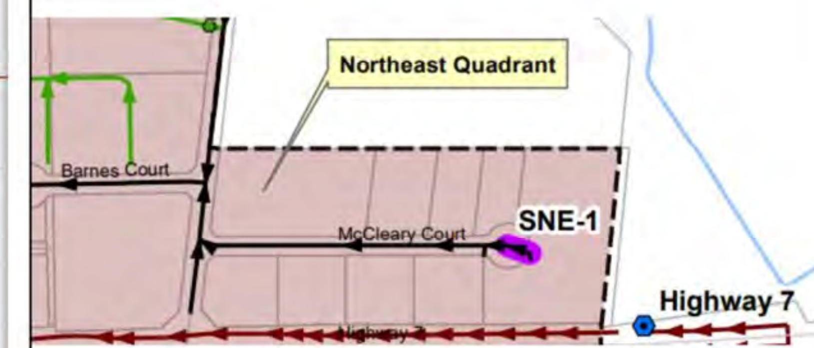
Appendix C Hydraulic Model Outputs

Proposed Improvements:

Pipe Replacement

XX Project ID





Link	STMMH2308_0001.1	
US node ID	STMMH2308_0001	
ds node	STMMH14720	
length (m)	30.0	
Shape ID	CIRC	
height (mm)	525	
us inv (m AD)	202.675	
ds inv (m AD)	201.575	
grad (m/m)	0.03672	
pfc (l/s)	824	
surc	0.69	
DS flow (l/s)	344.10	
Node	STMMH2308_0001	STMMH14720
ground (m AD)	206.380	205.981
level (m AD)	202.919	201.937
flood dep (m)	-3.461	-4.044

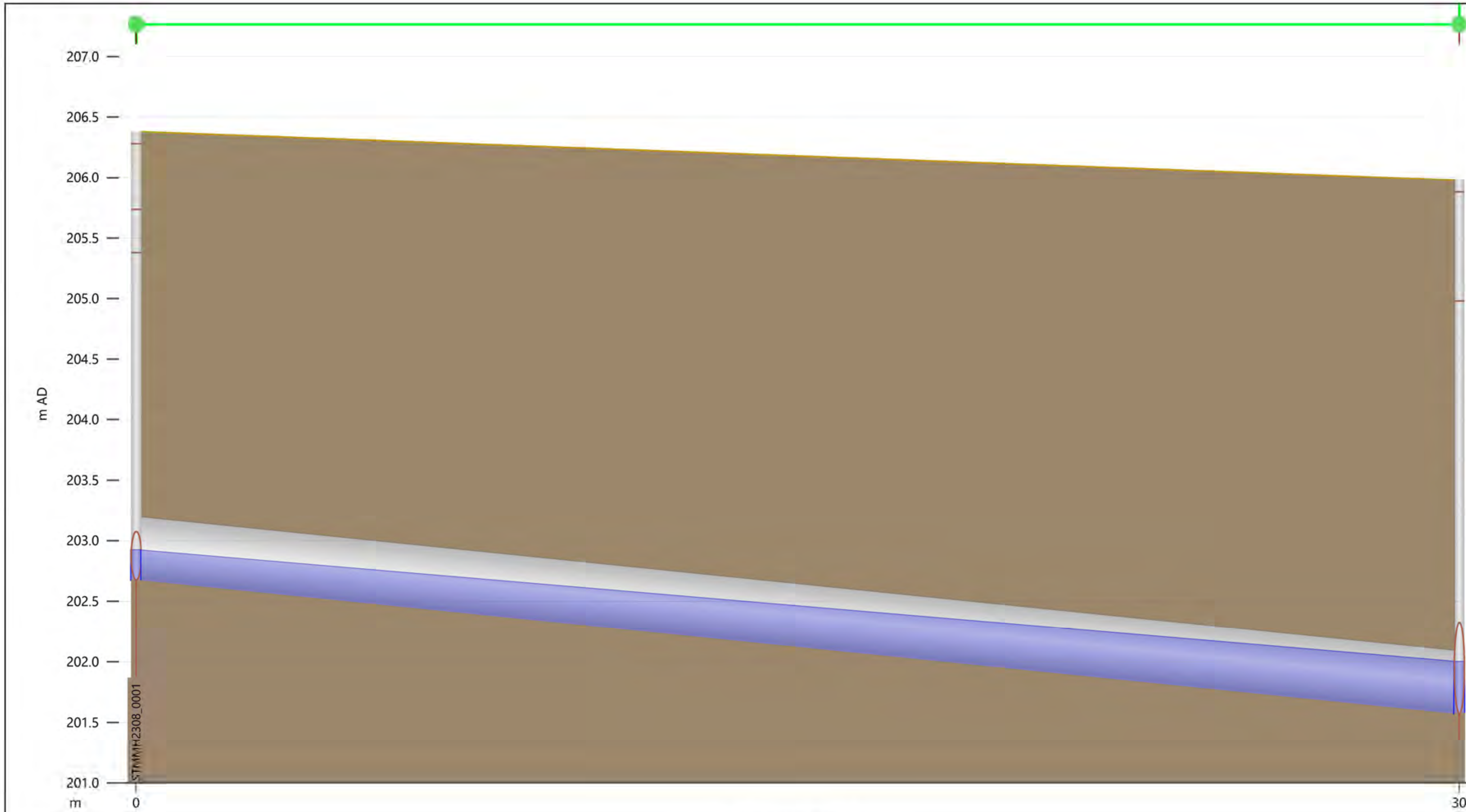
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNE-1
Location: McCleary Court
HGL - 5 Year Design Storm

DATE: February 2024

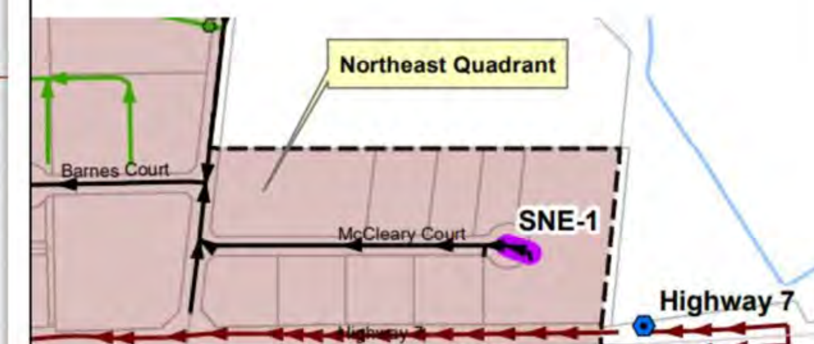
Figure: SNE-1



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH2308_0001.1	
US node ID	STMMH2308_0001	
ds node	STMMH14720	
length (m)	30.0	
Shape ID	CIRC	
height (mm)	525	
us inv (m AD)	202.675	
ds inv (m AD)	201.575	
grad (m/m)	0.03672	
pfc (l/s)	824	
surc	0.81	
DS flow (l/s)	349.77	
Node	STMMH2308_0001	STMMH14720
ground (m AD)	206.380	205.981
level (m AD)	202.921	202.000
flood dep (m)	-3.459	-3.981

CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNE-1
Location: McCleary Court
HGL - 100 Year Design Storm

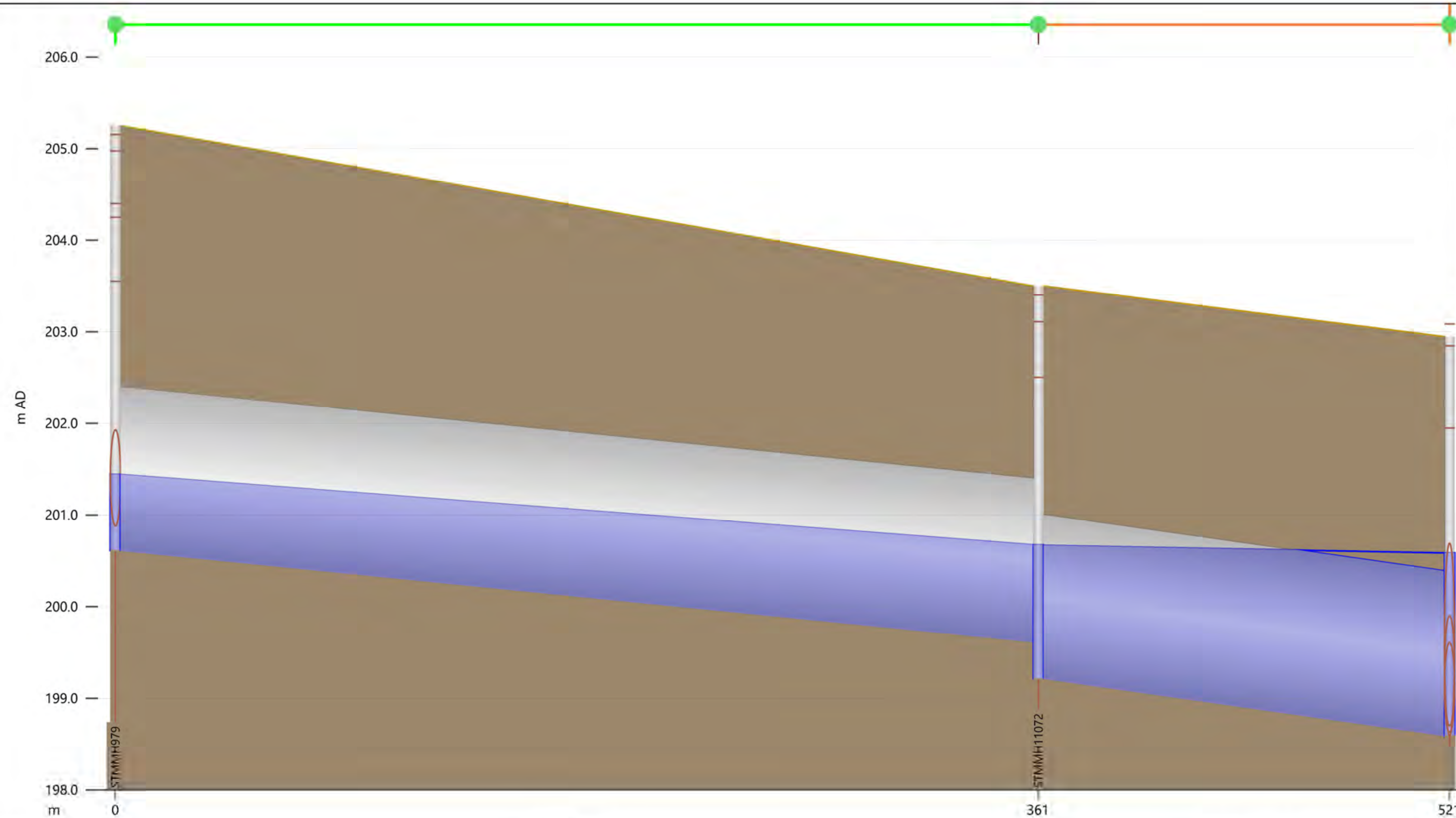
DATE: February 2024

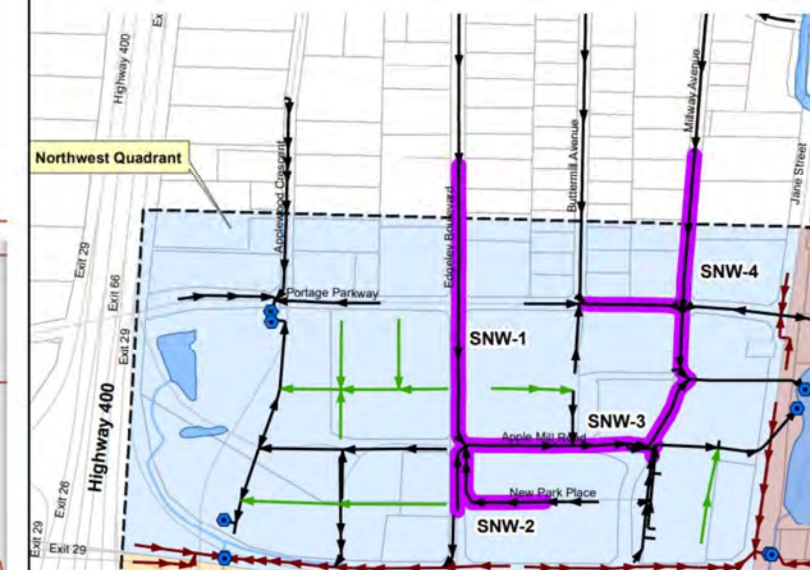
Figure: SNE-1

Proposed Improvements:

Pipe Replacement

XX Project ID





Link	STMMH979.1	STMMH11072.1
US node ID	STMMH979	STMMH11072
ds node	STMMH11072	STMMH763
length (m)	360.7	160.7
Shape ID	CIRC	CIRC
height (mm)	1800	1800
us inv (m AD)	200.610	199.213
ds inv (m AD)	199.610	198.591
grad (m/m)	0.00277	0.00387
pfc (l/s)	6053	7153
surc	0.59	1.00
DS flow (l/s)	2543.84	2550.11

Node	STMMH979	STMMH11072	STMMH763
ground (m AD)	205.252	203.503	202.948
level (m AD)	201.444	200.675	200.587
flood dep (m)	-3.808	-2.828	-2.361

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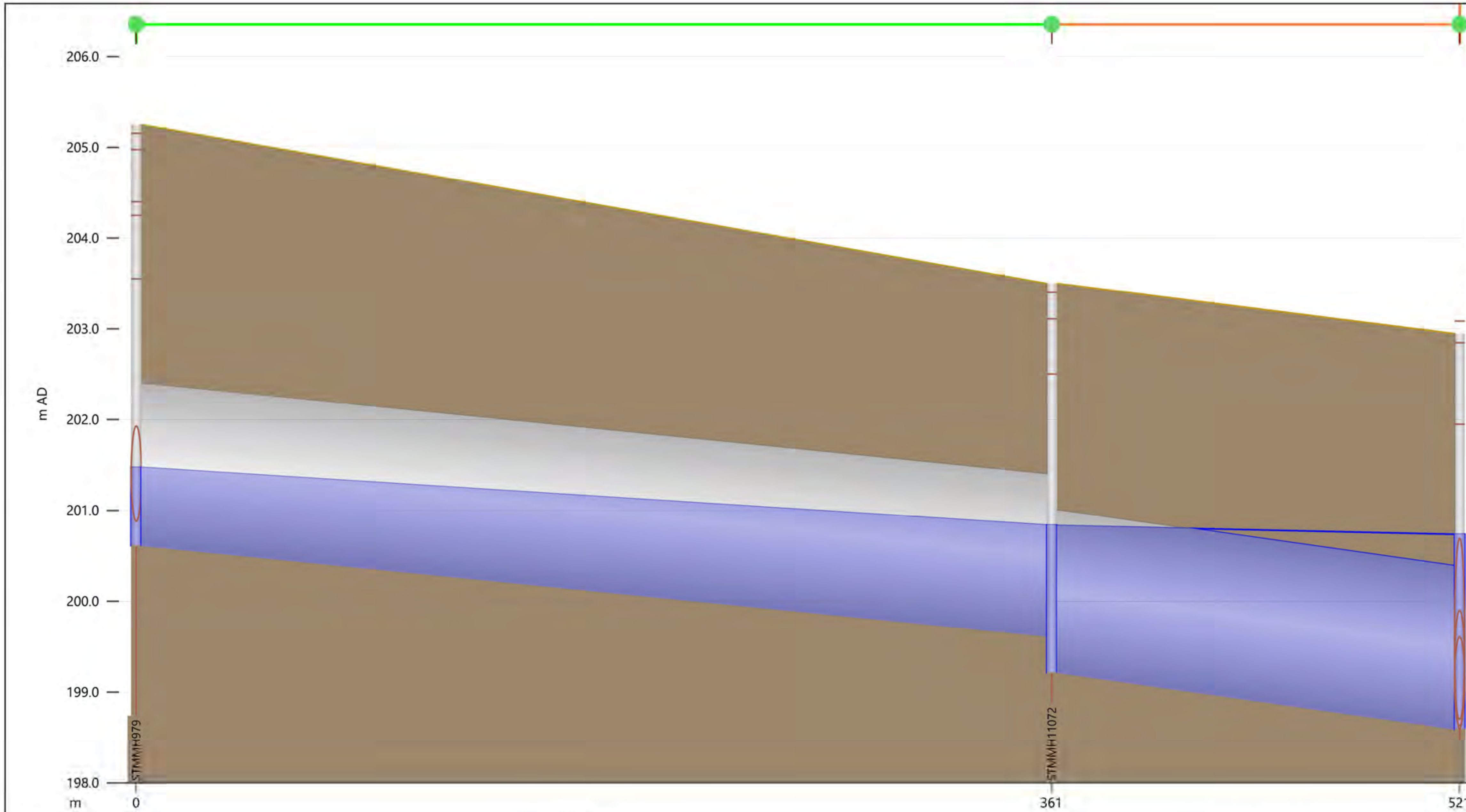
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-1
Location: Edgeley Blvd
HGL - 5 Year Design Storm

DATE: February 2024

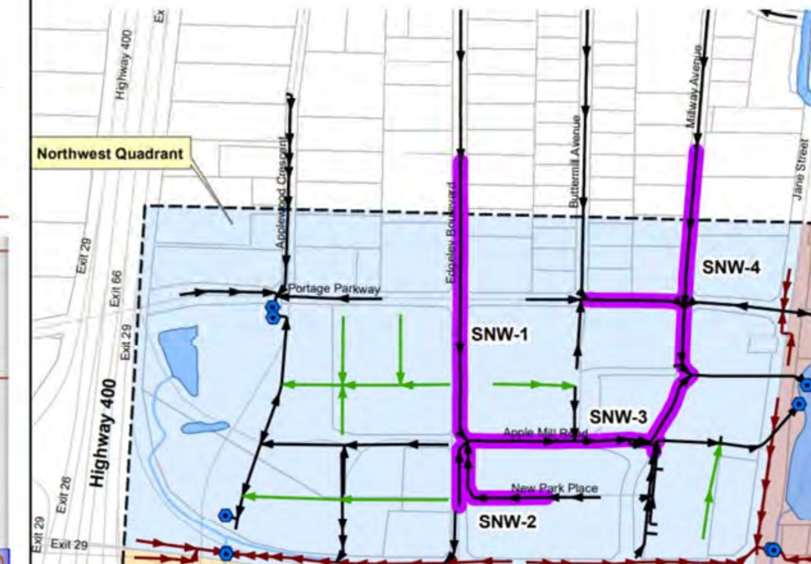
Figure: SNW-1



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH979.1	STMMH11072.1
US node ID	STMMH979	STMMH11072
ds node	STMMH11072	STMMH763
length (m)	360.7	160.7
Shape ID	CIRC	CIRC
height (mm)	1800	1800
us inv (m AD)	200.610	199.813
ds inv (m AD)	199.610	198.591
grad (m/m)	0.00277	0.00387
pfc (l/s)	6053	7153
surc	0.68	1.00
DS flow (l/s)	2759.87	2836.94

Node	STMMH979	STMMH11072	STMMH763
ground (m AD)	205.252	203.503	202.948
level (m AD)	201.475	200.839	200.737
flood dep (m)	-3.777	-2.664	-2.210

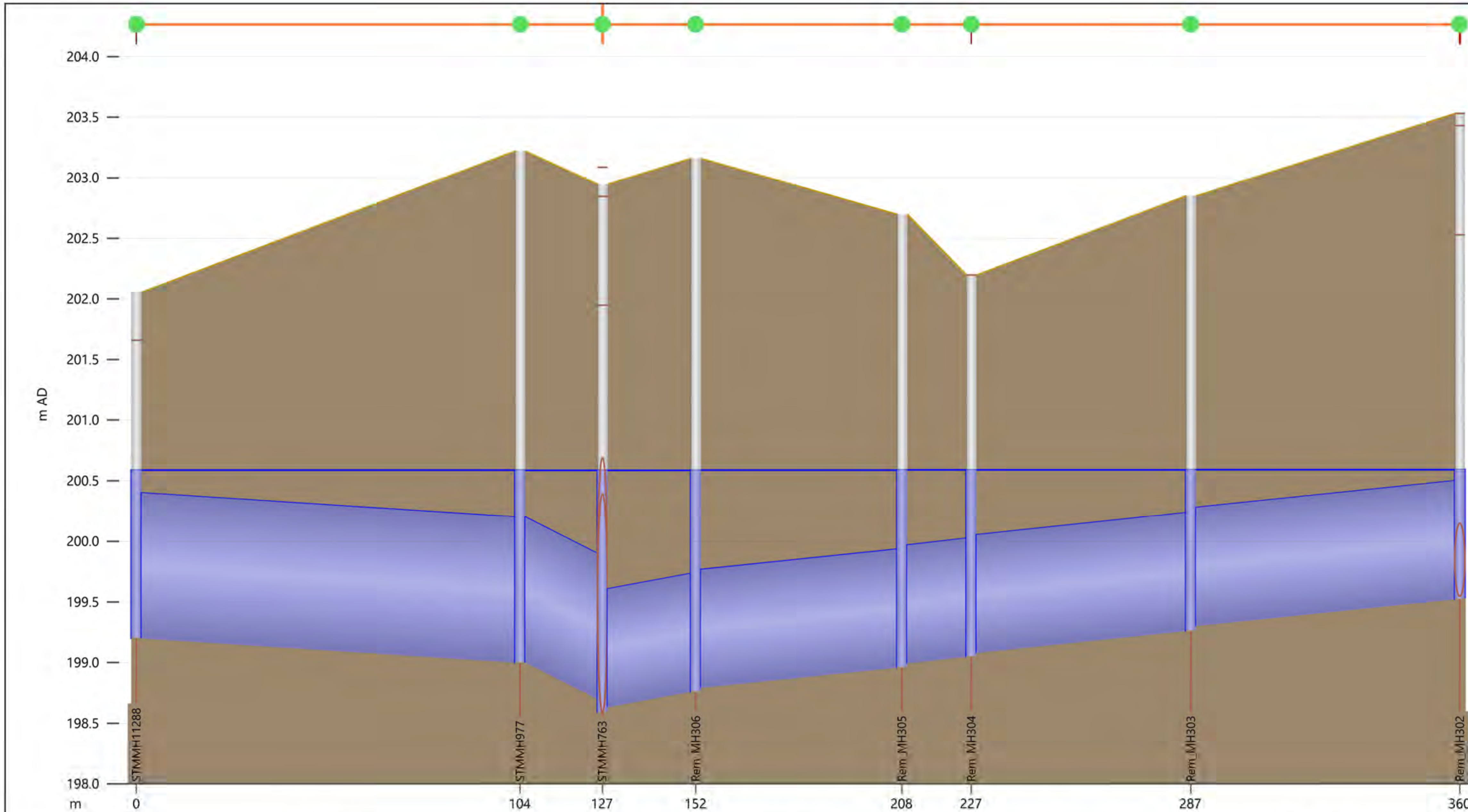
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-1
Location: Edgeley Blvd
HGL - 100 Year Design Storm

DATE: February 2024

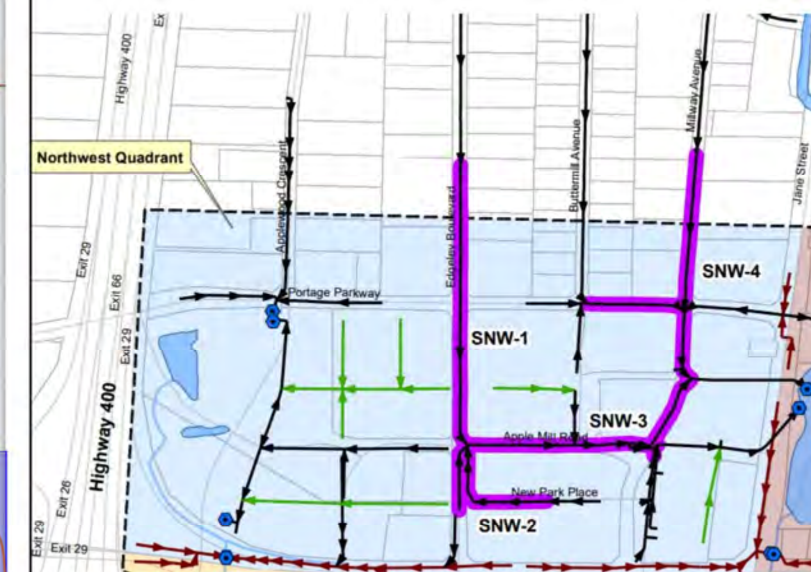
Figure: SNW-1



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH11288.1	-	-	Rem_MH305.1	-	Rem_MH303.1	Rem_MH302.1
US node ID	STMMH11288	STMMH977	Rem_MH306	Rem_MH305	-	Rem_MH303	Rem_MH302
ds node	STMMH977	STMMH763	STMMH763	Rem_MH306	-	Rem_MH304	Rem_MH303
length (m)	104.4	22.4	25.4	56.1	18.9	59.7	73.2
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	1200	1200	975	975	975	975	975
us inv (m AD)	199.200	199.000	198.760	198.960	199.050	199.261	199.525
ds inv (m AD)	199.000	198.700	198.633	198.792	198.993	199.079	199.305
grad (m/m)	0.00192	0.01340	0.00500	0.00299	0.00302	0.00305	0.00301
pfc (l/s)	1707	4514	1585	1227	1231	1238	1229
surc	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DS flow (l/s)	526.59	624.69	774.74	732.63	585.90	528.05	348.78

Node	STMMH11288	STMMH977	STMMH763	Rem_MH306	Rem_MH305	Rem_MH304	Rem_MH303	Rem_MH302
ground (m AD)	202.058	203.221	202.948	203.160	202.700	202.200	202.850	203.530
level (m AD)	200.587	200.587	200.587	200.587	200.589	200.589	200.590	200.592
flood dep (m)	-1.471	-2.635	-2.361	-2.573	-2.111	-1.611	-2.260	-2.938

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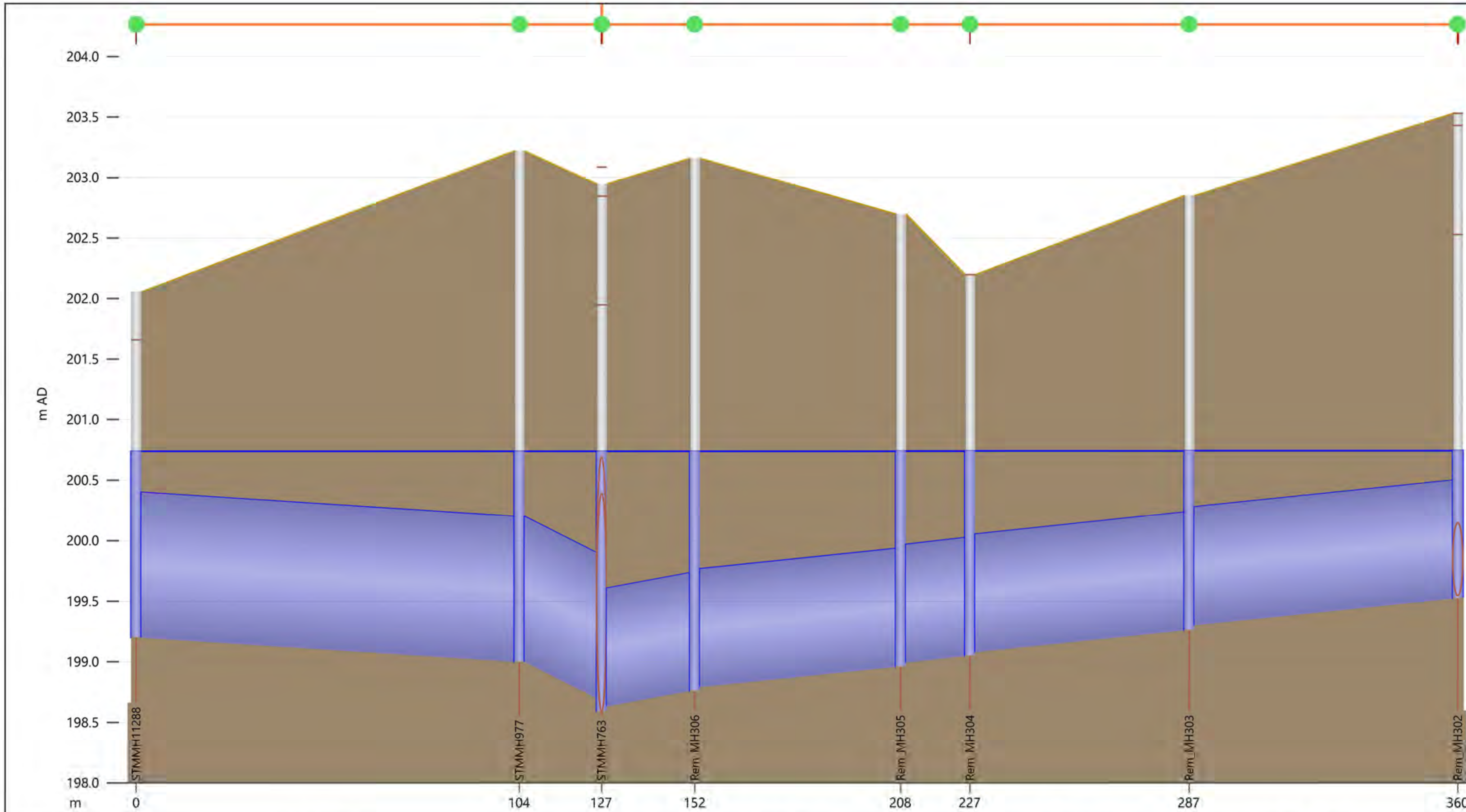
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-2
Location: Edgeley Blvd & New Park Place
HGL - 5 Year Design Storm

DATE: February 2024

Figure: SNW-2



Proposed Improvements:

Pipe Replacement

XX Project ID

Link	STMMH11288.1	-	-	Rem_MH305.1	-	Rem_MH303.1	Rem_MH302.1
US node ID	STMMH11288	STMMH977	Rem_MH306	Rem_MH305	-	Rem_MH303	Rem_MH302
ds node	STMMH977	STMMH763	STMMH763	Rem_MH306	-	Rem_MH304	Rem_MH303
length (m)	104.4	22.4	25.4	56.1	18.9	59.7	73.2
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	1200	1200	975	975	975	975	975
us inv (m AD)	199.200	199.000	198.760	198.960	199.050	199.261	199.525
ds inv (m AD)	199.000	198.700	198.633	198.792	198.993	199.079	199.305
grad (m/m)	0.00192	0.01340	0.00500	0.00299	0.00302	0.00305	0.00301
pfc (l/s)	1707	4514	1585	1227	1231	1238	1229
surc	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DS flow (l/s)	526.57	624.67	774.71	732.61	585.90	528.04	348.78

Node	STMMH11288	STMMH977	STMMH763	Rem_MH306	Rem_MH305	Rem_MH304	Rem_MH303	Rem_MH302
ground (m AD)	202.058	203.221	202.948	203.160	202.700	202.200	202.850	203.530
level (m AD)	200.738	200.737	200.737	200.738	200.740	200.741	200.743	200.745
flood dep (m)	-1.321	-2.484	-2.210	-2.422	-1.960	-1.459	-2.107	-2.785

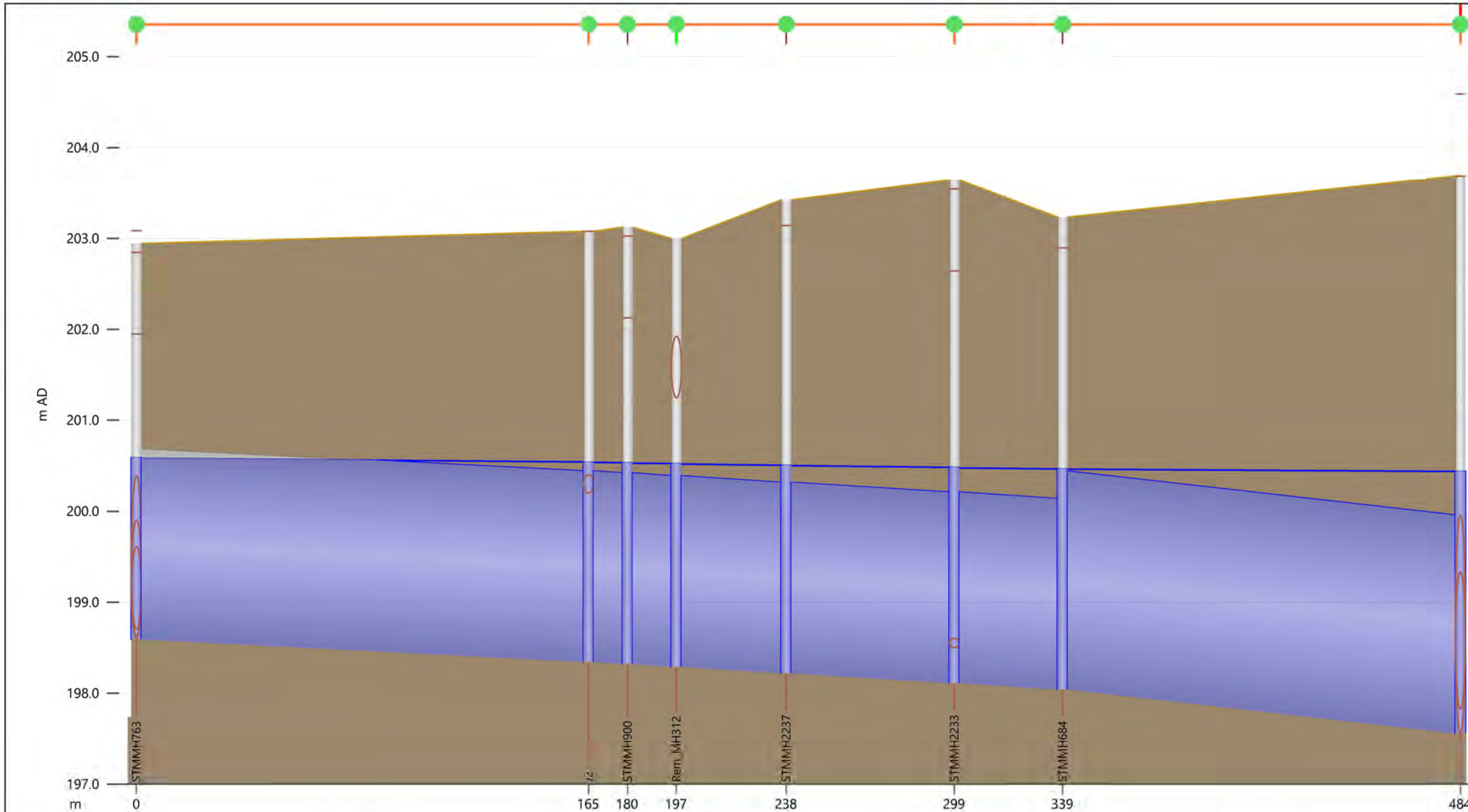
CIVICA Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-2
Location: Edgeley Blvd & New Park Place
HGL - 100 Year Design Storm

DATE: February 2024

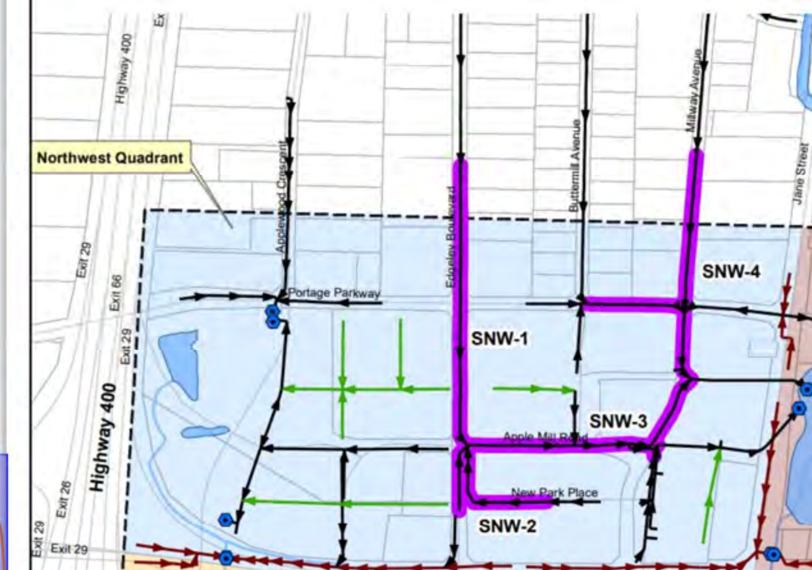
Figure: SNW-2



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH763.1	J2.1	-	Rem_MH312.1	STMMH2237.1	STMMH2233.1	STMMH684.1
US node ID	STMMH763	J2	-	Rem_MH312	STMMH2237	STMMH2233	STMMH684
ds node	J2	-	-	STMMH2237	STMMH2233	STMMH684	STMMH678
length (m)	165.3	14.2	17.9	40.2	61.5	39.6	145.4
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	2100	2100	2100	2100	2100	2100	2400
us inv (m AD)	198.591	-		198.289	198.218	198.110	198.040
ds inv (m AD)	198.342	-	-	198.218	198.110	198.040	197.558
grad (m/m)	0.00150	-	-	0.00176	0.00176	0.00177	0.00331
pfc (l/s)	6726	6726	7269	7269	7269	7294	14254
surc	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DS flow (l/s)	4059.99	-	-	4341.29	4686.47	5047.25	8836.97

Node	STMMH763	J2	-	-	STMMH2237	STMMH2233	STMMH684	STMMH678
ground (m AD)	202.948	203.080	-	203.000	203.424	203.644	203.236	203.687
level (m AD)	200.587	200.541	-	200.524	200.507	200.483	200.465	200.439
flood dep (m)	-2.361	-2.539	-	-2.476	-2.917	-3.161	-2.771	-3.248

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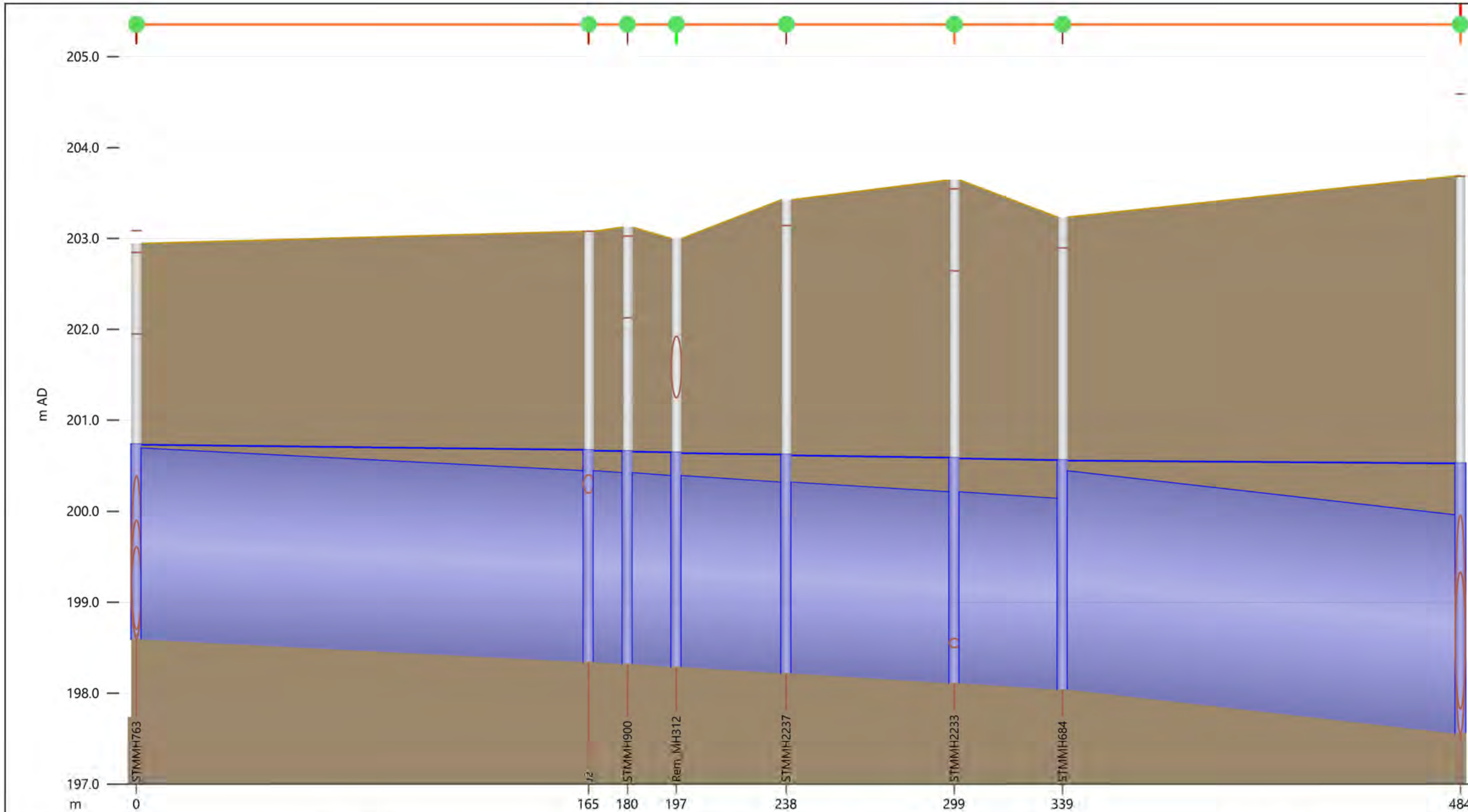
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-3
Location: Apple Mill Rd & Millway Ave
HGL - 5 Year Design Storm

DATE: February 2024

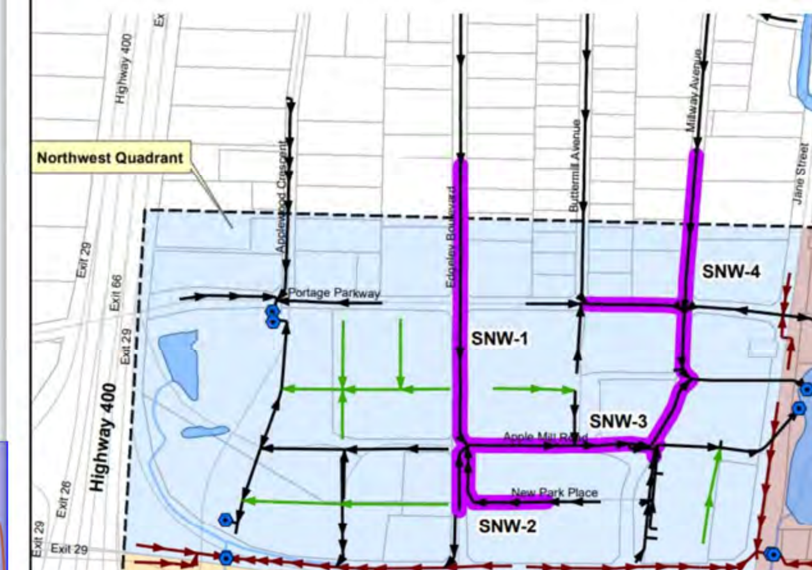
Figure: SNW-3



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH763.1	J2.1	-	Rem_MH312.1	STMMH2237.1	STMMH2233.1	STMMH684.1
US node ID	STMMH763	J2	-	Rem_MH312	STMMH2237	STMMH2233	STMMH684
ds node	J2	-	-	STMMH2237	STMMH2233	STMMH684	STMMH678
length (m)	165.3	14.2	17.9	40.2	61.5	39.6	145.4
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	2100	2100	2100	2100	2100	2100	2400
us inv (m AD)	198.591	-		198.289	198.218	198.110	198.040
ds inv (m AD)	198.342	-	-	198.218	198.110	198.040	197.558
grad (m/m)	0.00150	-	-	0.00176	0.00176	0.00177	0.00331
pfc (l/s)	6726	6726	7269	7269	7269	7294	14254
surc	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DS flow (l/s)	4059.87	-	-	4341.35	4686.38	5046.81	8835.85

Node	STMMH763	J2	-	-	STMMH2237	STMMH2233	STMMH684	STMMH678
ground (m AD)	202.948	203.080	-	203.000	203.424	203.644	203.236	203.687
level (m AD)	200.737	200.674	-	200.647	200.623	200.588	200.562	200.526
flood dep (m)	-2.210	-2.406	-	-2.353	-2.801	-3.056	-2.674	-3.161

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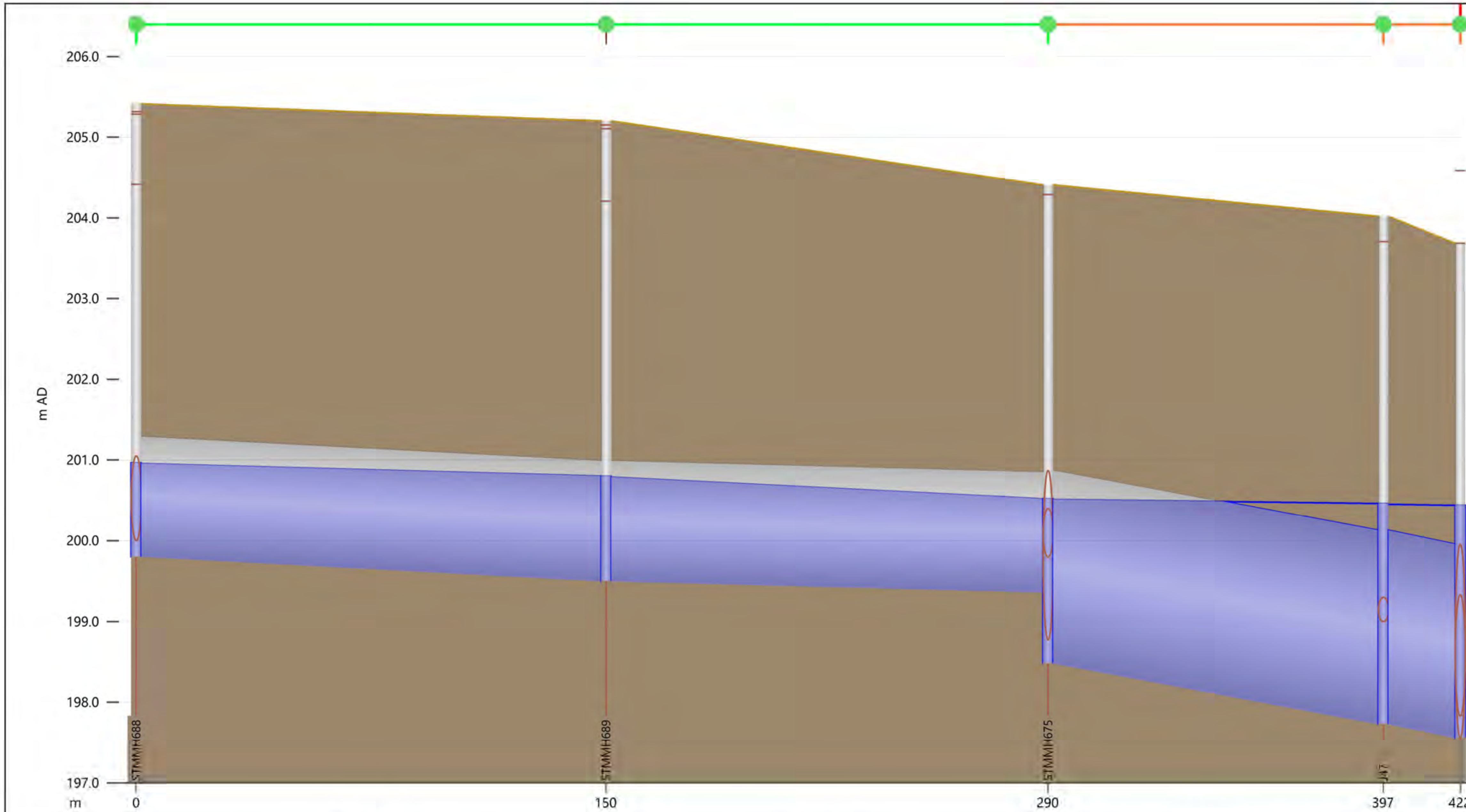
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-3
Location: Apple Mill Rd & Millway Ave
HGL - 100 Year Design Storm

DATE: February 2024

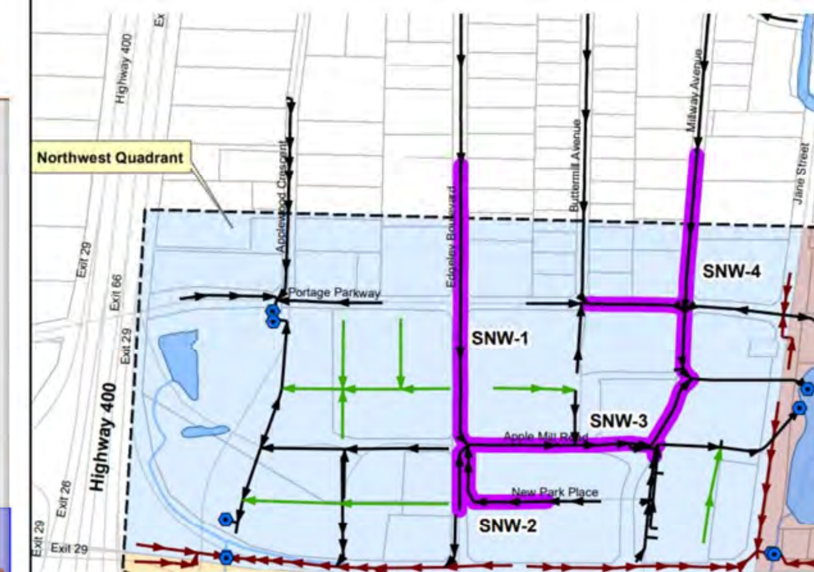
Figure: SNW-3



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH688.1	STMMH689.1	STMMH675.1	J47.1
US node ID	STMMH688	STMMH689	STMMH675	J47
ds node	STMMH689	STMMH675	J47	-
length (m)	149.7	140.7	106.8	24.5
Shape ID	CIRC	CIRC	CIRC	CIRC
height (mm)	1500	1500	2400	2400
us inv (m AD)	199.800	199.500	198.481	197.730
ds inv (m AD)	199.500	199.360	197.730	197.558
grad (m/m)	0.00200	0.00099	0.00703	0.00703
pfc (l/s)	3165	2230	20759	20754
surc	0.87	0.86	1.00	1.00
DS flow (l/s)	2352.07	2872.37	8334.67	9317.28

Node	STMMH688	STMMH689	STMMH675	J47	-
ground (m AD)	205.415	205.205	204.410	204.023	-
level (m AD)	200.964	200.801	200.521	200.462	-
flood dep (m)	-4.451	-4.404	-3.889	-3.561	-

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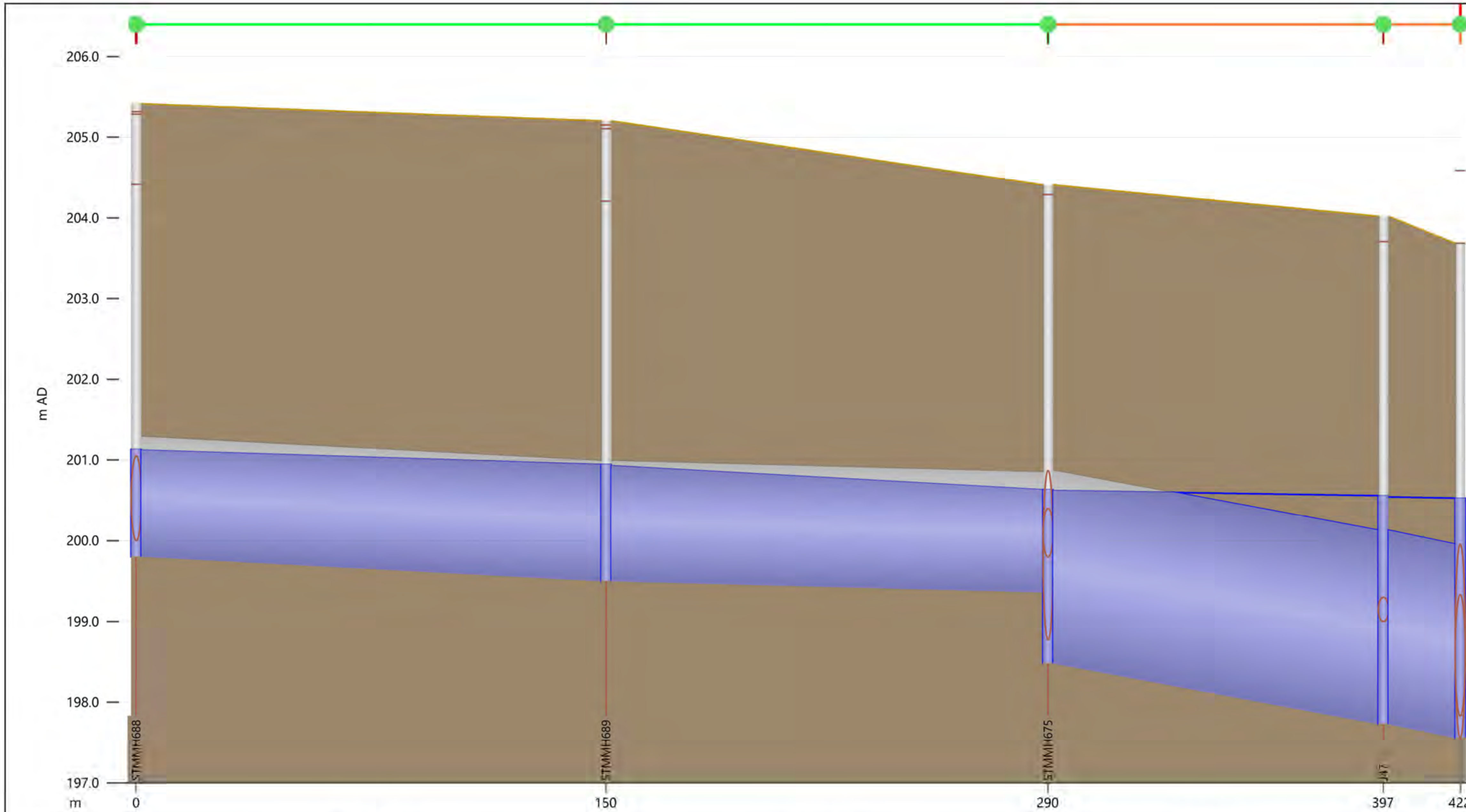
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-4 (A)
Location: Millway Ave
HGL - 5 Year Design Storm

DATE: February 2024

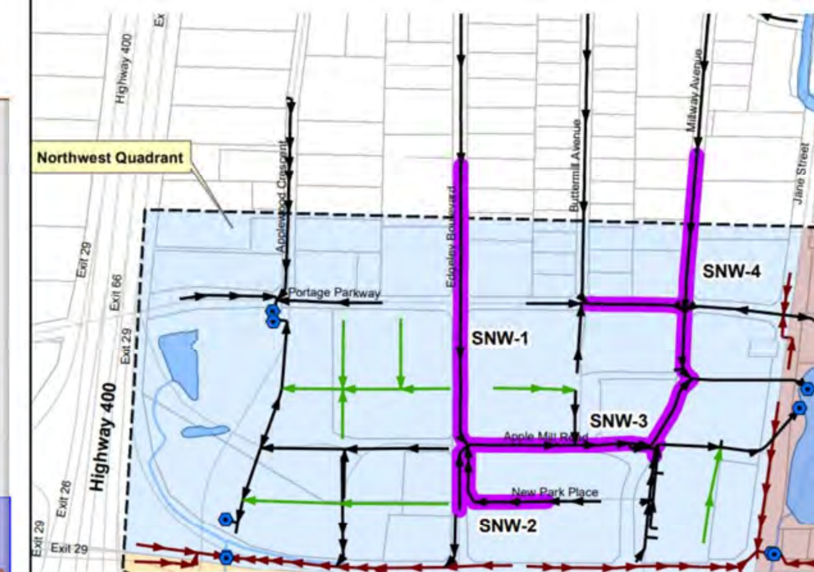
Figure: SNW-4 (A)



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH688.1	STMMH689.1	STMMH675.1	J47.1
US node ID	STMMH688	STMMH689	STMMH675	J47
ds node	STMMH689	STMMH675	J47	-
length (m)	149.7	140.7	106.8	24.5
Shape ID	CIRC	CIRC	CIRC	CIRC
height (mm)	1500	1500	2400	2400
us inv (m AD)	199.800	199.500	198.481	197.730
ds inv (m AD)	199.500	199.360	197.730	197.558
grad (m/m)	0.00200	0.00099	0.00703	0.00703
pfc (l/s)	3165	2230	20759	20754
surc	0.96	0.95	1.00	1.00
DS flow (l/s)	2518.00	3058.16	8334.22	9320.99

Node	STMMH688	STMMH689	STMMH675	J47	-
ground (m AD)	205.415	205.205	204.410	204.023	-
level (m AD)	201.130	200.944	200.631	200.558	-
flood dep (m)	-4.285	-4.261	-3.779	-3.466	-

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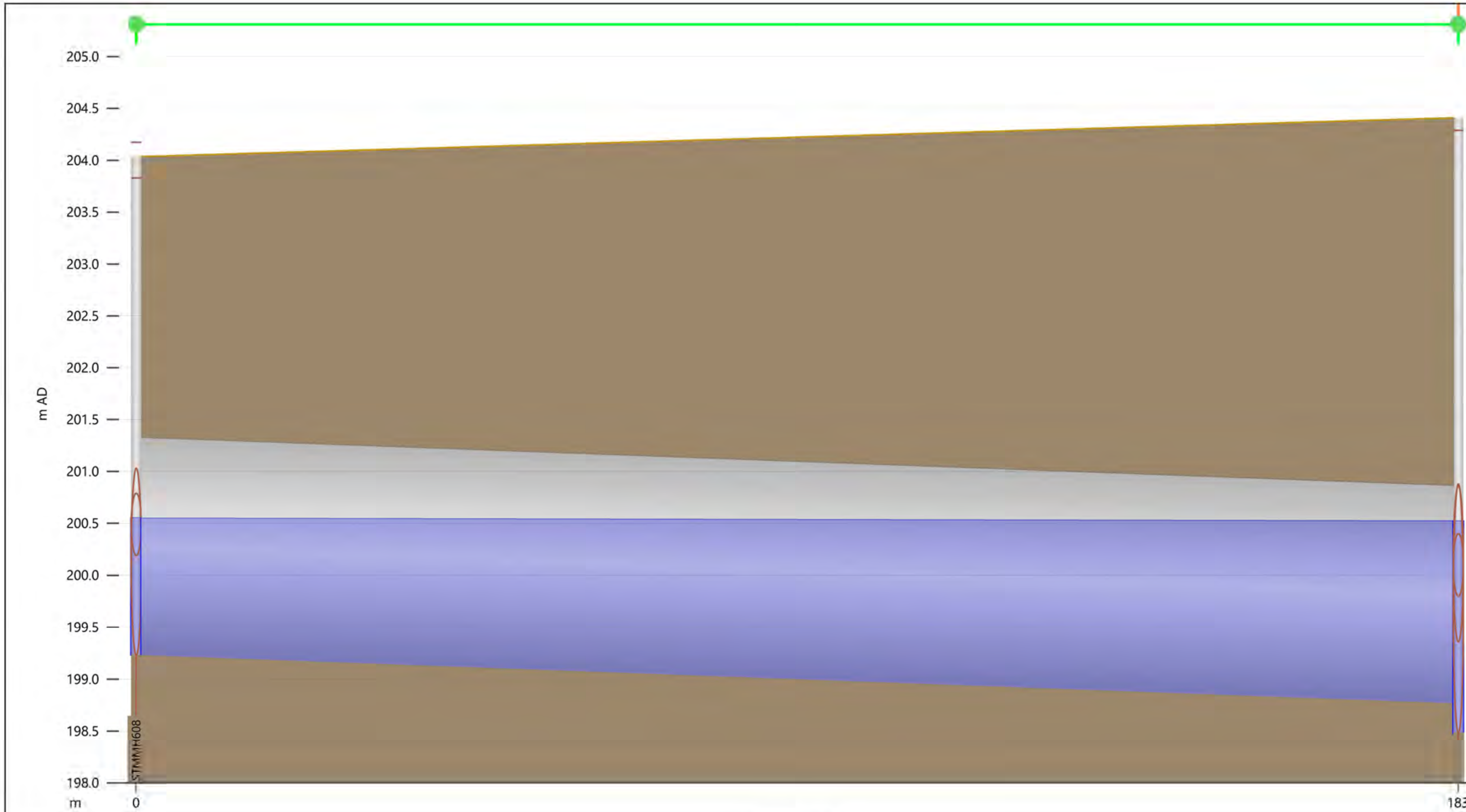
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-4 (A)
Location: Millway Ave
HGL - 100 Year Design Storm

DATE: February 2024

Figure: SNW-4 (A)



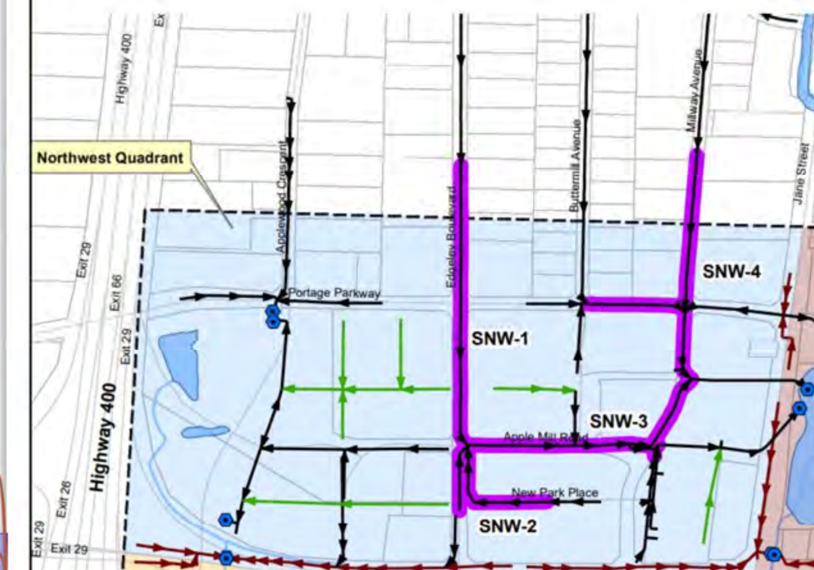
Link	STMMH608.1
US node ID	STMMH608
ds node	STMMH675
length (m)	182.6
Shape ID	CIRC
height (mm)	2100
us inv (m AD)	199.232
ds inv (m AD)	198.771
grad (m/m)	0.00252
pfc (l/s)	8713
surc	0.83
DS flow (l/s)	3726.35

Node	STMMH608	STMMH675
ground (m AD)	204.038	204.410
level (m AD)	200.548	200.521
flood dep (m)	-3.490	-3.889

Proposed Improvements:

Pipe Replacement

XX Project ID



CIVICA Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-4 (B)
Location: Portage Pkwy
HGL - 5 Year Design Storm

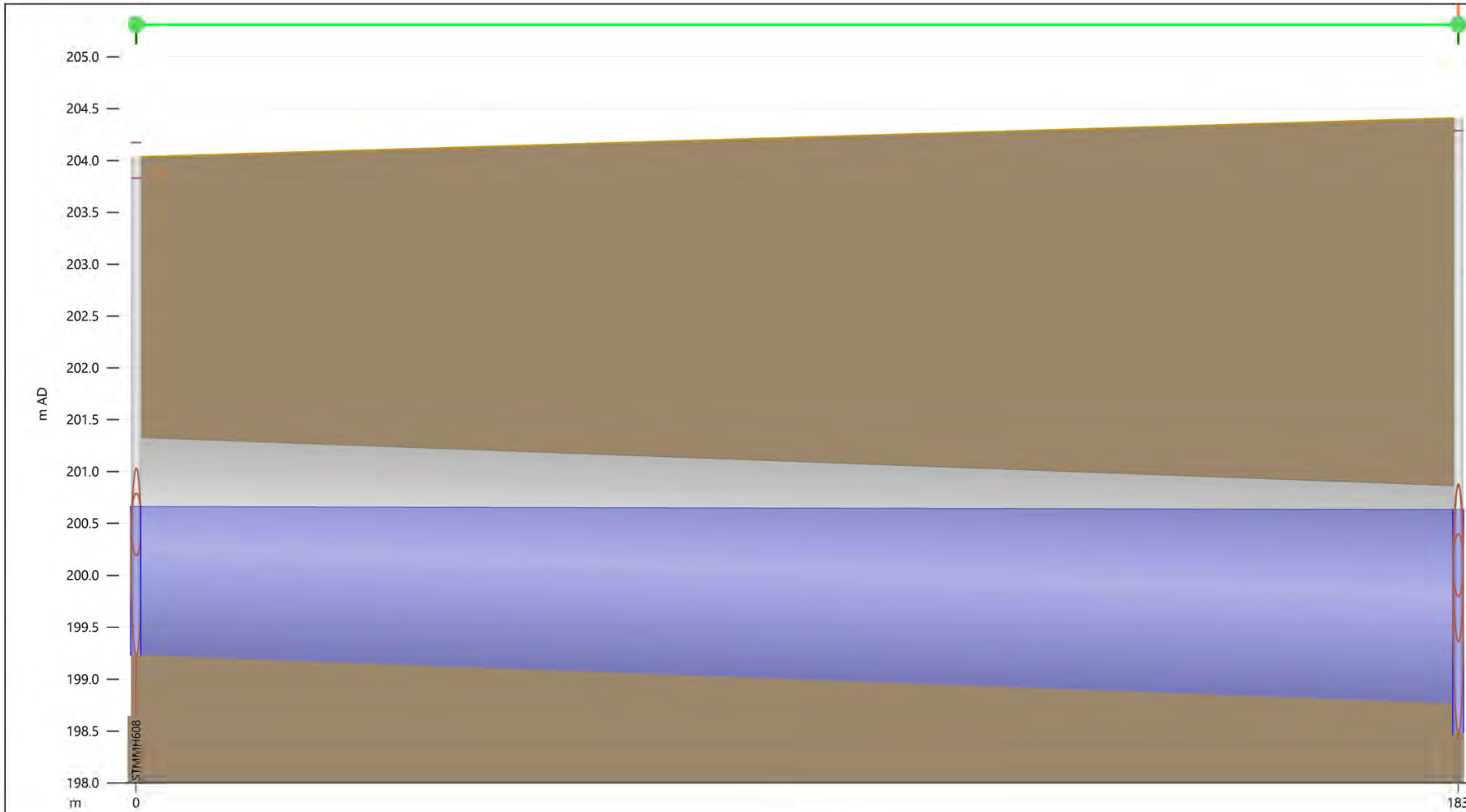
DATE: February 2024

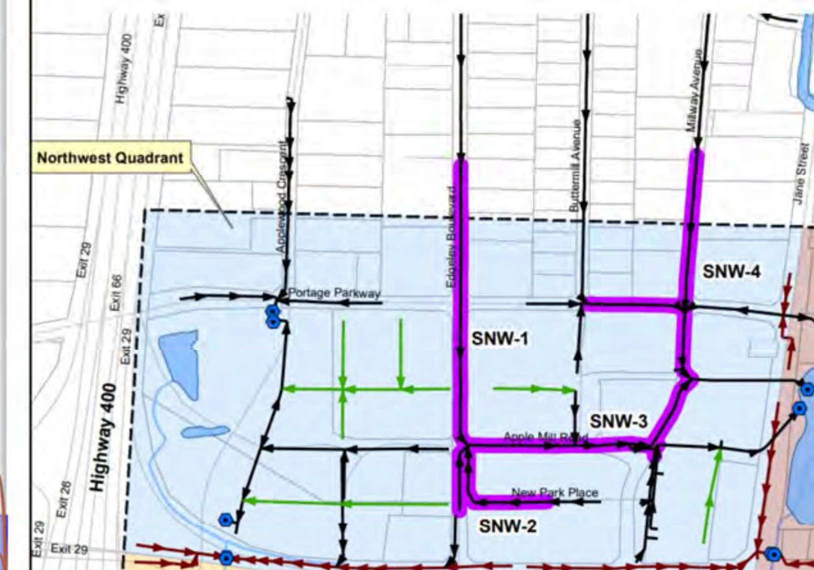
Figure: SNW-4 (B)

Proposed Improvements:

Pipe Replacement

XX Project ID





Link	STMMH608.1
US node ID	STMMH608
ds node	STMMH675
length (m)	182.6
Shape ID	CIRC
height (mm)	2100
us inv (m AD)	199.232
ds inv (m AD)	198.771
grad (m/m)	0.00252
pfc (l/s)	8713
surc	0.89
DS flow (l/s)	3726.88

Node	STMMH608	STMMH675
ground (m AD)	204.038	204.410
level (m AD)	200.663	200.631
flood dep (m)	-3.375	-3.779

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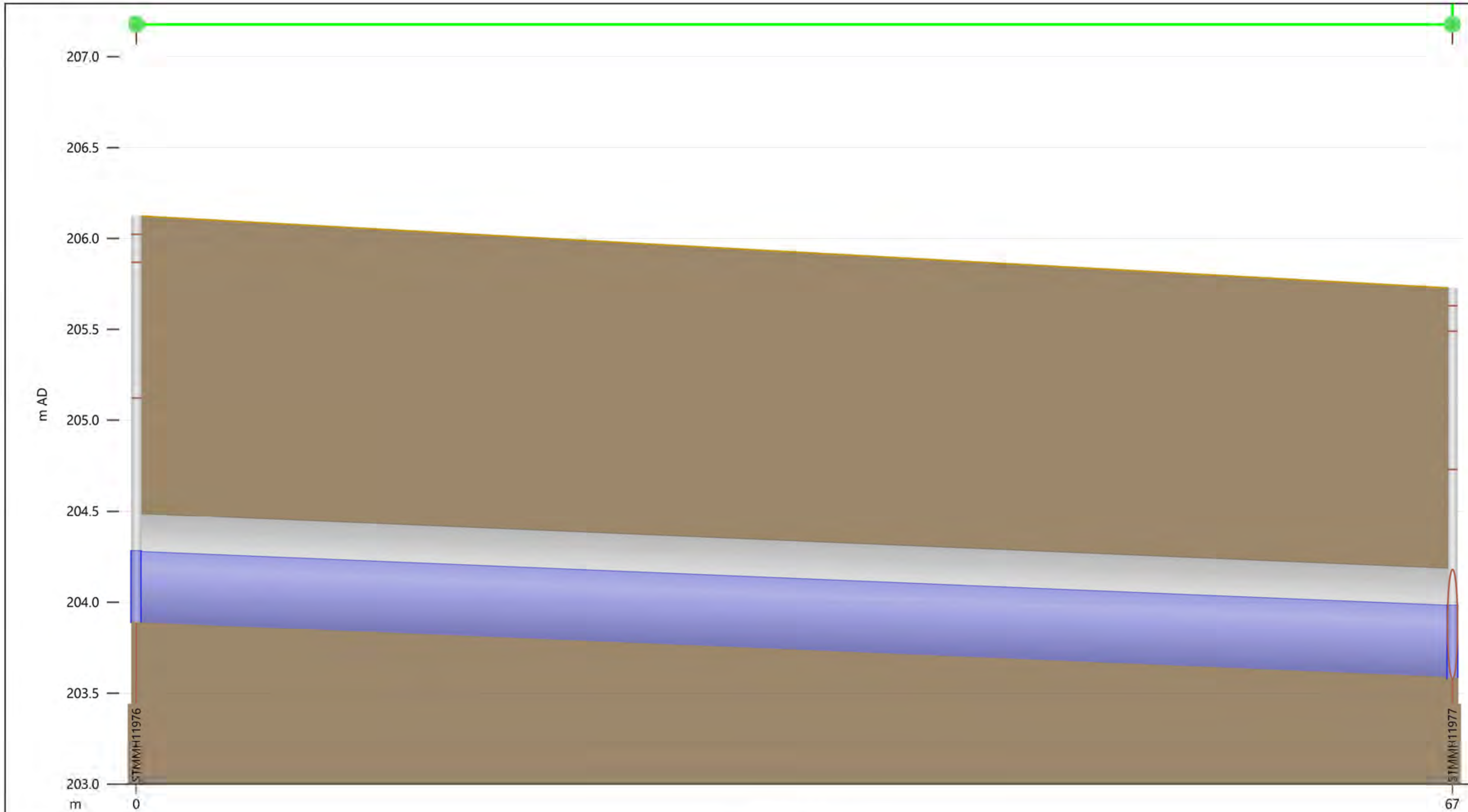
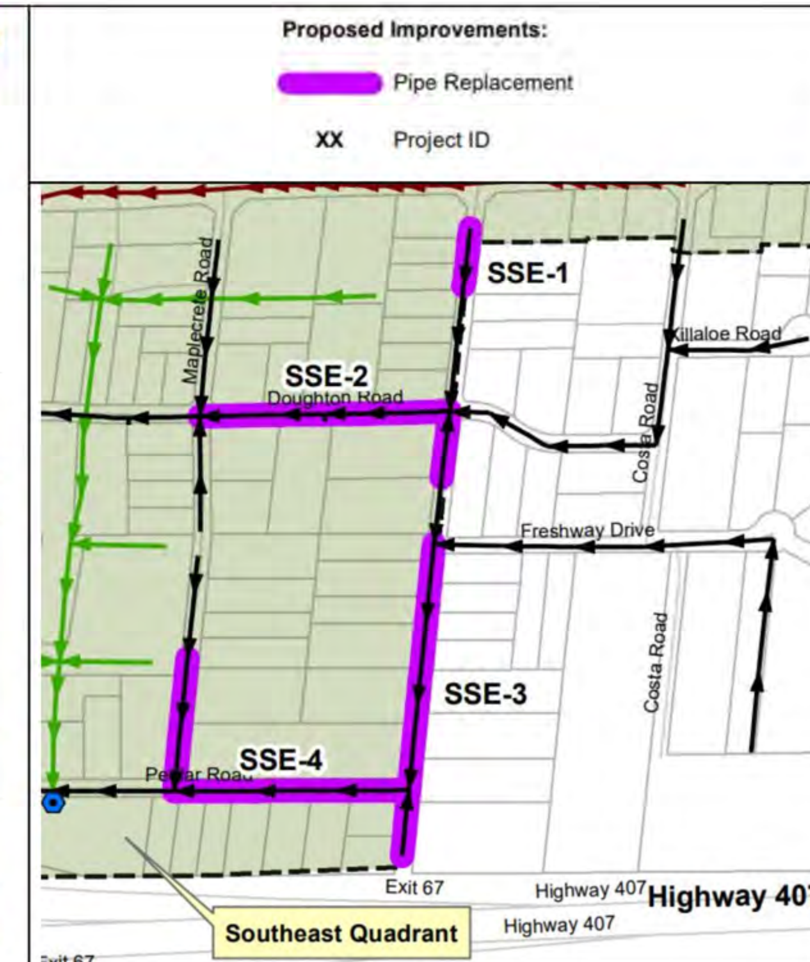
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SNW-4 (B)
Location: Portage Pkwy
HGL - 100 Year Design Storm

DATE: February 2024

Figure: SNW-4 (B)





Link	STMMH11976.1
US node ID	STMMH11976
ds node	STMMH11977
length (m)	67.5
Shape ID	CIRC
height (mm)	600
us inv (m AD)	203.890
ds inv (m AD)	203.590
grad (m/m)	0.00445
pfc (l/s)	410
surc	0.65
DS flow (l/s)	303.13

Node	STMMH11976	STMMH11977
ground (m AD)	206.123	205.730
level (m AD)	204.281	203.982
flood dep (m)	-1.843	-1.748

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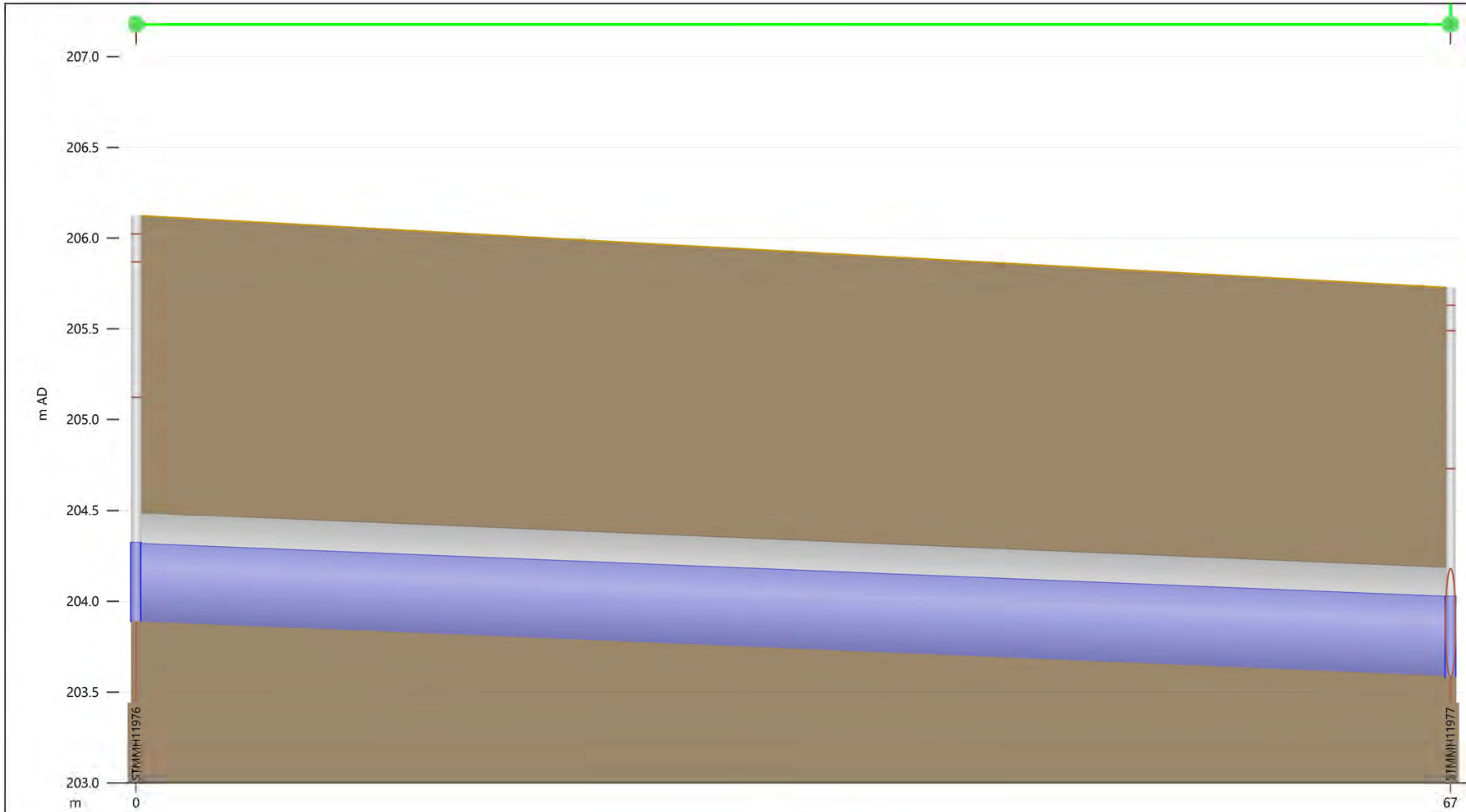
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-1
Location: Creditstone Rd
HGL - 5 Year Design Storm

DATE: February 2024

Figure: SSE-1



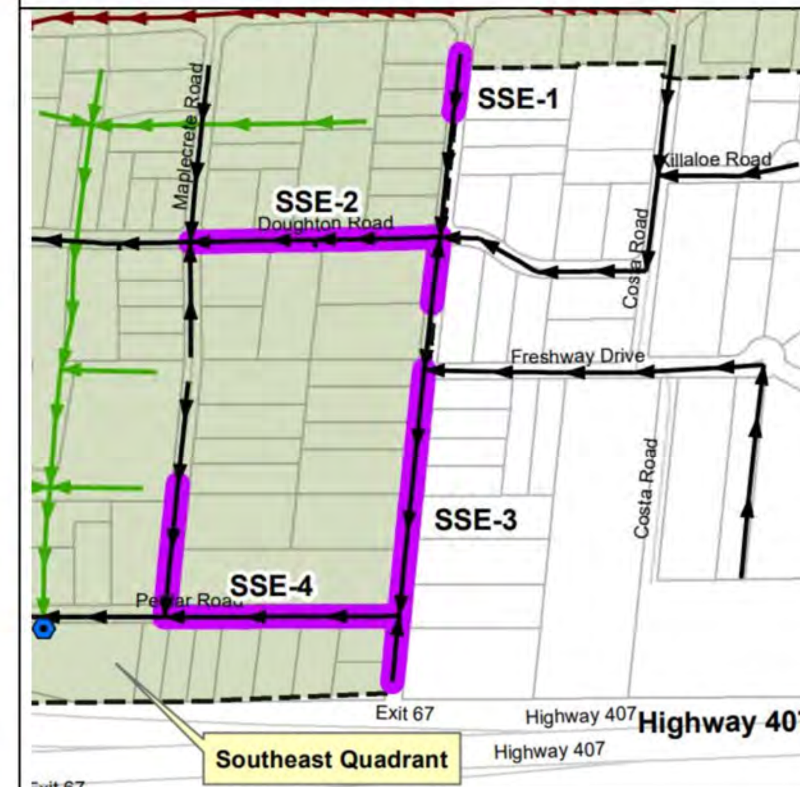
Link	STMMH11976.1
US node ID	STMMH11976
ds node	STMMH11977
length (m)	67.5
Shape ID	CIRC
height (mm)	600
us inv (m AD)	203.890
ds inv (m AD)	203.590
grad (m/m)	0.00445
pfc (l/s)	410
surc	0.73
DS flow (l/s)	344.28

Node	STMMH11976	STMMH11977
ground (m AD)	206.123	205.730
level (m AD)	204.321	204.026
flood dep (m)	-1.802	-1.704

Proposed Improvements:

Pipe Replacement

XX Project ID



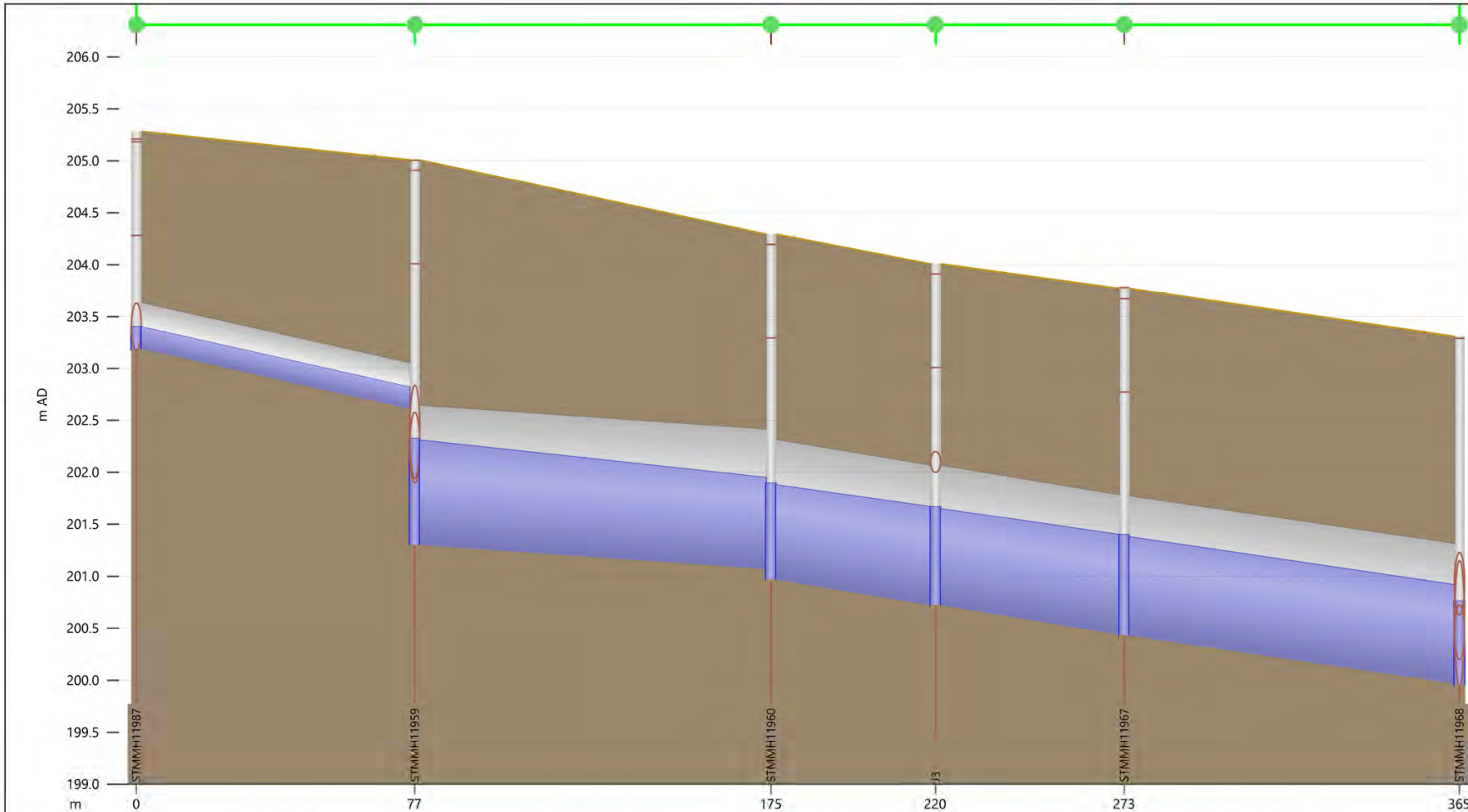
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-1
Location: Creditstone Rd
HGL - 100 Year Design Storm

DATE: February 2024

Figure: SSE-1



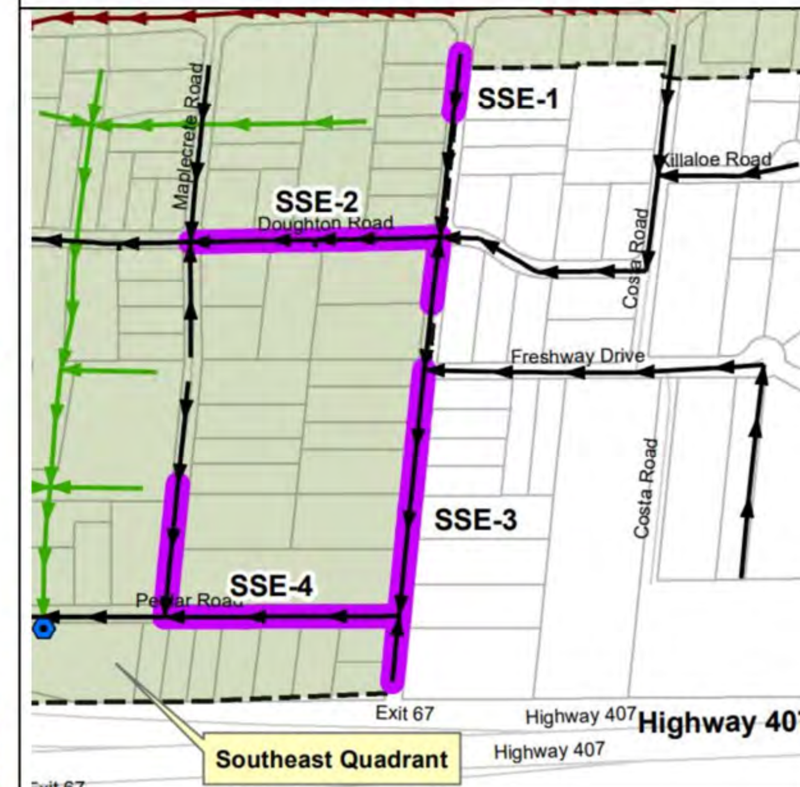
Link	STMMH11987.1	STMMH11959.1	STMMH11960.1	J3.1	STMMH11967.1
US node ID	STMMH11987	STMMH11959	STMMH11960	J3	STMMH11967
ds node	STMMH11959	STMMH11960	J3	STMMH11967	STMMH11968
length (m)	76.8	98.3	45.4	52.0	92.5
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	450	1350	1350	1350	1350
us inv (m AD)	203.190	201.300	200.970	200.723	200.430
ds inv (m AD)	202.610	201.070	200.723	200.440	199.970
grad (m/m)	0.00755	0.00234	0.00544	0.00544	0.00497
pfc (l/s)	248	2582	3937	3937	3765
surc	0.47	0.75	0.70	0.71	0.70
DS flow (l/s)	109.91	2698.66	2919.08	3059.59	3145.67

Node	STMMH11987	STMMH11959	STMMH11960	J3	STMMH11967	STMMH11968
ground (m AD)	205.283	205.010	204.295	204.011	203.774	203.310
level (m AD)	203.401	202.324	201.895	201.668	201.397	200.762
flood dep (m)	-1.882	-2.686	-2.400	-2.343	-2.377	-2.548

Proposed Improvements:

Pipe Replacement

XX Project ID



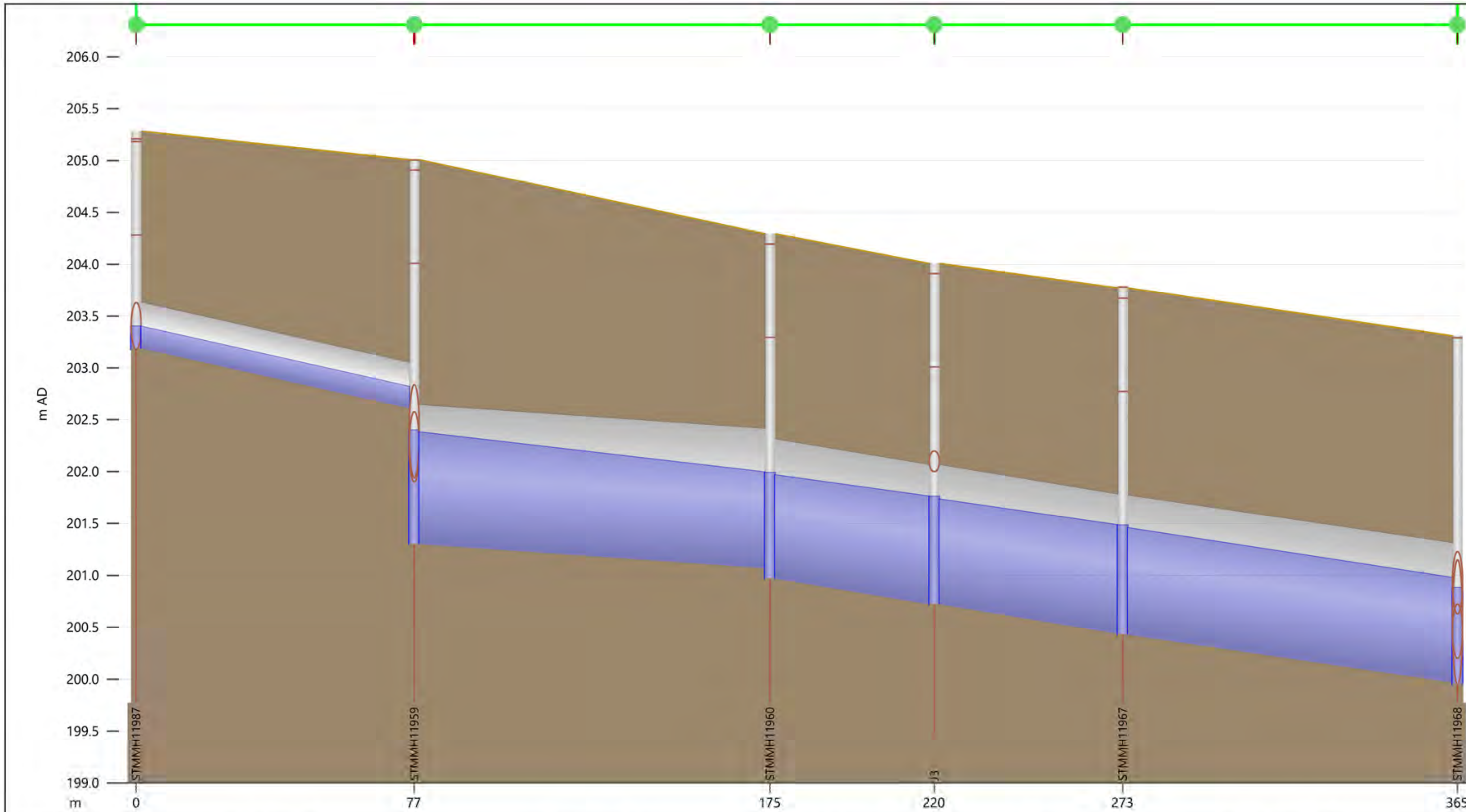
CIVICA
Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-2
Location: Creditstone Rd & Doughton Rd
HGL - 5 Year Design Storm

DATE: February 2024

Figure: SSE-2



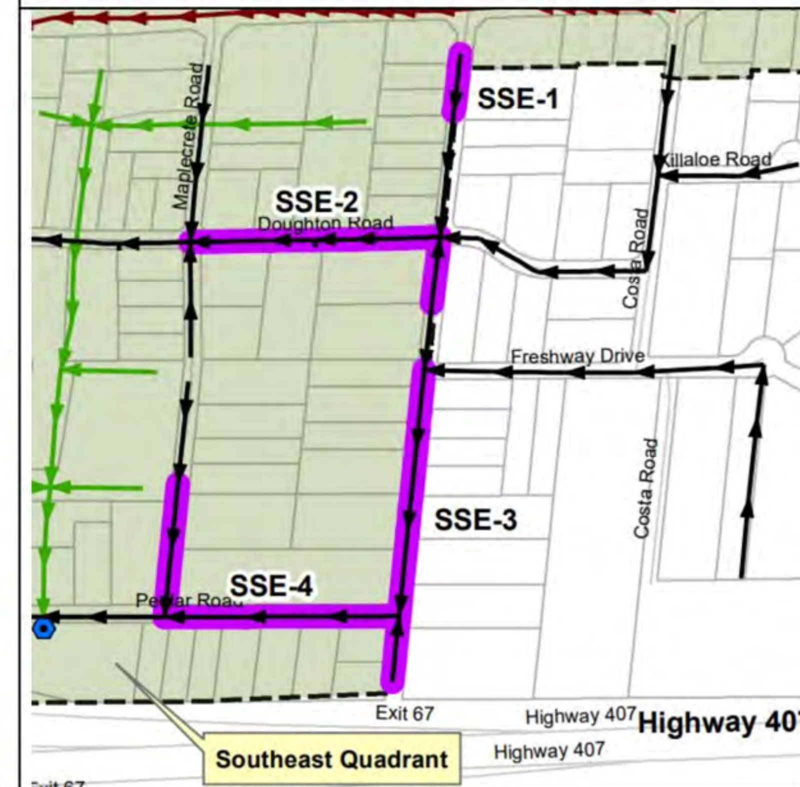
Link	STMMH11987.1	STMMH11959.1	STMMH11960.1	J3.1	STMMH11967.1
US node ID	STMMH11987	STMMH11959	STMMH11960	J3	STMMH11967
ds node	STMMH11959	STMMH11960	J3	STMMH11967	STMMH11968
length (m)	76.8	98.3	45.4	52.0	92.5
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	450	1350	1350	1350	1350
us inv (m AD)	203.190	201.300	200.970	200.723	200.430
ds inv (m AD)	202.610	201.070	200.723	200.440	199.970
grad (m/m)	0.00755	0.00234	0.00544	0.00544	0.00497
pfc (l/s)	248	2582	3937	3937	3765
surc	0.47	0.80	0.77	0.77	0.76
DS flow (l/s)	110.02	2977.22	3261.97	3399.53	3519.56

Node	STMMH11987	STMMH11959	STMMH11960	J3	STMMH11967	STMMH11968
ground (m AD)	205.283	205.010	204.295	204.011	203.774	203.310
level (m AD)	203.401	202.398	201.990	201.759	201.483	200.880
flood dep (m)	-1.882	-2.612	-2.306	-2.252	-2.291	-2.429

Proposed Improvements:

Pipe Replacement

XX Project ID



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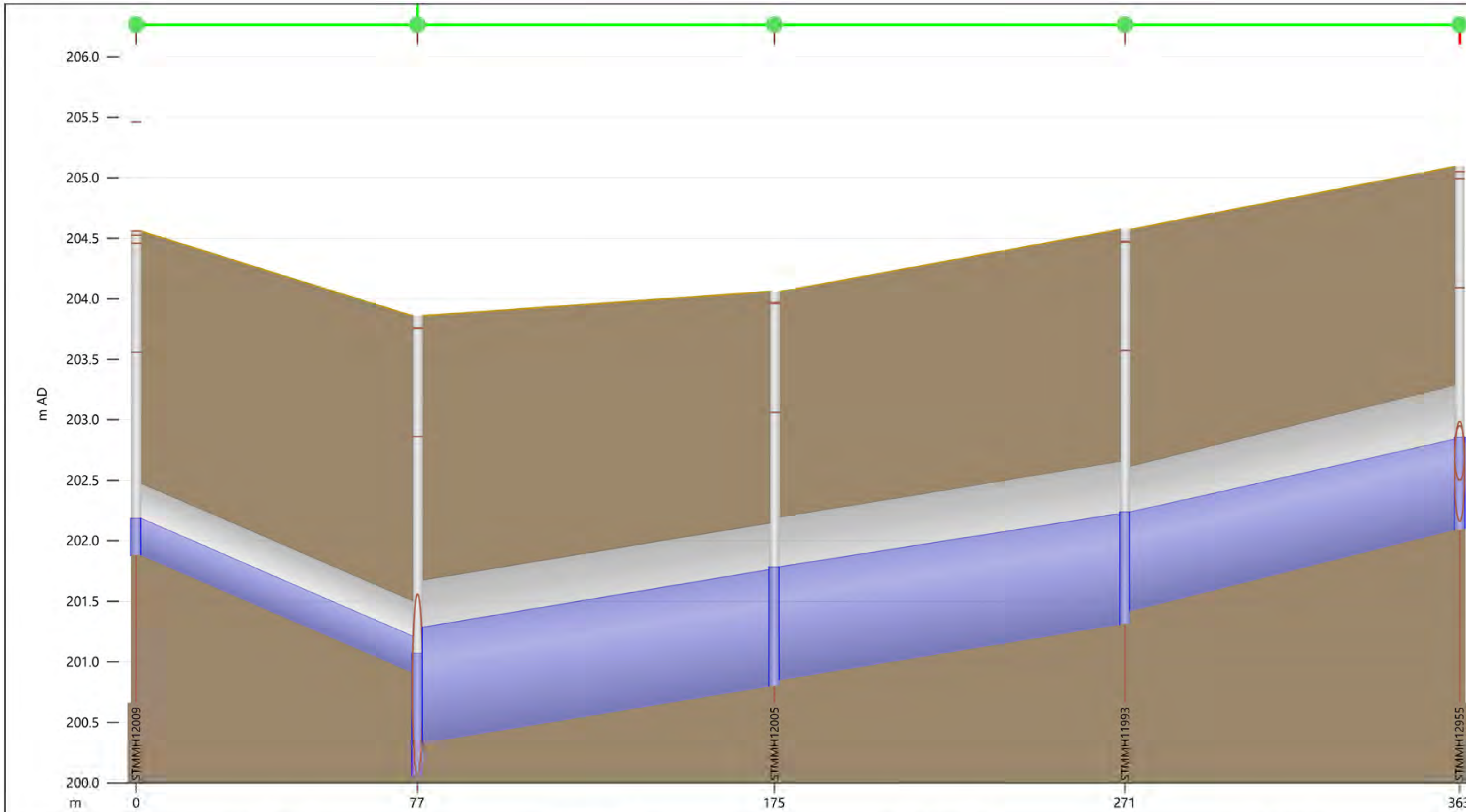
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-2
Location: Creditstone Rd & Doughton Rd
HGL - 100 Year Design Storm

DATE: February 2024

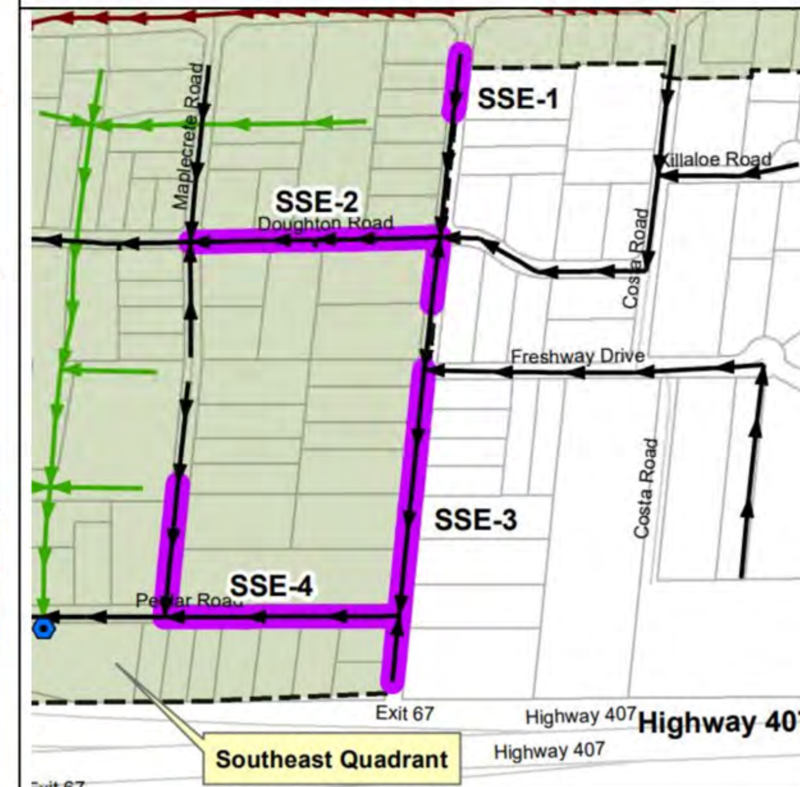
Figure: SSE-2



Proposed Improvements:

Pipe Replacement

XX Project ID



Link	STMMH12009.1	STMMH12005.1	STMMH11993.1	STMMH12955.1
US node ID	STMMH12009	STMMH12005	STMMH11993	STMMH12955
ds node	STMMH12006	STMMH12006	STMMH12005	STMMH11993
length (m)	77.0	97.8	96.1	91.6
Shape ID	CIRC	CIRC	CIRC	CIRC
height (mm)	600	1350	1350	1200
us inv (m AD)	201.880	200.800	201.310	202.090
ds inv (m AD)	200.910	200.330	200.850	201.420
grad (m/m)	0.01259	0.00480	0.00479	0.00731
pfc (l/s)	689	3700	3694	3334
surc	0.50	0.71	0.69	0.68
DS flow (l/s)	332.34	3162.61	2886.73	2298.93

Node	STMMH12009	STMMH12006	STMMH12005	STMMH11993	STMMH12955
ground (m AD)	204.560	203.860	204.061	204.575	205.094
level (m AD)	202.182	201.068	201.781	202.237	202.851
flood dep (m)	-2.379	-2.792	-2.280	-2.338	-2.243

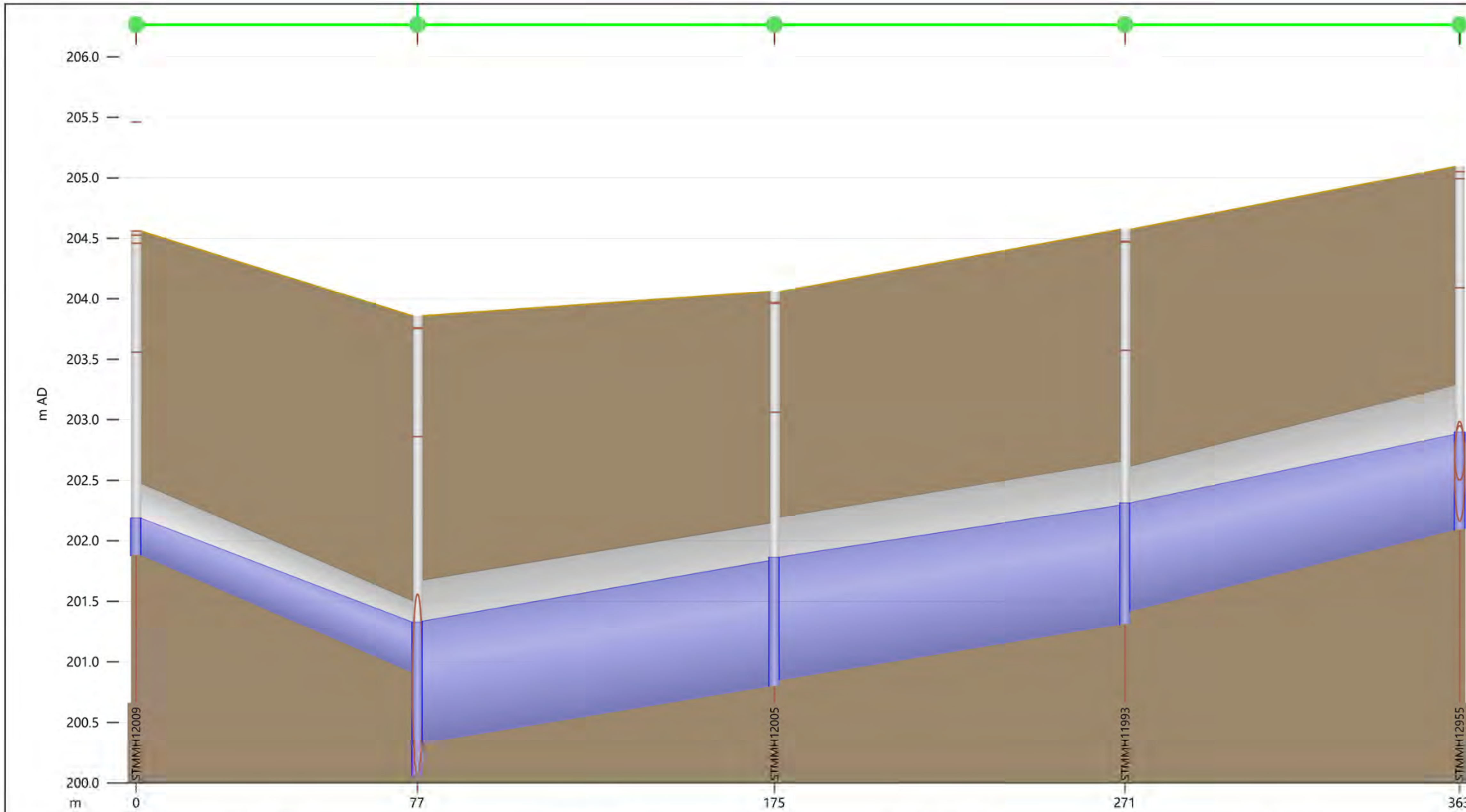
CIVICA Water Management Solutions

City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-3
Location: Creditstone Rd
HGL - 5 Year Design Storm

DATE: February 2024

Figure: SSE-3



Link	STMMH12009.1	STMMH12005.1	STMMH11993.1	STMMH12955.1
US node ID	STMMH12009	STMMH12005	STMMH11993	STMMH12955
ds node	STMMH12006	STMMH12006	STMMH12005	STMMH11993
length (m)	77.0	97.8	96.1	91.6
Shape ID	CIRC	CIRC	CIRC	CIRC
height (mm)	600	1350	1350	1200
us inv (m AD)	201.880	200.800	201.310	202.090
ds inv (m AD)	200.910	200.330	200.850	201.420
grad (m/m)	0.01259	0.00480	0.00479	0.00731
pfc (l/s)	689	3700	3694	3334
surc	0.69	0.77	0.75	0.74
DS flow (l/s)	334.67	3508.96	3150.85	2435.50

Node	STMMH12009	STMMH12006	STMMH12005	STMMH11993	STMMH12955
ground (m AD)	204.560	203.860	204.061	204.575	205.094
level (m AD)	202.183	201.326	201.860	202.311	202.894
flood dep (m)	-2.377	-2.534	-2.201	-2.264	-2.200

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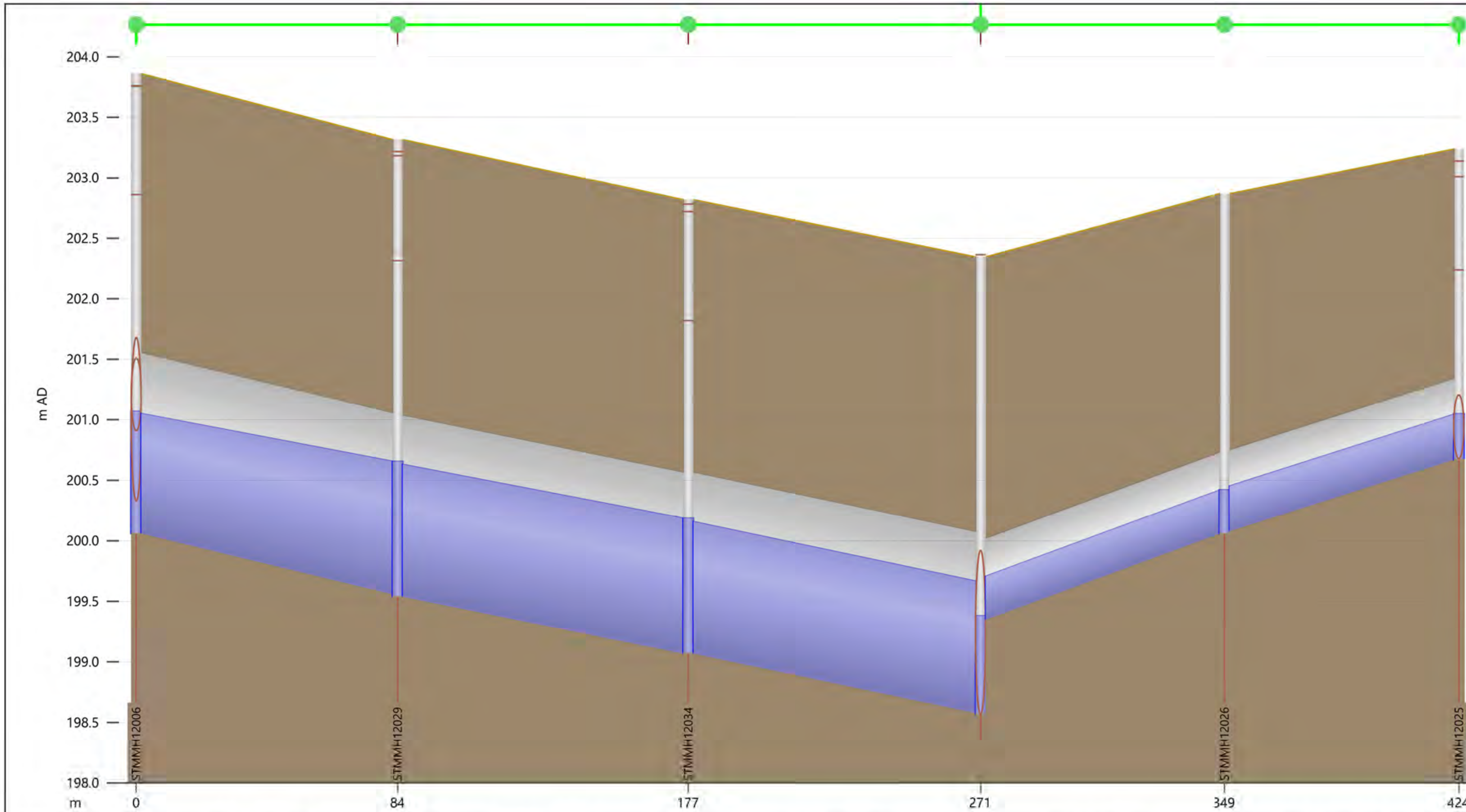
City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-3
Location: Creditstone Rd
HGL - 100 Year Design Storm

DATE: February 2024

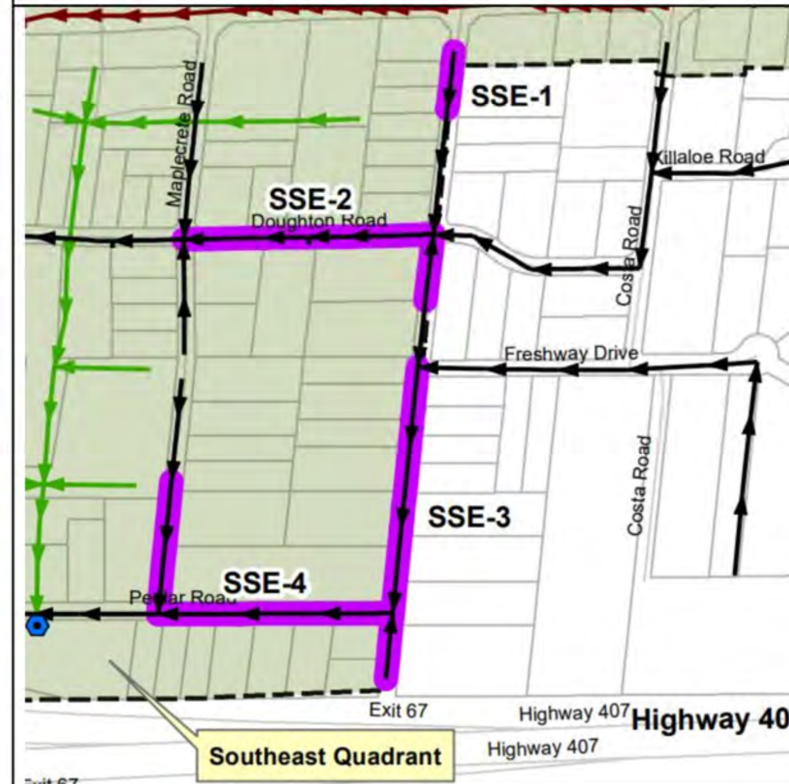
Figure: SSE-3



Proposed Improvements:

Pipe Replacement

XX Project ID



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ds node	STMMH12029	STMMH12034	STMMH12027	STMMH12027	STMMH12026
length (m)	83.9	93.2	93.8	78.2	75.2
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	1500	1500	1500	675	675
us inv (m AD)	200.060	199.540	199.070	200.060	200.670
ds inv (m AD)	199.560	199.070	198.580	199.350	200.080
grad (m/m)	0.00596	0.00504	0.00523	0.00908	0.00785
pfc (l/s)	5459	5020	5111	801	745
surc	0.73	0.74	0.73	0.53	0.55
DS flow (l/s)	3877.33	4300.28	4453.57	437.69	438.40

Node	STMMH12006	STMMH12029	STMMH12034	STMMH12027	STMMH12026	STMMH12025
ground (m AD)	203.860	203.317	202.820	202.348	202.868	203.240
level (m AD)	201.068	200.655	200.185	199.380	200.420	201.048
flood dep (m)	-2.792	-2.661	-2.635	-2.968	-2.448	-2.192

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City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-4
Location: Peelar Rd & Maplecrete Rd
HGL - 5 Year Design Storm

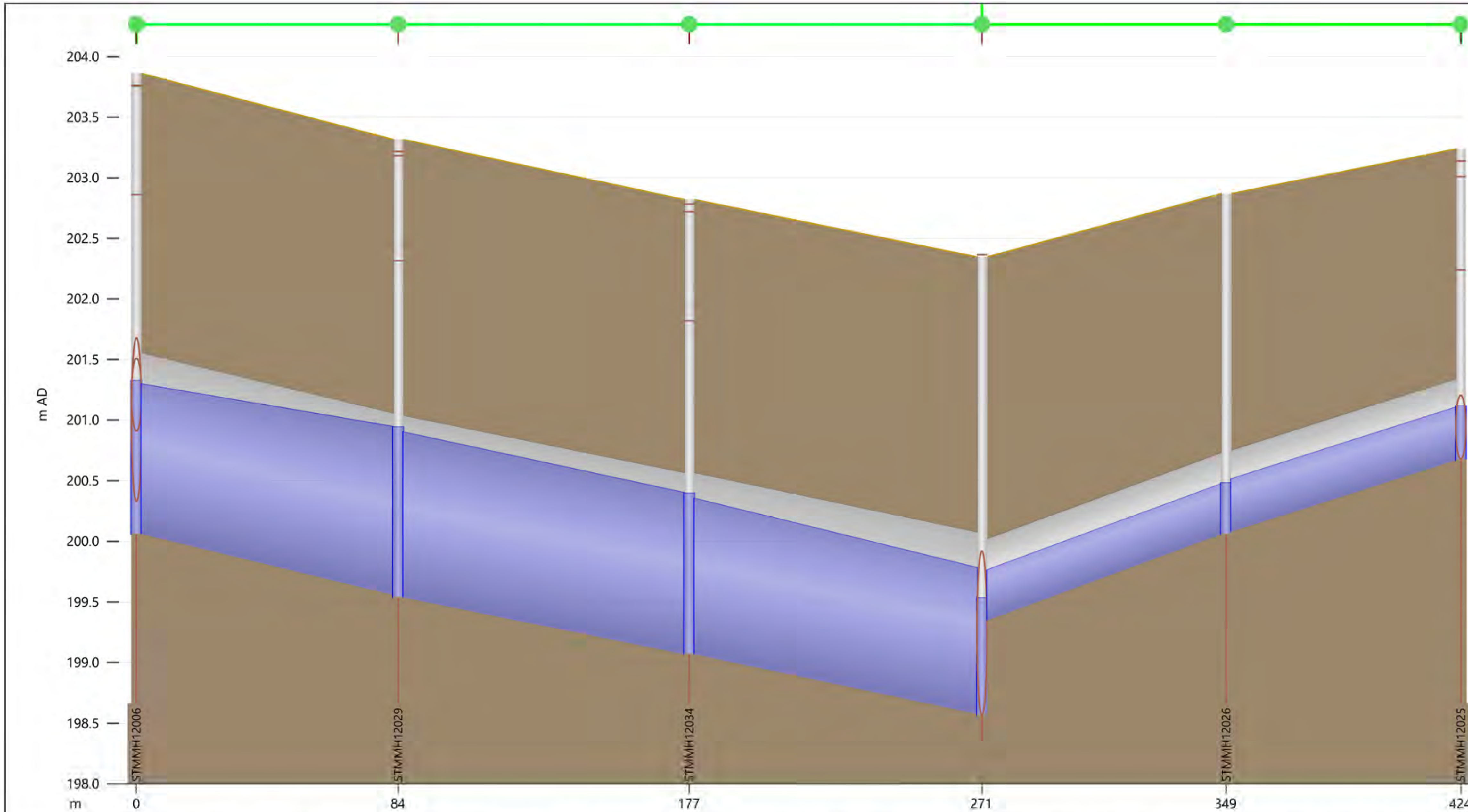
DATE: February 2024

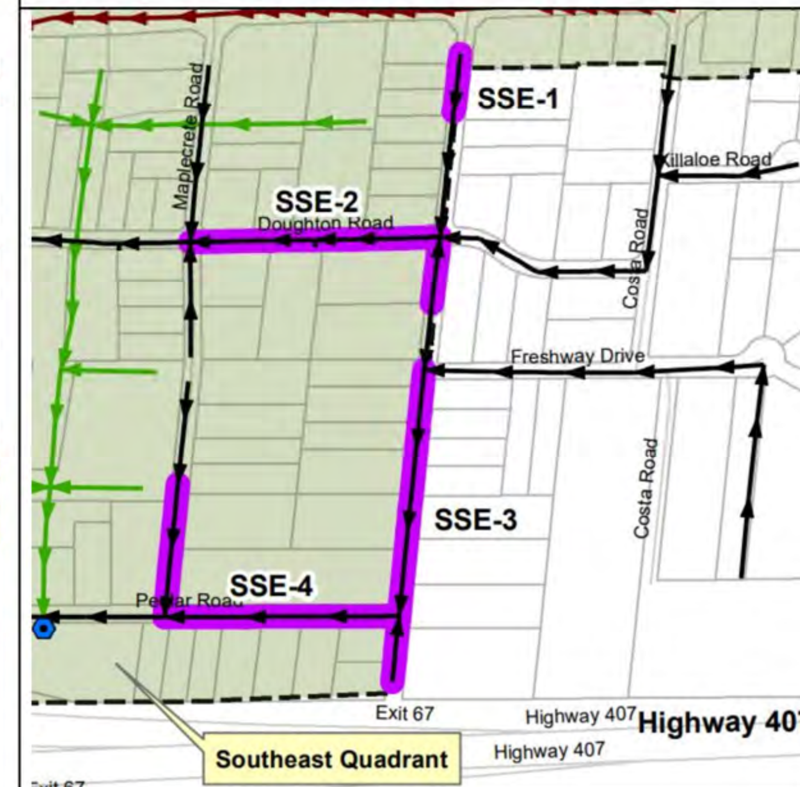
Figure: SSE-4

Proposed Improvements:

Pipe Replacement

XX Project ID





Link	STMMH12006.1	STMMH12029.1	STMMH12034.1	STMMH12026.1	STMMH12025.1
US node ID	STMMH12006	STMMH12029	STMMH12034	STMMH12026	STMMH12025
ds node	STMMH12029	STMMH12034	STMMH12027	STMMH12027	STMMH12026
length (m)	83.9	93.2	93.8	78.2	75.2
Shape ID	CIRC	CIRC	CIRC	CIRC	CIRC
height (mm)	1500	1500	1500	675	675
us inv (m AD)	200.060	199.540	199.070	200.060	200.670
ds inv (m AD)	199.560	199.070	198.580	199.350	200.080
grad (m/m)	0.00596	0.00504	0.00523	0.00908	0.00785
pfc (l/s)	5459	5020	5111	801	745
surc	0.92	0.91	0.86	0.61	0.65
DS flow (l/s)	4452.04	5055.14	5334.12	551.92	552.81

Node	STMMH12006	STMMH12029	STMMH12034	STMMH12027	STMMH12026	STMMH12025
ground (m AD)	203.860	203.317	202.820	202.348	202.868	203.240
level (m AD)	201.326	200.941	200.397	199.534	200.481	201.114
flood dep (m)	-2.534	-2.376	-2.423	-2.814	-2.387	-2.126

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City Of Vaughan Integrated Urban Water Master Plan
VMC Functional Servicing Strategy Report

Project: SSE-4
Location: Peelar Rd & Maplecrete Rd
HGL - 100 Year Design Storm

DATE: February 2024

Figure: SSE-4

Appendix D VMC Release Rate Calculations

VMC Release Rates

The 2012 TMIG report recommended:

- On-site controls for each development. The peak release rate is controlled to the 2-year post development flow rate, based on 80% level of imperviousness.
- On-site retention of 15mm over the building footprint, and an additional 15mm on-site retention over landscaped areas.
- No control from ROWs or parks

As outlined in sections 11.3.2 and 11.5 of the 2012 report, TMIG stated that each development block has:

- 79% impervious (which is the 80% referred to above)
    - 75% of this is the building footprint
        - which corresponds to 59% of total site area (75% of 79%)
    - 25% pavement, driveways, walkways, etc.
        - Which corresponds to 20% of site (25% of 79%)
- 21% pervious & landscaping

Appendix D shows detailed calculations for each quadrant for land use values and SWM pond sizing.

TMIG used the following method to calculate the 2-year release rate.

Steps to calculate 2-year peak flow

1. The rainfall data for the 6-hour AES storm is:

Return Period	Rainfall Depth (mm)
25mm	25.0
2	36.0
5	47.8
10	55.7
25	65.6
50	73.0
100	80.3

2. Determine the development impervious values, based on:

- The building footprint has C = 0.90, with 15mm retention
- Landscape has C = 0.25, with 10mm retention

a) Calculate the corresponding reduced C values

Adjusting the Building Runoff Coefficient

Return Period	Rainfall Depth (mm)	Base Runoff (mm)	15mm Runoff Reduction	C_{15}
25mm	25.0	22.50	7.50	0.30
2	36.0	32.40	17.40	0.48
5	47.8	43.02	28.02	0.59
10	55.7	50.13	35.13	0.63
25	65.6	59.04	44.04	0.67
50	73.0	65.70	50.70	0.69
100	80.3	72.27	57.27	0.71

Adjusting the Landscape Runoff Coefficient

Return Period	Rainfall Depth (mm)	Base Runoff (mm)	10mm Runoff Reduction	C_{15}
25mm	25.0	6.25	0.00	0.00
2	36.0	9.00	0.00	0.00
5	47.8	11.95	1.95	0.04
10	55.7	13.93	3.93	0.07
25	65.6	16.40	6.40	0.10
50	73.0	18.25	8.25	0.11
100	80.3	20.08	10.08	0.13

b) Determine lumped C values based on 100-year conditions

Sample Area

		Area (Ha)	C	AC
Residential	Building	5.59	0.71	3.99
	Paved Area	1.86	0.90	1.67
	Landscape	1.96	0.13	0.25
Commercial	Building	1.04	0.71	0.74
	Paved Area	0.35	0.90	0.32
	Landscape	0.37	0.13	0.05
	Lumped Total	*11.17*		*7.01*

Corresponding C is: 7.01/11.17 = 0.63

c) Convert new C values to % impervious:

C = 0.63
x + y = 100, where x = % impervious
y = % pervious
Or, x = 100 – y
Substituting,
0.9(100-y) + 0.2y = 63
90 – 0.7y = 63
y = 38.6 % pervious
x = 61.4 % impervious

Let C = 0.9 for impervious
C = 0.2 for pervious
Or, 0.9x + 0.2y = 63

Therefore a value of 61% should be used for T_{imp} in VO for a development with 80% imperviousness.

1. Create a StandHYD command within V that uses the T_{imp} and area, and use default values for all other input parameters. Run the 2-year 6hour AES storm to get the 2-year peak flow for the area.
2. Create a ROUTE RESERVOIR command that will permit only this 2-year peak flow for the 100-year storm.

But this 80% rule has been mis-applied by development applications. Consultants have used various methods to calculate the 2-year peak flow:

- C = 0.80 when using rational method, with 7 minute inlet time
- T_{imp} = 80% in VO