FUNCTIONAL SERVICING AND STORMWATER MANAGEMENT REPORT

BOLTON NORTH HILL
OPTION 1 LANDS

TOWN OF CALEDON
REGION OF PEEL

PREPARED FOR:

BOLTON NORTH HILL LANDOWNERS GROUP

PREPARED BY:

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EXECUTIVE SUMMARY

C.F. Crozier & Associates Inc. has prepared this Functional Servicing and Stormwater Management Report to support the development of the Bolton North Hill area, as part of the Secondary Plan Approval. Specifically, Option 1 Lands and a 4.64 ha development parcel within the Option 2 Lands, referred to as the Site, which are part of six (6) parcels of development areas around the existing community of Bolton (Options 1 to 6).

We have explored the municipal servicing opportunities and constraints for the Site and have summarized our findings and conclusions herein. Relevant standards from the Town of Caledon, Region of Peel, and Toronto and Region Conservation Authority have been applied to develop a functional servicing and stormwater management strategy. This report reviews water servicing, sanitary servicing, grading, pre- and post-development drainage conditions, stormwater management, water balance and low impact development, and natural heritage.

The proposed servicing strategies have been prepared with careful consideration of the Town and Region's overarching principles. The proposed strategies demonstrate the feasibility of servicing the Site by presenting technically correct and economically feasible solutions that use and improve existing infrastructure. These strategies also provide services to existing populations that are under-served and services population into the future beyond the Bolton Residential Expansion Settlement areas.

A Subwatershed Study (SWS) is also being prepared in parallel with this report (under separate cover). The stormwater management strategy developed herein will inform the completion of the SWS and will ultimately be the overarching document for directing more detailed stormwater management designs for the Site.

Water Servicing

R.J. Burnside & Associates Inc. was retained by the Bolton North Hill Landowners Group to develop a water servicing strategy for the Option 1, 2, and 3 Lands, which has most recently been summarized in a Technical Memorandum dated May 13, 2021. An updated version of this analysis is expected to be accepted by the Region in 2024, the results of which would supersede anything presented herein.

Our proposed water servicing strategy for the Option 1 and 2 Lands is consistent with the proposed R.J. Burnside strategy, which also provides water servicing for the Option 3 Lands to the southwest of the Site. In accordance with their memo, ultimate development of the Option 1 and 2 Lands will require the addition of Pressure Zone 7, accompanied by a new Zone 7 booster pumping station at King Street and Coleraine Drive. Water storage is proposed in the form of two elevated tanks to provide flow equalization and meet the required fire and emergency demands. One of the proposed elevated tanks is located in the northeast corner of the Option 1 Lands, adjacent to Regional Road 50.

Sanitary Servicing

Region of Peel is currently undertaking an Environmental Assessment (EA) to determine the preferred sanitary servicing alignment for the Option 1 and 2 lands. The current strategy is for these developments to discharge to a trunk sewer in Humber Station Road. Gravity trunk sewers in Regional Road 50 and Emil Kolb Parkway will direct flows to a sewage pump station within the Humber River Valley on Emil Kolb Parkway, which will pump flows south along Emil Kolb Parkway with discharge to a gravity sewer in King Street and ultimately to the trunk sewer in Humber Station Road. Option 2 will be serviced by a proposed forcemain or gravity sewer, dependant on the outcome of an EA, in Columbia Way which will convey flows west to Regional Road 50. The sanitary servicing solution is subject to refinement as the EA and detailed design by the Region is progressed.

Proposed Grading & Roads

A preliminary grading design was prepared to support the servicing and stormwater management strategies. The roadway elevations were constrained by the invert elevations of the normal water level of the stormwater management ponds and made considerations of the water and sanitary servicing.

The Site was graded to match post-development drainage conditions to the pre-development drainage divides. Sloping or retaining walls were minimized by setting boundary grades to be within a tolerance of the existing elevations at the property lines. This is particularly evident where the Site borders natural heritage features to be cognizant of restrictions for construction within or adjacent to these protected areas. Given the restrictions for construction within or adjacent to natural heritage features, particular attention was paid to setting boundary grades in areas where the Site borders these protected areas.

Drainage Conditions

Existing drainage patterns will be preserved as much as possible under the proposed development conditions, with topography generally sloping southwards toward the tributaries of the Main Humber River. The drainage divide between sub-basin 10 of the Main Humber River (which requires quantity control) and main areas of the Main Humber River Watershed (which do not require quantity control), will be generally maintained by the proposed grading and servicing concept. Minor and major system flows from most of the development area will be directed to one of nine (9) proposed stormwater management ponds. Stormwater management ponds have been located at natural topographic low-points and provide an appropriate outlet to the adjacent watercourse or ditch in accordance with the pre-development drainage conditions. Lot or park grading adjacent to Environmental Policy Areas will aim to discharge clean stormwater runoff from landscaped areas to the natural features to promote water balance.

Regional Road 50 and Emil Kolb Parkway have several existing features to allow for conveyance of overland flows through the right-of-ways. These features, consisting of culverts and bridges, will be maintained with no proposed upgrades. Additionally, we have not proposed any crossings of natural features to the existing road networks or within the proposed road network.

Floodplain Analysis

The floodplain analysis for the Site includes a headwater drainage feature assessment, mapping of the existing floodplain, and an evaluation of the post-development floodplain. Within the Toronto and Region Conservation Authority, the Regulatory Floodplain is based on the greater of the Regional storm (Hurricane Hazel) and the 100-year event. Based on the results of the analysis, there will be modifications required to some of the tributaries in order to safely convey external runoff either through or around the proposed development.

Stormwater Management

Runoff from the Site will be directed to on-site stormwater management (SWM) wet ponds designed to provide quantity (for ponds located within sub-basin 10 of the Humber River only), quality, and erosion control. A total of nine (9) end-of-pipe stormwater management wet pond facilities are proposed to treat runoff from post-development drainage areas within the Main Humber River Watershed. A total of six (6) ponds will be located within an area of the Main Humber watershed that does not require quantity control; therefore, these ponds will be designed to provide quality and erosion control. While quantity controls are not prescribed for areas draining to the Main Humber River, pond sizing within this report includes considerations for post-to-pre controls as a measure of conservatism. The remaining three (3) SWM ponds are located within sub-basin 10 of the Humber River, which will be designed to provide quantity control as well as quality and erosion control. The Subwatershed Study (being prepared under separate cover in parallel with this report) will ultimately be the overarching document for directing more detailed stormwater management criteria for the Site.

Outfall elevations for the SWM pond facilities were set at or above the 25-year water level of the receiving watercourse. The 25-Year water surface elevations are summarized in Section 8.3. Design of the SWM pond facilities adheres to the requirements of the Town of Caledon.

Water Balance and Low Impact Development

A site-wide water balance assessment and feature based water balance assessment will be completed for the Site as part of the Hydrogeological Report being prepared by Crozier under separate cover.

According to mapping from the Toronto and Region Conservation Authority, the Site is located within a Significant Groundwater Recharge Area and a High Groundwater Recharge Area (Stormwater Management Criteria, 2012). Due to these vulnerable areas, the Site is required to maintain pre-development groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrologic and ecologic functions.

Low Impact Development (LID) methods can be implemented on-site to mitigate water balance on-site and/or to wetland. Potential LID methods explored in this report include green roofs, roof downspout disconnection, infiltration galleries, rainwater harvesting, bioretention, vegetated filter strips, permeable pavement, and enhanced grass swales. Further implementation strategies will be explored at the Draft Plan stage.

Secondary Plan Natural Heritage Study Report

Dillon Consulting Ltd. has prepared a Secondary Plan Natural Heritage Study Report under separate cover, dated December 2024.

Conclusions & Recommendations

The conclusions and recommendations for servicing the Site are preliminary in nature based on the level of detail derived from the Concept Plan (Bousfields, January 27, 2025). Servicing and stormwater management solutions are expected to be refined as further planning applications progress and through correspondence with the Town of Caledon, Region of Peel, Toronto and Region Conservation Authority, and any other applicable reviewing agency. Drawings, figures, and appendices have been prepared in support of this report.

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1.0 INTRODUCTION

1.1 Study Purpose

C.F. Crozier & Associates Inc. (Crozier) was retained by Bolton North Hill Landowners Group to prepare a Functional Servicing and Stormwater Management Report in support of a Local Official Plan Amendment (LOPA) for the Bolton North Hill Secondary Plan Option 1 Lands (the Site) in the Town of Caledon, Region of Peel. The Site consists of 167.52 ha of developable land and is located generally north of the intersection of Regional Road 50 and Columbia Way.

This report will demonstrate how the Site can be developed in accordance with the Town of Caledon and Region of Peel guidelines from a functional sanitary and water servicing and preliminary stormwater management perspective. Functional water servicing for the Site has been developed based on a Technical Memorandum by R.J Burnside & Associates Inc. dated May 13, 2021 and will be discussed in this report. Note this report is expected to be updated again in 2024 and any revised results should supersede the water servicing strategy set forth in this Report.

The proposed servicing strategies included in this report have been prepared with careful consideration of the Town and Region's overarching principles. The proposed strategies demonstrate the feasibility of servicing these expansion lands by presenting technically correct and economically feasible solutions that use and improve existing infrastructure. These strategies also provide services to existing populations that are under-served and services population into the future beyond the Bolton Residential Expansion Settlement areas.

The goal of the servicing strategy presented herein is to develop the most feasible solution for the entire Site. Per drawing C701 – Landownership Map, there are several landowner holdouts within the Site. Should current landowners wish to progress the development of their properties, there are feasible interim servicing solutions available. These interim solutions can be explored in more detail in subsequent versions of this report and/or reports specific to the development of those properties, should they be required in support of a Draft Plan of Subdivision and/or Site Plan Application approval. A preliminary interim servicing strategy has been developed (see drawing C709B) to depict a viable servicing solution should the landowner holdouts remain.

1.2 Study Area

Option 1 Lands are approximately 163 ha and are generally located north of the intersection of Regional Road 50 and Columbia Way and north and south of Emil Kolb Parkway (east of the Humber River). One member of the Bolton North Hill Landowner Group owns land within the Option 2 Lands, which are approximately 4.6 ha and bound by Columbia Way to the south and Mount Hope Road to the west. This Report also addresses servicing and stormwater management for this parcel.

Both Option 1 and 2 Lands are located within the Main Humber River Watershed, and there is a minor watershed divide bisecting Option 1 Lands that directs flows east/west.

According to the Concept Plan by Bousfields Inc. dated January 27, 2025, the elements envisioned for the proposed development include:

- 1288 Single Units
- 1029 Townhouses/Back-to-Back Townhouse Units
- 1419 Medium/High Density Units
- 659 Mixed Use Units
- School, Parks, Woodlot and Open Spaces
- Stormwater Management Pond Blocks

The Concept Plan, outlining the proposed development and land ownership boundaries is provided in Appendix A.

A 31.3 ha parcel, located at the southern limit of the Option 1 Lands, has been subject to Regional Official Plan Amendment 30 (ROPA 30), which was approved by the Local Planning Appeal Tribunal (LPAT) on November 30, 2020. This LPAT approval brings the 31.3 ha portion of Option 1 Lands into the Bolton Rural Service Centre Settlement Area Boundary. A public meeting was held on April 25th, 2024, to discuss the rezoning of the Option 1 Lands through the use of Strong Mayor Powers. Subsequently, ROPA 30 was approved on November 30, 2020 and the ZBA for the Option 1 Lands was approved on June 26, 2024. Our final step is to obtain LOPA and approval of the secondary plan.

1.3 Concept Plan

The Concept Plan (Bousfields Inc., January 27, 2025) has been reviewed by the Bolton North Hill Landowners Group and conforms to the development proposals set forth by each landowner, along with the requests of external stakeholders such as the public and catholic school boards, Town of Caledon, and Region of Peel. The functional design is based on this plan and unit/population counts have been derived accordingly.

A number of major structural elements define the Bolton North Hill development, including:

- A logical hierarchy of collector and local roads that provide:
    - Internal movement in a manner that is supportive of vehicular and pedestrian modes of transportation; and
    - Connectivity to the existing collector roads (Mount Hope Road, Columbia Way, Regional Road 50, Emil Kolb Parkway, and Duffy's Lane).
- Key features of the above transportation hierarchy include:
    - Extension of the roundabout at the intersection of Regional Road 50 and Emil Kolb Parkway; and
    - Bisecting local collectors that provide internal connectivity to parks and shared spaces.

- Open Space blocks that allow for the protection of Natural Heritage features such as woodlots, wetlands, and floodplains.
- Mixed-use development including commercial, institutional, and residential.
- Mix of residential densities that focus on affordable housing solutions with apartments, back-to-back townhomes, townhomes, and single residential lots.
- Park space and integrated stormwater management blocks that provide trail connectivity through the development.
- Separate public and catholic school board space.

1.4 Background Studies & Previous Reports

A previous version of this Report was submitted to support the initial Secondary Plan application in early 2022 (dated December 2021). Since then, we have received comments from agencies and the development landscape within the Bolton area has evolved. The original report built upon several previous reports prepared by Crozier and other consultants to support the development of these lands. Many studies were undertaken from 2013 to 2020, which led to the decision for including a portion of Option 1 Lands within Regional Official Plan Amendment 30. Previous studies include:

1. **Without Prejudice Servicing Feasibility Report, Proposed ROPA 30 for Bolton Residential Expansion Study (September 2020):** This report provided a servicing strategy to demonstrate feasible sanitary and water servicing for Options ½ lands north of Columbia Way. This report was prepared as input to the Bolton Residential Expansion Study in preparation for the 2020 Local Planning Appeal Tribunal.

2. **Servicing Strategy for a 30 ha Portion of Option ½ Settlement Lands (October 2020):** This supplementary memo was prepared to facilitate consensus among landowners other than those of Option1/2 lands, in an effort to reach a settlement agreement as part of the Local Planning Appeal Tribunal. This memo also describes high level water and sanitary servicing strategies for approximately 30 ha of Option1/2 lands.

3. **Servicing Strategy & Cost for Option 1 & Option 3 Settlement Lands (November 2020):** This supplementary memo was prepared to clarify servicing strategies for Option 1 and Option 3 lands as part of the settlement agreement reached in the Local Planning Appeal Tribunal. This memo provided additional context for high level water and sanitary servicing strategies for approximately 60 ha of Option 3 in addition to the Option 1 settlement area.

4. **"Technical Memorandum, Bolton Option 1, 2 & 3 Lands Preliminary Water Modelling", R.J. Burnside & Associates Inc. (May 2021):** this memo provides a proposed strategy for providing water servicing to the Option 1, 2, and 3 Lands. The memo reviews various development horizons and discusses the feasibility of providing water servicing to support this variety of development expansion areas.

5. **Crozier's Response to RJ Burnside's Option 1, 2, 3 Preliminary Water Modelling (May 2021):** This memo was prepared to review a preliminary water modeling technical memorandum prepared by RJ Burnside. This review was done to summarize and better understand the sequencing of interim and ultimate water servicing strategies to allow for the development Option 1 and Option 3 lands in 2031.

6. **Option 1 & 2 Sanitary Servicing Capacity and Hydraulic Grade Line Analysis (June 2021):** This memo was prepared to analyze the feasibility and sequencing of interim and ultimate sanitary servicing opportunities and constraints for Option ½ lands over various planning horizons in 2031, 2051 and beyond 2051.

7. **Option 1 & 2 Lands Secondary Plan Natural Heritage Study Report (Dillon, December 2024):** This report was prepared to assess potential impacts to the Natural Heritage (NHS) Features within the Study Area to help inform the secondary Plan for the Option 1 & 2 lands.

This report has been completed in accordance with the guidelines, standards, and policies of the Town of Caledon, Region of Peel, and Toronto and Region Conservation Authority with consideration for various provincial-level initiatives. The relevant background studies and reports include:

- "2020 Water and Wastewater Master Plan for the Lake-Based Systems", Region of Peel & GM BluePlan, June 2020, herein "2020 Master Plan"
- "Provincial Policy Statement", May 2020, herein "2020 PPS"
- "A Place to Grow: Growth plan for the Greater Golden Horseshoe", August 2020, herein "2020 Growth Plan"
- "Bolton Residential Expansion Regional Official Plan Amendment Discussion Paper", The Planning Partnership (TPP), April 2016
- "Bolton Residential Expansion. Analysis in support of the Regional Official Plan Amendment", Region of Peel, June 2016
- "Development Standards Manual", Town of Caledon, 2019
- "Stormwater Management Criteria", Toronto and Conservation Authority, August 2012
- "Development Charges Background Study", Region of Peel, December 2020
- "Bolton Residential Expansion Study. Infrastructure Report", GM BluePlan, June 2014
- "Bolton Residential Expansion Study. Recommendations: Selection of Expansion Area", June 2013
- "North Bolton Elevated Tank/Reservoir and Feedermain – Schedule C Class EA Study", AECOM, October 2011
- "Bolton Urban Community Water and Wastewater Analysis", AECOM, March 2010
- "Region of Peel Watermain Design Criteria", June 2010
- "Region of Peel Sanitary Sewer Design Criteria", July 2009 (modified March 2017)

1.5 Subwatershed Study

A Subwatershed Study (SWS) will be conducted concurrently with the Local Official Plan Amendment application and the design for the Site will ultimately need to conform to the criteria established in the Subwatershed Study. It is expected that the SWS results will impact primarily the extended detention times and onsite retention volumes because of the erosion assessment. Reach delineation and rapid geomorphic assessments (on participating lands) were completed by GeoMorphix Ltd. in the spring of 2024. Results of this rapid field reconnaissance indicated that multiple reaches are sensitive to erosions, thereby requiring further analysis in support of an appropriate stormwater management strategy for the site. Detailed geomorphic field assessments will be completed and erosion thresholds calculated for erosion-sensitive reaches as part of the subwatershed study.

The number and location of LIDs required will also be established as part of the water balance and feature specific water balance modeling required for the SWS.

It is understood that a flood vulnerable area is present downstream of the subject Bolton North Hill lands, located in the vicinity of Highway 50 and King Street, referred to as the Bolton Flood Vulnerable Cluster on TRCA mapping. Additional analysis will be completed through the subwatershed study to assess any potential increases in flood elevation downstream of the site (with particular attention to this flood vulnerable area) as a result of the proposed development. Mitigation measures to prevent increases in downstream flood elevations will be assessed through the subwatershed study and will inform whether more stringent stormwater management controls are needed for the Bolton North Hill development.

The pond blocks in the Concept Plan (Bousfields Inc., January 27, 2025) were sized based on post-to-pre targets as a conservative estimate of pond sizing, taking into account that several SWM facility outlets are to small tributaries. The locations of the SWM facility outlets, the required quality and required quantity volumes are not expected to change significantly based on the results of the SWS.

1.6 Study Team

Members of the Bolton North Hill study team involved in the preparation of the Functional Servicing and Stormwater Management Report documents and their respective disciplines are listed below.

Bousfields Inc.	Urban Planning Land Use Design	Planning Justification Report
Arcadis (formerly IBI Group)	Planning and Urban Design	Fiscal Impact Study
C.F. Crozier & Associates Inc.	Municipal Design / Water Resources	Functional Servicing and Stormwater Management Report
	Transportation Engineering	Traffic Impact Study
Dillon Consulting Ltd.	Land Development Municipal Design	Secondary Plan Natural Heritage Study

The Region of Peel is currently undertaking a Municipal Class Environmental Assessment (EA) for water and wastewater servicing to determine the preferred servicing strategy for the ROPA 30 lands. The external servicing strategy has been developed in consultation with the Region of Peel and several other consultants representing the private and public sector. The servicing strategy to be adopted in future detailed design to support development will need to align with the work undertaken by all consultants.

R.J. Burnside & Associates Inc.	Water Distribution	On behalf of Option 3 lands
Urbantech Consultants	Wastewater Conveyance	On behalf of Option 3 lands
Ainley	Water and Wastewater Municipal Class EA	On behalf of Region of Peel
CIMA	Water and Wastewater Municipal Class EA	On behalf of Region of Peel

2.0 WATER SERVICING

2.1 Background

R.J. Burnside was retained by the Bolton North Hill Landowners Group in cooperation/ coordination with the Option 3 Landowners Group to complete an analysis on the existing water distribution system in the Bolton Residential Expansion Study (BRES) lands. The goal of this analysis was to provide a proposed water servicing strategy for the full build-out scenario of the Option 1, 2, and 3 Lands. The conclusions of their Technical Memorandum (May 13, 2021) with respect to Option 1 and 2 Lands are summarized below and Appendix A contains R.J. Burnside's Technical Memorandum from May 13, 2021.

2.2 Pressure Zone 7

According to the Bolton Residential Expansion Study (Region of Peel, September 24, 2020), the development of Option 1 and 2 Lands will require a new pressure zone to facilitate water servicing. The Site is outside of the range of elevations associated with the water distribution infrastructure for Pressure Zone 6 (214.5 m – 259.1 m), as stated in the Water and Wastewater Master Plan (Region of Peel, 2020). Therefore, ultimate development of Option 1 and 2 Lands will require the addition of Pressure Zone 7, accompanied by a new Zone 7 booster pumping station at King Street and Coleraine Drive.

Storage is proposed in the form of two elevated tanks to provide flow equalization and to meet the required fire and emergency demands. One of the proposed elevated tanks is in the northeast corner of Option 1 Lands, adjacent to Regional Road 50. The serviceable elevation of Pressure Zone 7 ranges from 243.4 m to 289.6 m as stated in the Water and Wastewater Master Plan (Region of Peel, 2020).

2.3 Servicing ROPA 30 Lands

R.J. Burnside stated in their Technical Memorandum (May 2021) that the ROPA 30 portion of Option 1 Lands and Option 3 Lands can be supported by the water infrastructure system without the need for a new elevated tank. Their modelling showed that the system can supply the maximum daily demand to these two lands while maintaining the required system pressure between 40 psi and 100 psi. See below for an excerpt of their Technical Memorandum:

"A hydraulic model of the proposed water distribution system has been developed for the Option 1, 2, 3, 4 Zone 7, Zone 7 ROA and Zone 7 Whitebelt Lands. In addition, allowance has been made to accommodate up to approximately 7,500 existing residents and jobs currently situated at the upper limits of Pressure Zone 6, and experiencing water pressure issues, into a new Pressure Zone 7, thereby addressing long standing deficiencies in water service.

The model demonstrated that the ROPA 2031 Option 1 and 3 Lands can be serviced with a booster pumping station and without a Zone 7 elevated tank (ET). The construction of the Zone 7 ET within the Option 3 Lands can adequately service the Option 3 Draft Plan Approved Lands, the ROPA 2031 Option 1 and 3 lands, and the 2031 Option 1 and 2051 Full buildout Option 3 Lands. To satisfy storage requirements it is anticipated that once the 2051 Option 1 and Option 2 Lands commence development, a second Zone 7 ET within the Option 1 Lands will need to be constructed. The modelling demonstrated that the ultimate Zone 7 servicing solution that includes two ETs on the Option 1 and Option 3 Lands can service the full Zone 7 buildout scenario, subject to confirmation of tank sizing."

Since the preparation of the 2021 Technical Memorandum, R.J. Burnside has been retained by the Option 3 Lands to undertake the detailed design of the water booster station that will provide servicing to the ROPA 30 Lands and ultimately work in conjunction with the elevated water tanks that will provide water supply for the entire Pressure Zone 7. This design is being undertaken in consultation with the Region, as it is proposed on Region owned lands and will be assumed by the Region for operation and maintenance. Alongside the detailed design, R.J. Burnside is updating their analysis on the water servicing for both the interim and ultimate development scenarios.

2.4 Ultimate Water Servicing Strategy

The full build-out water servicing strategy will require an elevated tank in the Option 1 Lands and a 400 mm diameter feedermain along Emil Kolb Parkway, Regional Road 50, and Columbia Way to create a loop between Option 1, 2, and 3 Lands. This elevated tank is currently proposed within landowner property but outside of the development limits within the Oak Ridges Moraine (ORM). The Ontario Regulation 140/02 policy of the ORM allows for infrastructure within its limits but not development. Internally, water servicing is proposed to provide the necessary domestic and fire demands. A looped system will be maintained, and all Region of Peel standards will be adhered to for the design of the watermains and appurtenances. Further details of the full build-out water servicing strategy can be seen on Drawing C711 – Preliminary Water Distribution Plan. The water servicing strategy for the Option 1 lands will need to respect the findings of any updated analysis conducted by R.J. Burnside and/or the Region of Peel.

3.0 SANITARY SERVICING

3.1 Existing Sanitary Servicing

The existing sanitary servicing infrastructure for lake-based systems within the Region of Peel is described in detail in the Water and Wastewater Master Plan (Region of Peel, 2020). Volume 3 and Volume 4 of this Master Plan discuss existing water and sanitary infrastructure in the Region, including an examination of the capacity of Bolton's existing sanitary infrastructure. The Master Plan is expected to be updated in 2025 (Volume 5); the servicing strategy moving forward from that point will need to respect the approach and conclusions set forth by the Region.

Bolton is predominantly serviced by two sanitary trunk sewers: a 900 mm diameter trunk sewer on Albion-Vaughan Road in the east end and a 750 mm diameter trunk sewer on Coleraine Drive in the west end. These two trunk sewers merge outside of the southern limits of Bolton at the intersection of Coleraine Drive and Regional Road 50. The wastewater then continues flowing south in a sanitary sewer along Regional Road 50 to the McVean Sewage Pumping Station, and ultimately for treatment at the G.E. Booth Wastewater Treatment Plant.

The 750 mm diameter sanitary trunk sewer on Coleraine Drive was installed in 1983, expanding to approximately 800 m north of George Bolton Parkway. This sanitary sewer was then extended 400 m further north at 600 mm diameter in 1989, then terminated at 375 mm diameter at King Street West in 1999.

The 900 mm diameter Albion-Vaughan (AV) trunk sewer as it exists today was completed in early 2015 and currently terminates north of the railway corridor on Albion Vaughan Road. The Region of Peel's capital works program included completing this trunk sewer by the spring of 2021 to terminate at the northern most extent of Nunnville Road, which also involves the decommissioning of the existing Albion Vaughan and Harvestview Sewage Pumping Stations along a similar timeline. The AV trunk sewer has an approximate full flow capacity of 1,000 L/s.

3.2 Design Sanitary Flow

The Water and Wastewater Master Plan, Volume 4 (Region of Peel, 2020) was referenced to calculate the sanitary design flows for the Site. Dry weather unit sewage flows of 290 L/capita/day and 270 L/capita/day were used for residential and employment populations, respectively. Population yields (derived from the unit count of the Concept Plan), an infiltration flow of 0.26 L/s/ha, and a peaking factor were applied to the unit sewage flow to obtain the total estimated design sanitary flow. Table 1 summarizes the results and Appendix B2 contains detailed calculations.

Table 1: Estimated Sanitary Design Flows

Land Parcel	Development Area (ha)	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Sanitary Flow (L/s)
Option 1	162.88	91.3	2.8	137.2	42.3	179.5
Option 2	4.64	2.65	4.0	5.8	1.2	7.0

Therefore, the proposed development of Option 1 and 2 Lands will generate a total of 186.5 L/s in sanitary discharge.

3.3 Proposed Sanitary Servicing

Based on advancement of the Water and Wastewater Municipal Class EA by the Region, an alternative servicing strategy has been prepared for the proposed development compared to the strategy previously presented by Crozier in the December 2021 version of this report. Our previously proposed solution included discharging flows from the ROPA 30 and Option 2 Lands to the existing sanitary infrastructure south of Columbia Way, ultimately discharging to the existing AV trunk sewer. The remainder of the Bolton North Hill lands would discharge to a trunk sewer on Emil Kolb Parkway and to an ultimate trunk sewer downstream on Humber Station Road. We now understand the preferred approach for all new developments north of Columbia Way, including the ROPA 30 Lands (31.3 ha), the remaining Option 1 Lands (118.2 ha), Option 2 Lands (4.64 ha), remaining Option 2 Lands (117.36 ha), Rounding Out Area C (7.5 ha), and Columbia Square (3.3 ha), is to discharge into a proposed sanitary system on Emil Kolb Parkway and ultimately to the proposed trunk sewer on Humber Station Road. Flows are then pumped via twin 450 mm diameter forcemains to a 525 mm diameter trunk sewer flowing west via gravity on King Street, and ultimately to a 1200 mm diameter trunk sewer flowing south on Humber Station Road.

The trunk sewer on Humber Station Road is being designed to convey flows from all the currently proposed development and future Whitebelt Lands development in the north and west ends of Bolton. The analysis, design, and construction for the furthest downstream portion of this sewer (between Mayfield Rd and Healey Rd) is being undertaken by the Region and its consultants, with Urbantech responsible for the upstream portion north of Healey Rd, including the trunk sewer on King St. The full construction and commissioning of this downstream system is expected to be completed by 2027 to facilitate the development of the priority ROPA 30 lands.

Internal Sanitary Servicing Strategy

The internal servicing strategy aims to convey flows via gravity to trunk sewer connections on Regional Road 50 and Emil Kolb Parkway. While there are significant negative elevation changes from these connection points to the outer edges of development, we understand the Region is proposing the trunk sewer to be deep enough such that no sewage pumping stations will be necessary within the Subject Lands.

All proposed sanitary sewers will be Polyvinyl chloride (PVC) pipes. PVC was chosen over reinforced concrete to reduce the infiltration into the sanitary sewer system. Additionally, unless otherwise stated all sanitary sewers are proposed to be 250 mm diameter with minimum slope to provide self-cleansing velocity, in accordance with the Region of Peel standards.

Interim Sanitary Servicing Strategy

An interim servicing strategy has also been provided for the 4.3 ha parcel in the Option 2 Lands, since it is likely that they would develop well ahead of the timeline for the remaining Option 2 Lands. The upgrades necessary within the existing system south of Columbia Way to accommodate the development are minor and may be proven unnecessary through more detailed modelling. For this solution, the Option 2 Lands would discharge into the existing sanitary sewer on Mount Hope Road south of Columbia Way and eventually discharge to the Bolton Sanitary Pumping Station south of King Street East, where flows would then be pumped via a forcemain into the existing AV trunk sewer.

Table 2 below breaks down the flows from the drainage area being sent to the existing sanitary sewer system south of Columbia Way during the interim condition. A total of 7.0 L/s of sanitary flows from the proposed development will be sent to the existing system south of Columbia Way.

Table 2: Sanitary Flows to the Existing System (Interim Condition)

Drainage Area Number	Area (ha)	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Sanitary Flow (L/s)
8	4.64	2.65	4.0	5.8	1.2	7.0

Sanitary flows from Drainage Area 8 will be connected to the existing system at Columbia Way and Mount Hope Drive via a 250 mm diameter gravity sewer at 0.5% grade.

Ultimate Sanitary Servicing Strategy

Table 3 below breaks down the flows from each drainage area being sent to Emil Kolb Parkway, and detailed calculations are provided in Appendix B2.

Table 3: Sanitary Flow to Emil Kolb Parkway (Ultimate Condition)

Drainage Area Number	Area (ha)	Average Daily Flow (L/s)	Peaking Factor	Peak Flow (L/s)	Infiltration Flow (L/s)	Total Sanitary Flow (L/s)
1	31.1	20.98	3.35	43.18	8.09	51.27
2	42.7	24.26	3.34	43.96	11.10	55.06
3	5.2	5.83	3.72	16.63	1.35	17.98
4	13.5	5.16	3.98	6.57	3.51	10.08
5	16.1	10.53	3.60	22.88	4.19	27.07
6	14.1	14.76	3.73	16.06	10.45	26.51
7	26.1	13.07	3.61	22.69	6.79	29.47
8	4.64	2.65	4.00	5.77	1.21	6.97

It should be noted that the design for the Emil Kolb Parkway trunk sewer is to be completed by the Region.

3.4 Proposed Sewage Pumping Station

We understand the Region's preferred approach is to provide one (1) sewage pumping station (SPS) within the Humber River Valley along Emil Kolb Parkway that will service the development of the Option 1 and 2 lands. Crozier has been working collaboratively with the Region to share and review preliminary design information. The ultimate design will be undertaken by the Region based on the results of the Municipal Class EA.

Table 4 shows the total tributary flows to the SPS.

Table 4: Sewage Pumping Station (SPS) Summary

Lands	Area (ha)	Cumulative Area (ha)	Population	Cumulative Population	Dry Weather Flow (L/s)	Peaking Factor	Infiltration & Inflow (L/s)	Total Flow (L/s)
Option 1 (ROPA 30)	31.3	31.3	3426	3426	11.5	3.4	8.1	47.2
Option 1 (Remaining Lands)	118.20	149.5	11209	14635	49.1	2.8	38.9	175.9
Option 2 (BNHLG)	4.64	154.1	429	15064	50.6	2.8	40.1	180.5
Option 2 (Remaining Whitebelt)	117.7	271.5	8077	23141	77.7	2.6	70.6	271.7
Rounding Out Area C	7.5	279.0	538	23679	79.5	2.6	72.5	277.5
Columbia Square	3.3	282.3	2247	25926	87.0	2.5	73.4	294.4

4.0 PROPOSED GRADING & ROADS

4.1 Grading Constraints & Objectives

The following constraints were taken into consideration in preparing the grading plan for the Site:

- The existing elevations of Emil Kolb Parkway, Regional Road 50, and Columbia Way.
- The existing elevations at the property lines of all land parcels.
- Matching the existing drainage patterns within the Site in the post-development condition, and keeping overland flows sent to the Humber River tributaries as close to existing as possible.
- Sending overland flows to the proposed Stormwater Management Pond locations.
- Conveying external flows through or around the Site as necessary.
- Minimum and maximum road slopes per the Town of Caledon standards.

Further to the above constraints, proposed grading for the Site adheres to the following objectives:

- Optimize cut and fill operations and achieve a balanced site.
    - Prevent / minimize the need for retaining walls.
    - Special consideration for the preservation of existing ground elevations in the vicinity of natural features.
- Maintain required cover for municipal infrastructure and utilities including reducing the need for pump stations to convey sanitary flows.
- Accommodate the future lot grading, based on preliminary concepts in accordance with the Town standards.
- Utilize the opportunity for walkout lot types where parcels border areas outside of the development limit.
- Maximize the reuse of topsoil within the Site to limit hauling operations.

4.2 Preliminary Grading Design

The preliminary grading design for the Site is shown on Drawing C704 – General Grading. The grading plans include proposed road centerline elevation and slopes, existing surface contours and the direction of overland flow routes. The following sections outline critical elements of the grading design.

Compatibility with Environmental Policy Areas

As mentioned in the above constraints, proposed elevations adjacent to Environmental Policy Areas will match existing as close as possible to minimize impact to these sensitive areas. Grading adjacent to natural heritage features considers natural heritage buffers/constraints, erosion setbacks, and external overland flow. As the concept plan and design progress we will continue to monitor the grading impacts in these areas and minimize the need for retaining walls, sloping, etc.

Lot or park grading adjacent to Environmental Policy Areas will aim to discharge clean stormwater runoff from landscaped areas to the natural features to promote water balance.

Road Centerline Gradients

The preliminary grading design conforms to the Town of Caledon design standard of maintaining a minimum and maximum asphalt gradient of 0.5% and 6.0%, respectively in most areas.

There are two areas where sawtooth grading is proposed to ensure overland conveyance to the stormwater management ponds while considering the constraints of matching boundary elevations. Where sawtooth grading is proposed, a minimum asphalt gradient of 0.5% and overall gradient of 0.3% is maintained. The maximum ponding depth has been set to 0.2m (below the maximum allowable Town standard of 0.3 m for paved areas to allow for flexibility at detailed design). The two areas are within the following Option 1 lands:

- In the ROPA 30 portion of Option 1, an overall gradient of 0.3% was proposed on the internal road adjacent to Regional Road 50 to keep centerline elevations within +-0.50 m from the existing Regional Road 50 elevations and allow conveyance south to the proposed stormwater management (SWM) Pond 210; and

- East of the proposed intersection of Emil Kolb Parkway and Regional Road 50, overall gradients of 0.4% and 0.3% were proposed to convey water to proposed SWM Pond 207 to achieve a low point elevation that accommodates existing Humber River Tributary D. The gradients are also proposed to achieve grades that match the existing boundary elevations of the Greenbelt lands to the west and south of the SWM Pond.

Stormwater Management Ponds

In some instances, the proposed stormwater management ponds (SWMPs) create boundary conditions that the road centerline elevations must adhere to for each drainage area. This occurs where the permanent pool elevations for the SWMPs were fixed based on the respective receiving outlet elevations, which are set at 0.10 m above the 25-year flood elevation of each tributary. These permanent pool elevations then set the road centerline elevation required to facilitate minor and major flow conveyance to the SWMPs.

Refer to Drawing C707 – Conceptual SWM Pond Plan and Section for preliminary grading of Pond 208, located within the ROPA 30 section of Option 1 Lands.

Grading of roads, lots, and SWMP Blocks considers a buffer required to match proposed or existing boundary elevations. Ponds have been sized such that no retaining walls are required to facilitate grading.

Overland and Emergency Flow Routes

The roads have been graded to ensure positive drainage of major system flows towards the SWMPs within each drainage area. The major system drainage is directed overland to the SWMPs and will operate in the event of a minor system blockage or when the minor system capacity is exceeded (above the 10-year storm event). Each SWMP includes an overland flow path to direct major flow from the roadways into the ponds and an emergency spillway that will operate in the event of an outlet blockage or in the event of a large storm exceeding the pond design capacity. Emergency spillways will be sized for the Regulatory event (larger of the 100-year uncontrolled flow or the Regional uncontrolled flow).

Other Drainage Considerations

If road grading cannot accommodate the conveyance of overland flow to the SWMP, localized capture of the 100-year storm will be contemplated. This will be further determined at detailed design based on road grading and stormwater management requirements for capturing and treating flows.

There are small areas identified across the Site that propose uncontrolled runoff directed to adjacent Environmental Policy Areas. The typical location is split or walkout lots that back onto undevelopable land where the rear-yard drainage cannot be captured. The drainage from these areas is considered inherently 'clean' runoff. At this time, uncontrolled flows from developable areas have been eliminated but are subject to change based on constraints encountered at detailed design. Uncontrolled drainage has been accounted for in the sizing of the SWMPs.

4.3 Earthworks Analysis

An earthworks analysis was performed based on the preliminary grading plan for the Site to determine the locations within the Site that require cut or fill and derive a net earthworks requirement. Matching the pre-development drainage divides helps to match proposed and existing elevations closely across the site, however, the natural topography is quite undulated, and areas of large cut and fill have still resulted.

Drawing C705 – Preliminary Earthworks Map illustrates the cut and fill areas for the Site with colour coded banding and Table 5 below for the resultant volumes.

Table 5: Earthworks Volumes

Land Area	Cut (m^3)	Fill (m^3)	Net (m^3)
ROPA 30 Lands	150,000	130,000	20,000 (CUT)
Option 1 Lands	1,350,000	1,130,000	220,000 (CUT)
Option 2 Lands	10,000	1,000	9,000 (CUT)

The earthworks were calculated with an average topsoil depth and pre-grade across the entire Site. In absence of a geotechnical report for the Site, the stripped topsoil depth was assumed to be 0.3 m, which is consistent with historically agricultural lands across southern Ontario. The pre-grade depth was assumed to be 0.8 m, which is a weighted average of the typical pre-grade for parks (0.3 m), roads/institutional/commercial (0.6 m), single residential lots (0.8 m), townhomes (1.0 m), and apartments (2.0 m).

At this stage, the earthworks analysis was completed to understand which areas of the Site could be refined in subsequent revisions so that cut and fill and the resultant net volume (import or export) is minimized. As the development is advanced, the proposed grading will be further refined to achieve balance where possible. It is not feasible that each parcel of land will balance, and therefore collaboration between the landowners will likely be required to share cuts and fills.

In preparing subsequent development staging/phasing plans, the cut and fill areas will be further analyzed to coordinate the earthworks program between individual owners.

5.0 DRAINAGE CONDITIONS

5.1 Existing Drainage Conditions

The Site is located within the regulation limits of Toronto and Region Conservation Authority (TRCA) and discharges to directly the Main Humber River and Cold Creek subwatersheds. A network of small tributaries, ditches, culverts, and bridges convey runoff from the Site to the larger watercourses downstream.

Drawing C703 – Pre-Development Storm Drainage Plan illustrates the existing drainage patterns within the Site and surrounding area.

A hydrologic model (Visual OTTHYMO v.6.2) was received from TRCA for the Main Humber River and Cold Creek. It is noted that subcatchment boundaries received from TRCA have been further refined by Crozier based on the detailed topographic data obtained from the Land Information Ontario Dataset by the Ministry of Natural Resources and Forestry and existing drainage features (ditches, culverts, bridges, etc.) to clarify existing drainage flow paths, boundaries, and outlets. The existing hydrologic and hydraulic modeling was obtained for the purposes of assessing the Floodplain. Refer to Section 8.0 for further details regarding the floodplain modeling.

Under existing conditions, Option 1 Lands have been discretized into a total of seventeen (17) internal drainage areas, comprising primarily agricultural lands. Additionally, the northern boundary of Option 1 Lands currently receives stormwater runoff from a total of eight (8) external drainage catchments, comprising largely of undeveloped area. Existing drainage, both internal and external to Option 1 Lands, generally flows south towards one of the five (5) nearby tributaries of the Main Humber River (labelled as Tributaries 'A-E').

Option 2 Lands are located northeast of the intersection at Mount Hope Road and Columbia Way and have been delineated as one (1) internal drainage area. Drainage from the Option 2 Lands generally drains north towards Cold Creek, a tributary of the Main Humber River.

Table 6 below provides a summary of the existing drainage catchments and parameters used for modeling. Time to peak values for each catchment were calculated using the Airport Method given that the existing areas are largely pervious, and the catchment areas are generally less than 1 km^2. The Airport Method uses the travel length and average slope within the catchment to calculate the time to peak (hours).

According to the Ontario Soil Survey mapping for Peel County, there are mainly four soil types present on Site: King Clay Loam, Bottom Land, Monoghan Clay Loam and Pontypool Sandy Loam. King Clay Loam is the dominant soil type found across the majority of the Site. Figure SOIL-1 (provided in Appendix E – Figures) illustrates the predominant soil types across the Site and surrounding area.

Existing land use on Site is primarily agricultural, with some commercial, forest, meadow, rural residential and wetlands present. Refer to Figure LAND-1, provided in Appendix E – Figures, which depicts the existing land use conditions.

The weighted average tool in Visual Otthymo (VO) was used to assign an SCS Curve Number value to each catchment, which was then converted to a Modified CN* value within VO for the 2-year to 100-year storm events. For modeling of the Regional (Hurricane Hazel) storm event, CN* values were converted to AMCIII values within VO to better represent the antecedent soil moisture conditions during a large storm event.

Refer to Table 6 for a summary of CN* and time to peak (Tp) values applied to each catchment. Refer to Appendix C2 for a detailed summary of the calculated hydrologic parameters.

Table 6: Pre-Development Catchments – Draining towards Site

Catchment ID	Drainage Area (ha)	Initial Abstraction, IA (mm)	Modified Curve Number, CN*	Time to Peak (hours)	Outlet
100	5.39	7.00	82	0.45	Tributary A
101	7.87	6.93	82	0.55	Tributary B
102	1.99	6.95	82	0.13	
103	5.54	6.90	82	0.45	
104	6.52	7.08	82	0.50	Tributary C
105	11.51	7.03	82	0.59	
106	15.65	6.99	81	0.76	Tributary D
107	5.36	6.59	83	0.61	
108	6.68	7.01	82	0.24	Tributary C
109	19.85	4.82	91	0.51	Tributary D
110	15.34	6.98	82	0.68	
111	22.12	7.01	82	0.46	Tributary E
112	4.62	7.00	82	0.40	Tributary D
113	12.78	7.00	82	0.69	Tributary E
114	9.91	6.79	83	0.51	Tributary D
115	9.87	7.02	82	0.72	Tributary E
116	7.40	6.82	83	0.59	Tributary D
117	5.14	6.92	83	0.51	Cold Creek
Total Site	**173.54**	**-**	**-**	**-**	**-**
EXT1	3.24	7.00	82	0.42	Tributary A
EXT2	13.39	7.02	83	0.77	Tributary B
EXT3	4.11	7.00	82	0.36	Tributary C
EXT4	44.26	6.82	69	1.32	
EXT5	8.36	9.06	61	0.66	Tributary D
EXT6	6.35	5.78	85	1.39	
EXT7	15.80	7.10	85	1.14	
EXT8	18.96	8.39	93	0.84	Tributary E
Total External	**114.49**	**-**	**-**	**-**	**-**

The catchments listed in Table 6 represent those that contribute drainage towards the Site. Drawing C703 – Pre-Development Storm Drainage Plan displays additional external drainage areas downstream of the site which were delineated for the hydraulic modelling. Refer to Tables 7 and 8 for a summary of hydrologic parameters applied to each of these external catchments downstream of the Site. For existing road right-of-ways TIMP and XIMP values were estimated by measuring the ROW and asphalt widths as-builts and/or satellite images.

Table 7: Pre-Development NASHYD Catchments – Externally Draining

Catchment ID	Drainage Area (ha)	Initial Abstraction, IA (mm)	Modified Curve Number, CN*	Time to Peak (hours)	Outlet
EXT9	24.02	8.47	79	0.57	Tributary A
EXT10	9.26	9.45	76	0.34	Tributary B
EXT11	5.25	7.65	80	0.50	
EXT12	10.28	8.13	82	0.42	Tributary C
EXT13	13.24	9.54	81	0.68	
EXT14	15.14	9.38	76	0.59	
EXT15	12.92	7.69	85	0.71	Tributary D
EXT16	22.09	7.86	83	0.51	
EXT17	10.44	9.73	76	0.50	Tributary C
EXT18	6.98	10.16	79	0.29	Confluence of Tributary C & D
EXT19	23.88	8.04	82	1.05	Tributary E
EXT20	17.82	7.76	83	0.99	
EXT21	51.56	7.54	82	1.08	
EXT22	59.54	7.53	83	0.94	Cold Creek

Table 8: Pre-Development STANDHYD Catchments – Externally Draining

Catchment ID	Drainage Area (ha)	Total Impervious (%)	Directly Connected Impervious (%)	Outlet
EXT62	0.31	38	38	Tributary B
EXT64	1.42	31	31	Tributary D
EXT65	1.64	44	44	
EXT66	0.62	44	44	
EXT70	0.35	38	38	Tributary B
EXT86	0.62	44	44	Tributary D
EXT138	0.63	31	31	
EXT139	0.59	31	31	
EXT165	0.48	44	44	
EXT166	0.68	31	31	

5.2 Proposed Drainage Conditions

Existing drainage patterns will be preserved as much as possible under the proposed development conditions, with topography generally sloping southwards toward the tributaries of the West Humber River. The drainage divide between sub-basin 10 of the Main Humber River and areas of the Main Humber River Watershed will be generally maintained by the proposed grading and servicing concept. Minor and major system flows will be directed to the SWM facilities via storm sewers and road grading.

The Option 1 lands have been discretized into a total of nine (9) internal drainage catchments under post-development conditions. The Option 2 lands have been delineated as a single drainage catchment. Proposed land uses were assigned based on the Concept Plan (Bousfields, January 27, 2025), comprising of low to high density residential, commercial, schools, parks, open space, and stormwater management ponds. Per the concept plan land uses, percent impervious values for each catchment were calculated using the area-weighted method and values from Table 2-2 of the 2018 Humber River Hydrology Update (Civica, April 2018). Detailed percent impervious value calculations and Table 2-2 are provided in Appendix C2.

Refer to Drawing C706 – Preliminary Post-Development Storm Drainage Plan, depicting the proposed drainage boundaries and conceptual SWM pond locations. A summary of the proposed Site drainage areas, composite runoff coefficients, and corresponding percent impervious values are provided in Table 9 below.

Table 9: Post-Development Drainage Area Summary

Catchment ID	**Drainage Area (ha)**	**Total Impervious** (%)	**Directly Connected Impervious** (%)
201	27.43	58	50
202	15.28	57	50
203	20.04	63	57
204	15.64	53	45
205	27.24	57	49
206	25.23	74	70
207	16.37	56	47
208	17.48	59	50
209	5.13	59	50
210	3.29	0	0
Total Site	**173.13**	**59**	**52**

Changes to the quantity and quality of stormwater runoff resulting from the proposed development will be mitigated by a comprehensive stormwater management (SWM) strategy. This strategy includes a total of nine (9) SWM wet pond facilities to provide stormwater management for the Site, including quantity, quality and erosion control of post-development runoff.

External Drainage

Runoff from external areas, which previously drained through the Option 1 lands under existing conditions will not be altered by the proposed development. Positive drainage for these external catchments will be maintained by the proposed grading and servicing concept to route these flows through or around the development area.

Flows from external drainage area EXT3 and the western portion of external drainage area EXT4 will be captured into a storm pipe, conveyed through the Site and will outlet to the upper reaches of Tributary C. Flows from the 1.87 ha woodlot area, external drainage area EXT5, and the eastern portion of external drainage area EXT4 will be captured into a storm sewer pipe, conveyed through the Site and will outlet to the existing concrete culvert at Emil Kolb Parkway (adjacent to the outlet for SWM Pond 3). These storm sewer pipes were sized to convey the 100-year storm event. Flow from extreme storm events that exceed the conveyance pipe capacity (i.e., storm events greater than the 100-year storm) will drain overland through the Site via the proposed road network and overland flow paths.

The remaining external drainage areas will be conveyed by swales around the proposed development. Runoff from these areas will be directed to the adjacent tributaries, thereby maintaining existing drainage patterns/outlets.

Minor System Drainage

Storm sewers internal to the development will be designed to convey post-development minor system flows to the stormwater management ponds. The Town of Caledon (Development Standards Manual, 2019) requires that storm sewers without foundation drains be designed to convey the 5-year storm event at a minimum. For systems where foundation drains will be connected to the storm sewers, the Town requires the system to be designed to accommodate a 10-year storm event. To be conservative at this stage in the development, the storm sewers for the Site were designed to convey the 10-year storm peak flows, which is required when foundation drains are used.

Sizing of these storm sewers was completed using the Rational Method and using the Town's standard Intensity-Duration-Frequency Rainfall Curves (Town Standard Drawing No. 103). Refer to Appendix C1 for the storm sewer design sheet.

Major System Drainage

Major system stormwater runoff that exceeds the capacity of the storm sewers will drain overland via the proposed road right-of-ways (ROWs) to the respective stormwater management ponds. Per development standards, overland flows shall be contained within the ROWs and shall not cross private property. Depths of flooding permitted on streets and at intersections for all classes of road during the 100-year design storm event are as follows:

- The product of depth of water (m) at the gutter times the velocity of flow (m/s) shall not exceed 0.65 m^2/s.
- The depth of water should not exceed 0.30m

6.0 STORMWATER MANAGEMENT

6.1 Stormwater Design Criteria & Targets

Stormwater management design for the Site is governed by criteria set out in the following documents:

- Development Standards Manual (Town of Caledon, 2019)
- Stormwater Management Criteria (Toronto and Region Conservation Authority (TRCA), 2012)
- Stormwater Management Planning and Design Manual (Ministry of Environment, Conservation and Parks (MECP), 2003)

The applicable stormwater management criteria are summarized below.

Quality Control

The Development Standards Manual (Town of Caledon, 2019) states that all new developments must adhere to the quality control requirements in the Stormwater Management and Planning & Design Manual (MECP, 2003). Additionally, all new stormwater management facilities shall be designed to meet Enhanced (Level 1) protection per the MECP SWM manual, requiring 80% removal of Total Suspended Solids (TSS) from 90% of the total annual runoff volume.

Erosion Control

The Development Standards Manual (Town of Caledon, 2019) requires that developments with proposed stormwater management ponds must provide extended detention control of the runoff volume generated from a 4-hour, 25 mm storm event over a period of 48 hours.

Since the Site is considered greenfield development, a detailed erosion analysis based on a geomorphic assessment will need to be completed to determine if more stringent erosion controls are required to mitigate erosion within the receiving tributaries.

Quantity Control

The Site is located within the Humber River Watershed, therefore post-development flow rates must be controlled to the TRCA unit flow rates for the Humber River. TRCA Stormwater Management Criteria (2012) states that the main branches of the Lower, Main, East, West and Upper Humber River watershed do not require any quantity control measures. Lands that do not discharge to these main branches are required to adhere to the quantity control flow rates for the Humber River Watershed. Most of the Site drains to one of the main branches of the Humber River, therefore quantity controls are not required for these areas. Remaining areas of the Site (generally located east of Highway 50) are located within sub-basin 10 and must therefore be designed to meet targets calculated using the Humber River Unit Flow Relationships for sub-basin 10.

The Unit Flow Relationship Equations for the 2 through 100-year storm events within sub-basin 10 (Stormwater Management Criteria, TRCA 2012) are presented in Table 10 below.

Table 10: Humber River Watershed - Sub-Basin 10 Unit Flow Relationships

Return Period	Equation C: Sub-Basin 10
2-Year	Q = 3.142 - 0.233 * ln(A)
5-Year	Q = 5.557 - 0.427 * ln(A)
10-Year	Q = 7.443 - 0.578 * ln(A)
25-Year	Q = 9.838 - 0.757 * ln(A)
50-Year	Q = 11.920 - 0.921 * ln(A)
100-Year	Q = 14.140 - 1.096 * ln(A)

In accordance with Table 3-1 of the Stormwater Management Criteria (TRCA, 2012) calculation of return period peak flows within the Humber River Watershed shall be based on the 6-hour and 12-hour AES storm distributions. The Town of Caledon's Intensity-Duration-Frequency Rainfall Curves (Standard Drawing No. 103) have been applied to the hydrologic analyses. A copy of Town Standard Drawing No. 103 is provided in Appendix C2.

Water Balance

Based on TRCA mapping, the Site is located within a Significant Groundwater Recharge Area and a High Groundwater Recharge Area (Stormwater Management Criteria, TRCA 2012). Due to these vulnerable areas, the Site will be required to maintain pre-development groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrologic and ecologic functions. Further analysis of the water balance requirements will be conducted following the completion of a hydrogeological report.

6.2 Stormwater Management Strategy

The proposed grading and servicing strategy for the Site will generally maintain existing drainage patterns as well as the sub-watershed divide between the two sub-basins of the Humber River Watershed; sub-basin 10, which is subject to prescribed water quantity and quality controls, and a sub-basin that does not require quantity control.

Runoff from most of the development lands will be directed to on-site stormwater management (SWM) wet ponds designed to provide quantity, quality, and erosion control. A total of nine (9) end-of-pipe stormwater management wet pond facilities are proposed to treat runoff from post-development drainage areas as illustrated on Drawing C706 – Preliminary Post-Development Storm Drainage Plan.

A total of six (6) ponds will be located within an area of the Main Humber River Watershed, which does not require quantity control. Although the Main Humber does not require quantity control, runoff from these ponds is conveyed through small drainage features to the Main Humber. These small drainage features will be evaluated as part of the Local Subwatershed Study to determine if they can safely convey uncontrolled flows from the development. The ponds in the Main Humber Watershed are therefore designed to provide post to pre quantity control as well as quality and erosion control, providing conservative pond block sizing for this FSR. The remaining three (3) SWM ponds are located within sub-basin 10 of the Humber River which requires quantity control to meet unit flow rates specific to this subbasin and have been designed accordingly to provide quantity control as well as quality and erosion control.

Conceptual locations for the SWM wet pond facilities are shown on Drawing C706 – Preliminary Post-Development Storm Drainage Plan and have been selected according to the following:

- Located within natural low points, to minimize earthworks and maintain existing drainage patterns.
- Proximity to an outlet, such as an existing receiving tributary, ditch, or storm sewer (there are no existing storm sewers in the vicinity of the Subject Lands, however they may be proposed if urbanization of the existing arterial roads is considered).
- Minimize storm sewer infrastructure size and avoid potential service crossing conflicts (should storm sewers be proposed as a receiver).
- Optimize land use by maximizing developable tableland and serviceable areas.

In addition to the parameters listed above, options to expand SWM ponds into adjacent Greenbelt areas can be explored throughout further refinement of the design in order to maximize the developable area. The Greenbelt Plan 2017 identifies where urbanization should be limited in order to provide permanent protection to the agricultural land base and the ecological and hydrological features and functions occurring on the landscape within the Greater Golden Horseshoe. Existing, expanded, and new infrastructure is permitted within the Greenbelt Plan Area provided it serves significant growth and economic development expected in southern Ontario beyond the Greenbelt (Planning Act, Section 4.3.1.1 (b)). Stormwater management infrastructure is permitted within the Greenbelt Plan Area, however SWM facilities are prohibited in key natural heritage features, key hydrologic features, and their associated vegetation protection zones (Planning Act, Section 4.2.3.3).

SWM Pond Grading & Design Considerations

Each of the stormwater management (SWM) ponds shall be designed with consideration for grading, public safety, future maintenance access, and safe conveyance of emergency flows. A summary of the criteria to be taken into consideration for design of the stormwater management ponds is as follows:

- Site grading to provide safe overland conveyance of flows into the stormwater management facilities.
- Ponds graded with maximum side slopes of 4:1 from the bottom of the pond to 0.5 m below the normal water level.
- Maximum side slopes of 7:1 applied above the 4:1 sloping to the top of pond berm/ access road, with maximum 4:1 sloping from the top of berm to match into the pond block perimeter grades outside the pond.
- Permanent pool volume sized to achieve an Enhanced Level of quality protection with a depth of 1.5 m in the forebay and the main cell.
- Permanent pool elevation above the 25-year water level of the receiving watercourse.
- Extended detention storage and drawdown of the 25-mm rainfall event over a minimum period of 48 hours, at a maximum depth of 1.0 m per MECP guidelines.

- Active storage ponds located within sub-Basin 10, sized according to TRCA Unitary Flow Rate criteria for the Humber River Watershed (sub-Basin 10) with a maximum active storage depth of 2.0 m.

- A minimum 0.30 m of freeboard provided above the maximum (100-year) water level to the top of pond berm.

- Emergency spillways sized to convey the unattenuated Regulatory storm event runoff, which is defined as the greater of the Regional or 100-year unattenuated flow.

- A 5.0 m wide maintenance access road located with maximum longitudinal slopes of 8.0% and a maximum cross-fall slope of 2.0%. The maintenance access road will facilitate access to the inlet structure, forebay, and outlet structure for maintenance.

Site-Specific Stormwater Management Considerations

The stormwater management strategy for the Bolton North Hill development relies mainly on communal stormwater management ponds to meet quantity (if needed), quality, and erosion control requirements. On-site stormwater management controls may be explored to supplement or replace the downstream communal wet ponds. High-density and/or commercial blocks would be ideally suited to provide such interim on-site controls.

6.3 Quality Control

As mentioned in Section 6.1, all new developments (including all new stormwater management facilities) are required to provide Enhanced (Level 1) Protection (80% removal of TSS) on an annual loading basis. This quality control criteria will be achieved by the permanent pool of each of the proposed stormwater management (SWM) wet pond facilities.

Permanent pool volumes required to achieve Enhanced (Level 1) Protection were calculated based on the drainage area and associated imperviousness (calculated per the Concept Plan) tributary to each pond, in accordance with Table 3.2 of the Planning and Design Manual (Ministry of Environment, Conservation and Parks (MECP), 2003). Detailed permanent pool volume sizing calculations are provided in Appendix C2 and the results are summarized in Table 11 below.

Table 11: SWM Pond Permanent Pool Volume Summary

SWM Facility	Contributing Drainage Area (ha)	Percent Impervious of Drainage Area (%)	Required Permanent Pool Volume[1] (m^3)
1	27.43	58%	4,308
2	15.28	57%	2,386
3	20.04	63%	3,386
4	15.64	53%	2,271
5	27.24	57%	4,209
6	25.23	74%	4,849
7	16.37	56%	2,483
8	17.48	59%	2,807
9	5.13	59%	817

[1] Required storage volumes interpolated from Table 3.2 of SWM Planning and Design Manual (MECP, 2003) are based on upstream impervious area, less 40 m^3/ha required for extended detention.

Each of the proposed SWM ponds will be graded to provide sufficient volume to meet or exceed the permanent pool volume required to achieve Enhanced Protection quality criteria, as shown in Table 11 above.

Permanent pool water levels within each of the proposed SWM pond facilities will be set based on the 25-year water level of the receiving tributary. Per TRCA criteria, the elevation between SWM pond outfalls and the receiving channel shall be minimized, by placing the outfall as low down on the slope as possible, while still above the 25-year floodline. Hydraulic modeling discussed in Section 8.3 analyzed the 25-year flood levels within the receiving tributaries for the purposes of determining minimum pond outfall elevations. From these outfall elevations, an outlet pipe slope was assumed to establish the minimum permanent pool water level within each pond; the pipe slope varies between ponds and was iterated so that the top of pond matches the minimum grade in the pond block. SWM ponds within catchments 203 and 207 outlet to an existing culvert or roadside ditch. Outfall inverts for these SWM pond facilities were based on the ditch or culvert invert. A summary of the preliminary permanent pool water levels for each of the proposed SWM ponds is provided in Table 12 below.

Table 12: Preliminary SWM Pond Permanent Pool Water Levels

SWM Pond ID	**Outfall Location**	**Approximate Outfall Invert** (masl)	**Minimum Permanent Pool Elevation** (masl)
1	Tributary B	254.10	254.20
2	Tributary C	252.80	263.90
3	Existing 1.250m Diameter Culvert	263.75	257.30
4	Tributary D	245.94	260.70
5	Tributary E	262.01	262.10
6	Tributary D	250.16	261.10
7	Existing Ditch	264.80	264.90
8	Tributary E	258.82	259.87
9	Cold Creek	244.23	256.60

It is noted that the permanent pool water levels indicated above are to be considered minimum elevations which can be raised as needed to tie into the site grades and minimize earthworks.

Forebay Sizing

At the Draft Plan stage, forebays within each of the SWM wet ponds will be designed to achieve required dispersion and settling lengths in accordance with water quality sizing objectives in Section 4.6.2. of the SWM Planning and Design Manual (MECP, 2003). Forebay berms will be used to achieve these criteria as well as to meet a minimum forebay length to width ratio of 2:1, as recommended by the MECP.

6.4 Erosion Control

At a minimum, a 40 m^3/ha erosion control volume is required (MECP, 2003). Per Town and TRCA criteria, erosion controls for each SWM wet pond are required to provide extended detention and drawdown of a 25 mm rainfall event over a minimum 48-hour period.

A VO model was prepared for the post-development drainage conditions using the 25 mm 4-hour Chicago design storm to determine the resulting runoff volumes directed to each stormwater management facility. Detailed output from the VO model is provided in Appendix C3**.** Erosion control volume requirements are summarized in Table 13 below.

Table 13: Erosion Control Volume Requirements

SWM Facility	Contributing Drainage Area (ha)	Percent Impervious of Drainage Area (%)	Required MECP Erosion Control Volume[1] (m^3)	Required 25mm Event Erosion Control Volume[2] (m^3)
1	27.43	58%	1,097	4,168
2	15.28	57%	611	3,026
3	20.04	63%	802	3,887
4	15.64	53%	626	2,757
5	27.24	57%	1,090	4,088
6	25.23	74%	1,009	5,652
7	16.37	56%	655	2,408
8	17.48	59%	699	2,670
9	5.13	59%	205	993

[1] MECP Erosion Control Volume required is 40 m^3/ha, obtained from the MOE SWM Planning and Design Manual (2003)
[2] 25mm Event Erosion Control Volume obtained from the Visual Otthymo model

6.5 Quantity Control

Sub-Basin 10 SWM Ponds

As previously noted, the eastern portion of the development is located within sub-basin 10 of the Humber River Watershed, where control of post-development peak flows is required to meet the Unit Flow Relationships for the Humber River (sub-basin 10), as previously identified in Table 10 of this report. See Table 14 below for the target flows to each pond based on pre-development areas to the pond outlets.

Table 14: Target Flows for SWM Ponds in Sub-Basin 10

Storm Event	SWMP 5		SWMP 8		SWMP 9	
	Pre-Development Area to Pond (ha)	Target Flow Rate (m^3/s)	Pre-Development Area to Pond (ha)	Target Flow Rate (m^3/s)	Pre-Development Area to Pond (ha)	Target Flow Rate (m^3/s)
2-Year	22.12	0.0024	22.64	0.0024	5.14	0.0028
5-Year		0.0042		0.0042		0.0049
10-Year		0.0057		0.0056		0.0065
25-Year		0.0075		0.0075		0.0086
50-Year		0.0091		0.0090		0.0104
100-Year		0.0107		0.0107		0.0123

A VO model was prepared for the post-development drainage conditions using the 6-hour and 12-hour AES design storms. Design storms were prepared using Town's standard Intensity-Duration-Frequency Rainfall Curves (Town Standard Drawing No. 103). Target flow rates for each pond were calculated using the Unit Flow Relationships for sub-basin 10 based on the total drainage area contributing to each pond. Target flows were then coded into VO as a route reservoir command to determine the resultant active storage volumes required. Detailed Humber River target flow calculations are provided in Appendix C2 and Visual Otthymo model outputs for the SWM Pond Designs are provided in Appendix C3.

Results of the modeling determined that the 12-hour AES storm produced the larger volume requirement compared to the 6-hour AES storm. As such, ponds shall be sized to meet the larger volume requirement for the ponds to achieve Unit Flow criteria under both 6-hour and 12-hour AES events for all storms up to and including the 100-year event. Tables 15, 16, and 17 summarize the resultant active storage volumes for each SWM pond facility located within sub-basin 10 of the Humber River Watershed.

Table 15: SWM Pond 5 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	27.24	57%	0.0024	7,743
5-Year			0.0042	10,612
10-Year			0.0057	12,596
25-Year			0.0075	15,199
50-Year			0.0091	17,018
100-Year			0.0107	18,935

[1] Target flow rates calculated based on contributing area to SWM pond and Unit Flow Rate Equations for Sub-Basin 10 of the Humber River Watershed (TRCA, 2012).
[2] Required active storage volumes based on the 12-hour AES event

Table 16: SWM Pond 8 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)	Provided Active Storage Volume (m^3)
2-Year	17.48	59%	0.0024	4,145	13,420
5-Year			0.0042	5,664	
10-Year			0.0056	6,710	
25-Year			0.0075	8,037	
50-Year			0.0090	9,034	
100-Year			0.0107	10,037	

[1] Target flow rates calculated based on contributing area to SWM pond and Unit Flow Rate Equations for Sub-Basin 10 of the Humber River Watershed (TRCA, 2012).
[2] Required active storage volumes based on the 12-hour AES event

Table 17: SWM Pond 9 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	5.13	59%	0.0028	1,767
5-Year			0.0049	2,346
10-Year			0.0065	2,730
25-Year			0.0086	3,207
50-Year			0.0104	3,556
100-Year			0.0123	3,903

[1] Target flow rates calculated based on contributing area to SWM pond and Unit Flow Rate Equations for Sub-Basin 10 of the Humber River Watershed (TRCA, 2012).
[2] Required active storage volumes based on the 12-hour AES event

For SWM ponds within Catchments 205, 208 and 209, the proposed ponds provide sufficient active storage volumes to accommodate post-development runoff to be controlled to the Humber River unit flow rates.

Main Humber River SWM Ponds

As previously noted, the level of control required for the ponds in the western portion of the development will be determined by the SWS. Though this subwatershed does not require quantity control, post-to-pre flow rates have been calculated for reference. See Table 18 below for the target flows to each pond based on pre-development areas to the pond outlets.

Table 18: Target Flows for SWM Ponds in Main Humber Area

Storm Event	Target Flow[1] Rate (m^3/s)					
	SWM 1	SWM 2	SWM 3	SWM4	SWM 6	SWM 7
2-Year	0.265	0.420	0.192	0.634	0.210	0.253
5-Year	0.433	0.687	0.319	0.958	0.347	0.412
10-Year	0.555	0.882	0.413	1.183	0.449	0.528
25-Year	0.717	1.140	0.539	1.471	0.583	0.681
50-Year	0.841	1.339	0.637	1.687	0.686	0.800
100-Year	0.967	1.543	0.737	1.904	0.793	0.921

[1] Target flow rates calculated based on the 6-hour AES event

Target flows were then coded into VO as a route reservoir command to determine the resultant active storage volumes required. Detailed Humber River target flow calculations are provided in Appendix C2 and Visual Otthymo model outputs for the SWM Pond Designs are provided in Appendix C3.

Results of the modeling determined that, overall, the 6-hour AES storm produced the larger volume requirement compared to the 12-hour AES storm. As such, ponds shall be sized to meet the larger volume requirement for the ponds to achieve quantity control under both 6-hour and 12-hour AES events for all storms up to and including the 100-year event. Tables 19-24 summarize the resultant active storage volumes for each SWM pond facility discharging to the Main Humber River.

Table 19: SWM Pond 1 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	27.43	58%	0.265	4,500*
5-Year			0.433	6,159
10-Year			0.555	7,303
25-Year			0.717	8,738
50-Year			0.841	9,833
100-Year			0.967	10,926

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.
* Required active storage volumes based on the 12-hour AES event.

Table 20: SWM Pond 2 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	15.28	57%	0.420	2,243
5-Year			0.687	2,970
10-Year			0.882	3,433
25-Year			1.140	4,027
50-Year			1.339	4,432
100-Year			1.543	4,850

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.

Table 21: SWM Pond 3 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	20.04	63%	0.192	4,570*
5-Year			0.319	5,983
10-Year			0.413	6,969
25-Year			0.539	8,191
50-Year			0.637	9,093
100-Year			0.737	9,978

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.
* Required active storage volumes based on the 12-hour AES event.

Table 22: SWM Pond 4 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	15.64	53%	0.634	1,281
5-Year			0.958	1,761
10-Year			1.183	2,085
25-Year			1.471	2,579
50-Year			1.687	2,897
100-Year			1.904	3,229

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.

Table 23: SWM Pond 6 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	25.23	74%	0.210	6,890*
5-Year			0.347	8,744*
10-Year			0.449	10,081
25-Year			0.583	11,737
50-Year			0.686	12,981
100-Year			0.793	14,180

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.
[3] Required active storage volumes based on the 12-hour AES event.

Table 24: SWM Pond 7 Active Storage Volume Summary

Storm Event	Post-Development Contributing Area (ha)	Percent Imperviousness (%)	Target Flow[1] Rate (m^3/s)	Required Active Storage Volume[2] (m^3)
2-Year	16.37	56%	0.253	2,080
5-Year			0.412	2,892
10-Year			0.528	3,437
25-Year			0.681	4,128
50-Year			0.800	4,687
100-Year			0.921	5,215

[1] Target flow rates calculated based on pre-development flow rates to the proposed outlet location in existing conditions.
[2] Required active storage volumes based on the 6-hour AES event, unless otherwise indicated.

Stormwater Facility Outfalls

The Stormwater Management Criteria (TRCA, 2012) outlines criteria required for stormwater management outfalls to reduce the risk of erosion to the outfall structures, channels, and receiving watercourse and floodplain. The outfall criteria are listed as follows:

- Hard structure outfalls (i.e., headwalls or anything made of concrete) are required to be located outside of the 100-year erosion limit, unless not technically feasible.
- Outfalls should not impact the flood levels.
- Avoid backwater conditions in outfalls, unless explicitly accounted for in the design.
- Minimize elevation between the outfall and receiving channel, placing it as low down on the slope as possible, while still above the 25-year floodline.

- Plunge pools are to be designed at the outfall outlet, unless it can be demonstrated that it is not required to dissipate flow energy, or a plunge pool cannot reasonably be constructed due to topographic constraints.

- Outfalls that are set-back 10 m to 20 m from the channel require a flow spreader and/or a plunge pool design, where feasible.

Several outfall pipes are likely to require steep slopes due to the deep valleys where the receiving watercourses are located. For the outfall pipes with steep slopes, opportunities to reduce slopes, such as incorporating drop structures or cascades will be evaluated at the detailed design stage.

6.6 Preliminary Stormwater Facility Grading

The pond block sizes shown on the Secondary Plan (Bousefields, January 27, 2025) are approximate and will be refined as part of future studies. Conceptual grading was completed only for SWMF 8 to display how the ponds can be graded to meet the design criteria listed in Section 6.2.

The completed conceptual grading for SWMF 8 provides a total 3,296 m^3 of permanent pool volume between the bottom of pond (258.07 masl) and normal water level (259.87 masl), and 13,240 m^3 of active storage between the normal water level and maximum water level (261.77 masl). Therefore, the conceptual pond grading provides sufficient permanent pool volume to achieve Enhanced Protection quality requirements, and sufficient active storage volume to achieve quantity control.

7.0 WATER BALANCE & LOW IMPACT DEVELOPMENT

7.1 Site Water Balance and Wetland Feature-Based Water Balance

A water balance assessment and feature based water balance assessment will be completed for the Site as part of the Hydrogeological Report being prepared by Crozier under separate cover. Well drilling took place during October and November 2021 and the results of the monitoring program will be provided in the Hydrogeological Report Submission.

7.2 Low Impact Development

Per TRCA mapping, the Site is located within a Significant Groundwater Recharge Area and a High Groundwater Recharge Area (Stormwater Management Criteria, TRCA 2012). Due to these vulnerable areas, the Site will be required to maintain pre-development groundwater recharge rates and appropriate distribution, ensuring the protection of related hydrologic and ecologic functions.

Low Impact Development (LID) methods can be implemented on-site to mitigate water balance within the Subject Lands and/or to a wetland. Detailed infiltration facility sizing, including in-situ percolation tests and drawdown calculations for each facility, will be completed as part of the Draft Plan stage. A list of potential LID options, with comments on the feasibility of each, is presented in Table 25 below for consideration.

Table 25: LID Options Feasibility Summary

LID Option	Comments	Feasible Y/N	Rationale
Green Roof	- Retains stormwater to reduce runoff - Does not recharge groundwater	Y	- Only in areas such as the apartment block where flat roofs may support a green roof.
Roof Downspout Disconnection	- Improves groundwater recharge by directing runoff from impervious roofs to landscaped areas	Y	- Residential development will include numerous buildings with sufficient landscape area available near each building to support downspout disconnection. Feasibility to be confirmed at Draft Plan stage.
Infiltration Galleries	- Improves groundwater recharge	TBD	- Feasibility based on in-situ groundwater and soils conditions to be confirmed at the Draft Plan stage. - It is preferred to direct 'clean' roof runoff into infiltration galleries. -If parking/asphalt areas will be directed to infiltration galleries, quality treatment of runoff will be required to treat runoff prior to entering the infiltration gallery.
Rainwater Harvesting	- Retains stormwater to reduce runoff - Allows infiltration when used for irrigation of landscaped areas	Y	-Runoff from residential rooftops could feasibly be directed to a rain barrels and used for irrigation of landscaped areas on-site.
Bioretention	- Improves groundwater recharge	TBD	- Residential development will include numerous buildings with sufficient landscape area available near each building to support bioretention. Feasibility to be confirmed at Draft Plan stage. - It is preferred to direct 'clean' roof runoff into vegetated filter strips. -If parking/asphalt areas will be directed to vegetated filter strip, quality treatment of runoff will be required to treat runoff prior to entering the bioretention facility.
Vegetated Filter Strips	- Reduces stormwater runoff - Improves groundwater recharge	Y	- Residential development will include numerous buildings with sufficient landscape area available near each building to support vegetated filter strips. Feasibility to be confirmed at Draft Plan stage. - It is preferred to direct 'clean' roof runoff into vegetated filter strips.

LID Option	Comments	Feasible Y/N	Rationale
			-If parking/asphalt areas will be directed to vegetated filter strip, quality treatment of runoff will be required to treat runoff prior to entering the vegetated filter strip.
Permeable Pavement	- Reduces stormwater runoff - Improves groundwater recharge	Y	- Driveways and local roads could feasibly be converted to permeable pavement to reduce runoff and promote infiltration. Feasibility to be confirmed at Draft Plan stage.
Enhanced Grass Swales	- Reduces stormwater runoff - Improves groundwater recharge	Y	- Residential development will include numerous buildings with sufficient landscape area available near each building to support enhanced grassed swales. Feasibility to be confirmed at Draft Plan stage.

Note that further investigation of these LID options, including understanding the feasibility of their implementation and in-situ soil and groundwater conditions, will be conducted at the Draft Plan stage once the results of the hydrogeological study are available.

8.0 FLOODPLAIN ANALYSIS

8.1 Headwater Drainage Feature Assessment

The Site is situated within the headwaters of the Main Humber River Watershed. A headwater drainage feature assessment specific to the Site has been prepared under separate cover as the Option 1/2 Lands Secondary Plan Natural Heritage Study Report (Dillon, December 2024).

According to the Natural Heritage Study, there are no headwater drainage features within the Site which are protected or require conservation. Therefore, none of the headwater drainage features are maintained within the Site and no floodplain mapping is required or provided for these features within the Site boundary. Conveyance of external drainage discharging to the Site under existing conditions will be achieved by routing the flow through sewers. Additional information regarding the conveyance of external drainage is described in more detail in Section 5.2.

8.2 Hydraulic Modelling

Existing hydraulic (HEC-RAS) models for the Main Humber River and Cold Creek were provided by the Toronto and Region Conservation Authority (TRCA). The received models include:

- Engineered HEC-RAS model for the Main Humber River and the associated TRCA floodplain Map Sheet Hum_77, Hum_81 and Hum_82
- Estimated HEC-RAS model titled Middle Main for tributaries of the Main Humber River Watershed
- Estimated HEC-RAS model titled Cold Creek for tributaries of the Cold Creek Subwatershed

Updated hydraulic modelling was completed in HEC-RAS v.6.4.1. Digital copies of the HEC-RAS models are provided with this submission. The estimated models for tributaries of the Main Humber River Watershed and Cold Creek Subwatershed were revised as part of this analysis due to their proximity to the Site. Based on pre-consultation with the TRCA, the existing engineered hydraulic model for the Main Humber River does not require re-modelling since the associated floodplain is well outside of the Site area and does not experience any impact in terms of water surface elevation due to development. While no changes were made to the engineered model of the Main Humber River, the results of the model were utilized to establish the downstream boundary conditions of the revised models and their associated reaches. Downstream boundary conditions are summarized in Table 20 following the description of each tributary.

From the TRCA estimated models, four (4) tributaries (MM_9_2 - 9.203, MM_9_2_trib - 9.204, MM_9_2 - 9.205, and Cold_10_7 - 10.7) were selected for further analysis. Upon further investigation of the Site's existing and proposed drainage conditions, three (3) new tributaries were added to the model to provide a more comprehensive analysis of the floodplain in the immediate vicinity of the Site. To simplify the review process, the naming convention of each tributary has been updated in the model to reflect the naming convention of tributaries described Section 5.0. The updated naming convention of each tributary, listed from west to east across the Site, is summarized below in Table 26.

Table 26: HEC-RAS Model River Reach Naming Convention

HEC-RAS Model	Original HEC-RAS Tributary ID	Updated HEC-RAS Tributary ID
Middle Main	X[1]	Tributary A
	X[1]	Tributary B
	MM_9_2 - 9.203	Tributary C
	MM_9_2_trib - 9.204	Tributary D
	MM_9_2 - 9.205	Tributary C + Tributary D
Cold Creek	Cold_10_7 - 10.7	Tributary E
	X[1]	Tributary F

1. "X" Refers to a new tributary that has been added to the HEC-RAS model.

The downstream boundary conditions for each tributary were obtained from the TRCA engineered model. The downstream boundary conditions for each tributary are summarized below in Table 27.

Table 27: Downstream Boundary Conditions

Tributary ID	Engineered Model X Section	Water Surface Elevation (masl)			
		2-Year	25-Year	100-Year	Regional
A	107.43	227.52	228.26	228.60	232.15
B	107.23	227.33	227.97	228.27	232.02
C + D	102.57	220.59	221.42	221.71	224.26
E	2920.15	255.68	255.72	255.78	256.10
F	1202.13	227.52	228.33	228.57	230.63

Modelled cross-sections within the Site were updated to reflect topographic survey information derived from Drone Survey Canada (July 2021). Modelled cross-sections outside of the Site were updated to reflect the Digital Terrain Model (LiDAR-Derived) data obtained from the Land Information Ontario (LIO) Dataset by the Ministry of Natural Resources and Forestry (October 2023). As described in Section 8.1, floodplain mapping has only been completed outside the Site where significant headwater drainage features are located. Since there are no changes to the topography outside of the Site, the cross-section geometries are the same under both existing and proposed conditions.

Four watercourse crossings were added to the existing hydraulic model. Watercourse crossing information was obtained from as-built drawings available on the Region of Peel Public Works – Peel Asset Locator Application. At locations where as-built drawings were not available, watercourse crossings were measured manually during field visits. Watercourse crossing information is summarized in Table 28 below.

Table 28: Modelled Watercourse Crossings

Location	HECRAS Tributary ID	Material	Culvert Length (m)	Culvert Diameter (mm)	Data Source	As-Built Drawing No.
Duffy's Ln approximately 175 m north of Emil Kolb Pkwy	Tributary B	Corrugated Steel Pipe	30.4	600	Field Measurement	N/A
Emil Kolb Pkwy approximately 770 m west of HWY 50	Tributary C	Concrete Bridge with Piers	NA	NA	As-Built	55280-D
Columbia Way approximately 600 m west of Mt Hope Rd	Tributary E	Corrugated Steel Pipe	62.5	2000	As-Built	45136-D

Detailed HEC-RAS model schematics, including invert elevations of the above culverts, for Middle Main and Cold Creek are provided in Appendix D1 for reference. Copies of as-built drawings are provided in Appendix D1.

HEC-RAS steady state flow data was updated using the results of the existing and proposed hydrologic models described in Section 6.0. To analyze the Regional floodplain elevations of each tributary, the following storm events were run in Visual Otthymo (v.6.2):

- 100-Year 6-hour AES Design Storm
- 100-Year 12-hour AES Design Storm
- Hurricane Hazel Design Storm

The results of the hydrologic model prove that Hurricane Hazel produces the greatest peak flows. Therefore, Hurricane Hazel was used to perform Regional analysis of the floodplain as per the TRCA's Technical Guidelines for Flood Hazard Mapping (March 2017).

In addition to the Regional event, 2-Year, 25-Year, and 100-Year design storms were also included in the hydraulic model to perform further analysis. The 6-hour AES design storm produced greater peak flow rates than the 12-hour AES design storm after running the events in the hydrologic model. Therefore, the 6-hour AES design storm was selected for further analysis to achieve the most conservative results. A summary of the design storms and method of analysis is provided below:

- 2-Year 6-hour AES: To analyze changes in erosive forces between the existing and proposed conditions models
- 25-Year 6-hour AES: To evaluate acceptable outfall elevations for proposed stormwater management facilities described in Section 6.0
- 100-Year 6-hour AES: To assess the overall changes in floodplain elevations during the 100-year event as part of standard floodplain mapping practices

Peak flow rates were input at various cross-sections of each tributary. The HEC-RAS flow change locations are defined by the upstream limits of each reach, points of confluence, watercourse crossings, and the locations proposed SWM facilities. The existing and proposed Regional flow rates, HEC-RAS flow change locations, and corresponding VO flow node are summarized below in Table 29.

Table 29: HEC-RAS Regional Flow Change Locations

Tributary ID	VO Flow Node	HEC-RAS Station	Regional Flow Rate (m^3/s)	
			Existing	Proposed
A	ADDHYD 177[1]	1017	0.520	0.365
	ADDHYD 177	996	3.993	3.341
B	ADDHYD 120	1005	4.012	5.187
	ADDHYD 121	999	5.097	7.069
C	ADDHYD 131	2179.936	7.363	5.393
	ADDHYD 134	1855.838	8.800	8.425
	ADDHYD 294	993.3609	12.247	11.220
D	ADDHYD 156	1195.92	6.486	11.118
	ADDHYD 183	1192.146	13.108	15.273
	ADDHYD 335	886.4161	15.611	17.984
C + D	ADDHYD 178	294	28.554	29.457
E	ADDHYD 296	4370.082	7.039	7.497
	ADDHYD 175	4369.909	10.388	11.205
	ADDHYD 176	3789.828	16.760	16.406
F	ADDHYD 88[1]	1571	1.425	1.039
	Area EXT22[1] & Area 117 [1]	1399.71	2.584	2.794
	ADDHYD 88	1184	7.021	6.974

1. Flow rates have been prorated based on an area-weighted calculation of each drainage area.

The above proposed flow rates represent the uncontrolled condition. The analysis assumes that the proposed SWM facilities would be under maximum capacity during the Regional event and would not provide quantity control of runoff from the Site. The 2-Year to 100-Year flow rates at each flow change location are provided in Appendix D2. Under the proposed condition, the 2-Year to 100-Year events represent the controlled condition. The analysis of design storms assumes that runoff from the Site would be controlled due to the proposed SWM facilities.

8.3 Hydraulic Model Results

The 25-year existing water surface elevations (WSE) were obtained near the outfall locations of the nine (9) proposed SWM ponds. The 25-Year WSE and proposed pond outfall elevations are compared below in Table 30.

Table 30: 25-Year Existing WSE Vs. Proposed SWM Pond Outfall Elevations

Tributary ID	HEC-RAS Station	SWM Pond ID	25-Year WSE (masl)	SWM Pond Outfall Elevation (masl)
B	1000.8	1	249.70	254.10
C	1723.57 & 1684.01	2	252.70[1]	252.80
D	1192.407	3[2]	261.14	263.75
D	830.2587	4	245.84	245.94
E	4368.863	5	261.91	262.08
D	1006.094	6	250.06	250.16
N/A	N/A	7[2]	N/A	264.80
E	3658.272	8	258.30	258.82
F	1318	9	244.13	244.23

1. Water surface elevation has been interpolated at the location of the proposed outfall.
2. SWMP7 discharges to Highway 50 road ditch. There is no floodplain delineation at this location.

As shown in the above table, the proposed outfalls are above the corresponding 25-Year floodlines. The information satisfies the TRCA Stormwater Management Criteria (August 2012).

WSE and velocities (left overbank, main channel, and right overbank) were generated and compared for both the existing and proposed conditions models. Tables summarizing the 2-Year, 25-Year, 100-Year, and Regional WSE and velocity data are summarized in Appendix D3. Table 31 provides a summary of the Regional results at Tributary A.

Table 31: Tributary A – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
1017	254.86	254.84	-0.02	-	-	0.00	0.99	0.86	-0.13	-	-	0.00
1000	253.53	253.51	-0.02	-	-	0.00	0.90	0.87	-0.03	-	-	0.00
999	252.41	252.38	-0.03	-	-	0.00	0.13	0.11	-0.02	-	-	0.00
998.6	252.38	252.36	-0.02	-	-	0.00	0.21	0.17	-0.04	-	-	0.00
998.4	252.34	252.33	-0.01	-	-	0.00	0.34	0.3	-0.04	-	-	0.00
998	251.93	251.91	-0.02	-	-	0.00	0.86	0.79	-0.07	-	-	0.00
997.7	249.47	249.42	-0.05	-	-	0.00	1.30	1.23	-0.07	-	-	0.00
997	245.80	245.75	-0.05	-	-	0.00	1.04	1.15	0.11	-	-	0.00
996.6	242.27	242.25	-0.02	-	-	0.00	1.02	0.92	-0.10	-	-	0.00
996	237.83	237.81	-0.02	-	-	0.00	1.27	1.21	-0.06	-	-	0.00
995.8	236.08	236.06	-0.02	-	-	0.00	1.47	1.38	-0.09	-	-	0.00
995.6	234.74	234.71	-0.03	-	-	0.00	1.17	1.10	-0.07	-	-	0.00
995	232.66	232.63	-0.03	-	-	0.00	1.78	1.69	-0.09	-	-	0.00
932	232.15	232.15	0.00	0.01	0.01	0.00	0.06	0.05	-0.01	0.02	0.02	0.00

1. A "–" indicates that the channel component does not contain runoff at this location

Tributary A experiences minimal decrease in WSE under the proposed condition. As a result, the main channel velocities are also subject to some minor reduction. This decrease occurs because the proposed drainage patterns within the Site are different compared to the existing conditions topography. Less runoff will discharge to Tributary A and more runoff will then discharge to Tributary B. The minimal decrease in WSE and velocity at Tributary A does not pose any increase to flood risk.

Table 32 provides a summary of the Regional results at Tributary B.

Table 32: Tributary B – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
1005	257.37	257.47	0.10	-	-	0.00	2.01	2.07	0.06	-	-	0.00
1004.6	256.19	256.28	0.09	-	-	0.00	2.13	2.28	0.15	-	-	0.00
1004	255.17	255.25	0.08	-	-	0.00	1.99	2.13	0.14	-	-	0.00
1003	251.9	251.97	0.07	-	-	0.00	1.81	1.94	0.13	-	-	0.00
1002	251.08	251.14	0.06	-	-	0.00	0.35	0.44	0.09	-	-	0.00
1001.4	251.09	251.14	0.05	-	-	0.00	0.13	0.17	0.04	-	-	0.00
1001	251.09	251.14	0.05	-	-	0.00	0.11	0.14	0.03	-	-	0.00
1000.8	251.09	251.14	0.05	-	-	0.00	0.02	0.02	0.00	-	-	0.00
1000.2	251.09	251.14	0.05	-	-	0.00	0.03	0.04	0.01	-	-	0.00
1000	251.09	251.14	0.05	-	0.01	0.01	0.03	0.04	0.01	-	-	0.00

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
999.64	Culvert											
999	243.72	244.01	0.29	-	-	0.00	3.46	3.88	0.42	-	-	0.00
998	241.67	241.83	0.16	-	-	0.00	2.40	2.57	0.17	-	-	0.00
997.4	239.66	239.78	0.12	-	-	0.00	2.10	2.27	0.17	-	-	0.00
997	237.54	237.62	0.08	-	-	0.00	1.68	1.84	0.16	-	-	0.00
996	234.92	234.99	0.07	-	-	0.00	1.69	1.89	0.20	-	-	0.00
995.4	232.48	232.66	0.18	-	-	0.00	2.15	1.98	-0.17	-	-	0.00
994.4	232.02	232.02	0.00	0.02	0.03	0.01	0.05	0.06	0.01	0.02	0.02	0.00
994	232.02	232.02	0.00	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.

As mentioned in the analysis of Tributary A results, the proposed condition routes less runoff to Tributary A and more runoff to Tributary B. As a result of allocating more runoff to Tributary B, there are increases in WSE throughout the channel. The most significant increase (0.29 m) occurs immediately downstream of the crossing at Duffy's Lane. This increase in WSE can likely be attributed to the increase in flow and undersized culvert at Duffy's Lane. While the increase is considerable, it occurs for a small length of channel is located deep in a significant valley corridor. As indicated in the velocity results, water is still contained well within the banks of the main channel. Since the steep side slopes of the valley provide a narrow channel corridor, there is minimal increase to the extent of floodplain area. Downstream of Duffy's Lane, there is only significant woodland area where no future development will occur. Therefore, the downstream increase in WSE poses no threat to developable land or public safety.

According to the Ministry of Natural Resources – Technical Guide River & Stream Systems: Flooding Hazard Limit (2002), safe access and egress are defined by the following conditions:

- Depths no greater than 0.3 m.
- Velocities no greater than 1.7 m/s.
- Product depth-velocities no greater than 0.4 m^2/s.

At Duffy's Lane, the maximum depth over the road under the proposed condition is 0.28 m. The velocity and product depth-velocity are 0.67 m/s and 0.18 m^2/s, respectively. Therefore, safe access along Duffy's Lane can still be achieved given the increase in flow at Tributary B.

Table 33 provides a summary of the Regional results at Tributary C.

Table 33: Tributary C – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
2179.936	257.14	257.09	-0.05	-	-	0.00	0.76	0.73	-0.03	-	-	0.00
2159.385	257.08	257.02	-0.06	-	-	0.00	0.56	0.52	-0.04	-	-	0.00
2097.132	256.92	256.86	-0.06	-	-	0.00	0.66	0.60	-0.06	-	-	0.00
2030.564	256.42	256.37	-0.05	-	-	0.00	1.66	1.53	-0.13	-	-	0.00
1994	256.37	256.24	-0.13	-	-	0.00	0.40	0.37	-0.03	-	-	0.00
1970.384	256.36	256.24	-0.12	-	-	0.00	0.25	0.22	-0.03	-	-	0.00
1911.614	256.36	256.24	-0.12	-	-	0.00	0.27	0.24	-0.03	-	-	0.00
1881.066	Bridge											
1855.838	255.92	255.91	-0.01	-	-	0.00	1.59	1.58	-0.01	-	-	0.00
1813.506	255.07	255.06	-0.01	-	-	0.00	1.40	1.38	-0.02	-	-	0.00
1775.696	254.48	254.48	0.00	-	-	0.00	1.14	1.12	-0.02	-	-	0.00
1726.57	253.39	253.38	-0.01	-	-	0.00	1.51	1.5	-0.01	-	-	0.00
1684.01	252.22	252.21	-0.01	-	-	0.00	1.32	1.3	-0.02	-	-	0.00
1603.573	252.07	252.06	-0.01	-	-	0.00	0.29	0.28	-0.01	-	-	0.00
1539.326	251.95	251.95	0.00	-	-	0.00	0.78	0.78	0.00	-	-	0.00
1486.021	251.45	251.44	-0.01	-	-	0.00	1.38	1.36	-0.02	-	-	0.00
1450.067	250.89	250.88	-0.01	-	-	0.00	1.86	1.83	-0.03	-	-	0.00
1406.638	250.31	250.3	-0.01	-	-	0.00	1.41	1.4	-0.01	-	-	0.00
1338.455	249.43	249.43	0.00	-	-	0.00	1.82	1.77	-0.05	-	-	0.00
1304.352	248.75	248.74	-0.01	-	-	0.00	1.68	1.68	0.00	-	-	0.00
1265.187	248.08	248.07	-0.01	-	-	0.00	1.78	1.76	-0.02	-	-	0.00
1206.875	246.95	246.93	-0.02	-	-	0.00	1.95	1.92	-0.03	-	-	0.00
1175.661	246.39	246.38	-0.01	-	-	0.00	1.82	1.80	-0.02	-	-	0.00
1120.613	245.55	245.53	-0.02	-	-	0.00	1.24	1.22	-0.02	-	-	0.00
1083.716	245.05	245.04	-0.01	-	-	0.00	1.74	1.71	-0.03	-	-	0.00
1042.153	243.84	243.83	-0.01	-	-	0.00	1.34	1.32	-0.02	-	-	0.00
1006.177	243.30	243.29	-0.01	-	-	0.00	2.01	1.99	-0.02	-	-	0.00
993.3609	243.19	243.16	-0.03	-	-	0.00	1.15	1.13	-0.02	-	-	0.00
935.4169	242.56	242.53	-0.03	-	-	0.00	2.13	2.08	-0.05	-	-	0.00
870.5434	240.88	240.83	-0.05	-	-	0.00	2.87	2.81	-0.06	-	-	0.00
836.4684	239.79	239.73	-0.06	-	-	0.00	2.85	2.80	-0.05	-	-	0.00
799.8246	238.98	238.93	-0.05	-	-	0.00	2.71	2.65	-0.06	-	-	0.00
745.4448	236.74	236.70	-0.04	-	-	0.00	2.58	2.52	-0.06	-	-	0.00
716.4415	235.66	235.63	-0.03	-	-	0.00	2.45	2.39	-0.06	-	-	0.00

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
687.3773	235.19	235.17	-0.02	-	-	0.00	1.90	1.86	-0.04	-	-	0.00
661.4518	234.48	234.43	-0.05	-	-	0.00	2.65	2.59	-0.06	-	-	0.00
627.6722	233.62	233.57	-0.05	-	-	0.00	2.62	2.57	-0.05	-	-	0.00
589.2625	232.97	232.92	-0.05	-	-	0.00	1.52	1.48	-0.04	-	-	0.00
540.5079	232.37	232.32	-0.05	-	-	0.00	2.55	2.51	-0.04	-	-	0.00
510.2238	231.38	231.33	-0.05	-	-	0.00	2.08	2.15	0.07	-	-	0.00
457.5412	230.18	230.12	-0.06	-	-	0.00	2.76	2.72	-0.04	-	-	0.00
414.0466	229.62	229.56	-0.06	-	-	0.00	1.57	1.69	0.12	-	-	0.00
374.4607	228.91	228.86	-0.05	-	-	0.00	2.01	2.09	0.08	-	-	0.00
330.2584	228.07	228.07	0.00	-	-	0.00	0.75	0.69	-0.06	-	-	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.

Tributary C experiences a minimal decrease in WSE and velocity throughout the channel. There are no concerns in terms of increasing the flood risk to adjacent properties and public safety.
Table 34 provides a summary of the Regional results at Tributary D.

Table 34: Tributary D – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
1195.922	264.37	NA	NA	0.63	NA	NA	1.56	NA	NA	0.46	NA	NA
1194	263.75	NA	NA	0.49	NA	NA	1.32	NA	NA	-	NA	NA
1193.146	263.44	NA	NA	-	NA	NA	0.56	NA	NA	0.34	NA	NA
1193.1	263.22	NA	NA	1.07	NA	NA	1.71	NA	NA	-	NA	NA
1193.002	263.21	NA	NA	0.07	NA	NA	0.23	NA	NA	0.08	NA	NA
1193.001	263.12	NA	NA	0.76	NA	NA	1.53	NA	NA	-	NA	NA
1193	262.54	NA	NA	0.16	NA	NA	0.83	NA	NA	-	NA	NA
1192.777	262.41	NA	NA	-	NA	NA	1.00	NA	NA	-	NA	NA
1192.631	262.13	NA	NA	-	NA	NA	0.99	NA	NA	-	NA	NA
1192.407	261.36	NA	NA	0.19	NA	NA	1.82	NA	NA	-	NA	NA
1192.296	260.67	NA	NA	-	NA	NA	2.08	NA	NA	-	NA	NA
1192.146	257.58	257.65	0.07	-	-	0.00	2.35	2.43	0.08	-	-	0.00
1158.742	255.99	256.05	0.06	-	-	0.00	1.57	1.60	0.03	-	-	0.00
1117.042	255.27	255.36	0.09	-	-	0.00	2.54	2.61	0.07	-	-	0.00
1085.498	254.63	254.70	0.07	-	-	0.00	2.41	2.48	0.07	-	-	0.00
1056.979	253.54	253.56	0.02	-	-	0.00	1.59	1.67	0.08	-	-	0.00
1006.094	250.57	250.67	0.10	-	-	0.00	2.68	2.75	0.07	-	-	0.00
954.6843	248.44	248.54	0.10	-	-	0.00	2.82	2.92	0.1	-	-	0.00

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
927.8772	247.79	247.90	0.11	-	-	0.00	3.01	3.12	0.11	-	-	0.00
886.4161	247.12	247.26	0.14	-	-	0.00	2.16	2.10	-0.06	-	-	0.00
830.2587	246.31	246.41	0.10	-	-	0.00	2.89	2.97	0.08	-	-	0.00
765.2102	245.33	245.37	0.04	-	-	0.00	1.77	1.85	0.08	-	-	0.00
719.386	244.62	244.66	0.04	-	-	0.00	1.89	1.98	0.09	-	-	0.00
691.6686	244.23	244.26	0.03	-	-	0.00	1.64	1.71	0.07	-	-	0.00
639.0789	243.32	243.36	0.04	-	-	0.00	2.00	2.08	0.08	-	-	0.00
605.7167	242.65	242.69	0.04	-	-	0.00	2.01	2.08	0.07	-	-	0.00
552.2101	241.03	241.07	0.04	-	-	0.00	1.91	1.98	0.07	-	-	0.00
508.8769	240.31	240.37	0.06	-	-	0.00	2.23	2.29	0.06	-	-	0.00
457.6058	239.22	239.26	0.04	-	-	0.00	1.90	2.00	0.1	-	-	0.00
393.3919	237.84	237.90	0.06	-	-	0.00	2.33	2.40	0.07	-	-	0.00
345.8717	237.30	237.34	0.04	-	-	0.00	1.61	1.73	0.12	-	-	0.00
308.4069	236.86	236.90	0.04	-	-	0.00	1.90	1.98	0.08	-	-	0.00
261.2717	236.16	236.24	0.08	-	-	0.00	1.62	1.60	-0.02	-	-	0.00
237.4458	235.61	235.69	0.08	-	-	0.00	2.76	2.87	0.11	-	-	0.00
197.6155	234.20	234.24	0.04	-	-	0.00	1.54	1.63	0.09	-	-	0.00
176.7205	233.90	233.93	0.03	-	-	0.00	1.93	2.03	0.1	-	-	0.00
163.5648	233.58	233.62	0.04	-	-	0.00	1.96	2.00	0.04	-	-	0.00
151.4771	232.48	232.58	0.1	-	-	0.00	2.75	2.76	0.01	-	-	0.00
140.92	231.93	231.98	0.05	-	-	0.00	2.22	2.31	0.09	-	-	0.00
123.28	231.07	231.14	0.07	-	-	0.00	2.63	2.72	0.09	-	-	0.00
89.70679	230.46	230.55	0.09	-	-	0.00	2.76	2.85	0.09	-	-	0.00
72.5771	229.82	229.90	0.08	-	-	0.00	2.25	2.20	-0.05	-	-	0.00
51.16022	229.01	229.04	0.03	-	-	0.00	1.66	1.72	0.06	-	-	0.00
26.54893	228.28	228.32	0.04	-	-	0.00	1.80	1.84	0.04	-	-	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.
2. An "NA" indicates that the open channel has been removed and converted to pipe flow under the proposed condition.

From cross sections 1195.992 to 1192.296, Tributary D will be converted to piped flow under the proposed condition. Therefore, the flood risk along this section does not exist. Similar to Tributary B, the maximum increase in WSE (0.14 m) occurs within a deep valley corridor. The results indicate that the water is contained within the main channel as there are no values for the left and right bank velocities. Even though there is a considerable increase in depth, the steep side slopes of the valley contain the water and prevent the floodplain area from increasing. The described increase will not pose any risk to public safety or neighbouring properties.

Table 35 provides a summary of the Regional results at Tributary C + Tributary D.

Table 35: Tributary C + Tributary D – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
294	227.49	227.50	0.01	-	-	0.00	1.76	1.78	0.02	-	-	0.00
266.3048	226.03	226.04	0.01	-	-	0.00	2.24	2.26	0.02	-	-	0.00
236.2558	225.23	225.25	0.02	-	-	0.00	2.11	2.13	0.02	-	-	0.00
205.6305	224.73	224.75	0.02	-	-	0.00	2.79	2.81	0.02	-	-	0.00
173.8239	224.08	224.07	-0.01	-	-	0.00	2.46	2.58	0.12	-	-	0.00
151.7834	224.24	224.24	0.00	-	-	0.00	0.86	0.89	0.03	-	-	0.00
116.6732	224.26	224.26	0.00	-	-	0.00	0.36	0.37	0.01	-	-	0.00
66.5837	224.26	224.26	0.00	0.01	0.01	0.00	0.20	0.20	0.00	0.03	0.03	0.00
34.76245	224.26	224.26	0.00	0.02	0.03	0.01	0.11	0.11	0.00	0.03	0.03	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.

The increase to WSE and velocity at Tributary C + Tributary D is minimal and can be considered negligible (0.01 m to 0.02 m). There will be no increase in flood risk due to the proposed development.

Table 36 provides a summary of the Regional results at Tributary E.

Table 36: Tributary E – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
4370.082	265.37	265.37	0.00	-	-	0.00	0.98	0.98	0.00	-	-	0.00
4370.081	264.68	264.68	0.00	-	-	0.00	0.96	0.96	0.00	-	-	0.00
4370.079	262.77	262.77	0.00	0.30	0.30	0.00	1.53	1.53	0.00	0.60	0.60	0.00
4370.073	262.16	262.16	0.00	0.01	0.01	0.00	0.26	0.26	0.00	0.08	0.08	0.00
4370.043	262.13	262.13	0.00	0.06	0.06	0.00	0.23	0.23	0.00	0.07	0.07	0.00
4369.909	262.12	262.12	0.00	0.03	0.03	0.00	0.10	0.10	0.00	0.02	0.02	0.00
4368.863	262.11	262.11	0.00	0.04	0.04	0.00	0.36	0.36	0.00	0.01	0.01	0.00
4344	261.90	261.90	0.00	0.16	0.16	0.00	0.68	0.68	0.00	0.23	0.23	0.00
4308.669	261.68	261.68	0.00	-	-	0.00	0.55	0.55	0.00	-	-	0.00
4196.075	260.25	260.25	0.00	-	-	0.00	1.54	1.54	0.00	-	-	0.00
4007.722	259.13	259.13	0.00	0.15	0.15	0.00	0.38	0.38	0.00	0.14	0.14	0.00
3956.844	259.12	259.12	0.00	0.07	0.07	0.00	0.22	0.22	0.00	0.07	0.07	0.00
3899.436	259.12	259.12	0.00	0.02	0.02	0.00	0.10	0.10	0.00	0.03	0.03	0.00
3821.818	259.11	259.11	0.00	0.07	0.07	0.00	0.22	0.22	0.00	0.06	0.06	0.00
3789.828	258.89	258.89	0.00	0.50	0.50	0.00	1.87	1.87	0.00	0.33	0.33	0.00
3711.272	258.76	258.76	0.00	0.16	0.16	0.00	0.51	0.51	0.00	0.16	0.16	0.00
3653.272	258.66	258.66	0.00	0.25	0.25	0.00	0.78	0.78	0.00	0.23	0.23	0.00
3602.49	258.52	258.52	0.00	0.26	0.26	0.00	0.88	0.88	0.00	0.24	0.24	0.00
3483.216	257.85	257.85	0.00	0.20	0.2	0.00	1.22	1.22	0.00	0.18	0.18	0.00
3413.879	257.77	257.77	0.00	0.18	0.18	0.00	0.50	0.50	0.00	0.20	0.20	0.00
3378.862	257.77	257.77	0.00	0.07	0.07	0.00	0.32	0.32	0.00	0.10	0.10	0.00
3308.731	257.77	257.77	0.00	0.05	0.05	0.00	0.17	0.17	0.00	0.05	0.05	0.00
3216.276	257.77	257.77	0.00	0.06	0.06	0.00	0.21	0.21	0.00	0.05	0.05	0.00
3198.314	257.77	257.77	0.00	0.05	0.05	0.00	0.19	0.19	0.00	0.04	0.04	0.00
3190.241	257.77	257.77	0.00	0.01	0.01	0.00	0.05	0.05	0.00	0.01	0.01	0.00
3115.165	257.77	257.77	0.00	0.01	0.01	0.00	0.08	0.08	0.00	0.02	0.02	0.00
3084	Culvert											
3054.114	256.08	256.08	0.00	-	-	0.00	1.28	1.28	0.00	-	-	0.00
3040.584	256.10	256.10	0.00	0.06	0.06	0.00	0.19	0.19	0.00	0.05	0.05	0.00
2972.104	256.10	256.10	0.00	0.03	0.03	0.00	0.09	0.09	0.00	0.03	0.03	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.

Tributary E experiences no impact to WSE and velocity throughout the channel. There is no flood risk at Tributary E due to the proposed development.

Table 37 provides a summary of the Regional results at Tributary F.

Table 37: Tributary F – Regional Existing Vs. Proposed WSE and Velocity Data

X Section	Water Surface Elev.			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ	Ex.	Pr.	Δ
1571.71	254.63	254.56	-0.07	-	-	0.00	1.66	1.55	-0.11	-	-	0.00
1539.69	253.60	253.55	-0.05	-	-	0.00	1.42	1.26	-0.16	-	-	0.00
1511.34	252.75	252.72	-0.03	-	-	0.00	0.99	0.89	-0.10	-	-	0.00
1450.99	250.42	250.34	-0.08	-	-	0.00	1.83	1.72	-0.11	-	-	0.00
1399.71	248.72	248.74	0.02	-	-	0.00	0.88	0.90	0.02	-	-	0.00
1373	247.25	247.26	0.01	-	-	0.00	1.13	1.18	0.05	-	-	0.00
1318	244.34	244.35	0.01	-	-	0.00	1.30	1.34	0.04	-	-	0.00
1245	239.52	239.53	0.01	-	-	0.00	1.60	1.63	0.03	-	-	0.00
1184	236.72	236.72	0.00	-	-	0.00	1.65	1.64	-0.01	-	-	0.00
1126	234.88	234.87	-0.01	-	-	0.00	1.02	1.02	0.00	-	-	0.00
993	232.06	232.05	-0.01	-	-	0.00	2.48	2.48	0.00	-	-	0.00
992	230.63	230.63	0.00	-	-	0.00	0.58	0.57	-0.01	-	-	0.00

1. A "–" indicates that the channel component does not contain runoff at this location.

There is generally a decrease in WSE and velocity at the beginning section of Tributary F. This occurs because the proposed grading sends water further downstream compared to the existing conditions. The decreases are not a concern in terms of flood risk. There is minimal increase at the mid-tributary that can be considered negligible (0.01 m to 0.02 m).

As per the TRCA's Technical Guidelines for Flood Hazard Mapping (March 2017), Regional floodplain mapping for the Hurricane Hazel event was generated for both the existing and proposed conditions. Drawings C712A to C712D depict the Regional floodplain mapping and associated 10 m development setback. As illustrated in the floodplain mapping, the property boundary and extent of development is outside of the Regulatory floodplain. A comparison of the existing and proposed conditions floodplain mapping demonstrates that there is minimal increase to floodplain area due to development.

9.0 SECONDARY PLAN NATURAL HERITAGE STUDY REPORT

Dillon Consulting Ltd. has prepared a Secondary Plan Natural Heritage Study Report (herein referred to as the Report), dated December 2024, under separate cover. The purpose of this Report is to document the existing conditions of the natural environment within 120 m of the Site. The Report also addresses the potential limits of development, evaluates potential environmental impacts associated with development, and recommends mitigation, restoration, and enhancement measures to preserve and/or restore natural features.

The Report includes discussion on the following with respect to existing conditions:

- Designated Natural Heritage Features
- Landforms, Soils and Geology
- Aquatic Environment
- Terrestrial Environment
- Significant Wildlife Habitat
- Species at Risk

Additional studies will be required for future development proposal and particularly on lands where access was not granted for preparation of the Secondary Plan Natural Heritage Study Report.

10.0 ROPA 30 Lands

It is understood that the development of the lands designated under the Regional Official Plan Amendment (2021) will advance well before the remaining Option 1 Lands. Therefore, consideration has been given to the servicing strategy for these lands and integration with the existing network of infrastructure.

Water Servicing

The R.J. Burnside Technical Memorandum (May 13, 2021) did not address the water servicing demands of the ROPA 30 Lands alone. It is anticipated that an extension of the existing feedermains on Regional Road 50 and Mount Hope Road would be sufficient to service the domestic and fire demands of the ROPA 30 Lands. This will need to be confirmed through hydrant flow tests and modelling of the existing and proposed systems. If the design and construction of the ultimate water servicing solution can advance prior to the occupancy of the ROPA 30 Lands, this would be beneficial for avoiding an interim solution and ensuring adequate flows were available.

Sanitary Servicing

In summary, sanitary flows in the ROPA 30 Lands will be conveyed to Emil Kolb Parkway via a gravity trunk sewer and eventually Humber Station Road, further details are found in Section 3.3. Sanitary flows from the Option 2 Lands will be conveyed to the ROPA 30 Lands via a gravity trunk sewer or forcemain, depending on the outcome of an EA.

Stormwater Management

Three (3) stormwater management (SWM) wet ponds are proposed within the ROPA 30 Lands. The western most pond is situated adjacent to Regional Road 50 and will outlet to the existing ditch before ultimately being conveyed west of Regional Road 50 via an existing box culvert. This pond only requires quality and erosion control in accordance with criteria for the main branches of the West Humber River. The other two (2) ponds, situated in the southeast corner of the Option 1 Lands and in the Option 2 Lands, need to be controlled for quantity, quality, and erosion per the control requirements for sub-basin 10 of the Humber River Watershed. A plan and profile view of Pond 211 has been provided in Drawing C707 – Conceptual SWM Pond Plan and Section to show the conceptual pond grading in accordance with the Town and MECP requirements.

11.0 CONCLUSIONS & RECOMMENDATIONS

The proposed development of the Site can be serviced for water, sanitary and stormwater in accordance with the Town of Caledon and Region of Peel requirements and standards. A summary of our conclusions and recommendations includes:

1. Water servicing is in line with the R.J. Burnside Technical Memorandum dated May 13, 2021, which includes the creation of a new Pressure Zone 7 to service the north end of Bolton. An elevated water tank will be included within Option 1 and a 400 mm diameter feedermain is required along Emil Kolb Parkway and Regional Road 50 to service the Subject Lands. A water booster station (designed by R.J. Burnside) will be utilized for water supply prior to the construction of the elevated water tank.

2. The Region and other consulting teams are completing the design of the sanitary servicing strategy for the Subject Lands. Through consultation with these teams, we understand that sanitary servicing is designed to convey all sanitary flows from the Option 1 and Option 2 Lands west to Humber Station Road. From the Option 2 Lands to the intersection of Regional Road 50 and Emil Kolb Parkway, flows will be conveyed via a forcemain or gravity sewer depending on the outcome of the Region's Water and Wastewater Municipal Class Environmental Assessment. From Regional Road 50, flows will then discharge via a gravity sewer to a proposed sewage pumping station on Emil Kolb Parkway. Flows will then be pumped south on Emil Kolb Parkway to a gravity sewer on King Street, which will outlet to the trunk sewer on Humber Station Road.

3. Grading of the Site is constrained by existing elevations (matching drainage divides and elevations at the boundary), the normal water level in the stormwater management (SWM) facilities, and minimum cover on the gravity sanitary system. Stormwater flows in excess of the 10-year event are conveyed to the SWM facilities via overland flow path. Existing elevations on the arterial roadways (Regional Road 50, Emil Kolb, and Duffy's) will be maintained and matched at the entrances to the Site.

4. Several drainage divides exist throughout the Site, which direct flows to tributaries of the West Humber River. The drainage divide between sub-basin 10 of the West Humber River (which requires quantity controls) and areas of the West Humber River Watershed (which do not require quantity control) will be generally maintained by the proposed grading and servicing concept.

5. The floodplain analysis includes mapping of the existing floodplain and an evaluation of the post-development floodplain. The proposed development plan will require tributaries within the development area to be realigned in order to safely convey external drainage though or around the proposed development. Based on the findings of the Dillon headwater drainage feature assessment this realignment may need to include replication of the floodplain storage provided onsite and natural channel design.

6. Stormwater management facilities (wet ponds) will be implemented within each of the drainage divides to maintain outlets to the existing watersheds. A total of six (6) ponds will be located within an area of the Main Humber watershed, which does not require quantity control; however these ponds will be designed to provide post to pre quantity control as well as quality and erosion control. The remaining three (3) SWM ponds are located within sub-basin 10 of the Humber River and designed to provide quantity control as well as quality and erosion control. Outlets from the ponds are set at or above the 25-year water level of the receiving watercourse.

7. A water balance assessment will be included in a future hydrogeological report, which will be prepared by C.F. Crozier & Associates Inc. under separate cover. Low impact development (LID) features were investigated to assist with water balance and environmentally friendly stormwater management solutions. Potential LID methods to be utilized on Site include green roofs, roof downspout disconnection, infiltration galleries, rainwater harvesting, bioretention, vegetated filter strips, permeable pavement, and enhanced grass swales.

8. A Secondary Plan Natural Heritage Study Report (the Report) was prepared by Dillon Consulting Ltd. and provided under separate cover. The Report provides a detailed background review and description of the existing terrestrial and aquatic conditions within 120 m of the Site where access was permitted.

Based on the above conclusions, we support the proposed development application of the Site from the perspective of water supply, sanitary servicing, and stormwater management.

C.F. CROZIER & ASSOCIATES INC.

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Project Engineer, Land Development

JL:RA/tc

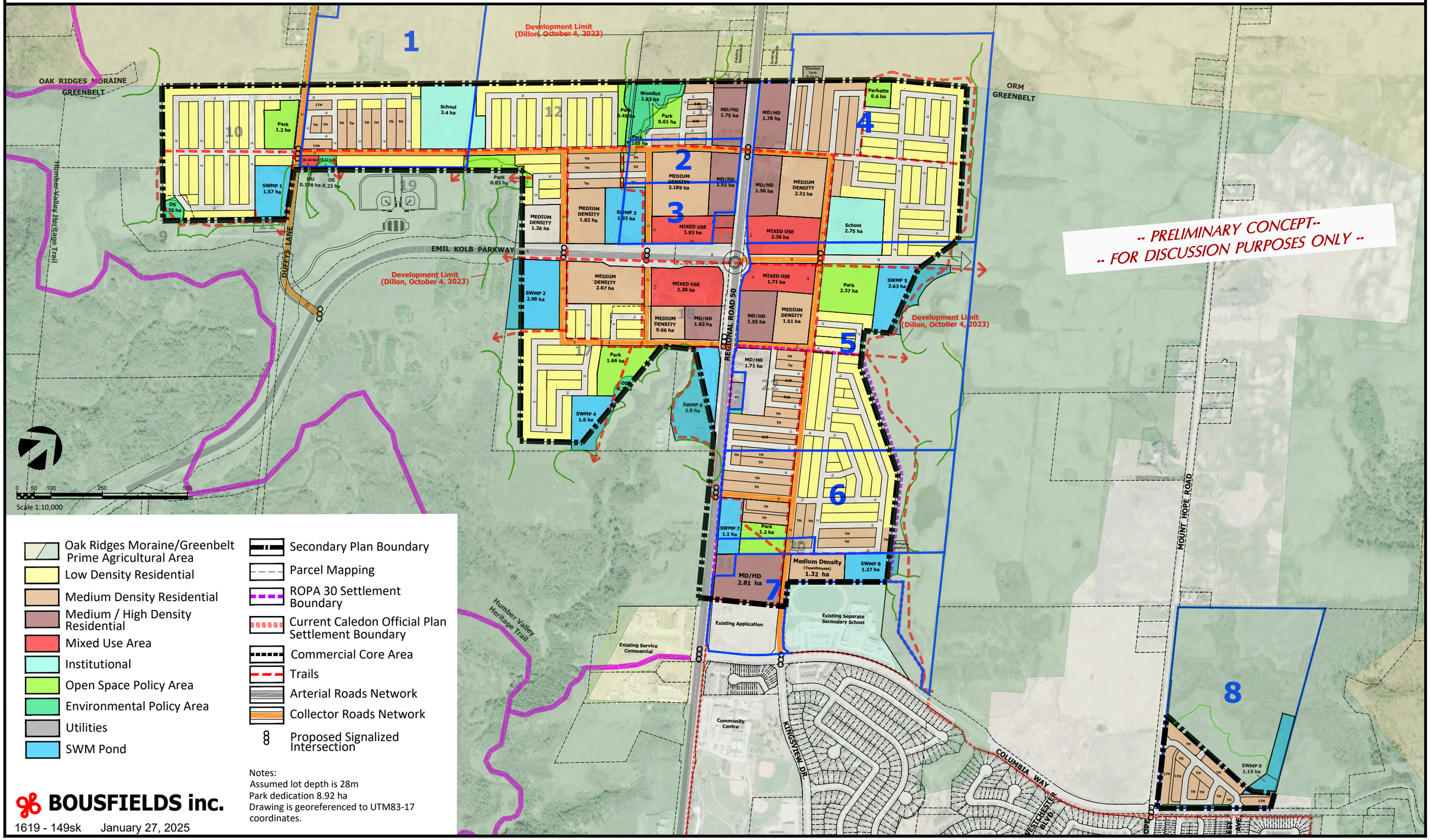
\\Crozier-Files\Toronto-Projects\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\Reports\2024 Master Servicing Study\2024.12.12_(0708-3446)_FSR_SWM Report.docx

APPENDIX A

Background Documentation

Bolton North Hill Secondary Plan

Detailed Concept Plan



- Oak Ridges Moraine/Greenbelt Prime Agricultural Area
- Low Density Residential
- Medium Density Residential
- Medium / High Density Residential
- Mixed Use Area
- Institutional
- Open Space Policy Area
- Environmental Policy Area
- Utilities
- SWM Pond
- Secondary Plan Boundary
- Parcel Mapping
- ROPA 30 Settlement Boundary
- Current Caledon Official Plan Settlement Boundary
- Commercial Core Area
- Trails
- Arterial Roads Network
- Collector Roads Network
- Proposed Signalized Intersection

Notes:
Assumed lot depth is 28m
Park dedication 8.92 ha
Drawing is georeferenced to UTM83-17 coordinates.

BOUSFIELDS inc.

1619 - 149sk January 27, 2025

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BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

Technical Memorandum

Date: May 13, 2021 **Project No.:** 300034976.0001

Project Name: Bolton Option 1, 2 & 3 Lands Preliminary Water Modelling

Client Name: Option 1/2 Landowners Group and Bolton Option 3 Landowners Group

Submitted To: Ms. Miriam Polga, P.Eng., Region of Peel

Submitted By: Rachel Walton, MASc., E.I.T.

Reviewed By: Jeff Langlois, P.Eng., MBA
Ian Drever, P.Eng.

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Option 1/2 Landowners and Bolton Option 3 Landowners Group to complete a preliminary hydraulic water modelling analysis of future development areas within a new pressure Zone 7 in the community of Bolton. The water distribution system in Bolton is part of the Region of Peel (Region) water distribution system.

The Town previously completed the Bolton Residential Expansion Study (BRES) to determine the best approach to meet their urban boundary expansion needs. The BRES examined six different options for expansion of the Bolton settlement area and examined how each area could be serviced. The location of the BRES Lands are shown in Figure 1.

ROPA 30, the Region of Peel Official Plan Amendment addressing growth through 2031 was appealed to the Local Planning Appeal Tribunal (LPAT). A settlement agreement was reached between the appellant parties which allocated forecast population between several expansion areas, including portions of the Option 1 and Option 3 lands within a future Bolton Pressure Zone 7.

As dictated by the Ontario Growth Plan (2019), the Region must now plan for its share of growth to 2051. The projected growth numbers are dictated by the Province of Ontario and allocated by the Region to the lower tier Municipalities through Regional Council direction and Regional Official Plan Amendment (ROPA). The Region is currently undertaking Settlement Area Boundary Expansion (SABE) studies and consultations to determine the preferred approach to

accommodate growth to 2051. Lands under consideration include lands within Bolton Pressure Zone 7.

The Bolton Option 3 Landowners Group has prepared and submitted a SABE Concept Plan (Nak Design Strategies, February 2021) identifying a proposed development horizon and growth allocation area to each of the BRES Land Areas, as shown in Figure 1 below. Lands to be developed in 2031, 2051 and beyond 2051 (Whitebelt) have been identified.

As had been determined in the previous BRES work, the Option 1, 2, 3, and Rounding Out Area (ROA) lands are generally outside of the range of elevations associated with Pressure Zone 6 of the existing water distribution infrastructure in Bolton. The northern section of Option 4 Lands will also generally be outside of the range of elevations associated with Pressure Zone 6. As such, development of the Option 1, 2, 3, 4 and ROA lands will ultimately require the development of a new Pressure Zone 7 within Bolton. Previous studies completed in support of BRES identified a new Zone 7 booster pumping station at King Street and Coleraine Drive. Ultimately, floating storage is proposed in the form of an elevated tanks (ET) to provide storage for flow equalization, fire demands and emergencies. Two ETs have been ultimately proposed, the first is to be situated in the vicinity of the northwest corner of the Option 3 lands and the second to be situated generally to the north of the Option 1 lands. The general location of the Zone 7 ETs are shown in Figure 2 below.

The purpose of this modelling exercise and supporting technical memorandum is to determine interim and ultimate water servicing arrangements, which allow for development of the Option 1, 2 and 3 lands initially, and then future lands through the creation of the ultimate Zone 7 servicing solution, based on the proposed February 2021 SABE Concept Plan

ELEVATED WATER TANK - ALTERNATE LOCATION

ELEVATED WATER TANK

OPTION 3
GO STATION FOCUS
165ha

FUTURE GO STATION

OPTION 1
NORTH HILL WEST
151ha

ELEVATED WATER TANK

ZONE 7

OPTION 2
NORTH HILL EAST
160ha

ROUNDING OUT AREA - 1

ROUNDING OUT AREA - 2

ROUNDING OUT AREA - 3

BOOSTER PUMPING STATION

KING ST

GTA WEST CORRIDOR NORTH PLANNING LIMIT

OPTION 4
KING STREET WEST
171ha

ZONE 7

ZONE 6

ZONE 5

ZONE 6

NORTH BOLTON ELEVATED TANK

BOLTON ELEVATED WATER TANK

HUMBER STATION RD

OPTION 5
HEALY ROAD NORTH
213ha

HEALEY RD

ROPA 28
EMPLOYMENT LANDS

ZONE 6

OPTION 6
HUMBER STATION ROAD
182ha

THE GORE RD

COLERAINE DR

CN RAIL

MAYFIELD RD

ZONE 6

ZONE 5

ZONE 5

CITY OF BRAMPTON
SPA 47
EMPLOYMENT LANDS

GTA WEST CORRIDOR SOUTH PLANNING LIMIT

Figure1

LEGEND

- EXISTING URBAN BOUNDARY
- GTA WEST CORRIDOR ROUTE PLANNING STUDY AREA
- GTA WEST CORRIDOR FOCUSED DEVELOPMENT AREA
- GTA WEST POTENTIAL DEVELOPMENT AREA
- GREEN BELT
- WATER PRESSURE ZONE
- EXISTING TRUNK WATERMAIN
- FUTURE TRUNK WATERMAIN (Region of Peel 2031a Capital Plan)
- FUTURE TRUNK WATERMAIN (Post 2031)
- CN RAIL LINE

SCALE 1:15000 (APPROX.)

BRES
INFRASTRUCTURE REQUIREMENTS
OVERALL WATER DEVELOPMENT PLAN

BURNSIDE

OPTION AREA 1
2051
155.1 ha
10,082 P&J

OPTION AREA 3
2051
112.9 ha
7,339P&J

OPTION AREA 3
2031
60.0 ha
3,900 P&J

OPTION AREA 1
2031
28.1 ha
1,827 P&J

ROUNDING OUT AREAS
2051
20.7 ha
1,346 P&J

OPTION AREA 2
2051
10.8 ha
702 P&J

ROUNDING OUT AREAS
2031
8.5 ha
553 P&J

OPTION AREA 4
2051
156.8 ha
10,192 P&J

WB
641.0 ha
32,030 P&J

OPTION AREA 5
2051
182 ha
4,732 P&J

OPTION AREA 6
2031
167.5 ha
4,355 P&J

HUMBER STATION ROAD
KING STREET
REGIONAL ROAD 50
COLUMBIA WAY
HEALEY ROAD
CANADIAN PACIFIC RAILWAY
GEORGE BOLTON PARKWAY
COLERAINE DRIVE
THE GORE ROAD
MAYFIELD ROAD
MACVILLE PUBLIC SCHOOL

PLANNING HORIZON	AREA (HA)	TOTAL POPULATION & EMPLOYMENT
2031 - BRES	264.1	10,635
2051 - BRES	638.3	34,393
2051 - WHITEBELT	641	32,030
TOTAL	1,543.4	77,058

Note - population projection based on 65P&J per net developable hectare, except in employment lands, where projection is based on 26P&J per net developable hectare

LEGEND

- Planning Horizon 2031
- Planning Horizon 2051
- Whitebelt Lands
- PSEZ
- Proposed Environmental Policy Area
- Greenbelt Lands
- 407 GTA West Preferred Route
- GO Station
- Existing Arterial Road
- Rural Collector Road
- Multi-Modal Collector Road
- Collector / Transit Road
- Community Spine Road
- Character Road
- CPR Rail Line
- Node
- Gateway / Feature (per OP)

250m

WITHOUT PREJUDICE FOR DISCUSSION PURPOSES ONLY - SUBJECT TO CHANGE

Population Allocation 2031-2051 Plan

BOLTON RESIDENTIAL EXPANSION

TOWN OF CALEDON

NAK design strategies

2.0 Background Documents

The following reports have been referenced to complete the hydraulic modelling discussed in this memorandum:

- Planning Rational Executive Summary, prepared by NAK Design Strategies, dated February 24, 2021.
- Bolton Residential Expansion Study Infrastructure Report, prepared by GM BluePlan dated June 16, 2014.
- Region of Peel 2013 Water and Wastewater Master Plan for the Lake-Based Systems, Volume III – Water Master Plan, prepared by GM BluePlan and AECOM, dated March 31, 2014.
- Proposed Regional Official Plan Amendment, An Amendment to Establish the Bolton (2031) Residential Expansion Area Planning Justification Report, prepared by Meridian Planning, dated October 2014.
- Region of Peel 2020 Water and Wastewater Master Plan for the Lake Based Systems, prepared by GM BluePlan and Region of Peel, June 2020.
- Ministry of the Environment, Conservation and Parks (MECP), “Guidelines for the Design of Water Distribution Systems”, 2008.

LiDAR data from Urbantech was provided to estimate existing ground elevations for the development areas without a preliminary grading plan. Where a preliminary grading plan has not been provided, proposed elevations have been assumed to be similar to existing elevations. The LiDAR data was also used to estimate the elevations along Emil Kolb Parkway.

2.1 System Pressure

As per the Region of Peel 2020 Water and Wastewater Master Plan for the Lake-Based Systems, Volume III – Water Master Plan, prepared by GM BluePlan and Region of Peel, dated June 2020, a minimum operating pressure of 40 psi and a maximum operating pressure of 100 psi shall be maintained within the water distribution system under maximum day demand and a minimum operating pressure of 40 psi shall be maintained under peak hour demand. The allowable operating pressure during fire flow conditions is a minimum of 20 psi.

2.2 Roughness Coefficient (“C” Value)

The friction factors “C” used in the model are based on the Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking Water Systems (2008) and are as follows:

- 150 mm diameter: C=100
- 200 mm or 250 mm diameter: C=110
- 300 mm to 600 mm diameter: C=120
- > 600 mm diameter: C=130

2.3 Peaking Factor

Peaking factors have been referenced from the 2020 Water and Wastewater Master Plan. The peaking factors used in the modelling are as follows:

- Residential Maximum Day Factor (MDF) = 1.8
- Non-Residential Maximum Day Factor (MDF) = 1.4
- Peak Hour Factor (PHF) = 3

2.4 Water Demand

Water Demands for the model have been calculated based on the following per capita demand:

- Residential 270 L/cap/d
- Employment 250 L/cap/d

These per capita demands are referenced from the Region of Peel 2020 Water and Wastewater Master Plan for the Lake Based Systems.

Preliminary Block Plans for the Option 1 2031 Lands and the Option 3 Lands were prepared by Gerrard Designs and provided for modelling purposes. Demands for the Option 1 - 2031 Lands and the Option 3 - 2031+2051 were distributed throughout the model using the polygon allocation method. Each proposed land use was assigned a per hectare water demand, based on the overall projected demand. Using the Theisen Polygon tool, each junction was assigned a coverage area in the model. The polygons were used to develop an area weighted demand based on the intersected neighbouring land uses.

To calculate the population for Option 1 and 3 using the block plans provided, the following densities were assumed:

- Townhouse – 3.1 ppu
- Single Detached – 3.7 ppu
- Mixed Use (Apartment/Townhouse) – 1.99 ppu
- Employment – 25 pp/ha

Block plans were not available for the Option 1 2051 Lands, Option 2 Lands, Option 4 Lands, 2051 Rounding Out Areas or Whitebelt Lands. As such, demands for these locations were added in at a single node in the model. If block plans are available in the future, the model can be updated to reflect the proposed demand distribution.

The following population densities were assumed in absence of a block plan:

- Residential Lands – 65 pp/ha
- Employment – 25 jobs/ha

It is anticipated that as the development design progresses the demands will be further refined. Refer to Appendix A for the demand calculations.

2.4.1 Option 1 Lands

The calculated population yield for the 2031 Option 1 lands is based on the Preliminary Concept Plan dated March 25, 2021, prepared by Gerrard Design. This block plan includes the 2031 Option 1 lands only.

The 2051 Option 1 Land population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan.

The total estimated population yield for the Option 1 Lands are as follows:

- Residential 12,128 persons
- Employment 52 jobs

The calculated 2051 Option 1 lands demands are:

- Average Day Demand (ADD) = 38.1 L/s
- Maximum Day Demand (MDD) = 68.5 L/s
- Peak Hour Demand (PHD) = 114.2 L/s

Based on the Population Allocation 2031-2051 Plan (February 2021), 28.1 ha of land has been allocated for development in 2031 and an additional 155.1 ha of land has been allocated for development in 2051. The total Option 1 Land area is approximately 183.2 ha.

2.4.2 Option 2 Lands

The Option 2 Lands are entirely within the 2051 buildout scenario.

The 2051 Option 2 Land population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan.

The total estimated population yield for the Option 2 Lands are as follows:

- Residential 702 persons

The calculated 2051 Option 1 lands demands are:

- Average Day Demand (ADD) = 2.2 L/s
- Maximum Day Demand (MDD) = 3.9 L/s
- Peak Hour Demand (PHD) = 6.6 L/s

2.4.3 Option 3 Lands

The calculated population yield for the Option 3 lands is based on the proposed Block Plan dated January 12, 2021, prepared by Gerrard Design. This block plan includes the 2051 full

build out of the Option 3 Lands. The population yields assume employment at the school. The estimated population yields are as follows:

- Residential 17,016 persons
- Employment 171 jobs

The calculated 2051 Option 3 lands demands are:

- Average Day Demand (ADD) = 53.7 L/s
- Maximum Day Demand (MDD) = 96.4 L/s
- Peak Hour Demand (PHD) = 161.0 L/s

Based on the Population Allocation 2031-2051 Plan (February 2021), 60 ha of land has been allocated for development in 2031 and an additional 112.9 ha of land has been allocated for development in 2051. The total Option 3 Land area is 172.9 ha.

2.4.4 Option 4 Lands

The area of Option 4 Lands that would be brought into Zone 7 was estimated based on the existing Zone 6 pressure elevation boundary of 259.1 m. Using the existing topography within Option 4, an approximate total land area of 28 ha has been established.

The 2051 Option 4 Land population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan.

The total estimated population yield for the Option 4 Lands are as follows:

- Residential 1,820 persons

The calculated 2051 Option 4 Demands are:

- Average Day Demand (ADD) = 5.7 L/s
- Maximum Day Demand (MDD) = 10.2 L/s
- Peak Hour Demand (PHD) = 17.1 L/s

2.4.5 Rounding Out Areas

The Zone 7 Rounding Out Areas are entirely within the 2051 buildout scenario.

The 2051 Rounding Out Area population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan.

The total estimated population yield for the Rounding Out Lands are as follows:

- Residential 1,346 persons

The calculated 2051 Rounding Out Area demands are:

- Average Day Demand (ADD) = 4.2 L/s
- Maximum Day Demand (MDD) = 7.6 L/s
- Peak Hour Demand (PHD) = 12.6 L/s

2.4.6 Existing Lands

There are existing areas within Bolton Pressure Zone 6 that have ground elevations within the Pressure Zone 7 servicing range. As such, the development of Bolton Pressure Zone 7 will allow for these existing lands to move into the new Pressure Zone, thereby providing pressure improvements for existing residents.

The existing land area that would be brought into Pressure Zone 7 was estimated based on the existing Pressure Zone 6 elevation boundary of 259.1 m. Using the existing topography, an approximate total land area of 137 ha has been established. Two existing areas have been identified, west of Coleraine Drive, and largely on the south side of King Street and east of Highway 50, south of Columbia Way.

The existing population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan. An employment density of 25 jobs per hectare was assumed.

The total estimate population yields for the existing lands are as follows:

- Residential West of Coleraine Drive 2,860
- Employment West of Coleraine Drive 500
- Residential East of Highway 50 3,705
- Employment East of Highway 50 400

The calculated existing demands are:

- Average Day Demand (ADD) = 23.1 L/s
- Maximum Day Demand (MDD) = 40.6 L/s
- Peak Hour Demand (PHD) = 69.4 L/s

2.4.7 Whitebelt Lands

The Whitebelt Lands represent lands having future development potential beyond the 2051 planning horizon. Using ground elevation 259.1 m as an approximation of the Pressure Zone Boundary, it is estimated that approximately 290 ha of the Whitebelt Lands will be in Pressure Zone 7.

The post-2051 Whitebelt Lands population was taken from the population target set out in the Population Allocation 2031-2051 Plan (February 2021). A population density of 65 people per hectare was assumed in the allocation plan.

The total estimated population yield for the Whitebelt lands are as follows:

- Residential 18,850

The calculated Whitebelt Lands Demands are:

- Average Day Demand (ADD) = 58.9 L/s
- Maximum Day Demand (MDD) = 106.0 L/s
- Peak Hour Demand (PHD) = 179.7 L/s

2.4.8 Total Demands

The total estimated demands considered for this exercise are summarized in Table 1 below:

Table 1: Demand Summary

	Area (ha)	Population	Demand L/s		
			ADD	MDD	PHD
Option 1 Full Buildout 2051	183.2	12,180	38.1	68.5	114.2
Option 2 Full Buildout 2051	10.8	702	2.2	3.9	6.6
Option 3 Full Buildout 2051	172.9	17,187	53.7	96.4	161
Option 4 Pressure Zone 7 Lands 2051	28.0	1,820	5.7	10.2	17.1
ROA 2051	20.7	1,346	4.2	7.6	12.6
Existing Pressure Zone 6 Lands	137.0	7,465	23.1	40.6	69.3
Whitebelt Pressure Zone 7 - Post 2051	290.0	18,850	58.9	106	179.7
Total	**802.6**	**59,550**	**185.9**	**333.2**	**560.6**

2.5 Fire Flow

The required fire flow for all lands is based on Ministry of the Environment, Conservation and Parks (MECP), “Guidelines for the Design of Water Distribution Systems”, 2008.

A minimum requirement of 220 L/s for 3 hours while maintaining a minimum system operating pressure of 20 psi, was established in the Bolton Residential Expansion Study Infrastructure Report, prepared by GM BluePlan dated June 16, 2014. Both flow and duration requirements increase from this minimum as the service population increases.

3.0 Existing Water Distribution System

Bolton receives water supply from the Tullamore Pumping Station and Reservoir, through a transmission main along Mayfield Road and Coleraine Drive. Bolton’s water distribution system is serviced in two pressure zones, Zone 5 and Zone 6. Zone 5 is serviced through Zone 6 by pressure reducing valves at the Bolton Zone 5 Standpipes. The Zone 5 Standpipes have a high-water level (HWL) of 274.1 m. Storage for Zone 6 is supplied by the Bolton ET and the North Bolton ET. The HWL of both Zone 6 ET’s is 297 m. The Zone 6 ET water level ranges from 295 m to 297 m.

According to the 2020 Water and Wastewater Master Plan for Lake Based Systems the serviceable elevations ranges for each zone are as follows:

- **Zone 6** 214.5 m - 259.1 m
- **Zone 7** 243.4 m - 289.6 m

The existing ground elevations within the proposed development areas range from approximately 257 m to 280 m. The elevations within the Option 3 Lands range from 257 m to 280 m. The elevations within the Option 1 and Option 2 Lands range from 259 m to 279 m. These elevations fall outside of the range of elevations capable of being serviced by Zone 6 while maintaining adequate operating pressures within the system. The Region of Peel reports operating pressure issues within an existing residential subdivision on the south side on King Street in close proximity to the Option 3 lands.

The elevations along Emil Kolb Parkway range from 234 m to 265 m.

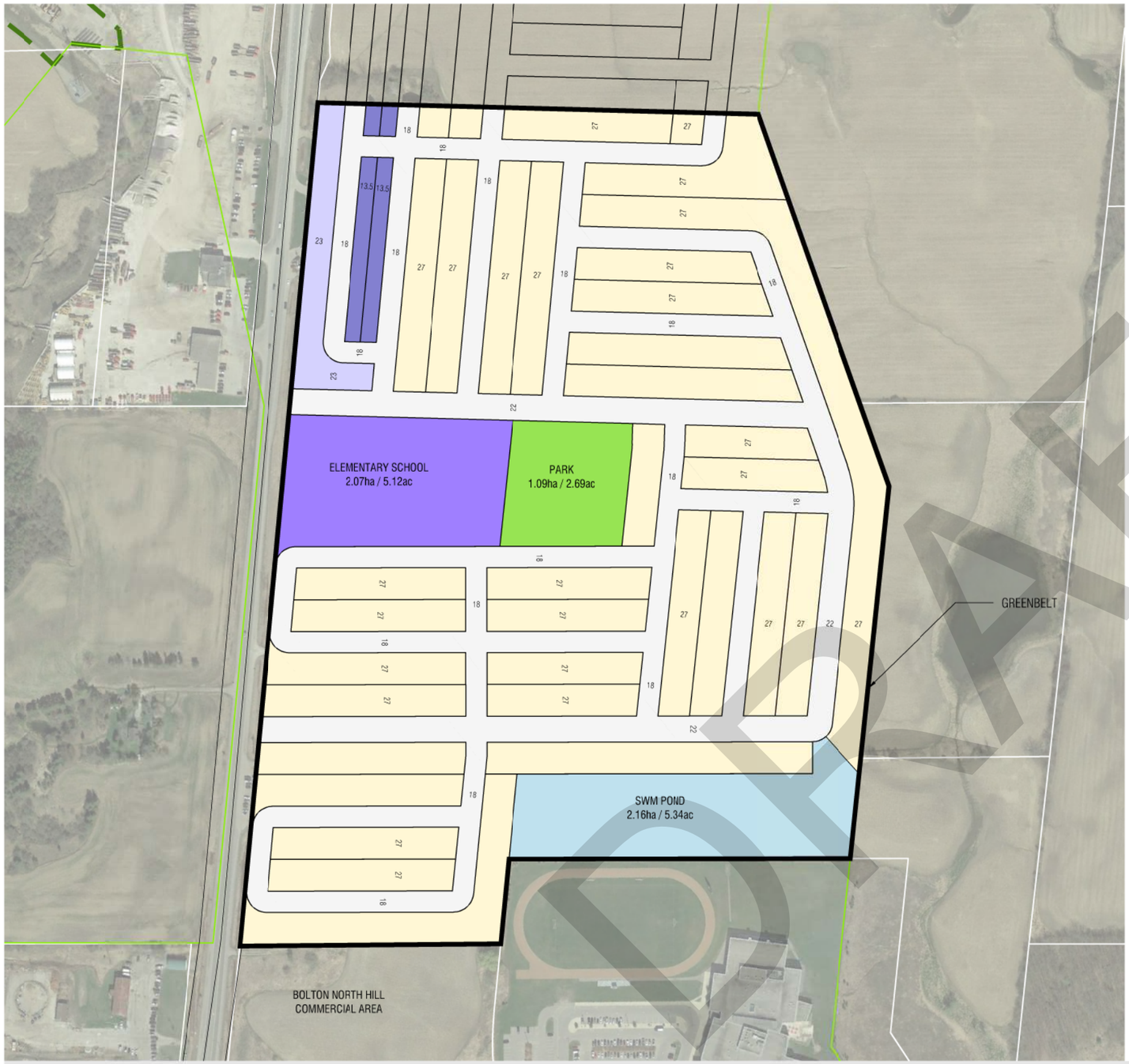
A new Pressure Zone 7 with a HGL of 327.7 m would adequately service all of the future development lands, as well as address existing operating pressure issues for some existing residents.

4.0 Hydraulic Modelling

The hydraulic model was developed using Infowater modelling software. The Option 1 (2031) and Option 3 lands water system networks were input into the model based on the proposed road network consistent with the January 12, 2021 Block Plan, and March 25, 2021 Block Plan shown in Figures 3 and 4 below. The remainder of the lands, without a block plan have been identified as a single node within the model.

As identified through previous studies undertaken by the Town of Caledon and Region of Peel, sufficient supply is available to service the domestic and fire flow requirements associated with the Bolton residential expansion through 2031. Beyond 2031, the Region may need to provide additional supply to the Bolton urban area, however that has not been the focus of this review. The servicing constraints are based on supply pressure and hydraulic losses, which is dependent on watermain size and ground elevations within the serviced area.

The existing Zone 6 Bolton ET's have been shown schematically in the model as a reservoir and set at a HWL of 297 m during regular operating scenarios and 295 m during Fire Flow scenarios. Although the existing elevated tanks and proposed booster pumping station are shown schematically in relatively close proximity to the Option 3 lands, the pipe lengths have been modelled with the actual lengths to properly reflect the friction losses and actual location of the existing and proposed infrastructure. For the purpose of this model, the Zone 7 Booster Pumping Station is proposed to be sited on land owned by the Region of Peel, on the east side of Coleraine Drive, just south of King Street. The final location of the Booster Pumping Station will depend on block sizing and available lands but is anticipated to be situated in the general area of the Coleraine Drive/King Street/Emil Kolb Parkway intersection.



LAND USE SUMMARY

Total Site Area	32.00 ha.	79.1 ac.	
NON-DEVELOPABLE			
Road Widening	0.04 ha.	0.10 ac.	
Net Site Area	31.96 ha.	79.0 ac.	100.0%
DEVELOPABLE			
Residential (see 'UNIT SUMMARY' Below)	17.59 ha.	43.5 ac.	55.0%
Parks	1.09 ha.	2.69 ac.	3.4%
SWM Pond	2.16 ha.	5.34 ac.	6.8%
School	2.07 ha.	5.11 ac.	6.5%
Vista / Walkway	0.00 ha.	0.00 ac.	0.0%
Right of Way	9.05 ha.	22.4 ac.	28.3%
TOTAL (Developable)	31.96 ha.	79.0 ac.	100.0%

UNIT SUMMARY

		Width (m)	Dpth. (m)	Unit Count	Lot Mix	Lot Mix	Frntg. (lin.m)	Area		% Net Res.
Back To Back Townhouses	(25')	**6.40**	x 13.5	**48**	8%		313.09	0.50 ha.	1.2 ac.	2.8%
Dual FrontageTownhouses	(25')	**6.00**	x 23.0	**38**	7%		229.64	0.67 ha.	1.7 ac.	3.8%
Single Detached	(34')	**10.40**	x 27.0	**27**	5%	6%	284.47			
Single Detached	(36')	**11.00**	x 27.0	**103**	18%	21%	1137.90			
Single Detached	(38')	**11.60**	x 27.0	**269**	47%	56%	3129.22	16.42 ha.	40.6 ac.	93.3%
Single Detached	(45')	**13.72**	x 27.0	**82**	14%	17%	1137.90			
TOTAL RESIDENTIAL				**567**	100%	100%	6232.2	17.59 ha.	43.5 ac.	100.0%

ROW SCHEDULE

	(m) width	(lin.m)	(lin.m) half width
Collector Road	**22.0**	1185.3	0.0
Local Street	**18.0**	3539.5	0.0
ROW Total		4724.8	0.0

- All Units n Metric Unless Cherwise Noted.
- Base Information Obtained from Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification by Appropriate Agency.
- Aerial Photo: Google Earth

GERRARD DESIGN

BRES OPTION AREA 1 | Caledon, Ontario

PRELIMINARY CONCEPT

MAR 25,2021
PROJECT 2126
SCALE 1:4000

CP-01

LEGEND:

- LOW DENSITY RESIDENTIAL
- LOW-MED DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- MIXED-USE RESIDENTIAL (AT GRADE COMMERCIAL)
- GO TRANSIT LANDS
- FLEX DENSITY RESIDENTIAL/MIXED-USE
- EMPLOYMENT - OFFICE/INNOVATION
- COMMERCIAL/MIXED-USE
- SCHOOL
- PARK
- PROPOSED ENVIRONMENTAL PROTECTION AREA
- SWM POND

UNIT SPECIFIC USES

- REAR LANE TOWNHOUSE
- BACK-TO BACK TOWNHOUSES
- STANDARD TOWNHOUSES
- SHALLOW SINGLE DETACHED
- STANDARD SINGLE DETACHED

ELEMENTARY SCHOOL 2.09ha (5.16ac)

PARK 4.10ha (10.13 ac)

SWM POND 3.35ha (8.28 ac)

SECONDARY SCHOOL 5.11ha (12.63ac)

SWM POND 5.23 ha (12.92 ac)

COMMERCIAL - MIXED USE 3.03ha (7.49 ac)

THE GORE ROAD

HUMBER STATION ROAD

KING STREET

EMIL KOLB PARKWAY

C.P.R.

- All Units In Metric Unless Otherwise Noted.
- Base Information Obtained From Various Sources And Is Approximate.
- Schedule / Plan Information Is Conceptual And Requires Verification by Appropriate Agency.

GERRARD DESIGN

MACVILLE | Caledon, Ontario

PRELIMINARY FRAMEWORK PLAN

JAN 12, 2021

PROJECT 1420

SCALE 1:8000

4.1 Scenarios

Eight different modelling scenarios were developed to show possible servicing options over the various expansion horizons. These eight scenarios consider only lands that will be developed within the Pressure Zone 7. Table 2 below provides a summary of the demands considered in each scenario. The following sections provide a more detailed explanation of the scenarios and modelling results. All Maps referred to in the following section are in Appendix B. The model output for each scenario is in Appendix C.

Table 2: Demand Summary per Scenario

Scenario	MDD (L/s)							
	1	2	3	4	5	6	7	8
Option 1 ROPA 2031		11.7		11.7	11.7			
Option 1 Full Buildout 2051						68.5	68.5	68.5
Option 2 Full Buildout 2051						3.9	3.9	3.9
Option 3 MZO Approved 2031	52.7	52.7		52.7				
Option 3 Draft Plan Lands			70					
Option 3 Full Buildout 2051					96.4	96.4	96.4	96.4
Option 4 Zone 7 Lands 2051							10.2	10.2
ROA 2051						7.6	7.6	7.6
Existing Zone 6 Lands		40.6	18.1 (west only)	40.6	40.6	40.6	40.6	40.6
Whitebelt - post 2051								106
Total	**52.7**	**105**	**88.1**	**105**	**148.7**	**217**	**227.2**	**333.2**

4.2 Scenario 1 – Option 3 MZO Approved Lands

This scenario includes the Option 3 Lands that have received Minister's Zoning Order (MZO) approval only. This scenario was simulated without a booster pumping station (BPS) or Zone 7 ET. This scenario was modelled to determine if the Option 3 MZO Lands under the MDD could be serviced from the Zone 6 ET during a disaster or emergency situation in which the Zone 7 BPS was out of service.

The results of Scenario 1 are shown on Map 1. The model shows that the Option 3 MZO Lands can be serviced off the existing Zone 6 ET and maintain pressures greater than 36 psi during the MDD scenario.

4.3 Scenario 2 – ROPA 2031 Lands Options 1 and 3

This scenario includes the ROPA 2031 Option 1 and 3 lands and the existing Zone 6 lands experiencing pressure issues moved to Zone 7 (existing lands). The scenario was simulated

with the BPS only. The purpose of this scenario was to see if the 2031 lands could be serviced without an ET.

It is anticipated in this scenario that a transmission watermain will be constructed along Emil Kolb Parkway to service the Option 1 Lands from the proposed BPS.

To represent the booster pumping station, a single equivalent pump was input into the model. In reality, the BPS would include several pumps to deliver the range of flows experienced within the zone at acceptable pressures. A typical pumping system arrangement would include a jockey pump, an ADD pump, large domestic service pumps, and if required a fire pump, all with built-in redundancy as per the Region and MECP Drinking Water Guideline requirements. The specific pumping arrangement would be determined during detailed design. The equivalent pump was set to deliver the required MDD of 105.0 L/s at a total dynamic head (TDH) of 30.5 m. The TDH was set to match the Zone 7 HGL of 327.7 m.

The results of Scenario 2 are shown on Map 2. The system can supply the MDD to the entirety of the Option 1 and 3 lands while maintaining system pressures between 40 psi and 100 psi. The transmission main along Emil Kolb Parkway has ground elevations outside of the Zone 7 pressure boundary, as such experiences pressures greater than 100 psi. Service connections along the transmission main are not anticipated, as such these higher pressures are generally acceptable.

4.4 Scenario 3 – Option 3 Draft Plan Lands

Scenario 3 includes the Option 3 Lands for which a formal application for Draft Plan Approval will be submitted, as well as the existing lands west of Coleraine Drive. This scenario was simulated with a Zone 7 ET adjacent the Option 3 Lands, as the elevations of the western portion of the Draft Plan are such that an ET is necessary to deliver the required fire flow. The Zone 7 ET was set to a HWL of 327.7 m, which is the Hydraulic Grade Line of Zone 7. Both the MDD and MDD + Fire Flow were simulated for Scenario 3.

It is anticipated that a transmission main from the BPS at King and Coleraine Drive will be constructed along King Street to the Gore Road and along Gore Road to the Zone 7 ET. A separate feedermain would be constructed from the Zone 7 ET to the Option 3 Lands distribution network.

Map 3 shows the results of the MDD + Fire Flow scenario. A fire flow of 220 L/s can be supplied to the majority of the system, with the exception of a few dead-end locations. Fire flow could be achieved at these dead ends with looping or upsizing of the watermain. The watermain sizing shown represents the sizing required for the ultimate scenario. Interim upsizing has not been explored at this time. The watermains in these locations have been modelled as 200 mm diameter mains. It is not recommended to increase the diameter of a dead-end watermain above 200 mm diameter given concerns around the maintenance of chlorine residual.

It is recommended that any watermains installed in the interim are looped to avoid dead ends.

Map 3.1 shows the results of the MDD scenario. With the ET, the system can supply the MDD while maintaining system pressures between 40 psi and 100 psi.

4.5 Scenario 4 – ROPA 2031 Lands Option 1 and Option 3

Scenario 4 included the ROPA 2031 Option 1 and Option 3 Lands, and the existing lands. This scenario was simulated to show if one ET constructed within the Option 3 Lands could service the Option 1 and Option 3 Lands in the interim, before a second ET servicing lands east of Highway 50 is necessary. The Zone 7 ET was set to a HWL of 327.7, which is the HGL of Zone 7 as previously noted. Both MDD and MDD+ Fire Flow were simulated for Scenario 4.

As discussed above, it is anticipated that a transmission main from the BPS at King and Coleraine Drive will be constructed along King Street to the Gore Road and along Gore Road to the Zone 7 ET. A feeder main would be constructed from the Zone 7 ET and through the Option 3 distribution network. At the east corner of the Option 3 Lands the feedermain will loop northeast along King Street and connect into the transmission main along Emil Kolb Parkway to feed the Option 1 Lands.

Map 4 shows the results of the MDD+ Fire Flow scenario. A fire flow of 220 L/s can be supplied to the majority of the system, again with the exception of a few dead-end locations. It is recommended that any watermains installed in the interim are looped to avoid dead ends.

Map 4.1 shows the results of the MDD scenario. With the ET, the system can supply both Option 1 and Option 3 MDD while maintaining system pressures between 40 psi and 100 psi. The transmission main along Emil Kolb Parkway has ground elevations outside of the Zone 7 pressure boundary, and as such experiences pressures greater than 100 psi. Service connections along the transmission main are not anticipated, as such these higher pressures are generally acceptable.

4.6 Scenario 5 – 2031 Option 1 and 2051 Option 3

Scenario 5 included the 2031 Option 1 Lands, the 2051 Option 3 Lands and the existing lands. The purpose of this scenario was to see if the Zone 7 ET in the Option 3 Lands could service the 2051 Full Buildout of Option 3 and the 2031 Option 1 Lands.

A similar servicing arrangement to Scenario 4 is anticipated; a transmission main from the BPS to the Zone 7 ET, and then a feedermain through the Option 3 Lands, connecting into the transmission main along Emil Kolb Parkway to service the Option 1 Lands.

Map 5 shows the results of the MDD+ Fire Flow scenario. A fire flow of 220 L/s can be supplied to the majority of the system, again with the exception of a few dead-end locations. It is recommended that any watermains installed in the interim are looped to avoid dead ends.

Map 5.1 shows the results of the MDD scenario. The MDD can be supplied throughout the system while maintaining system pressures between 40 psi and 100 psi, with the exception of higher pressures along the Emil Kolb Parkway transmission main.

4.7 Scenario 6 – 2051 Option 1, 2, 3 and ROA

Scenario 6 includes the 2051 Option 1, 2, 3, Zone 7 ROA Lands and the existing lands. It is anticipated that during the 2051 Full Buildout of the Option 1, 2 and 3 Lands, the second ET located within the Option 1 Lands will be constructed to satisfy water storage requirements. As such, it is anticipated that the connection between the Option 3 feedermain and the transmission main along Emil Kolb Parkway will be decommissioned. The Emil Kolb Parkway transmission main will be connected directly to the Zone 7 BPS, and water will be supplied to the Option 1 and 2 Lands through the ET located within the Option 1 Lands. The transmission main along Emil Kolb Parkway will feed the Option 1 Zone 7 ET, and a feedermain from the Option 1 Zone 7 ET will feed into the Option 1 and Option 2 distribution systems.

The 2051 Option 1 Lands and the Option 2 Lands have been modelled as a single equivalent node. Elevations based on the highest observed existing ground elevations within the Option 1 and 2 2051 lands were assigned to the single node location.

Map 6 shows the results of the MDD + Fire Flow scenario. 220 L/s can be supplied throughout the majority of the system.

Map 6.1 shows the results of the MDD scenario. The MDD can be supplied throughout the system while maintaining system pressures between 40 psi and 100 psi, with the exception of higher pressures along the Emil Kolb Parkway transmission main.

4.8 Scenario 7 – 2051 Option 1, 2, 3, 4 and ROA

Scenario 7 includes the same servicing configuration as Scenario 6 to service Option 1, 2, 3, Zone 7 ROA Lands, and the existing lands, with the addition of the Option 4 Zone 7 Lands.

A single node was input into the model to represent the Option 4 Lands. It is anticipated that a single connection would be made from Option 4 to the Option 3 feedermain. The highest existing ground elevation observed within the Option 4 Lands of 265 m was assigned to the single node location.

Map 7 shows the results of the MDD + Fire Flow scenario. 220 L/s can be supplied throughout the majority of the system.

Map 7.1 shows the results of the MDD scenario. The MDD can be supplied throughout the system while maintaining system pressures between 40 psi and 100 psi, with the exception of higher pressures along the Emil Kolb Parkway transmission main

4.9 Scenario 8 – 2051 Option 1, 2, 3, 4, ROA and Whitebelt Lands

Scenario 8 includes the same servicing configuration as Scenario 7 to service Option 1, 2, 3, 4 Zone 7, the Zone 7 ROA Lands, and the existing lands, with the addition of the Whitebelt Zone 7 Lands.

The Whitebelt Lands have been represented in the model as a single node connection to the Option 3 feedermain. Based on the existing topography, the highest observed elevation within the Whitebelt Lands of 285 m was assigned to the node. A length of 1,200 m was assigned to the pipe connecting to the Option 3 feedermain to account for some of the friction losses that would occur to service the Whitebelt Lands.

Map 8 shows the results of the MDD + Fire Flow scenario. 220 L/s can be supplied throughout the majority of the system.

Map 8.1 shows the results of the MDD scenario. The MDD can be supplied throughout the system while maintaining system pressures between 40 psi and 100 psi, with the exception of higher pressures along the Emil Kolb Parkway transmission main

5.0 Conclusion

A hydraulic model of the proposed water distribution system has been developed for the Option 1, 2, 3, 4 Zone 7, Zone 7 ROA and Zone 7 Whitebelt Lands. In addition, allowance has been made to accommodate up to approximately 7500 existing residents and jobs currently situated at the upper limits of Pressure Zone 6, and experiencing water pressure issues, into a new Pressure Zone 7, thereby addressing long standing deficiencies in water service. Various scenarios have been modelled to determine how much development can be reasonably serviced before the ultimate Zone 7 servicing solution is required.

The Option 3 MZO Lands can be serviced with a booster pumping station and without a Zone 7 ET. If the booster pumping station was put out of service during an emergency situation, the Option 3 MZO Lands can maintain a pressure of 36 psi when serviced by the Zone 6 ET only.

The model demonstrated that the ROPA 2031 Option 1 and 3 Lands can be serviced with a booster pumping station and without a Zone 7 ET.

The construction of the Zone 7 ET within the Option 3 Lands can adequately service the Option 3 Draft Plan Approved Lands, the ROPA 2031 Option 1 and 3 lands, and the 2031 Option 1 and 2051 Full buildout Option 3 Lands. To satisfy storage requirements it is anticipated that once the 2051 Option 1 and Option 2 Lands commence development, the second Zone 7 ET within the Option 1 Lands will be required to constructed. The modelling demonstrated that the ultimate Zone 7 servicing solution that includes two ETs on the Option 1 and Option 3 Lands can service the full Zone 7 buildout scenario, subject to confirmation of tank sizing.

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Enclosures
Appendix A: Demands
Appendix B: Figures
Appendix C: Model Output

cc: Mr. Aaron Wisson, Argo Development Corporation (enc.) (Via Email)
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BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Demands

Bolton Zone 7 Demand Summary

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

	Area (ha)	Population	MDD L/s							
			Scenario 1 No ET	Scenario 2 No ET	Scenario 3 ET	Scenario 4 ET	Scenario 5 ET	Scenario 6 ET	Scenario 7 ET	Scenario 8 ET
Option 1 ROPA 2031	28.1	2098		11.7		11.7	11.7			
Option 1 Full Buildout 2051	155.1	12180						68.5	68.5	68.5
Option 2 Full Buildout 2051	10.8	702						3.9	3.9	3.9
Option 3 MZO Approved 2031	60	9376	52.7	52.7		52.7				
Option 3 Draft Plan Lands	82	12448			70					
Option 3 Full Buildout 2051	172.9	17186					96.4	96.4	96.4	96.4
Option 4 Zone 7 Lands 2051	28	1820							10.2	10.2
ROA 2051	20.7	1346						7.6	7.6	7.6
Existing Zone 6 Lands	137	5185		40.6	18.1	40.6	40.6	40.6	40.6	40.6
Whitebelt - post 2051	290	18850								106
Total	**984.6**	**81191**	**52.7**	**105**	**88.1**	**105**	**148.7**	**217**	**227.2**	**333.2**
MDD (ML/Day)			**4.6**	**9.1**	**7.6**	**9.1**	**12.8**	**18.7**	**19.6**	**28.8**

	Area (ha)	Population	Demand L/s		
			ADD	MDD	PHD
Option 1 Full Buildout 2051	183.2	12180	38.1	68.5	114.2
Option 2 Full Buildout 2051	10.8	702	2.2	3.9	6.6
Option 3 Full Buildout 2051	172.9	17187	53.7	96.4	161
Option 4 Zone 7 Lands 2051	28	1820	5.7	10.2	17.1
ROA 2051	20.7	1346	4.2	7.6	12.6
Existing Zone 6 Lands	137	7465	23.1	40.6	69.4
Whitebelt - post 2051	290	18850	58.9	106	179.7
Total	**842.6**	**59550**	**185.9**	**333.2**	**560.6**
MDD (ML/Day)			**16.1**	**28.8**	**48.4**

Bolton Option 1 2031 Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
Townhome	1.17	86	267	0.7	1.3	2.1	0.8	1.5	2.5
Single Detached	16.42	481	1780	0.3	0.6	1.0	5.6	10.0	16.7
School	2.07	1	52	0.1	0.1	0.2	0.1	0.2	0.4
Total	**19.66**	**568**	**2098**	**1.1**	**2.0**	**3.4**	**6.5**	**11.7**	**19.6**

Bolton Option 1 2051 Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
2031	19.66	568	2098	1.1	2.0	3.4	6.5	11.7	19.6
2051	155.1	TBD	10082				31.5	56.7	94.5
Total	**143.2**	**TBD**	**12180**				**38.1**	**68.5**	**114.2**

Bolton Option 2 2051 Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
2051	**10.8**	**TBD**	**702**				**2.2**	**3.9**	**6.6**

Bolton Option 3 2031 MZO Approved Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
2031	**60**	**TBD**	**9376**				**29.3**	**52.7**	**87.9**

NOTE: Option 3 Lands were allocated in the model based on the full 2051 buildout. To model the Option 3 MZO approved lands and the Option 3 Draft Plan Approved Lands, the future buildout areas were turned off, and the demand was then represented by the areas left on in the model.

Bolton Option 3 Draft Plan Approved Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
2031	**82**	**TBD**	**12448**				**38.9**	**70.0**	**116.7**

NOTE: Option 3 Lands were allocated in the model based on the full 2051 buildout. To model the Option 3 MZO approved lands and the Option 3 Draft Plan Approved Lands, the future buildout areas were turned off, and the demand was then represented by the areas left on in the model.

Bolton Option 3 2051 Full Buildout Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
Townhomes	14.4	1095	3395	0.7	1.3	2.2	10.6	19.1	31.8
Single Detached	67.5	1244	4603	0.2	0.4	0.6	14.4	25.9	43.2
Mixed Use	29.25	4532	9019	1.0	1.7	2.9	28.2	50.7	84.6
School	6.82	2	171	0.1	0.1	0.2	0.5	0.7	1.5
Total	**118.0**	**6871**	**17186**				**53.7**	**96.4**	**161.0**

Bolton Option 4 2051 Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)*	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
2051	**28**	**TBD**	**1820**				**5.7**	**10.2**	**17.1**

*area estimated based on land area within Option 4 exceeding 259 m, based on existing ground elevation

Bolton Existing Lands Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
Employment		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)*	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
Single Detached West of Coleraine Drive	44	N/A	2860				8.9	16.1	26.8
Industrial West of Coleraine Drive	20	N/A	500				1.4	2.0	4.3
Single Detached East of HWY 50	57	N/A	3705				11.6	20.8	34.7
Recreation Complex East of HWY 50	16	N/A	400				1.2	1.6	3.5
Total	**137**		**7465**				**23.1**	**40.6**	**69.4**

*area estimated based on existing land area exceeding 259 m, based on existing ground elevation

Bolton Whitebelt Post 2051 Zone 7 Demand Calculations

Prepared by:	RW
Checked by:	JLL
Project No:	300034976
Date:	4/27/2021

BURNSIDE

Assumptions

Water Demands From the Region of Peel 2020 Water & Wastewater Master Plan for the Lake-Based System

Residential	Residential Per Capita Flow	270	L/person/day
	Max Day Factor	1.8	
	Peak Hour Factor	3	
Employment	Employment Per Capita Flow	250	L/employee/day
	Max Day Factor	1.4	
	Peak Hour Factor	3	

Fire Flow

220 L/s	From Bolton Residential Expansion Study Infrastructure Report, June 16, 2014

Density

Unit Type	People Per Unit (ppu)*	People Per Hectare (pp/ha)**
Townhomes	3.1	65
Single Detached	3.7	65
Mixed Use	1.99	65
School		25

*from development plan
** from BRES Population Allocation 2031-2051 Plan
BRES assumptions used in absences of a development plan

Demand Allocation

Unit Type	Total Area (ha)	# of units	Population	L/ha/s			L/s		
				ADD	MDD	PHD	ADD	MDD	PHD
Whitebelt	**290**	**TBD**	**18850**				**58.9**	**106.0**	**176.7**

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Figures

Junction
Pressure (psi)
- less than 20.00
- 20.00 ~ 40.00
- 40.00 ~ 70.00
- 70.00 ~ 80.00
- 80.00 ~ 100.00
- > 100

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

THE GORE ROAD

KING STREET

COLERAINE DR

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

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Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3

SCENARIO 1 - OPTION 3 MZO LANDS

Drawn	Checked	Date	Map No.
RW	JLL	2021/04/30	1
Scale		Project No.	
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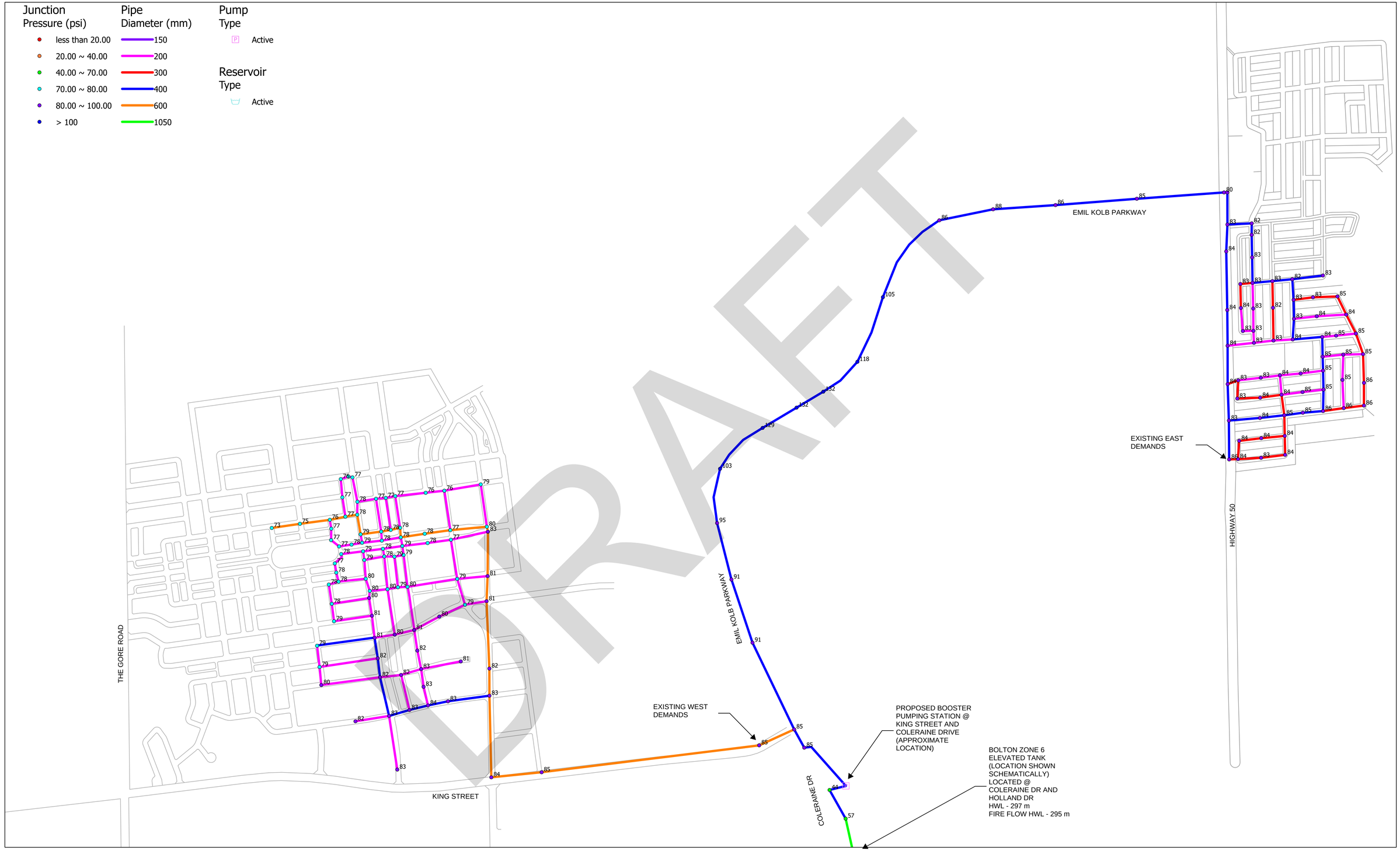

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Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 2 - MDD ROPA 2031 OPTION 1 AND 3 LANDS

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	**2**
Scale		Project No.	
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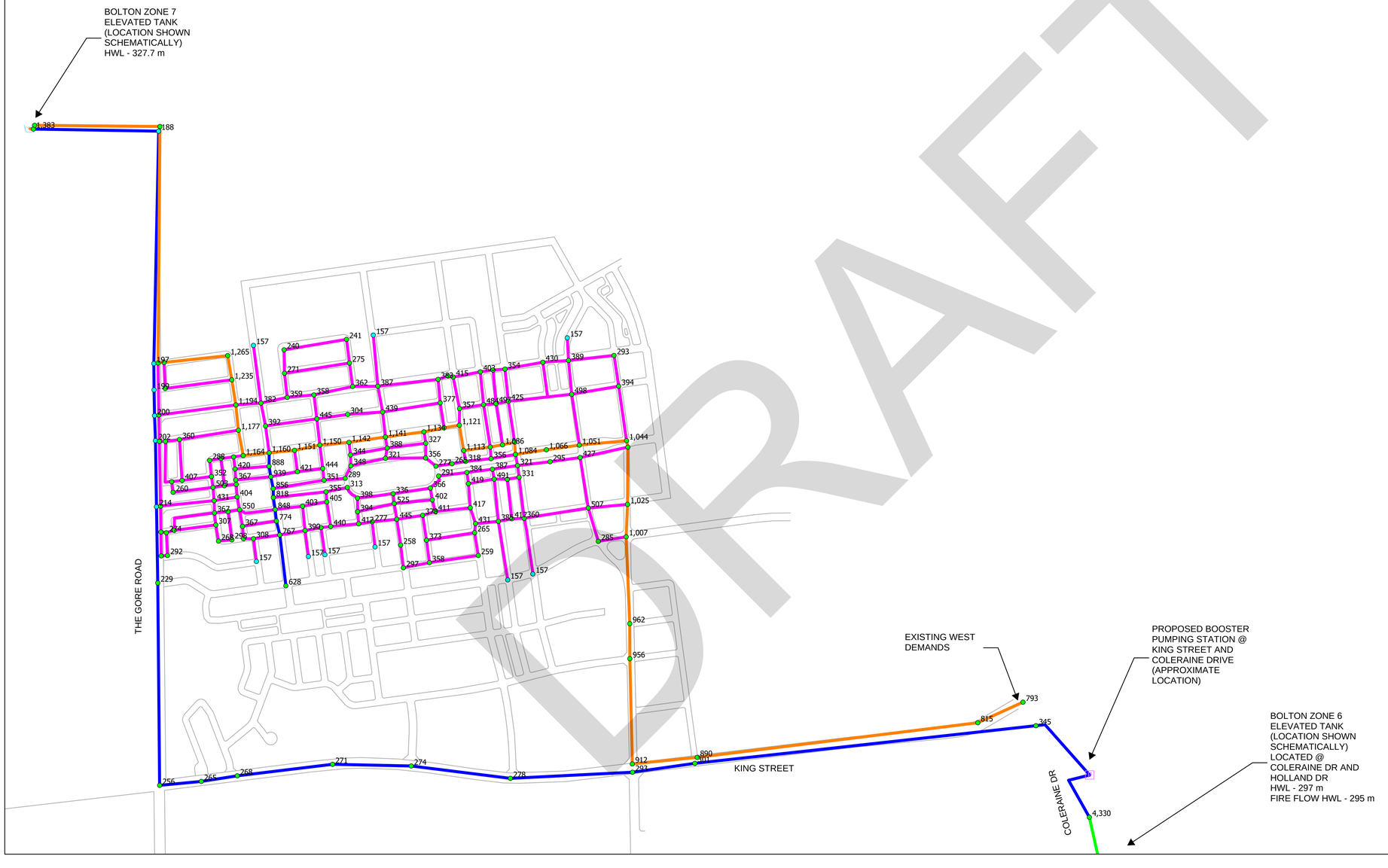
Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active



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Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 3 - FIRE FLOW OPTION 3
DRAFT PLAN APPROVED LANDS

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	3
Scale		Project No.	
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Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 3 - OPTION 3 DRAFT PLAN APPROVED LANDS

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	**3.1**
Scale		Project No.	
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Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

EMIL KOLB PARKWAY

EXISTING EAST
DEMANDS

HIGHWAY 50

THE GORE ROAD

EMIL KOLB PARKWAY

EXISTING WEST
DEMANDS

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

KING STREET

COLERAINE DR

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Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 4 - FIRE FLOW 2031 OPTION 1 AND OPTION 3

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/11	4
Scale		Project No.	
H 1:6000		300034976	

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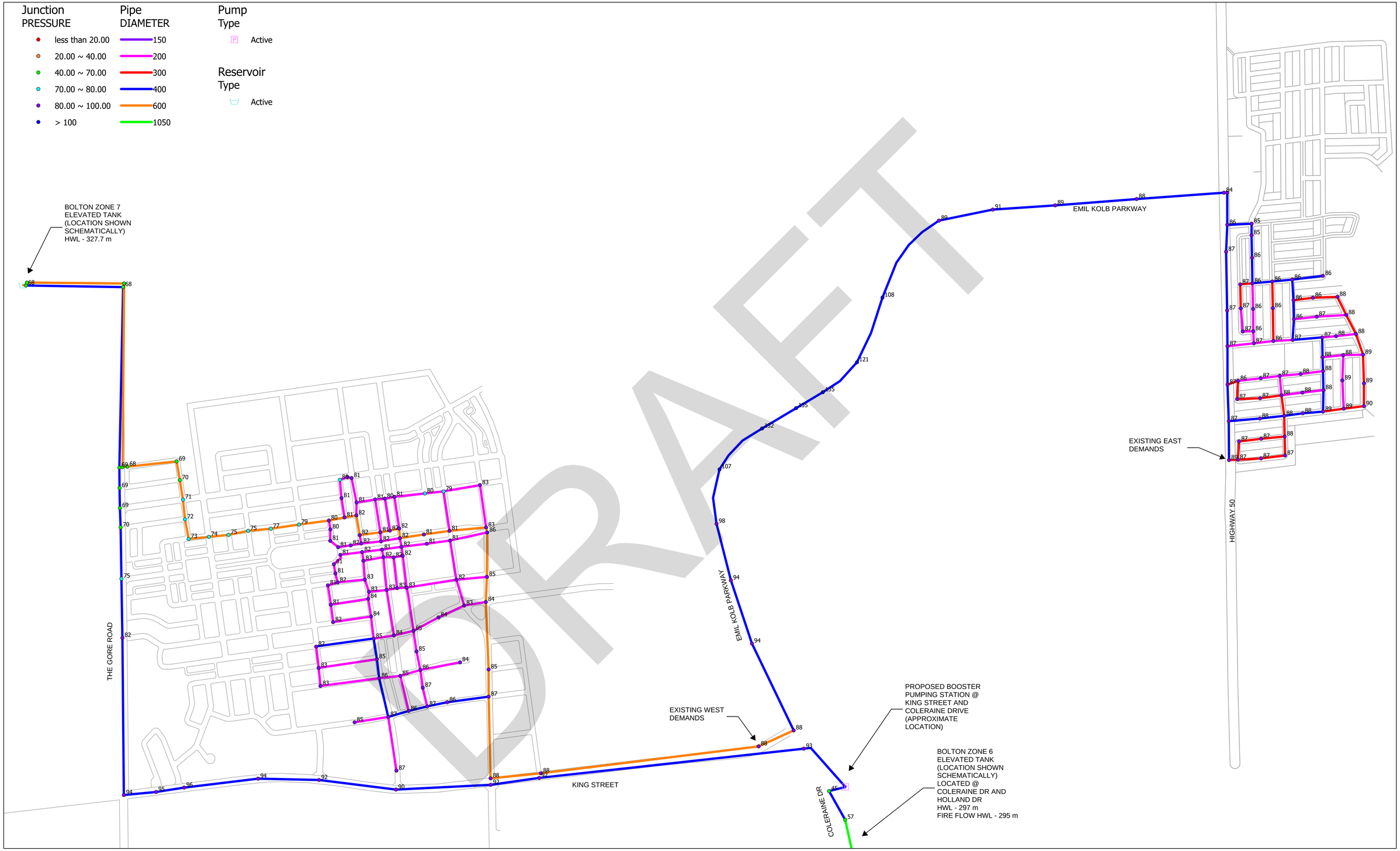

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Datum:	
Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 4 - MDD 2031 OPTION 1 AND OPTION 3

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	**4.1**
Scale		Project No.	
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Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

THE GORE ROAD

EMIL KOLB PARKWAY

EXISTING EAST
DEMANDS

HIGHWAY 50

EXISTING WEST
DEMANDS

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

KING STREET

COLERAINE DR

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Datum:	
Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 5 - FIRE FLOW FULL BUILDOUT
2051 OPTION 3 + 2031 OPTION 1

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	5
Scale		Project No.	
H 1:6000		300034976	

File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowater New.apx Print Date: 2021/05/10 Time: 05:21 PM

Junction
PRESSURE

- less than 20.00
- 20.00 ~ 40.00
- 40.00 ~ 70.00
- 70.00 ~ 80.00
- 80.00 ~ 100.00
- > 100

Pipe
DIAMETER

- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type

- Active

Reservoir
Type

- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

EMIL KOLB PARKWAY

EXISTING EAST
DEMANDS

HIGHWAY 50

THE GORE ROAD

EMIL KOLB PARKWAY

EXISTING WEST
DEMANDS

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

KING STREET

Sources:

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Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 5 - MDD FULL BUILDOUT 2051
OPTION 3 + 2031 OPTION 3

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	5.1
Scale		Project No.	
H 1:6000		300034976	

File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowater New.aprx Print Date: 2021/05/10 Time: 04:32 PM

Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

BOLTON ZONE 7 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) HWL - 327.7 m

BOLTON ZONE 7 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) HWL - 327.7 m

2051 OPTION 1

2051 OPTION 2

EMIL KOLB PARKWAY

EMIL KOLB PARKWAY

THE GORE ROAD

KING STREET

EXISTING EAST DEMANDS

EXISTING WEST DEMANDS + 2051 ROA

PROPOSED BOOSTER PUMPING STATION @ KING STREET AND COLERAINE DRIVE (APPROXIMATE LOCATION)

BOLTON ZONE 6 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) LOCATED @ COLERAINE DR AND HOLLAND DR HWL - 297 m FIRE FLOW HWL - 295 m

COLERAINE DR

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Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 6 - FIRE FLOW FULL BUILDOUT
2051 OPTION 1, 2, 3 + ROA

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	6
Scale		Project No.	
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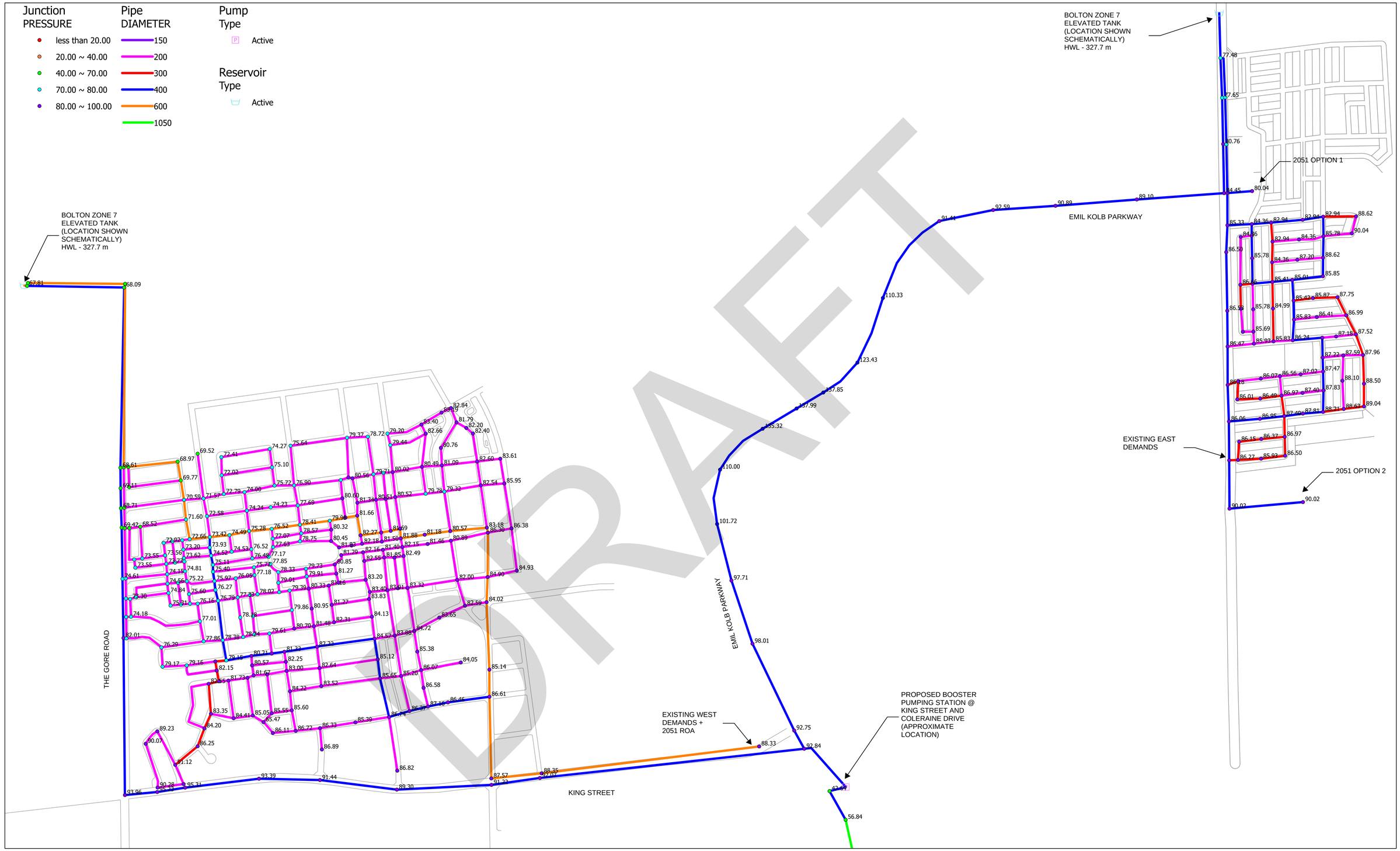
File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowater New.apx Print Date: 2021/05/10 Time: 09:25 PM



Sources:

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Datum:	
Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 6 - MDD FULL BUILDOUT 2051
OPTION 1, 2, 3 + ROA

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	**6.1**
Scale		Project No.	
H 1:6000		300034976	

File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowator New.apx Print Date: 2021/05/10 Time: 04:39 PM

Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

2051 OPTION 1

2051 OPTION 2

EXISTING EAST
DEMANDS

EMIL KOLB PARKWAY

EMIL KOLB PARKWAY

HIGHWAY 50

THE GORE ROAD

KING STREET

EXISTING WEST
DEMANDS +
2051 ROA

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

COLERAINE DR

2051 OPTION 4

Sources:

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Datum:	
Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 7 - FIRE FLOW FULL BUILDOUT
2051 OPTION 1, 2, 3, 4 + ROA

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	7
Scale		Project No.	
H 1:6000		300034976	

File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowater New.apx Print Date: 2021/05/10 Time: 05:28 PM

Junction
PRESSURE

- less than 20.00
- 20.00 ~ 40.00
- 40.00 ~ 70.00
- 70.00 ~ 80.00
- 80.00 ~ 100.00

Pipe
DIAMETER

- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type

- Active

Reservoir
Type

- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

THE GORE ROAD

EMIL KOLB PARKWAY

2051 OPTION 1

EXISTING EAST
DEMANDS

2051 OPTION 2

HIGHWAY 50

EXISTING WEST
DEMANDS +
2051 ROA

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

KING STREET

COLERAINE DR

2051 OPTION 4

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Datum:	
Coord. System:	
Projection:	
Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 7 - MDD FULL BUILDOUT 2051
OPTION 1, 2, 3, 4 + ROA

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	7.1
Scale		Project No.	
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Junction
Hydrant Design Flow (L/s)
- less than 0.0
- 0.0 ~ 100.0
- 100.0 ~ 150.0
- 150.0 ~ 220.0
- > 220

Pipe
Diameter (mm)
- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type
- Active

Reservoir
Type
- Active

BOLTON ZONE 7 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) HWL - 327.7 m

WHITEBELT LANDS

BOLTON ZONE 7 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) HWL - 327.7 m

2051 OPTION 1

EMIL KOLB PARKWAY

EXISTING EAST DEMANDS

2051 OPTION 2

HIGHWAY 50

THE GORE ROAD

EMIL KOLB PARKWAY

EXISTING WEST DEMANDS + 2051 ROA

PROPOSED BOOSTER PUMPING STATION @ KING STREET AND COLERAINE DRIVE (APPROXIMATE LOCATION)

BOLTON ZONE 6 ELEVATED TANK (LOCATION SHOWN SCHEMATICALLY) LOCATED @ COLERAINE DR AND HOLLAND DR HWL - 297 m FIRE FLOW HWL - 295 m

KING STREET

2051 OPTION 4

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False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 8 - FIRE FLOW FULL BUILDOUT
2051 OPTION 1, 2, 3, 4, ROA + WHITEBELT

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	8
Scale		Project No.	
H 1:6000		300034976	

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Junction
PRESSURE

- less than 20.00
- 20.00 ~ 40.00
- 40.00 ~ 70.00
- 70.00 ~ 80.00
- 80.00 ~ 100.00

Pipe
DIAMETER

- 150
- 200
- 300
- 400
- 600
- 1050

Pump
Type

- Active

Reservoir
Type

- Active

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

WHITEBELT LANDS

BOLTON ZONE 7
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
HWL - 327.7 m

2051 OPTION 1

EMIL KOLB PARKWAY

EXISTING EAST
DEMANDS

2051 OPTION 2

HIGHWAY 50

THE GORE ROAD

EMIL KOLB PARKWAY

EXISTING WEST
DEMANDS +
2051 ROA

PROPOSED BOOSTER
PUMPING STATION @
KING STREET AND
COLERAINE DRIVE
(APPROXIMATE
LOCATION)

KING STREET

BOLTON ZONE 6
ELEVATED TANK
(LOCATION SHOWN
SCHEMATICALLY)
LOCATED @
COLERAINE DR AND
HOLLAND DR
HWL - 297 m
FIRE FLOW HWL - 295 m

2051 OPTION 4

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Datum:	
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Central Meridian:	
False Easting: m	False Northing: m
Page Orientation: °	Scale Factor:

True North

0 100 200 300 400 500 600 700 800
Metres

BURNSIDE

Client
BOLTON OPTION 3 LANDOWNERS GROUP

Map Title
BOLTON ZONE 7 OPTIONS 1, 2 & 3
SCENARIO 8 - MDD FULL BUILDOUT 2051
OPTION 1, 2, 3, 4, ROA + WHITEBELT

Drawn	Checked	Date	Map No.
RW	JLL	2021/05/10	**8.1**
Scale		Project No.	
H 1:6000		300034976	

File Path: C:\Users\RWatson\Documents\210414 Bolton Rebuild Project\210414 Bolton Inflowater New.apzx Print Date: 2021/05/10 Time: 04:46 PM

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Model Output

APPENDIX B

Sanitary Servicing Calculations

B1 – Sanitary Design Flow Calculations
B2 – Sanitary Sewer Sizing Calculations

Appendix B1 – Sanitary Design Flow Calculations

CROZIER & ASSOCIATES Consulting Engineers

PROJECT:	Bolton North Hill Landowners Group
PROJ. NO.:	708-3446
DESIGN:	JL
CHECK:	JB
DATE:	2024.02.14

POPULATION SUMMARY
BOLTON NORTH HILL LANDOWNERS GROUP

Note: Unit counts and population yields received from Bousfields on April 8, 2024 (Bousfields, January 2024)

Residential Population Yields	Persons per Unit
Singles	4.2
Townhouses	3.4
B2B Towns	3.4
MD Blocks	3.4
MD/HD Blocks	3.1
Mixed Use	1.7

Employment Population Yields	Jobs/School	Jobs/Block	Jobs/ha
Schools	50	-	-
Apartments	-	10	-
MU	-	60	-

Statistics	Option 1	Option 2	Option 1 + 2
Area	162.9	4.6	167.5
Units			
Singles at Average 11 m	1288		1288
Townhouses at 6.1 m	678	126	804
B2b Towns at 6.0 m	225		225
MD Blocks	694		694
MD/HD Blocks	724		724
Mixed Use	659		659
Total Units	4269	126	4395
Population			
Population	14206	429	14635
Density	87.2	92.4	87.4
# of Schools	2.0		
# of Apartment Blocks	7.0		
# of MU Blocks	4.0		
Jobs	410		410
Residential + Employment Pop	**14,616**	**429**	**15,045**

CROZIER & ASSOCIATES Consulting Engineers

PROJECT:	Bolton North Hill Landowners Group
PROJ. NO.:	708-3446
DESIGN:	JL
CHECK:	JB
DATE:	2025.02.14

SANITARY DESIGN FLOW ANALYSIS
BOLTON NORTH HILL LANDOWNERS GROUP

	Option 1	Option 2		References
Peaking Factor:				
Harmon Peak Factor: $M = 1 + 14 / (4 + P^{0.5})$				Peel Region 2020 Water & Wastewater Master Plan, Volume 4 Page 106
Design population in thousands, P =	14.206	0.429		
Peaking factor, M =	2.8	4.0		
Infiltration:				
Unit infiltration allowance (Residential & Employment) =	0.26	0.26	L/s/ha	Peel Region 2020 Water & Wastewater Master Plan, Volume 4 Table 4
Area, A =	162.88	4.64	ha	
Infiltration Flows =	**42.3**	**1.2**	**L/s**	
Average Dry Weather Flow:				
Unit Dry Weather Flow, Residential =	290	290	L/person/day	Peel Region 2020 Water & Wastewater Master Plan, Volume 4 Table 2
Population, Residential =	14,206	429	persons	
Average Dry Weather Flow, Residential =	4,119,815	124,381	L/day	
	47.7	1.4	L/s	Peel Region 2020 Water & Wastewater Master Plan,
Unit Dry Weather Flow, Employment =	270	-	L/person/day	Peel Region 2020 Water & Wastewater Master Plan, Volume 4 Table 2
Population, Employment =	410	-	persons	
Average Dry Weather Flow, Employment =	110,700	-	L/day	
	1.28	-	L/s	Peel Region 2020 Water & Wastewater Master Plan, Volume 4 Table 2
Total Dry Weather Flow	**49.0**	**1.4**	**L/s**	
Total Average Daily Flow (Dry Flow and Infiltration):	**91.3**	**2.65**	**L/s**	
Peak Flow Based on Population:	137.20	5.77	L/s	
Total Peak Design Flow (Peak Flow and Infiltration):	**179.5**	**7.0**	**L/s**	Peak Day Flow + Base Infiltration

Appendix B2 – Sanitary Sewer Sizing Calculations

PROJECT: Bolton North Hill Landowners Group
PROJ. NO: 708-3446
DESIGN: JB
CHECK: JB
DATE: 2025.02.14

SANITARY TRUNK SEWER ANALYSIS
BOLTON NORTH HILL LANDOWNERS GROUP
DRAINAGE AREA POPULATION BREAKDOWN

Drainage Area	Total Area Serviced (ha)	Unit Breakdown	Total Population
Drainage Area 1	31.1	Townhomes/B2B = 399 Singles = 262 MU/MD/HD = 504	3842
Drainage Area 2	42.7	Townhomes/B2B = 199 Singles = 314 MU/MD/HD = 542	3490
Drainage Area 3	5.2	Singles = 154 MU/MD/HD = 249	1333
Drainage Area 4	13.5	Singles = 20 MU/MD/HD = 148	492
Drainage Area 5	16.1	Townhomes/B2B = 120 Singles = 20 MU/MD/HD = 507	1891
Drainage Area 6	14.1	Townhomes/B2B = 50 Singles = 181 MU/MD/HD = 128	1283
Drainage Area 7	26.1	Townhomes/B2B = 135 Singles = 337	1873
Drainage Area 8	4.6	Townhomes/B2B = 126	429
			14635

Notes:
Person Per Unit used to calculate population: 4.2 for Singles, 3.4 for Towns & B2B, 2.76 (Average) for MD/HD Blocks/Apartments
Townhouse, B2B, singles and apartment population densities (PPU) based on Bousfields Unit Breakdown dated January 2024

CROZIER & ASSOCIATES
Consulting Engineers

Peak Factor (M) = 1+(14/4+(P/1000)^0.5)
Avg. Daily Flow= 290 L/cap/d
N = 0.013
Infiltration = 0.26 L/s/ha

PROJECT: Bolton North Hill Landowners Group
PROJ. NO: 708-3446
DESIGN: JL
CHECK: JB
DATE: 2024.02.14

SANITARY TRUNK SEWER ANALYSIS
BOLTON NORTH HILL LANDOWNERS GROUP
INTERNAL TRUNK SEWER SIZING

Drainage Area	Total Area Serviced (ha)	Population	Total Trib. Pop.	Pop. Flow Q(p) (L/s)	Peak	Peak Design Flow (L/s)	Infiltration Flow (L/s)	Combined Design Flow (L/s)	Pipe Diameter (mm)	Slope	Pipe Cap. (L/s)	Remaining Capacity (L/s)	% Capacity
Drainage Area 8	4.64	429	429	1.44	4.00	5.77	1.21	6.97	250	0.005	42.05	35.08	16.58
Drainage Area 2	42.7	3490	3920	13.16	3.34	43.96	11.10	55.06	300	0.005	68.38	13.32	80.52
Drainage Area 3	5.2	1333	1333	4.47	3.72	16.63	1.35	17.98	250	0.005	42.05	24.07	42.76
Drainage Area 4	13.5	492	492	1.65	3.98	6.57	3.51	10.08	250	0.005	42.05	31.96	23.98
Drainage Area 1	31.1	3842	3842	12.89	3.35	43.18	8.09	51.27	375	0.006	135.81	84.54	37.75
Drainage Area 7	26.1	1873	1873	6.29	3.61	22.69	6.79	29.47	250	0.005	42.05	12.58	70.09
Drainage Area 6	14.1	1283	1283	4.31	3.73	16.06	10.45	26.51	250	0.005	42.05	15.54	63.04
Drainage Area 5	16.1	1891	1891	6.35	3.60	22.88	4.19	27.07	250	0.005	42.05	14.98	64.37
Flows to Pump Station 1	**153.44**	**0**	**14635**	**49.12**	**2.79**	**137.00**	**39.89**	**176.90**	-	-	-	-	-

Notes:
Region of Peel minimum pipe size = 250 mm dia.
Maximum pipe capacity (assumed) = 85%

APPENDIX C

Stormwater Management Design Calculations

C1 – Storm Sewer Sizing Calculations
C2 – Stormwater Management Pond Sizing Calculations
C3 – Pond Design Visual OTTHYMO Model Output

Appendix C1 – Storm Sewer Sizing Calculations

CROZIER & ASSOCIATES
Consulting Engineers

Inlet flows are extracted from the 10-year, 6 hour AES storm in the post-development VO model prepared by Crozier
Outlet flows for SWM Ponds 201-204 and 206-207 are extracted from the 100-year, 6 hour AES storm in the post-development VO model prepared by Crozier.
Outlet flows for SWM Ponds 205, 208 and 209 are from the unit flow rates (TRCA) and extracted from the post-development VO model prepared by Crozier.

Mannings "n" = 0.013

PROJ. NO:	Bolton North Hill Landowners Group
PROJECT:	708-3446
DESIGN:	JB
CHECK:	CS
DATE:	2024.12.13

STORM SEWER PIPE SIZES
BOLTON NORTH HILL LANDOWNERS GROUP

SWM POND DRAINAGE AREA	Area (ha)	Composite Runoff Coefficient	INLET FLOW (L/s)	INLET PIPE DIA. (mm)	INLET PIPE SLOPE (m/m)	PIPE CAPACITY (L/s)	REMAINING CAPACITY (L/s)	VELOCITY (m/s)	% CAPACITY	OUTLET FLOW (L/s)	OUTLET PIPE DIA. (mm)	OUTLET PIPE SLOPE (m/m)	PIPE CAPACITY (L/s)	REMAINING CAPACITY (L/s)	VELOCITY (m/s)	% CAPACITY
201	27.43	0.6	2621	1200	0.01	3898.73	1277.73	3.45	67.23	967	750	0.01	1113.28	146.28	2.52	86.86
202	15.28	0.6	1884	1050	0.01	2730.73	846.73	3.15	68.99	1487	675	0.07	2143.09	656.09	5.99	69.39
203	20.04	0.64	2424	1050	0.01	2730.73	306.73	3.15	88.77	734	675	0.01	840.59	106.59	2.35	87.32
204	15.64	0.57	1782	1050	0.01	2730.73	948.73	3.15	65.26	1864	600	0.20	2745.94	881.94	9.71	67.88
205	27.24	0.6	2590	1200	0.01	3898.73	1308.73	3.45	66.43	11	250	0.01	59.47	48.47	1.21	18.50
206	25.23	0.72	3973	1350	0.01	4465.59	492.59	3.12	88.97	745	675	0.22	3942.71	3197.71	11.02	18.90
207	16.37	0.59	1054	825	0.01	1435.44	381.44	2.69	73.43	910	750	0.01	1113.28	203.28	2.52	81.74
208	17.48	0.61	1696	1050	0.01	2730.73	1034.73	3.15	62.11	11	250	0.02	79.78	68.78	1.63	13.79
209	5.13	0.61	654	675	0.01	840.59	186.59	2.35	77.80	12	250	0.11	194.52	182.52	3.96	6.17

Notes:
Development Standards Manual (Town of Caledon, 2019)
Min cover = 1.5 m
Min velocity = 0.75 m/s
Max velocity = 4.0 m/s
Max capacity = 90%
Min pipe size = 300 mm
Min slope = 0.40%
*Where velocities exceed the maximum velocity, opportunities to reduce slopes, such as incorporating drop structures or cascades will be evaluated at the detailed design stage

Appendix C2 – Stormwater Management Pond Sizing Calculations

PROJECT: Bolton North Hill
PROJECT No.: 0708-3446

CREATED BY: ED
UPDATED BY: ED
CHECKED BY: JL

DATE: 2021-10-25
UPDATED: 2024-06-05

Existing Conditions VO Parameters

Existing Site Conditions

CN, CN*, CN III and IA values were determined through the Area Weighted calculator capabilities of Visual Otthymo 6.2

VO Parameters

Catchment #	Area (ha)	CN	CN*	CN III	IA (mm)	Tp (hr)
100	5.39	82	82	91	7.00	0.45
101	7.87	82	82	91	6.93	0.55
102	1.99	82	82	91	6.95	0.13
103	5.54	82	82	91	6.90	0.45
104	6.52	82	82	91	7.08	0.50
105	11.51	82	82	91	7.03	0.59
106	15.65	81	81	91	6.99	0.76
107	5.36	83	83	92	6.59	0.61
108	6.68	82	82	91	7.01	0.24
109	19.85	89	91	96	4.82	0.51
110	15.34	82	82	91	6.98	0.68
111	22.12	82	82	91	7.01	0.46
112	4.62	82	82	91	7.00	0.40
113	12.78	82	82	91	7.00	0.69
114	9.91	83	83	92	6.79	0.51
115	9.87	82	82	91	7.02	0.72
116	7.40	83	83	92	6.82	0.59
117	5.14	83	83	92	6.92	0.51
Total Site:	**173.54**	**83**	**83**	**92**	**6.71**	**0.56**

Existing Conditions VO Parameters

Existing Site Conditions

CN, CN*, CN III and IA values were determined through the Area Weighted calculator capabilities of Visual Otthymo 6.2

VO Parameters

Catchment #	Area (ha)	CN	CN*	CN III	IA (mm)	Tp (hr)
EXT1	3.24	82	82	91	7.00	0.42
EXT2	13.39	83	83	92	7.02	0.77
EXT3	4.11	82	82	91	7.00	0.36
EXT4	44.26	71	69	84	6.82	1.32
EXT5	8.36	62	61	78	9.06	0.66
EXT6	6.35	84	85	93	5.78	1.39
EXT7	15.80	84	85	93	7.10	1.14
EXT8	18.96	84	93	93	8.39	0.84
EXT9	24.02	79	80	90	8.47	0.57
EXT10	9.26	76	76	88	9.45	0.34
EXT11	5.25	80	80	90	7.65	0.50
EXT12	10.28	82	81	91	8.13	0.42
EXT13	13.24	81	80	90	9.54	0.68
EXT14	15.14	76	76	88	9.38	0.59
EXT15	12.92	85	85	93	7.69	0.71
EXT16	22.09	83	83	92	7.86	0.51
EXT17	10.44	76	76	88	9.73	0.50
EXT18	6.98	79	80	90	10.16	0.29
EXT19	23.88	82	82	91	8.04	1.05
EXT20	17.82	83	83	92	7.76	0.99
EXT21	51.56	82	82	91	7.54	1.08
EXT22	59.54	83	83	92	7.53	0.94

Catchment ID	Area (ha)	TIMP (%)	XIMP (%)
EXT62	0.31	38	38
EXT64	1.42	31	31
EXT65	1.64	44	44
EXT66	0.62	44	44
EXT70	0.35	38	38
EXT86	0.62	44	44
EXT138	0.63	31	31
EXT139	0.59	31	31
EXT165	0.48	44	44
EXT166	0.68	31	31

PROJECT: Bolton North Hill
PROJECT No.: 0708-3446

CREATED BY: ED
CHECKED BY: JL

DATE: 2021-10-25

Time to Peak Calculations

Time to Peak Inputs								Airport	
Drainage Area ID	Area (ha)	C	Length (m)	US Elev	DS Elev	Drop (m)	Slope (%)	Tc (hr)	**Tp (hr)**
100	5.39	0.25	447.4	266.4	252.9	13.5	3.0%	0.68	**0.45**
101	7.87	0.25	590.7	266.9	252.0	14.9	2.5%	0.83	**0.55**
102	1.99	0.25	121.6	261.5	237.0	24.5	20.1%	0.19	**0.13**
103	5.54	0.25	335.6	264.5	257.8	6.7	2.0%	0.67	**0.45**
104	6.52	0.25	393.1	264.5	257.0	7.5	1.9%	0.74	**0.50**
105	11.51	0.25	575.4	269.3	257.8	11.5	2.0%	0.88	**0.59**
106	15.65	0.25	771.1	274.4	263.2	11.1	1.4%	1.14	**0.76**
107	5.36	0.25	477.5	271.8	265.3	6.6	1.4%	0.91	**0.61**
108	6.68	0.25	178.6	266.5	256.7	9.8	5.5%	0.35	**0.24**
109	19.85	0.25	450.2	267.5	257.7	9.8	2.2%	0.76	**0.51**
110	15.34	0.25	596.1	271.1	263.0	8.1	1.4%	1.02	**0.68**
111	22.12	0.25	374.6	271.0	262.8	8.2	2.2%	0.69	**0.46**
112	4.62	0.25	284.3	268.5	262.0	6.5	2.3%	0.59	**0.40**
113	12.78	0.25	560.5	269.3	262.5	6.8	1.2%	1.03	**0.69**
114	9.91	0.25	333.8	266.1	261.6	4.4	1.3%	0.77	**0.51**
115	9.87	0.25	554.2	266.5	260.9	5.6	1.0%	1.08	**0.72**
116	7.40	0.25	286.1	266.3	264.3	1.9	0.7%	0.89	**0.59**
117	5.14	0.25	265.6	262.0	259.5	2.5	1.0%	0.76	**0.51**
EXT1	3.24	0.25	277.9	267.5	262.3	5.2	1.9%	0.63	**0.42**
EXT2	13.39	0.25	547.6	267.0	262.4	4.6	0.8%	1.15	**0.77**
EXT3	4.11	0.25	261.1	267.0	259.6	7.4	2.8%	0.53	**0.36**
EXT4	44.26	0.25	1685.7	278.5	263.5	15.0	0.9%	1.97	**1.32**
EXT5	8.36	0.25	512.6	274.0	267.8	6.2	1.2%	0.98	**0.66**
EXT6	6.35	0.25	717.0	273.0	271.5	1.5	0.2%	2.07	**1.39**
EXT7	15.80	0.25	959.0	278.2	272.5	5.7	0.6%	1.70	**1.14**
EXT8	18.96	0.25	790.3	278.5	269.8	8.7	1.1%	1.26	**0.84**
EXT9	24.02	0.25	826.2	259.5	226.9	32.6	3.9%	0.84	**0.57**
EXT10	9.26	0.25	406.9	252.0	226.5	25.5	6.3%	0.51	**0.34**
EXT11	5.25	0.25	504.7	263.0	248.9	14.1	2.8%	0.74	**0.50**
EXT12	10.28	0.25	338.8	265.5	257.0	8.5	2.5%	0.63	**0.42**
EXT13	13.24	0.25	612.5	257.0	248.3	8.7	1.4%	1.02	**0.68**
EXT14	15.14	0.25	509.1	248.3	240.0	8.4	1.6%	0.88	**0.59**
EXT15	12.92	0.25	951.5	264.3	241.0	23.2	2.4%	1.06	**0.71**
EXT16	22.09	0.25	768.5	265.5	227.5	38.0	4.9%	0.76	**0.51**
EXT17	10.44	0.25	482.6	240.0	227.5	12.4	2.6%	0.74	**0.50**
EXT18	6.98	0.25	408.1	263.0	220.0	43.0	10.5%	0.43	**0.29**
EXT19	23.88	0.25	1101.3	269.0	258.8	10.3	0.9%	1.57	**1.05**
EXT20	17.82	0.25	685.4	262.0	258.2	3.8	0.6%	1.47	**0.99**
EXT21	50.76	0.25	1136.5	263.6	253.3	10.3	0.9%	1.61	**1.08**
EXT22	59.54	0.25	1612.1	265.0	227.7	37.3	2.3%	1.41	**0.94**

CROZIER CONSULTING ENGINEERS

PROJECT: Bolton North Hill
PROJECT No.: 0708-3446

CREATED BY: ED
UPDATED BY: ED
CHECKED BY: JL

DATE: 2021-10-25
UPDATED: 2024-12-12

Proposed Conditions VO Parameters

Total Impervious and Directly Connected Impervious Values:

Landuse	TIMP (%)	XIMP (%)
Residential (Low-Density)	60%	50%
Residential (Medium-Density)	60%	50%
Residential (High-Density)	80%	80%
Commercial	95%	95%

Landuse	TIMP	XIMP
Institutional (Schools & Churches)	80%	75%
Parks / Open Space	10%	10%
Woodlot	0%	0%
SWM Pond	50%	50%

TIMP and XIMP values from Table 2-2 of the 2018 Humber River Hydrology update

Proposed Site Conditions

Percent Impervious (TIMP):

Catchment #	Landuse	Area (ha)	TIMP	XIMP
201	Residential (Low-Density)	14.70	60%	50%
	Residential (Medium-Density)	6.32	60%	50%
	Parks and Open Space	2.07	10%	10%
	Institutional (School)	2.45	80%	75%
	SWM Pond	1.57	50%	50%
	Commercial	0.32	95%	95%
	Total / Weighted Total:	**27.43**	**58%**	**50%**
202	Residential (Low-Density)	8.61	60%	50%
	Residential (Medium-Density)	2.18	60%	50%
	SWM Pond	2.98	50%	50%
	Institutional (School)	0.95	80%	75%
	Parks and Open Space	0.56	10%	10%
	Total / Weighted Total:	**15.28**	**57%**	**50%**
203	Commercial	2.09	95%	95%
	Residential (Low-Density)	1.47	60%	50%
	Residential (Medium-Density)	9.81	60%	50%
	Residential (High-Density)	3.42	80%	80%
	Parks and Open Space	1.33	10%	10%
	SWM Pond	1.92	50%	50%
	Total / Weighted Total:	**20.04**	**63%**	**57%**
204	Residential (Low-Density)	9.14	60%	50%
	Residential (Medium-Density)	3.03	60%	50%
	Parks and Open Space	1.84	10%	10%
	SWM Pond	1.63	50%	50%
	Total / Weighted Total:	**15.64**	**53%**	**45%**
205	Residential (Low-Density)	15.97	60%	50%
	Residential (Medium-Density)	2.69	60%	50%
	Parks and Open Space	2.56	10%	10%
	SWM Pond	2.63	50%	50%
	Institutional (School)	3.38	80%	75%
	Total / Weighted Total:	**27.24**	**57%**	**49%**

CROZIER CONSULTING ENGINEERS

PROJECT: Bolton North Hill
PROJECT No.: 0708-3446

CREATED BY: ED
UPDATED BY: ED
CHECKED BY: JL

DATE: 2021-10-25
UPDATED: 2024-12-12

Proposed Conditions VO Parameters

Total Impervious and Directly Connected Impervious Values:

Landuse	TIMP (%)	XIMP (%)
Residential (Low-Density)	60%	50%
Residential (Medium-Density)	60%	50%
Residential (High-Density)	80%	80%
Commercial	95%	95%

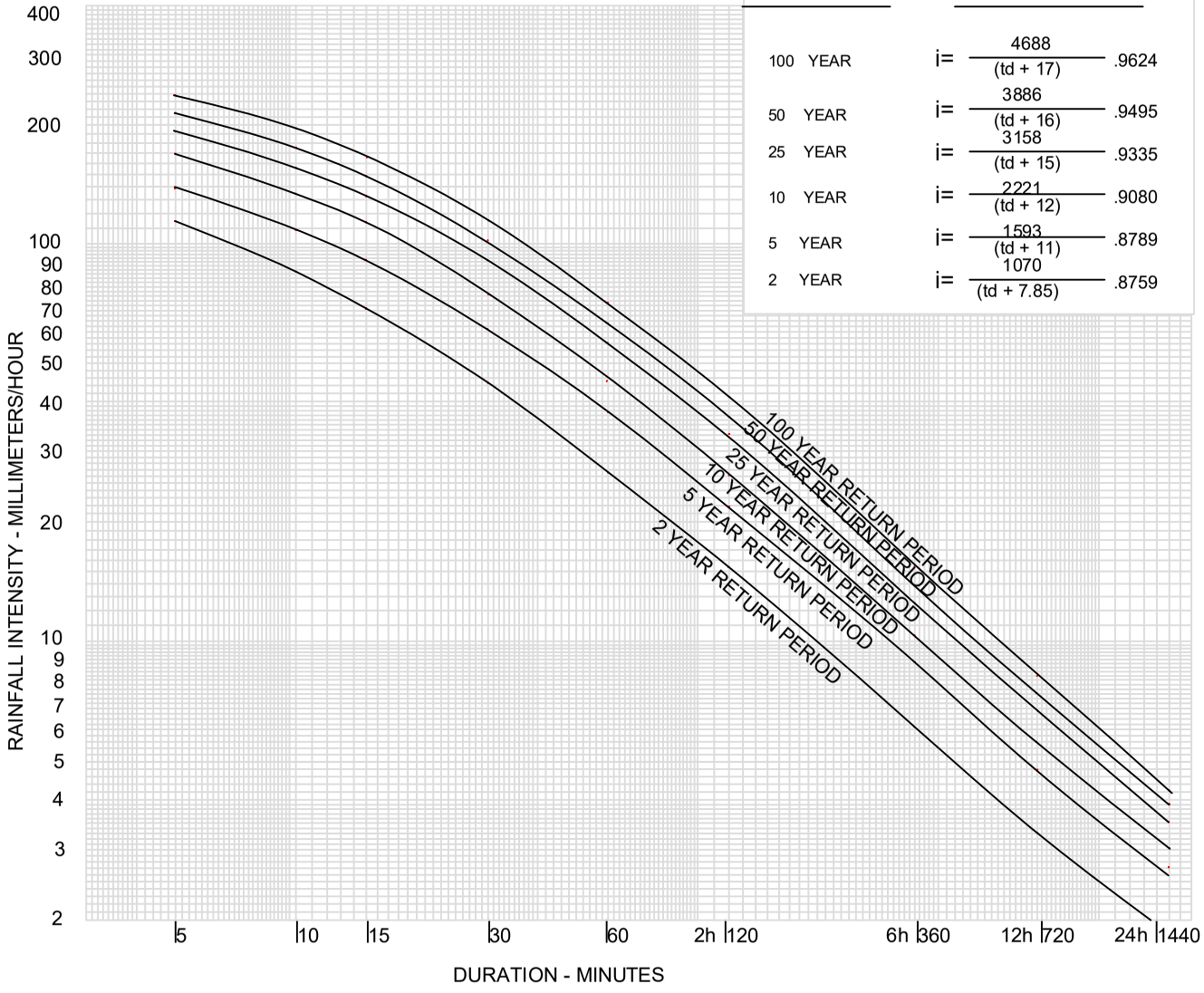
Landuse	TIMP	XIMP
Institutional (Schools & Churches)	80%	75%
Parks / Open Space	10%	10%
Woodlot	0%	0%
SWM Pond	50%	50%

TIMP and XIMP values from Table 2-2 of the 2018 Humber River Hydrology update

Proposed Site Conditions

Percent Impervious (TIMP):

Catchment #	Landuse	Area (ha)	TIMP	XIMP
206	Commercial	7.35	95%	95%
	Residential (Medium-Density)	9.22	60%	50%
	Residential (High-Density)	5.76	80%	80%
	SWM Pond	2.90	50%	50%
	Total / Weighted Total:	**25.23**	**74%**	**70%**
207	Residential (Medium-Density)	8.99	60%	50%
	Residential (High-Density)	5.10	60%	50%
	SWM Pond	1.08	50%	50%
	Parks and Open Space	1.20	10%	10%
	Total / Weighted Total:	**16.37**	**56%**	**47%**
208	Residential (Low-Density)	11.88	60%	50%
	Residential (Medium-Density)	4.33	60%	50%
	SWM Pond	1.27	50%	50%
	Total / Weighted Total:	**17.48**	**59%**	**50%**
209	Residential (Medium-Density)	4.52	60%	50%
	SWM Pond	0.60	50%	50%
	Total / Weighted Total:	**5.13**	**59%**	**50%**
210	Agricultural	**3.29**	**0%**	**0%**
	Total / Weighted Total:	**173.13**	**59%**	**52%**



RETURN PERIOD	EQUATION OF CURVE	
100 YEAR	$i = \frac{4688}{(td + 17)}$	.9624
50 YEAR	$i = \frac{3886}{(td + 16)}$	.9495
25 YEAR	$i = \frac{3158}{(td + 15)}$	.9335
10 YEAR	$i = \frac{2221}{(td + 12)}$	.9080
5 YEAR	$i = \frac{1593}{(td + 11)}$	.8789
2 YEAR	$i = \frac{1070}{(td + 7.85)}$	.8759

INLET TIMES

SUBURBAN RESIDENTIAL	
(ROOF DRAINS UNCONNECTED)	15 min
(ROOF DRAINS CONNECTED)	10 min
SUBURBAN, COMMERCIAL, INDUSTRIAL MULTIPLE FAMILY	10 min
DOWNTOWN COMMERCIAL, HIGH DENSITY APARTMENTS, EXPRESSWAYS	5 min

RUNOFF COEFFICIENT

COMMERCIAL	
- DOWNTOWN & SUBURBAN SHOPPING	0.90
INDUSTRIAL	
- DOWNTOWN	0.90
- SUBURBAN INDUSTRIAL PARKS	0.75
RESIDENTIAL	
- APARTMENTS	0.75
- ROW DWELLINGS	0.70
- DUPLEX DWELLINGS	0.70
- SEMIDETACHED - DOWNTOWN	0.60
- SINGLE FAMILY - DOWNTOWN	0.60
- SEMIDETACHED - SUBURBAN	0.50
- SINGLE FAMILY - SUBURBAN	0.40
SCHOOLS, CHURCHES, HOSPITALS	0.75
PARKS, CEMETERIES, RAIL YARDS	
(OVER 4 Ha)	0.20
(UNDER 4 Ha)	0.25
PARKING LOTS ASPHALT & GRAVEL	0.90

TOWN OF CALEDON

RAINFALL INTENSITY CURVES

NO.	REVISION	APR'D	DATE
3	ADDITION OF TEXT		APR 19
2	STANDARD 104 NOW 103		JAN 08
1	STANDARD 112.01 NOW 104		JUNE 08

APR'D: C.C. DATE: FEB 2000

DRAWN: BJM SCALE: N.T.S.

STANDARD No. 103

CROZIER
CONSULTING ENGINEERS

Project: Bolton North Hill
File: 0708-3446
Designed by: ED
Checked by: JL
Date: December 2, 2021
Updated: May 15, 2024

TRCA Unit Flow Rate Calculations

		SWMP 5			SWMP 8			SWMP 9		
Storm Event	**TRCA Equation C Sub-Basin 10[1]** Q (L/s/ha) A (ha)	**Pre-Development Area to Pond Outlet (Catchment 111)** (ha)	**Target Flow Rate** (L/s)	**Target Flow Rate** (m^3/s)	**Pre-Development Area to Pond Outlet (Catchments 113 & 115)** (ha)	**Target Flow Rate** (L/s)	**Target Flow Rate** (m^3/s)	**Pre-Development Area to Pond Outlet (Catchment 117)** (ha)	**Target Flow Rate** (L/s)	**Target Flow Rate** (m^3/s)
2-Year	Q=3.142-0.233*ln(A)	22.12	2.4	0.0024	22.64	2.4	0.0024	5.14	2.8	0.0028
5-Year	Q=5.557-0.427*ln(A)		4.2	0.0042		4.2	0.0042		4.9	0.0049
10-Year	Q=7.443-0.578*ln(A)		5.7	0.0057		5.6	0.0056		6.5	0.0065
25-Year	Q=9.838-0.757*ln(A)		7.5	0.0075		7.5	0.0075		8.6	0.0086
50-Year	Q=11.920-0.921*ln(A)		9.1	0.0091		9.0	0.0090		10.4	0.0104
100-Year	Q=14.140-1.096*ln(A)		10.7	0.0107		10.7	0.0107		12.3	0.0123

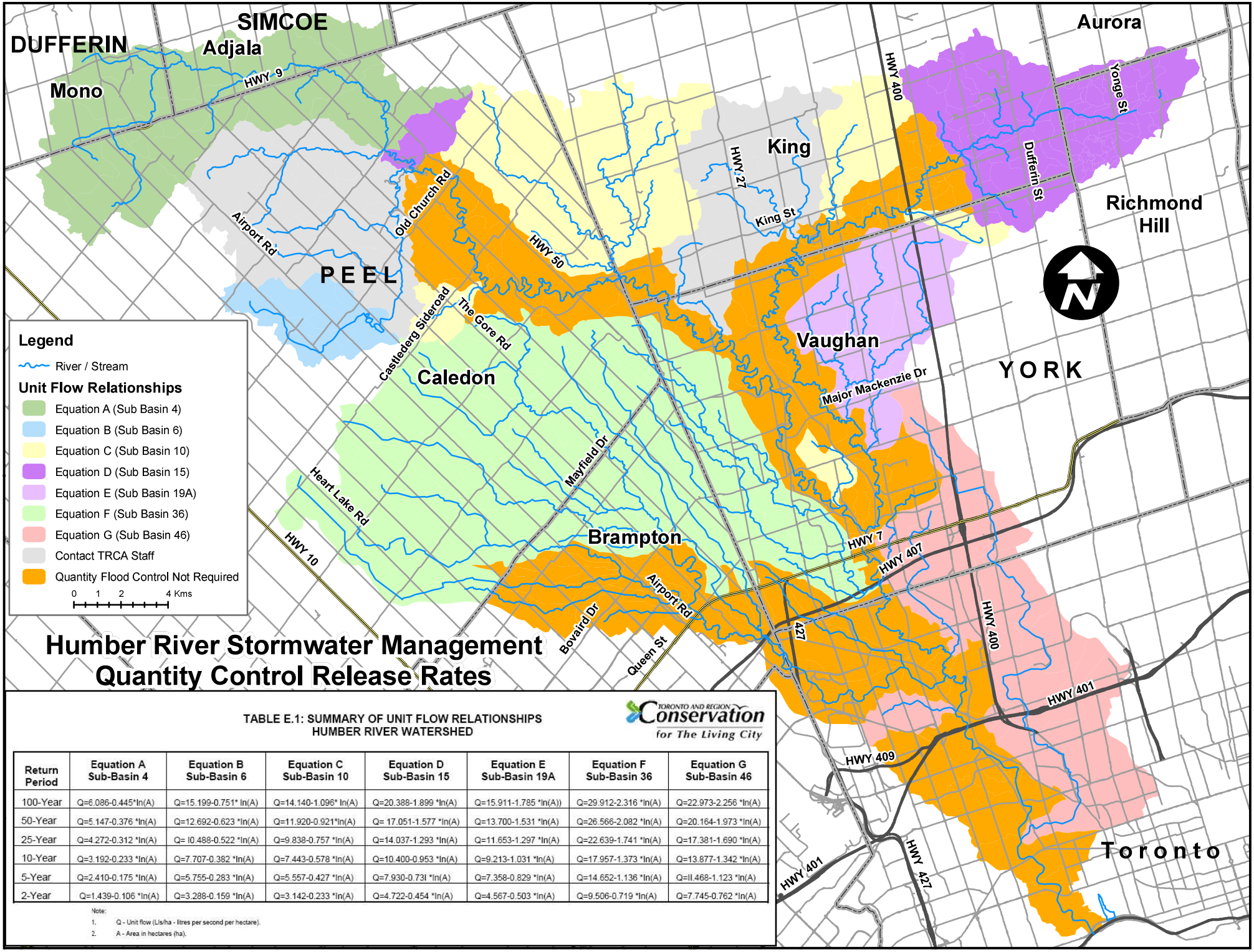
Notes: 1) Unitary flow rates obtained from Toronto and Region Conservation Authority Stormwater Management Criteria (August 2012) Table E.1: Summary of Unit Flow Relationships (Humber River Watershed) for Sub-Basin 10 (Equation C)

TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS HUMBER RIVER WATERSHED

TORONTO AND REGION Conservation for The Living City

Return Period	Equation A Sub-Basin 4	Equation B Sub-Basin 6	Equation C Sub-Basin 10	Equation D Sub-Basin 15	Equation E Sub-Basin 19A	Equation F Sub-Basin 36	Equation G Sub-Basin 46
100-Year	Q=6.086-0.445*ln(A)	Q=15.199-0.751* ln(A)	Q=14.140-1.096* ln(A)	Q=20.388-1.899 *ln(A)	Q=15.911-1.785 *ln(A))	Q=29.912-2.316 *ln(A)	Q=22.973-2.256 *ln(A)
50-Year	Q=5.147-0.376 *ln(A)	Q=12.692-0.623 *ln(A)	Q=11.920-0.921*ln(A)	Q= 17.051-1.577 *ln(A)	Q=13.700-1.531 *ln(A)	Q=26.566-2.082 *ln(A)	Q=20.164-1.973 *ln(A)
25-Year	Q=4.272-0.312 *ln(A)	Q= I0.488-0.522 *ln(A)	Q=9.838-0.757 *ln(A)	Q=14.037-1.293 *ln(A)	Q=11.653-1.297 *ln(A)	Q=22.639-1.741 *ln(A)	Q=17.381-1.690 *ln(A)
10-Year	Q=3.192-0.233 *ln(A)	Q=7.707-0.382 *ln(A)	Q=7.443-0.578 *ln(A)	Q=10.400-0.953 *ln(A)	Q=9.213-1.031 *ln(A)	Q=17.957-1.373 *ln(A)	Q=13.877-1.342 *ln(A)
5-Year	Q=2.410-0.175 *ln(A)	Q=5.755-0.283 *ln(A)	Q=5.557-0.427 *ln(A)	Q=7.930-0.73I *ln(A)	Q=7.358-0.829 *ln(A)	Q=14.652-1.136 *ln(A)	Q=II.468-1.123 *ln(A)
2-Year	Q=1.439-0.106 *ln(A)	Q=3.288-0.159 *ln(A)	Q=3.142-0.233 *ln(A)	Q=4.722-0.454 *ln(A)	Q=4.567-0.503 *ln(A)	Q=9.506-0.719 *ln(A)	Q=7.745-0.762 *ln(A)

Note:
1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).



Humber River Stormwater Management Quantity Control Release Rates

TABLE E.1: SUMMARY OF UNIT FLOW RELATIONSHIPS
HUMBER RIVER WATERSHED

Return Period	Equation A Sub-Basin 4	Equation B Sub-Basin 6	Equation C Sub-Basin 10	Equation D Sub-Basin 15	Equation E Sub-Basin 19A	Equation F Sub-Basin 36	Equation G Sub-Basin 46
100-Year	Q=6.086-0.445*ln(A)	Q=15.199-0.751* ln(A)	Q=14.140-1.096* ln(A)	Q=20.388-1.899 *ln(A)	Q=15.911-1.785 *ln(A))	Q=29.912-2.316 *ln(A)	Q=22.973-2.256 *ln(A)
50-Year	Q=5.147-0.376 *ln(A)	Q=12.692-0.623 *ln(A)	Q=11.920-0.921*ln(A)	Q= 17.051-1.577 *ln(A)	Q=13.700-1.531 *ln(A)	Q=26.566-2.082 *ln(A)	Q=20.164-1.973 *ln(A)
25-Year	Q=4.272-0.312 *ln(A)	Q= I0.488-0.522 *ln(A)	Q=9.838-0.757 *ln(A)	Q=14.037-1.293 *ln(A)	Q=11.653-1.297 *ln(A)	Q=22.639-1.741 *ln(A)	Q=17.381-1.690 *ln(A)
10-Year	Q=3.192-0.233 *ln(A)	Q=7.707-0.382 *ln(A)	Q=7.443-0.578 *ln(A)	Q=10.400-0.953 *ln(A)	Q=9.213-1.031 *ln(A)	Q=17.957-1.373 *ln(A)	Q=13.877-1.342 *ln(A)
5-Year	Q=2.410-0.175 *ln(A)	Q=5.755-0.283 *ln(A)	Q=5.557-0.427 *ln(A)	Q=7.930-0.73l *ln(A)	Q=7.358-0.829 *ln(A)	Q=14.652-1.136 *ln(A)	Q=II.468-1.123 *ln(A)
2-Year	Q=1.439-0.106 *ln(A)	Q=3.288-0.159 *ln(A)	Q=3.142-0.233 *ln(A)	Q=4.722-0.454 *ln(A)	Q=4.567-0.503 *ln(A)	Q=9.506-0.719 *ln(A)	Q=7.745-0.762 *ln(A)

Note:
1. Q - Unit flow (Lls/ha - litres per second per hectare).
2. A - Area in hectares (ha).

Toronto and Region Conservation for The Living City

CROZIER
CONSULTING ENGINEERS

Project: Bolton North Hill
File: 0708-3446
Designed by: Erin Dodd
Checked by: Jessica Lysecki
Date: May 14, 2024
Updated: December 9, 2024

Active Storage Volumes

Storm Event	SWMP 5			SWMP 8			SWMP 9		
	Target Flow (m^3/s)	Required Storage (ha-m)	Required Storage (m^3)	Target Flow (m^3/s)	Required Storage (ha-m)	Required Storage (m^3)	Target Flow (m^3/s)	Required Storage (ha-m)	Required Storage (m^3)
2-Year	0.0024	0.7743	7,743	0.0024	0.4145	4,145	0.0028	0.1767	1,767
5-Year	0.0042	1.0612	10,612	0.0042	0.5664	5,664	0.0049	0.2346	2,346
10-Year	0.0057	1.2596	12,596	0.0056	0.6710	6,710	0.0065	0.2730	2,730
25-Year	0.0075	1.5119	15,119	0.0075	0.8037	8,037	0.0086	0.3207	3,207
50-Year	0.0091	1.7018	17,018	0.0090	0.9034	9,034	0.0104	0.3556	3,556
100-Year	0.0107	1.8935	18,935	0.0107	1.0037	10,037	0.0123	0.3903	3,903

**12hr AES results in highest storage volumes*

CROZIER CONSULTING ENGINEERS

Project: Bolton North Hill
File: 0708-3446
Designed by: ED
Checked by: JL
Date: May 29, 2024
Updated: December 11, 2024

Post-to-Pre Target Flow Rates

		SWMP 1				SWMP 2				SWMP 3
		Pre-Development Peak Flow Rates (m^3/s)				Pre-Development Peak Flow Rates (m^3/s)				Pre-Development Peak Flow Rates (m^3/s)
Storm Distribution	Storm Event	Catchment 101	Catchment 102	Catchment 103	Total to Future Pond Outlet	Catchment 104	Catchment 105	Catchment 108	Total to Future Pond Outlet	Catchment 106
6-hour AES	2-Year	0.119	0.063	0.094	0.275	0.103	0.166	0.160	0.429	0.186
	5-Year	0.212	0.109	0.167	0.488	0.184	0.297	0.287	0.767	0.332
	10-Year	0.282	0.143	0.223	0.647	0.245	0.394	0.381	1.020	0.442
	25-Year	0.376	0.188	0.298	0.862	0.328	0.525	0.508	1.361	0.591
	50-Year	0.449	0.223	0.357	1.030	0.393	0.630	0.607	1.630	0.709
	100-Year	0.525	0.259	0.417	1.201	0.459	0.736	0.708	1.903	0.829
12-hour AES	2-Year	0.122	0.048	0.095	0.265	0.106	0.170	0.144	0.420	0.192
	5-Year	0.201	0.076	0.156	0.433	0.174	0.282	0.231	0.687	0.319
	10-Year	0.259	0.095	0.201	0.555	0.224	0.364	0.295	0.882	0.413
	25-Year	0.336	0.121	0.260	0.717	0.290	0.472	0.378	1.140	0.539
	50-Year	0.395	0.140	0.305	0.841	0.342	0.556	0.441	1.339	0.637
	100-Year	0.456	0.160	0.352	0.967	0.395	0.642	0.506	1.543	0.737

		SWMP 4			SWMP 6	SWMP 7		
		Pre-Development Peak Flow Rates (m^3/s)			Pre-Development Peak Flow Rates (m^3/s)	Pre-Development Peak Flow Rates (m^3/s)		
Storm Distribution	Storm Event	Catchment 107	Catchment 109	Total to Future Pond Outlet	Catchment 110	Catchment 112	Catchment 114	Total to Future Pond Outlet
6-hour AES	2-Year	0.082	0.573	0.655	0.205	0.083	0.166	0.249
	5-Year	0.144	0.913	1.057	0.363	0.149	0.292	0.440
	10-Year	0.190	1.153	1.342	0.483	0.198	0.387	0.585
	25-Year	0.252	1.465	1.717	0.644	0.226	0.515	0.741
	50-Year	0.300	1.703	2.002	0.771	0.319	0.615	0.935
	100-Year	0.350	1.939	2.289	0.900	0.374	0.717	1.091
12-hour AES	2-Year	0.083	0.550	0.634	0.210	0.084	0.169	0.253
	5-Year	0.136	0.821	0.958	0.347	0.137	0.275	0.412
	10-Year	0.175	1.008	1.183	0.449	0.175	0.353	0.528
	25-Year	0.226	1.246	1.471	0.583	0.227	0.455	0.681
	50-Year	0.265	1.422	1.687	0.686	0.266	0.534	0.800
	100-Year	0.305	1.599	1.904	0.793	0.307	0.615	0.921

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Project: Bolton North Hill
File: 0708-3446
Designed by: E.D.
Checked by: J.L.
Date: October 15, 2021
Updated: December 9, 2024

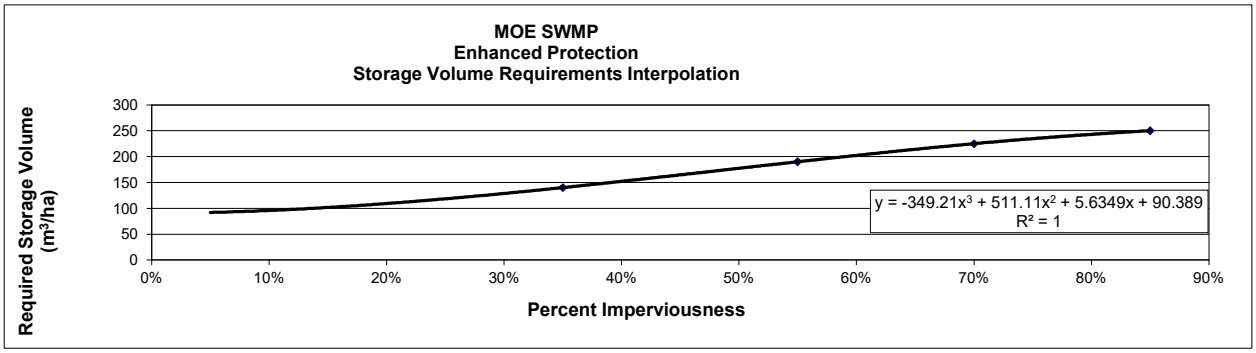
SWM Pond Permanent Pool Volume Calculations

Pond Name	Drainage Catchment	Area to Pond (ha)	Percent Impervious (%)	Storage Vol. Req'd (m^3/ha)	Extended Detention Volume Req'd (m^3/ha)	Permanent Pool Vol. Req'd (m^3/ha)	Extended Detention Volume Req'd (m^3)	Permanent Pool Vol. Req'd (m^3)
1	201	27.43	58%	197	40	157	1,097	4,308
2	202	15.28	57%	196	40	156	611	2,386
3	203	20.04	63%	209	40	169	802	3,386
4	204	15.64	53%	185	40	145	626	2,271
5	205	27.24	57%	195	40	155	1,090	4,209
6	206	25.23	74%	232	40	192	1,009	4,849
7	207	16.37	56%	192	40	152	655	2,483
8	208	17.48	59%	201	40	161	699	2,807
9	209	5.13	59%	199	40	159	205	817

MOE 2003 SWMP Manual: Water Quality Storage Requirements based on Receiving Waters *

PROTECTION LEVEL	SWMP Type	STORAGE VOLUME (m^3 / ha) FOR IMPERVIOUS LEVEL			
		35%	55%	70%	85%
Enhanced	Wet Pond	140	190	225	250
Normal	Wet Pond	90	110	130	150
Basic	Wet Pond	60	75	85	95

** Table 3.2 from the MOE SWMP Planning & Design Manual, 2004, pg 3-10*



CROZIER
CONSULTING ENGINEERS

Project: Bolton North Hill
File: 0708-3446
Designed by: E.D.
Checked by: J.N.L.
Date: October 15, 2021
Updated: December 9, 2024

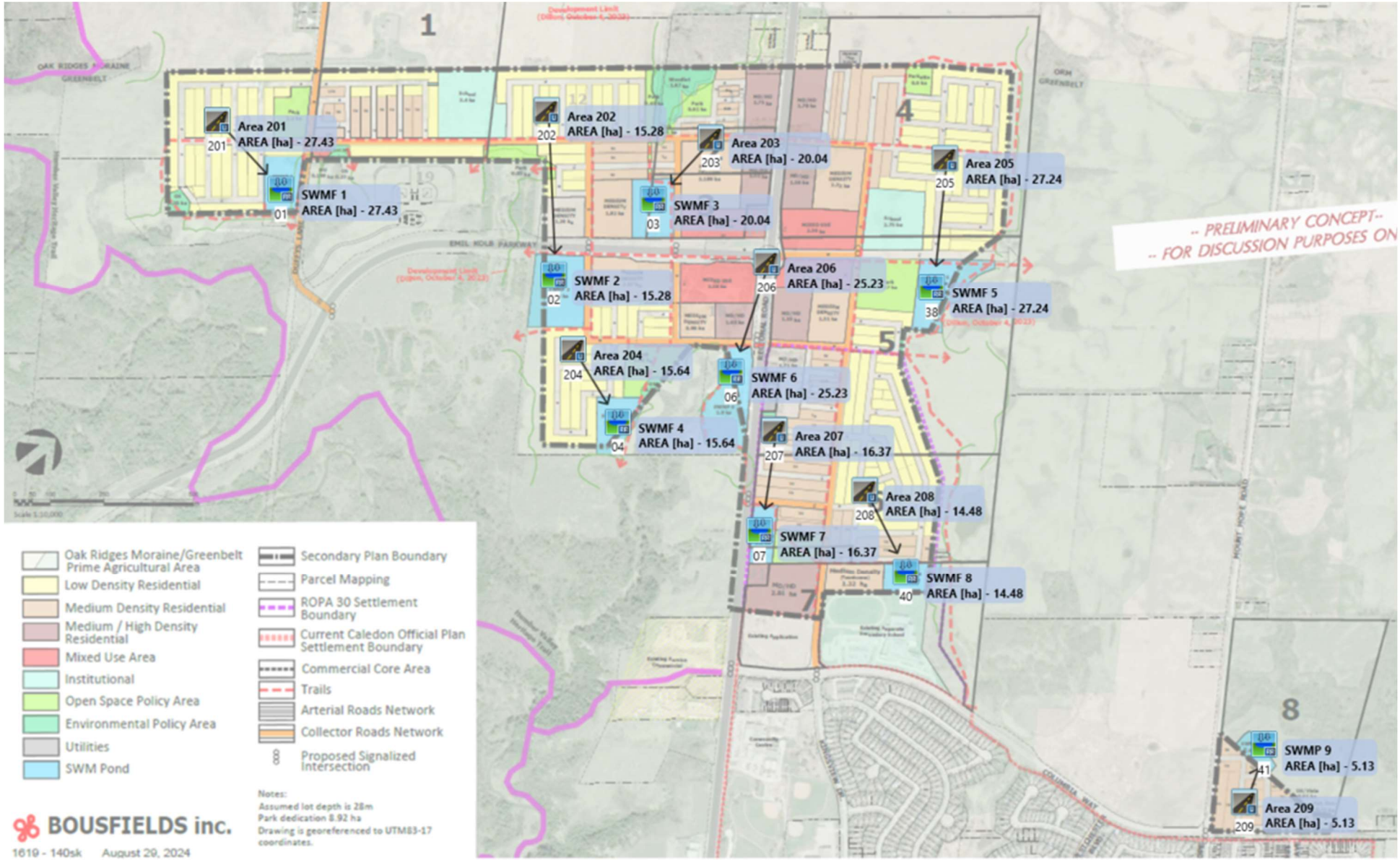
SWM Pond Extended Detention Volume Calculations

Pond Name	Drainage Catchment	Area to Pond (ha)	Percent Impervious (%)	MOE Extended Detention Volume[1] (m^3/ha)	MOE Extended Detention Volume (m^3)	25mm Event Runoff Volume[2] (mm)	25mm Event Runoff Volume (m^3)
1	201	27.43	58%	40	1,097	15.20	4,168
2	202	15.28	57%	40	611	19.80	3,026
3	203	20.04	63%	40	802	19.40	3,887
4	204	15.64	53%	40	626	17.63	2,757
5	205	27.24	57%	40	1,090	15.01	4,088
6	206	25.23	74%	40	1,009	22.40	5,652
7	207	16.37	56%	40	655	14.71	2,408
8	208	17.48	59%	40	699	15.28	2,670
9	209	5.13	59%	40	205	19.38	993

Notes:
1) MOE Extended Detention Volume requirement of 40m^3/ha obtained from MOE SWMP Planning & Design Manual, 2004, Pg 3-10
2) 25mm Event Runoff Volume obtained from Visual Otthymo model

C3 – Pond Design Visual OTTHYMO Model Output

Bolton North Hill – Option 1 & 2 Lands
Town of Caledon, Region of Peel
VO Modelling Schematic – Pond Design
Project No.: 0708-3446
Date: December 2024



Project #: 0708-3446
Project Name: Bolton North Hill – Option 1 & 2 Lands
Town of Caledon, Region of Peel

VO Modelling Results – Pond Design
25mm 4-hour Chicago Design Storm
December, 2024

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================================================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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DATE: 12-13-2024                          TIME: 11:49:54

USER:


COMMENTS: _____________________________________________________

----------------------------------------------------------------------------------------------------------------
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  ************************************************
  ** SIMULATION : 0 - 25mm 4hr Storm            **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              56762394-5f72-49ec-8210-286465011046\98053cad
| Ptotal= 25.00 mm |    Comments: 25mm 4hr Chicago Storm
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    1.67 |  1.00   12.70 |  2.00    3.88 |  3.00    1.98
                0.17    1.91 |  1.17   56.21 |  2.17    3.31 |  3.17    1.84
                0.33    2.24 |  1.33   16.62 |  2.33    2.90 |  3.33    1.72
                0.50    2.74 |  1.50    8.80 |  2.50    2.59 |  3.50    1.62
                0.67    3.59 |  1.67    6.09 |  2.67    2.34 |  3.67    1.53
                0.83    5.40 |  1.83    4.72 |  2.83    2.14 |  3.83    1.45

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

--------------------
| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         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    1.67 | 1.083   12.70 | 2.083    3.88 |  3.08    1.98
               0.167    1.67 | 1.167   12.70 | 2.167    3.88 |  3.17    1.98
               0.250    1.91 | 1.250   56.21 | 2.250    3.31 |  3.25    1.84
               0.333    1.91 | 1.333   56.21 | 2.333    3.31 |  3.33    1.84
               0.417    2.24 | 1.417   16.62 | 2.417    2.90 |  3.42    1.72
               0.500    2.24 | 1.500   16.62 | 2.500    2.90 |  3.50    1.72
               0.583    2.74 | 1.583    8.80 | 2.583    2.59 |  3.58    1.62
               0.667    2.74 | 1.667    8.80 | 2.667    2.59 |  3.67    1.62
               0.750    3.59 | 1.750    6.09 | 2.750    2.34 |  3.75    1.53
               0.833    3.59 | 1.833    6.09 | 2.833    2.34 |  3.83    1.53
               0.917    5.40 | 1.917    4.72 | 2.917    2.14 |  3.92    1.45
               1.000    5.40 | 2.000    4.72 | 3.000    2.14 |  4.00    1.45

     Max.Eff.Inten.(mm/hr)=      56.21         24.30
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      6.50 (ii)    18.93 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.18          0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.91          0.26       0.982 (iii)
     TIME TO PEAK    (hrs)=      1.33          1.58        1.33
     RUNOFF VOLUME    (mm)=     24.00         12.42       17.63
     TOTAL RAINFALL   (mm)=     25.00         25.00       25.00
     RUNOFF COEFFICIENT   =      0.96          0.50        0.71


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  94.0    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(  0004)|     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    |  1.4710     0.2600
                         0.6340     0.1300    |  1.6870     0.2900
                         0.9580     0.1800    |  1.9040     0.3300
                         1.1830     0.2100    |  0.0000     0.0000

                                    AREA     QPEAK     TPEAK      R.V.
                                    (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0204)      15.642      0.982      1.33      17.63
   OUTFLOW: ID= 1 (  0004)      15.642      0.417      1.75      17.63

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.51
                 TIME SHIFT OF PEAK FLOW          (min)= 25.00
                 MAXIMUM  STORAGE   USED        (ha.m.)=  0.0857

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0201)|   Area     (ha)=  27.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

Max.Eff.Inten.	(mm/hr)=	56.21	10.01	
over	(min)	10.00	30.00	
Storage Coeff.	(min)=	7.69 (ii)	25.42 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	30.00	
Unit Hyd. peak	(cms)=	0.13	0.04	
				TOTALS
PEAK FLOW	(cms)=	1.47	0.16	1.512 (iii)
TIME TO PEAK	(hrs)=	1.42	1.83	1.42
RUNOFF VOLUME	(mm)=	24.00	6.40	15.20
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.26	0.61

(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(0001)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0201)	27.428	1.512	1.42	15.20
OUTFLOW: ID= 1 (	0001)	27.428	0.163	2.83	15.18

PEAK FLOW REDUCTION [Qout/Qin](%)= 10.76
TIME SHIFT OF PEAK FLOW (min)= 85.00
MAXIMUM STORAGE USED (ha.m.)= 0.2765

CALIB			
STANDHYD (0203)	Area (ha)= 20.04		
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00	Dir. Conn.(%)= 57.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 12.62	7.41	
Dep. Storage	(mm)= 1.00	5.00	
Average Slope	(%)= 1.00	2.00	
Length	(m)= 365.48	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

Max.Eff.Inten.	(mm/hr)=	56.21	26.49	
over	(min)	5.00	20.00	
Storage Coeff.	(min)=	7.00 (ii)	19.01 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.17	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.44	0.28	1.518 (iii)
TIME TO PEAK	(hrs)=	1.33	1.58	1.33
RUNOFF VOLUME	(mm)=	24.00	13.30	19.40
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.53	0.78

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5390	0.8200
	0.1920	0.4600	0.6370	0.9100
	0.3190	0.6000	0.7370	1.0000
	0.4130	0.7000	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0203)	20.036	1.518	1.33	19.40
OUTFLOW: ID= 1 (	0003)	20.036	0.118	3.17	19.37

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.77
TIME SHIFT OF PEAK FLOW (min)=110.00
MAXIMUM STORAGE USED (ha.m.)= 0.2826

CALIB			
STANDHYD (0206)	Area (ha)= 25.23		
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00	Dir. Conn.(%)= 70.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 18.67	6.56	
Dep. Storage	(mm)= 1.00	5.00	
Average Slope	(%)= 1.00	2.00	
Length	(m)= 410.14	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

				TOTALS
Max.Eff.Inten.	(mm/hr)=	56.21	55.97	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	7.50 (ii)	16.40 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
PEAK FLOW	(cms)=	1.90	0.43	2.163 (iii)
TIME TO PEAK	(hrs)=	1.42	1.58	1.42
RUNOFF VOLUME	(mm)=	24.00	18.66	22.40
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.75	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5830	1.1750
0.2100	0.6900	0.6860	1.3000
0.3470	0.8750	0.7930	1.4200
0.4490	1.0100	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0206)	25.232	2.163	1.42	22.40
OUTFLOW: ID= 1	(0006)	25.232	0.134	3.42	22.36

PEAK FLOW REDUCTION [Qout/Qin](%)= 6.21
TIME SHIFT OF PEAK FLOW (min)=120.00
MAXIMUM STORAGE USED (ha.m.)= 0.4413

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

				TOTALS
Max.Eff.Inten.	(mm/hr)=	56.21	10.28	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	6.59 (ii)	24.12 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.18	0.05	
PEAK FLOW	(cms)=	0.99	0.10	1.009 (iii)
TIME TO PEAK	(hrs)=	1.33	1.75	1.33
RUNOFF VOLUME	(mm)=	24.00	6.47	14.71
TOTAL RAINFALL	(mm)=	25.00	25.00	25.00
RUNOFF COEFFICIENT	=	0.96	0.26	0.59

(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(0007)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6810	0.4150
0.2530	0.2100	0.8000	0.4700
0.4120	0.2900	0.9210	0.5250
0.5280	0.3450	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0207)	16.372	1.009	1.33	14.71
OUTFLOW: ID= 1	(0007)	16.372	0.158	2.25	14.70

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.61
TIME SHIFT OF PEAK FLOW (min)= 55.00
MAXIMUM STORAGE USED (ha.m.)= 0.1309

CALIB	
STANDHYD (0202)	Area (ha)= 15.28
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62

0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

Max.Eff.Inten.(mm/hr)=	56.21	33.33		
over (min)	5.00	20.00		
Storage Coeff. (min)=	6.45 (ii)	17.41 (ii)		
Unit Hyd. Tpeak (min)=	5.00	20.00		
Unit Hyd. peak (cms)=	0.18	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.99	0.33	1.088 (iii)	
TIME TO PEAK (hrs)=	1.33	1.58	1.33	
RUNOFF VOLUME (mm)=	24.00	15.60	19.80	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.62	0.79	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.088	1.33	19.80
OUTFLOW: ID= 1 (0002)	15.280	0.273	2.08	19.79

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.10
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= 0.1465

CALIB			
STANDHYD (0205)	Area (ha)= 27.24		
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 49.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	15.53	11.71	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	426.16	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

Max.Eff.Inten.(mm/hr)=	56.21	9.92		
over (min)	10.00	30.00		
Storage Coeff. (min)=	7.68 (ii)	25.46 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.13	0.04		
			TOTALS	
PEAK FLOW (cms)=	1.43	0.16	1.474 (iii)	
TIME TO PEAK (hrs)=	1.42	1.83	1.42	
RUNOFF VOLUME (mm)=	24.00	6.37	15.01	
TOTAL RAINFALL (mm)=	25.00	25.00	25.00	
RUNOFF COEFFICIENT =	0.96	0.25	0.60	

(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(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	1.474	1.42	15.01
OUTFLOW: ID= 1 (0038)	27.241	0.001	5.67	2.52

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.09
TIME SHIFT OF PEAK FLOW (min)=255.00
MAXIMUM STORAGE USED (ha.m.)= 0.4070

CALIB			
STANDHYD (0208)	Area (ha)= 14.48		
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	8.54	5.94	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	310.68	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	1.67	1.083	12.70	2.083	3.88	3.08	1.98
0.167	1.67	1.167	12.70	2.167	3.88	3.17	1.98
0.250	1.91	1.250	56.21	2.250	3.31	3.25	1.84
0.333	1.91	1.333	56.21	2.333	3.31	3.33	1.84
0.417	2.24	1.417	16.62	2.417	2.90	3.42	1.72
0.500	2.24	1.500	16.62	2.500	2.90	3.50	1.72
0.583	2.74	1.583	8.80	2.583	2.59	3.58	1.62
0.667	2.74	1.667	8.80	2.667	2.59	3.67	1.62
0.750	3.59	1.750	6.09	2.750	2.34	3.75	1.53
0.833	3.59	1.833	6.09	2.833	2.34	3.83	1.53
0.917	5.40	1.917	4.72	2.917	2.14	3.92	1.45
1.000	5.40	2.000	4.72	3.000	2.14	4.00	1.45

Max.Eff.Inten.(mm/hr)=	56.21	10.58		
over (min)	5.00	25.00		
Storage Coeff. (min)=	6.35 (ii)	23.69 (ii)		
Unit Hyd. Tpeak (min)=	5.00	25.00		
Unit Hyd. peak (cms)=	0.19	0.05		

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                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.94         0.09          0.959 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.75           1.33
     RUNOFF VOLUME    (mm)=      24.00         6.56          15.28
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.26           0.61


       (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(  0040)|     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   |   0.0075     0.8037
                         0.0024     0.4145   |   0.0090     0.9034
                         0.0042     0.5664   |   0.0107     1.0038
                         0.0056     0.6710   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0208)     14.479     0.959      1.33      15.28
   OUTFLOW: ID= 1 (  0040)     14.479     0.001      5.25       4.44

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.13
                  TIME SHIFT OF PEAK FLOW         (min)=235.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2195

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| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  59.00   Dir. Conn.(%)=  50.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.02         2.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     184.85        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    1.67 | 1.083   12.70 | 2.083    3.88 |  3.08    1.98
               0.167    1.67 | 1.167   12.70 | 2.167    3.88 |  3.17    1.98
               0.250    1.91 | 1.250   56.21 | 2.250    3.31 |  3.25    1.84
               0.333    1.91 | 1.333   56.21 | 2.333    3.31 |  3.33    1.84
               0.417    2.24 | 1.417   16.62 | 2.417    2.90 |  3.42    1.72
               0.500    2.24 | 1.500   16.62 | 2.500    2.90 |  3.50    1.72
               0.583    2.74 | 1.583    8.80 | 2.583    2.59 |  3.58    1.62
               0.667    2.74 | 1.667    8.80 | 2.667    2.59 |  3.67    1.62
               0.750    3.59 | 1.750    6.09 | 2.750    2.34 |  3.75    1.53
               0.833    3.59 | 1.833    6.09 | 2.833    2.34 |  3.83    1.53
               0.917    5.40 | 1.917    4.72 | 2.917    2.14 |  3.92    1.45
               1.000    5.40 | 2.000    4.72 | 3.000    2.14 |  4.00    1.45

     Max.Eff.Inten.(mm/hr)=      56.21        32.30
           over (min)            5.00        20.00
     Storage Coeff.  (min)=       4.65 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.22         0.07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.11          0.396 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      24.00        14.77          19.38
     TOTAL RAINFALL   (mm)=      25.00        25.00          25.00
     RUNOFF COEFFICIENT   =       0.96         0.59           0.78

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  96.0    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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)     5.125     0.396      1.33      19.38
   OUTFLOW: ID= 1 (  0041)     5.125     0.002      4.67      11.80

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.39
                  TIME SHIFT OF PEAK FLOW         (min)=200.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0976

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 FINISH
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Project #: 0708-3446
Project Name: Bolton North Hill – Option 1 & 2 Lands
Town of Caledon, Region of Peel

VO Modelling Results – Pond Design
2, 5, 10, 25, 50, 100-Year 6-hour AES Design Storm
December, 2024

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


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  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
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5bc5a1b3e645\484f6627-8d66-4d09-88f4-d06513e35d68\sce


DATE: 12-13-2024                          TIME: 11:58:40

USER:


COMMENTS: _____________________________________________________

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  ************************************************
  ** SIMULATION : 1.0 - 2Yr 6Hr AES             **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\85872eda
| Ptotal= 36.00 mm |    Comments: 2 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   12.24 |  3.50    5.04 |  5.25    0.72
                0.25    0.72 |  2.00   12.24 |  3.75    2.88 |  5.50    0.72
                0.50    0.72 |  2.25   33.12 |  4.00    2.88 |  5.75    0.72
                0.75    0.72 |  2.50   33.12 |  4.25    1.44 |  6.00    0.72
                1.00    0.72 |  2.75    9.36 |  4.50    1.44 |
                1.25    4.32 |  3.00    9.36 |  4.75    0.72 |
                1.50    4.32 |  3.25    5.04 |  5.00    0.72 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
-------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         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    4.32 | 3.250    9.36 |  4.83    0.72
               0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
               0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
               0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
               0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
               0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
               0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
               0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
               0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
               0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
               0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
               1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
               1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
               1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
               1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
               1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
               1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
               1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
               1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12         30.88
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       8.03 (ii)   19.32 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.63          0.43          1.013 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=      35.00         22.08          27.90
     TOTAL RAINFALL   (mm)=      36.00         36.00          36.00
     RUNOFF COEFFICIENT   =       0.97          0.61           0.77


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  94.0    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(  0004)|     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    |   1.4710     0.2600
                         0.6340     0.1300    |   1.6870     0.2900
                         0.9580     0.1800    |   1.9040     0.3300
                         1.1830     0.2100    |   0.0000     0.0000

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)        15.642     1.013      2.75       27.90
   OUTFLOW: ID= 1 (  0004)        15.642     0.623      3.08       27.89

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 61.49
                TIME SHIFT OF PEAK FLOW          (min)= 20.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1281
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CALIB					
STANDHYD (0201)	Area (ha)= 27.43				
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00	Dir. Conn.(%)= 50.00			
		IMPERVIOUS	PERVIOUS (i)		
Surface Area	(ha)=	15.91	11.52		
Dep. Storage	(mm)=	1.00	5.00		
Average Slope	(%)=	1.00	2.00		
Length	(m)=	427.61	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

Max.Eff.Inten.(mm/hr)=		33.12	18.26	
over (min)		10.00	25.00	
Storage Coeff. (min)=		9.50 (ii)	23.44 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.12	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.21	0.34	1.455 (iii)
TIME TO PEAK	(hrs)=	2.75	3.00	2.75
RUNOFF VOLUME	(mm)=	35.00	12.86	23.93
TOTAL RAINFALL	(mm)=	36.00	12.86	36.00
RUNOFF COEFFICIENT	=	0.97	0.36	0.66

(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(0001)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0201)	27.428	1.455	2.75	23.93
OUTFLOW: ID= 1 (	0001)	27.428	0.261	4.08	23.91

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.92

TIME SHIFT OF PEAK FLOW (min)= 80.00
MAXIMUM STORAGE USED (ha.m.)= 0.4431

CALIB					
STANDHYD (0203)	Area (ha)= 20.04				
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00	Dir. Conn.(%)= 57.00			
		IMPERVIOUS	PERVIOUS (i)		
Surface Area	(ha)=	12.62	7.41		
Dep. Storage	(mm)=	1.00	5.00		
Average Slope	(%)=	1.00	2.00		
Length	(m)=	365.48	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

Max.Eff.Inten.(mm/hr)=		33.12	32.14	
over (min)		10.00	20.00	
Storage Coeff. (min)=		8.65 (ii)	19.76 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.02	0.45	1.423 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	35.00	23.26	29.95
TOTAL RAINFALL	(mm)=	36.00	36.00	36.00
RUNOFF COEFFICIENT	=	0.97	0.65	0.83

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5390	0.8200
	0.1920	0.4600	0.6370	0.9100
	0.3190	0.6000	0.7370	1.0000
	0.4130	0.7000	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0203)	20.036	1.423	2.75	29.95
OUTFLOW: ID= 1 (	0003)	20.036	0.185	4.25	29.92

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                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.01
                  TIME SHIFT OF PEAK FLOW          (min)= 90.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.4435

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| CALIB             |
| STANDHYD (  0206)|   Area    (ha)=  25.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  74.00   Dir. Conn.(%)=  70.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.67         6.56
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     410.14        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    4.32 | 3.250    9.36 |  4.83    0.72
               0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
               0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
               0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
               0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
               0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
               0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
               0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
               0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
               0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
               0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
               1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
               1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
               1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
               1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
               1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
               1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
               1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
               1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        37.68
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       9.27 (ii)   19.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.57         0.51        2.051 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83         2.75
     RUNOFF VOLUME    (mm)=      35.00        29.59        33.38
     TOTAL RAINFALL   (mm)=      36.00        36.00        36.00
     RUNOFF COEFFICIENT   =       0.97         0.82         0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  99.0    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(  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    |  0.5830     1.1750
                        0.2100     0.6900    |  0.6860     1.3000
                        0.3470     0.8750    |  0.7930     1.4200
                        0.4490     1.0100    |  0.0000     0.0000

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

  INFLOW : ID= 2 (  0206)     25.232      2.051      2.75      33.38
  OUTFLOW: ID= 1 (  0006)     25.232      0.202      4.33      33.34

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.83
                  TIME SHIFT OF PEAK FLOW          (min)= 95.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.6629

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| CALIB             |
| STANDHYD (  0207)|   Area    (ha)=  16.37
|ID= 1 DT= 5.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  47.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.17         7.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     330.38        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    4.32 | 3.250    9.36 |  4.83    0.72
               0.167    0.00 | 1.750    4.32 | 3.333    5.04 |  4.92    0.72
               0.250    0.00 | 1.833   12.24 | 3.417    5.04 |  5.00    0.72
               0.333    0.72 | 1.917   12.24 | 3.500    5.04 |  5.08    0.72
               0.417    0.72 | 2.000   12.24 | 3.583    5.04 |  5.17    0.72
               0.500    0.72 | 2.083   12.24 | 3.667    5.04 |  5.25    0.72
               0.583    0.72 | 2.167   12.24 | 3.750    5.04 |  5.33    0.72
               0.667    0.72 | 2.250   12.24 | 3.833    2.88 |  5.42    0.72
               0.750    0.72 | 2.333   33.12 | 3.917    2.88 |  5.50    0.72
               0.833    0.72 | 2.417   33.12 | 4.000    2.88 |  5.58    0.72
               0.917    0.72 | 2.500   33.12 | 4.083    2.88 |  5.67    0.72
               1.000    0.72 | 2.583   33.12 | 4.167    2.88 |  5.75    0.72
               1.083    0.72 | 2.667   33.12 | 4.250    2.88 |  5.83    0.72
               1.167    0.72 | 2.750   33.12 | 4.333    1.44 |  5.92    0.72
               1.250    0.72 | 2.833    9.36 | 4.417    1.44 |  6.00    0.72
               1.333    4.32 | 2.917    9.36 | 4.500    1.44 |  6.08    0.72
               1.417    4.32 | 3.000    9.36 | 4.583    1.44 |  6.17    0.72
               1.500    4.32 | 3.083    9.36 | 4.667    1.44 |  6.25    0.72
               1.583    4.32 | 3.167    9.36 | 4.750    1.44 |

     Max.Eff.Inten.(mm/hr)=      33.12        18.64
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       8.14 (ii)   21.96 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=       0.13         0.05
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.22        0.852 (iii)
     TIME TO PEAK    (hrs)=       2.75         3.00         2.75
     RUNOFF VOLUME    (mm)=      35.00        12.98        23.33
     TOTAL RAINFALL   (mm)=      36.00        36.00        36.00
     RUNOFF COEFFICIENT   =       0.97         0.36         0.65


       (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(  0007)|     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    |  0.6810     0.4150
                        0.2530     0.2100    |  0.8000     0.4700
                        0.4120     0.2900    |  0.9210     0.5250
                        0.5280     0.3450    |  0.0000     0.0000
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	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	0.852	2.75	23.33
OUTFLOW: ID= 1 (0007)	16.372	0.251	3.58	23.32

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.41
TIME SHIFT OF PEAK FLOW (min)= 50.00
MAXIMUM STORAGE USED (ha.m.)= 0.2080

CALIB	
STANDHYD (0202)	Area (ha)= 15.28
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	33.12	35.33	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	7.97 (ii)	18.68 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
PEAK FLOW	(cms)=	0.69	0.46	1.115 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	35.00	26.13	30.56
TOTAL RAINFALL	(mm)=	36.00	36.00	36.00
RUNOFF COEFFICIENT	=	0.97	0.73	0.85

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.1400	0.4050
0.4200	0.2250	1.3390	0.4450
0.6870	0.3000	1.5430	0.5000
0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.115	2.75	30.56
OUTFLOW: ID= 1 (0002)	15.280	0.418	3.42	30.56

PEAK FLOW REDUCTION [Qout/Qin](%)= 37.49
TIME SHIFT OF PEAK FLOW (min)= 40.00
MAXIMUM STORAGE USED (ha.m.)= 0.2243

CALIB	
STANDHYD (0205)	Area (ha)= 27.24
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	33.12	18.14	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	9.49 (ii)	23.46 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	25.00	
Unit Hyd. peak	(cms)=	0.12	0.05	
PEAK FLOW	(cms)=	1.18	0.34	1.425 (iii)
TIME TO PEAK	(hrs)=	2.75	3.00	2.75
RUNOFF VOLUME	(mm)=	35.00	12.82	23.69
TOTAL RAINFALL	(mm)=	36.00	36.00	36.00
RUNOFF COEFFICIENT	=	0.97	0.36	0.66

(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(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	1.5119

	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	1.425	2.75	23.69
OUTFLOW: ID= 1 (0038)	27.241	0.002	7.33	3.95

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.14
TIME SHIFT OF PEAK FLOW (min)=275.00
MAXIMUM STORAGE USED (ha.m.)= 0.6420

CALIB	
STANDHYD (0208)	Area (ha)= 14.48
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

Max.Eff.Inten.(mm/hr)=	33.12	19.05		
over (min)	10.00	25.00		
Storage Coeff. (min)=	7.85 (ii)	21.55 (ii)		
Unit Hyd. Tpeak (min)=	10.00	25.00		
Unit Hyd. peak (cms)=	0.13	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.65	0.19	0.789 (iii)	
TIME TO PEAK (hrs)=	2.75	3.00	2.75	
RUNOFF VOLUME (mm)=	35.00	13.11	24.05	
TOTAL RAINFALL (mm)=	36.00	36.00	36.00	
RUNOFF COEFFICIENT =	0.97	0.36	0.67	

(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(0040)	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	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	0.789	2.75	24.05
OUTFLOW: ID= 1 (0040)	14.479	0.002	7.00	6.95

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.25
TIME SHIFT OF PEAK FLOW (min)=255.00
MAXIMUM STORAGE USED (ha.m.)= 0.3452

CALIB	
STANDHYD (0209)	Area (ha)= 5.13
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.02	2.10
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	184.85	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	4.32	3.250	9.36	4.83	0.72
0.167	0.00	1.750	4.32	3.333	5.04	4.92	0.72
0.250	0.00	1.833	12.24	3.417	5.04	5.00	0.72
0.333	0.72	1.917	12.24	3.500	5.04	5.08	0.72
0.417	0.72	2.000	12.24	3.583	5.04	5.17	0.72
0.500	0.72	2.083	12.24	3.667	5.04	5.25	0.72
0.583	0.72	2.167	12.24	3.750	5.04	5.33	0.72
0.667	0.72	2.250	12.24	3.833	2.88	5.42	0.72
0.750	0.72	2.333	33.12	3.917	2.88	5.50	0.72
0.833	0.72	2.417	33.12	4.000	2.88	5.58	0.72
0.917	0.72	2.500	33.12	4.083	2.88	5.67	0.72
1.000	0.72	2.583	33.12	4.167	2.88	5.75	0.72
1.083	0.72	2.667	33.12	4.250	2.88	5.83	0.72
1.167	0.72	2.750	33.12	4.333	1.44	5.92	0.72
1.250	0.72	2.833	9.36	4.417	1.44	6.00	0.72
1.333	4.32	2.917	9.36	4.500	1.44	6.08	0.72
1.417	4.32	3.000	9.36	4.583	1.44	6.17	0.72
1.500	4.32	3.083	9.36	4.667	1.44	6.25	0.72
1.583	4.32	3.167	9.36	4.750	1.44		

Max.Eff.Inten.(mm/hr)=	33.12	35.77		
over (min)	5.00	20.00		
Storage Coeff. (min)=	5.75 (ii)	16.39 (ii)		
Unit Hyd. Tpeak (min)=	5.00	20.00		
Unit Hyd. peak (cms)=	0.20	0.06		
			TOTALS	
PEAK FLOW (cms)=	0.23	0.15	0.379 (iii)	
TIME TO PEAK (hrs)=	2.75	2.83	2.75	
RUNOFF VOLUME (mm)=	35.00	25.08	30.04	
TOTAL RAINFALL (mm)=	36.00	36.00	36.00	
RUNOFF COEFFICIENT =	0.97	0.70	0.83	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 96.0 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(0041)	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    |  0.0086      0.3208
                         0.0028     0.1768    |  0.0104      0.3558
                         0.0049     0.2347    |  0.0123      0.3905
                         0.0065     0.2732    |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)    5.125     0.379      2.75      30.04
   OUTFLOW: ID= 1 (  0041)    5.125     0.002      6.58      18.22

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.63
                  TIME SHIFT OF PEAK FLOW       (min)=230.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.1506

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\0dce745b-265f-4dc0-8d81-6cd3041cf9f5\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\0dce745b-265f-4dc0-8d81-6cd3041cf9f5\sce

DATE: 12-13-2024                          TIME: 11:58:41

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : 2.0 - 5Yr 6Hr AES             **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\1f2a23bb
| 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 |
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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=         8.29          7.35
     Dep. Storage     (mm)=         1.00          5.00
     Average Slope     (%)=         1.00          2.00
     Length            (m)=       322.93         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         45.20
               over (min)        5.00         20.00
     Storage Coeff.  (min)=      7.17 (ii)    16.87 (ii)
     Unit Hyd. Tpeak (min)=      5.00         20.00
     Unit Hyd. peak  (cms)=      0.17          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.85          0.66      1.473 (iii)
     TIME TO PEAK    (hrs)=      2.75          2.83       2.75
     RUNOFF VOLUME    (mm)=     46.81         33.03      39.23
     TOTAL RAINFALL   (mm)=     47.81         47.81      47.81
     RUNOFF COEFFICIENT   =      0.98          0.69       0.82

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  94.0    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(  0004)|     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    |  1.4710      0.2600
                         0.6340     0.1300    |  1.6870      0.2900
                         0.9580     0.1800    |  1.9040      0.3300
                         1.1830     0.2100    |  0.0000      0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)    15.642     1.473      2.75      39.23
   OUTFLOW: ID= 1 (  0004)    15.642     0.933      3.00      39.23
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                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 63.34
                  TIME SHIFT OF PEAK FLOW          (min)= 15.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.1761

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| CALIB             |
| STANDHYD (  0201)|   Area    (ha)=  27.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  50.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.91         11.52
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     427.61         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         29.49
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       8.49 (ii)    19.99 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.12          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.63          0.61          2.152 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.92           2.75
     RUNOFF VOLUME    (mm)=      46.81         21.03          33.92
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.44           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(  0001)|     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   |  0.7170     0.8740
                         0.2650     0.4502   |  0.8410     0.9835
                         0.4330     0.6160   |  0.9670     1.0927
                         0.5550     0.7304   |  0.0000     0.0000

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

  INFLOW : ID= 2 (  0201)     27.428      2.152      2.75      33.92
  OUTFLOW: ID= 1 (  0001)     27.428      0.433      3.92      33.90

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.10
                  TIME SHIFT OF PEAK FLOW          (min)= 70.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.6159

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| CALIB             |
| STANDHYD (  0203)|   Area    (ha)=  20.04
|ID= 1 DT= 5.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  57.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.62          7.41
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     365.48         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         46.25
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       7.72 (ii)    17.33 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.37          0.69          2.014 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83           2.75
     RUNOFF VOLUME    (mm)=      46.81         34.41          41.48
     TOTAL RAINFALL   (mm)=      47.81         47.81          47.81
     RUNOFF COEFFICIENT   =       0.98          0.72           0.87

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0    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(  0003)|     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   |  0.5390     0.8200
                         0.1920     0.4600   |  0.6370     0.9100
                         0.3190     0.6000   |  0.7370     1.0000
                         0.4130     0.7000   |  0.0000     0.0000
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		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0203)	20.036	2.014	2.75	41.48
OUTFLOW: ID= 1	(0003)	20.036	0.317	4.00	41.45

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.75
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.5983

CALIB	
STANDHYD (0206)	Area (ha)= 25.23
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	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		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	43.98	50.42	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	8.28 (ii)	17.56 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
PEAK FLOW	(cms)=	2.10	0.72	2.802 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	46.81	41.36	45.17
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.87	0.94

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5830	1.1750
0.2100	0.6900	0.6860	1.3000
0.3470	0.8750	0.7930	1.4200
0.4490	1.0100	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0206)	25.232	2.802	2.75	45.17
OUTFLOW: ID= 1	(0006)	25.232	0.346	4.08	45.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 12.34
TIME SHIFT OF PEAK FLOW (min)= 80.00
MAXIMUM STORAGE USED (ha.m.)= 0.8734

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	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		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	43.98	30.05	
over	(min)	5.00	20.00	
Storage Coeff.	(min)=	7.27 (ii)	18.68 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.17	0.06	
PEAK FLOW	(cms)=	0.93	0.40	1.276 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	46.81	21.19	33.23
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.44	0.70

(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(0007)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6810	0.4150

	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	1.276	2.75	33.23
OUTFLOW: ID= 1 (0007)	16.372	0.410	3.42	33.22

PEAK FLOW REDUCTION [Qout/Qin](%)= 32.15
TIME SHIFT OF PEAK FLOW (min)= 40.00
MAXIMUM STORAGE USED (ha.m.)= 0.2892

CALIB	
STANDHYD (0202)	Area (ha)= 15.28
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	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		

				TOTALS
Max.Eff.Inten.(mm/hr)=		43.98	48.93	
over (min)		5.00	20.00	
Storage Coeff. (min)=		7.12 (ii)	16.51 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.17	0.06	
PEAK FLOW	(cms)=	0.92	0.68	1.578 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	46.81	37.66	42.24
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.79	0.88

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	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	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.578	2.75	42.24
OUTFLOW: ID= 1 (0002)	15.280	0.676	3.25	42.23

PEAK FLOW REDUCTION [Qout/Qin](%)= 42.86
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.2970

CALIB	
STANDHYD (0205)	Area (ha)= 27.24
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	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		

				TOTALS
Max.Eff.Inten.(mm/hr)=		43.98	29.31	
over (min)		10.00	20.00	
Storage Coeff. (min)=		8.47 (ii)	20.00 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.12	0.06	
PEAK FLOW	(cms)=	1.59	0.62	2.114 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	46.81	20.98	33.63
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.44	0.70

(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(0038)	OVERFLOW IS OFF

| IN= 2---> OUT= 1 |
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	2.114	2.75	33.63
OUTFLOW: ID= 1 (0038)	27.241	0.003	7.17	5.95

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.15
TIME SHIFT OF PEAK FLOW (min)=265.00
MAXIMUM STORAGE USED (ha.m.)= 0.9114

CALIB
STANDHYD (0208)
ID= 1 DT= 5.0 min

Area (ha)= 14.48
Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	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	30.66	
over (min)		5.00	20.00	
Storage Coeff. (min)=		7.01 (ii)	18.33 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.17	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.88	0.34	1.171 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	46.81	21.36	34.09
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.45	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.

RESERVOIR(0040)	OVERFLOW IS OFF
IN= 2---> OUT= 1	

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	1.171	2.75	34.09
OUTFLOW: ID= 1 (0040)	14.479	0.003	6.83	10.16

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.28
TIME SHIFT OF PEAK FLOW (min)=245.00
MAXIMUM STORAGE USED (ha.m.)= 0.4889

CALIB
STANDHYD (0209)
ID= 1 DT= 5.0 min

Area (ha)= 5.13
Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.02	2.10
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	184.85	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	50.27	
over (min)		5.00	15.00	
Storage Coeff. (min)=		5.13 (ii)	14.42 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.21	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.31	0.24	0.548 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	46.81	36.47	41.64
TOTAL RAINFALL	(mm)=	47.81	47.81	47.81
RUNOFF COEFFICIENT	=	0.98	0.76	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 96.0 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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)    5.125     0.548      2.75      41.64
   OUTFLOW: ID= 1 (  0041)    5.125     0.004      6.50      25.54

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.72
                  TIME SHIFT OF PEAK FLOW         (min)=225.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2083

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\0430edbc-f9e4-4b51-8cb1-8aadec922435\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\0430edbc-f9e4-4b51-8cb1-8aadec922435\sce


DATE: 12-13-2024                          TIME: 11:58:41

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : 3.0 - 10Yr 6Hr AES            **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\cba7582c
| Ptotal= 55.69 mm |    Comments: 10 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   18.94 |  3.50    7.80 |  5.25    1.11
                0.25    1.11 |  2.00   18.94 |  3.75    4.46 |  5.50    1.11
                0.50    1.11 |  2.25   51.24 |  4.00    4.46 |  5.75    1.11
                0.75    1.11 |  2.50   51.24 |  4.25    2.23 |  6.00    1.11
                1.00    1.11 |  2.75   14.48 |  4.50    2.23 |
                1.25    6.68 |  3.00   14.48 |  4.75    1.11 |
                1.50    6.68 |  3.25    7.80 |  5.00    1.11 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
-------------------
                                 IMPERVIOUS    PERVIOUS (i)
     Surface Area      (ha)=        8.29          7.35
     Dep. Storage      (mm)=        1.00          5.00
     Average Slope      (%)=        1.00          2.00
     Length             (m)=      322.93         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    6.68 | 3.250   14.48 | 4.83    1.11
               0.167    0.00 | 1.750    6.68 | 3.333    7.80 | 4.92    1.11
               0.250    0.00 | 1.833   18.94 | 3.417    7.80 | 5.00    1.11
               0.333    1.11 | 1.917   18.94 | 3.500    7.80 | 5.08    1.11
               0.417    1.11 | 2.000   18.94 | 3.583    7.80 | 5.17    1.11
               0.500    1.11 | 2.083   18.94 | 3.667    7.80 | 5.25    1.11
               0.583    1.11 | 2.167   18.94 | 3.750    7.80 | 5.33    1.11
               0.667    1.11 | 2.250   18.94 | 3.833    4.46 | 5.42    1.11
               0.750    1.11 | 2.333   51.24 | 3.917    4.46 | 5.50    1.11
               0.833    1.11 | 2.417   51.24 | 4.000    4.46 | 5.58    1.11
               0.917    1.11 | 2.500   51.24 | 4.083    4.46 | 5.67    1.11
               1.000    1.11 | 2.583   51.24 | 4.167    4.46 | 5.75    1.11
               1.083    1.11 | 2.667   51.24 | 4.250    4.46 | 5.83    1.11
               1.167    1.11 | 2.750   51.24 | 4.333    2.23 | 5.92    1.11
               1.250    1.11 | 2.833   14.48 | 4.417    2.23 | 6.00    1.11
               1.333    6.68 | 2.917   14.48 | 4.500    2.23 | 6.08    1.11
               1.417    6.68 | 3.000   14.48 | 4.583    2.23 | 6.17    1.11
               1.500    6.68 | 3.083   14.48 | 4.667    2.23 | 6.25    1.11
               1.583    6.68 | 3.167   14.48 | 4.750    2.23 |

     Max.Eff.Inten.(mm/hr)=      51.24         54.19
                 over (min)        5.00         20.00
     Storage Coeff.  (min)=       6.74 (ii)    15.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00         20.00
     Unit Hyd. peak  (cms)=       0.18          0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.99          0.83          1.782 (iii)
     TIME TO PEAK    (hrs)=       2.75          2.83          2.75
     RUNOFF VOLUME    (mm)=      54.69         40.50         46.89
     TOTAL RAINFALL   (mm)=      55.69         55.69         55.69
     RUNOFF COEFFICIENT   =       0.98          0.73          0.84


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  94.0    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(  0004)|     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   |   1.4710     0.2600
                         0.6340     0.1300   |   1.6870     0.2900
                         0.9580     0.1800   |   1.9040     0.3300
                         1.1830     0.2100   |   0.0000     0.0000
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		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0204)	15.642	1.782	2.75	46.89
OUTFLOW: ID= 1 (	0004)	15.642	1.166	3.00	46.88

PEAK FLOW REDUCTION [Qout/Qin](%)= 65.41
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.2085

CALIB	
STANDHYD (0201)	Area (ha)= 27.43
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	51.24	37.53	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	7.98 (ii)	18.43 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
PEAK FLOW	(cms)=	1.91	0.81	2.621 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	54.69	26.96	40.83
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.48	0.73

(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(0001)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.7170	0.8740
0.2650	0.4502	0.8410	0.9835
0.4330	0.6160	0.9670	1.0927
0.5550	0.7304	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (	0201)	27.428	2.621	2.75	40.83
OUTFLOW: ID= 1 (	0001)	27.428	0.555	3.83	40.81

PEAK FLOW REDUCTION [Qout/Qin](%)= 21.17
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.7303

CALIB	
STANDHYD (0203)	Area (ha)= 20.04
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	51.24	55.14	
over	(min)	5.00	20.00	
Storage Coeff.	(min)=	7.26 (ii)	16.22 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.17	0.06	
PEAK FLOW	(cms)=	1.61	0.86	2.424 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	54.69	41.99	49.23
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.75	0.88

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5390	0.8200

	0.1920	0.4600	0.6370	0.9100
	0.3190	0.6000	0.7370	1.0000
	0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	2.424	2.75	49.23
OUTFLOW: ID= 1 (0003)	20.036	0.410	3.83	49.20

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.91
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.6969

CALIB	
STANDHYD (0206)	Area (ha)= 25.23
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

Max.Eff.Inten.(mm/hr)=		51.24	58.85	
over (min)		10.00	20.00	
Storage Coeff. (min)=		7.78 (ii)	16.51 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.13	0.06	
				TOTALS
PEAK FLOW	(cms)=	2.46	0.87	3.304 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	54.69	49.23	53.05
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.88	0.95

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(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	0.5830	1.1750
	0.2100	0.6900	0.6860	1.3000
	0.3470	0.8750	0.7930	1.4200
	0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	3.304	2.75	53.05
OUTFLOW: ID= 1 (0006)	25.232	0.447	4.00	53.02

PEAK FLOW REDUCTION [Qout/Qin](%)= 13.54
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 1.0081

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

Max.Eff.Inten.(mm/hr)=		51.24	38.21	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.84 (ii)	17.21 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.06	
				TOTALS
PEAK FLOW	(cms)=	1.09	0.53	1.556 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	54.69	27.15	40.09
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.49	0.72

(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(0007)	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	0.6810	0.4150
	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	1.556	2.75	40.09
OUTFLOW: ID= 1 (0007)	16.372	0.524	3.42	40.08

PEAK FLOW REDUCTION [Qout/Qin](%)= 33.70
TIME SHIFT OF PEAK FLOW (min)= 40.00
MAXIMUM STORAGE USED (ha.m.)= 0.3437

CALIB
STANDHYD (0202) | Area (ha)= 15.28
ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

				TOTALS
Max.Eff.Inten.(mm/hr)=		51.24	57.65	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.70 (ii)	15.49 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.07	
PEAK FLOW	(cms)=	1.08	0.83	1.884 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	54.69	45.42	50.05
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.82	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002) | OVERFLOW IS OFF
IN= 2---> OUT= 1

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.884	2.75	50.05
OUTFLOW: ID= 1 (0002)	15.280	0.856	3.17	50.05

PEAK FLOW REDUCTION [Qout/Qin](%)= 45.43
TIME SHIFT OF PEAK FLOW (min)= 25.00
MAXIMUM STORAGE USED (ha.m.)= 0.3433

CALIB
STANDHYD (0205) | Area (ha)= 27.24
ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

				TOTALS
Max.Eff.Inten.(mm/hr)=		51.24	37.31	
over (min)		10.00	20.00	
Storage Coeff. (min)=		7.97 (ii)	18.44 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.13	0.06	
PEAK FLOW	(cms)=	1.86	0.82	2.577 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	54.69	26.90	40.52
TOTAL RAINFALL	(mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT	=	0.98	0.48	0.73

(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(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	2.577	2.75	40.52
OUTFLOW: ID= 1 (0038)	27.241	0.004	7.00	8.07

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.17
TIME SHIFT OF PEAK FLOW (min)=255.00
MAXIMUM STORAGE USED (ha.m.)= 1.0973

CALIB			
STANDHYD (0208)	Area (ha)= 14.48		
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	8.54	5.94	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	310.68	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

Max.Eff.Inten.(mm/hr)=	51.24	38.94	
over (min)	5.00	20.00	
Storage Coeff. (min)=	6.59 (ii)	16.88 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.18	0.06	
			TOTALS
PEAK FLOW (cms)=	1.02	0.45	1.422 (iii)
TIME TO PEAK (hrs)=	2.75	2.92	2.75
RUNOFF VOLUME (mm)=	54.69	27.35	41.02
TOTAL RAINFALL (mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT =	0.98	0.49	0.74

(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(0040)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	1.422	2.75	41.02
OUTFLOW: ID= 1 (0040)	14.479	0.004	6.83	13.26

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.32
TIME SHIFT OF PEAK FLOW (min)=245.00
MAXIMUM STORAGE USED (ha.m.)= 0.5877

CALIB			
STANDHYD (0209)	Area (ha)= 5.13		
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	3.02	2.10	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	184.85	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	6.68	3.250	14.48	4.83	1.11
0.167	0.00	1.750	6.68	3.333	7.80	4.92	1.11
0.250	0.00	1.833	18.94	3.417	7.80	5.00	1.11
0.333	1.11	1.917	18.94	3.500	7.80	5.08	1.11
0.417	1.11	2.000	18.94	3.583	7.80	5.17	1.11
0.500	1.11	2.083	18.94	3.667	7.80	5.25	1.11
0.583	1.11	2.167	18.94	3.750	7.80	5.33	1.11
0.667	1.11	2.250	18.94	3.833	4.46	5.42	1.11
0.750	1.11	2.333	51.24	3.917	4.46	5.50	1.11
0.833	1.11	2.417	51.24	4.000	4.46	5.58	1.11
0.917	1.11	2.500	51.24	4.083	4.46	5.67	1.11
1.000	1.11	2.583	51.24	4.167	4.46	5.75	1.11
1.083	1.11	2.667	51.24	4.250	4.46	5.83	1.11
1.167	1.11	2.750	51.24	4.333	2.23	5.92	1.11
1.250	1.11	2.833	14.48	4.417	2.23	6.00	1.11
1.333	6.68	2.917	14.48	4.500	2.23	6.08	1.11
1.417	6.68	3.000	14.48	4.583	2.23	6.17	1.11
1.500	6.68	3.083	14.48	4.667	2.23	6.25	1.11
1.583	6.68	3.167	14.48	4.750	2.23		

Max.Eff.Inten.(mm/hr)=	51.24	59.49	
over (min)	5.00	15.00	
Storage Coeff. (min)=	4.83 (ii)	13.51 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.22	0.08	
			TOTALS
PEAK FLOW (cms)=	0.36	0.29	0.654 (iii)
TIME TO PEAK (hrs)=	2.75	2.75	2.75
RUNOFF VOLUME (mm)=	54.69	44.16	49.42
TOTAL RAINFALL (mm)=	55.69	55.69	55.69
RUNOFF COEFFICIENT =	0.98	0.79	0.89

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

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  96.0     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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)    5.125     0.654      2.75      49.42
   OUTFLOW: ID= 1 (  0041)    5.125     0.005      6.50      31.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.82
                  TIME SHIFT OF PEAK FLOW          (min)=225.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2465

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\2593009e-0f59-4388-9b83-c27f94a66205\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\2593009e-0f59-4388-9b83-c27f94a66205\sce


DATE: 12-13-2024                          TIME: 11:58:41

USER:



COMMENTS: _____________________________________________________


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  ************************************************
  ** SIMULATION : 4.0 - 25Yr 6Hr AES            **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\8f1eec8a
| Ptotal= 65.59 mm |    Comments: 25 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   22.30 |  3.50    9.18 |  5.25    1.31
                  0.25    1.31 |  2.00   22.30 |  3.75    5.25 |  5.50    1.31
                  0.50    1.31 |  2.25   60.35 |  4.00    5.25 |  5.75    1.31
                  0.75    1.31 |  2.50   60.35 |  4.25    2.62 |  6.00    1.31
                  1.00    1.31 |  2.75   17.06 |  4.50    2.62 |
                  1.25    7.87 |  3.00   17.06 |  4.75    1.31 |
                  1.50    7.87 |  3.25    9.18 |  5.00    1.31 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         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    7.87 | 3.250   17.06 | 4.83    1.31
                 0.167    0.00 | 1.750    7.87 | 3.333    9.18 | 4.92    1.31
                 0.250    0.00 | 1.833   22.30 | 3.417    9.18 | 5.00    1.31
                 0.333    1.31 | 1.917   22.30 | 3.500    9.18 | 5.08    1.31
                 0.417    1.31 | 2.000   22.30 | 3.583    9.18 | 5.17    1.31
                 0.500    1.31 | 2.083   22.30 | 3.667    9.18 | 5.25    1.31
                 0.583    1.31 | 2.167   22.30 | 3.750    9.18 | 5.33    1.31
                 0.667    1.31 | 2.250   22.30 | 3.833    5.25 | 5.42    1.31
                 0.750    1.31 | 2.333   60.35 | 3.917    5.25 | 5.50    1.31
                 0.833    1.31 | 2.417   60.35 | 4.000    5.25 | 5.58    1.31
                 0.917    1.31 | 2.500   60.35 | 4.083    5.25 | 5.67    1.31
                 1.000    1.31 | 2.583   60.35 | 4.167    5.25 | 5.75    1.31
                 1.083    1.31 | 2.667   60.35 | 4.250    5.25 | 5.83    1.31
                 1.167    1.31 | 2.750   60.35 | 4.333    2.62 | 5.92    1.31
                 1.250    1.31 | 2.833   17.06 | 4.417    2.62 | 6.00    1.31
                 1.333    7.87 | 2.917   17.06 | 4.500    2.62 | 6.08    1.31
                 1.417    7.87 | 3.000   17.06 | 4.583    2.62 | 6.17    1.31
                 1.500    7.87 | 3.083   17.06 | 4.667    2.62 | 6.25    1.31
                 1.583    7.87 | 3.167   17.06 | 4.750    2.62 |

     Max.Eff.Inten.(mm/hr)=      60.35         65.38
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      6.32 (ii)    14.68 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.19          0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=      1.17          1.07      2.240 (iii)
     TIME TO PEAK    (hrs)=      2.75          2.83       2.75
     RUNOFF VOLUME    (mm)=     64.59         50.02      56.57
     TOTAL RAINFALL   (mm)=     65.59         65.59      65.59
     RUNOFF COEFFICIENT   =      0.98          0.76       0.86


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  94.0     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(  0004)|     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	1.4710	0.2600
	0.6340	0.1300	1.6870	0.2900
	0.9580	0.1800	1.9040	0.3300
	1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	2.240	2.75	56.57
OUTFLOW: ID= 1 (0004)	15.642	1.455	2.92	56.57

PEAK FLOW REDUCTION [Qout/Qin](%)= 64.98
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.2579

CALIB
STANDHYD (0201)| Area (ha)= 27.43
ID= 1 DT= 5.0 min | Total Imp(%)= 58.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

Max.Eff.Inten.(mm/hr)=		60.35	49.52	
over (min)		5.00	20.00	
Storage Coeff. (min)=		7.48 (ii)	16.82 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.17	0.06	
				TOTALS
PEAK FLOW	(cms)=	2.27	1.09	3.250 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	64.59	34.82	49.71
TOTAL RAINFALL	(mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT	=	0.98	0.53	0.76

(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(0001)| OVERFLOW IS OFF
IN= 2---> OUT= 1 |

DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	3.250	2.75	49.71
OUTFLOW: ID= 1 (0001)	27.428	0.717	3.75	49.69

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.05
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.8738

CALIB
STANDHYD (0203)| Area (ha)= 20.04
ID= 1 DT= 5.0 min | Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

Max.Eff.Inten.(mm/hr)=		60.35	66.19	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.80 (ii)	15.13 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.07	
				TOTALS
PEAK FLOW	(cms)=	1.90	1.07	2.928 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	64.59	51.60	59.00
TOTAL RAINFALL	(mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT	=	0.98	0.79	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)| 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 | 0.5390 0.8200
0.1920 0.4600 | 0.6370 0.9100
0.3190 0.6000 | 0.7370 1.0000
0.4130 0.7000 | 0.0000 0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	2.928	2.75	59.00
OUTFLOW: ID= 1 (0003)	20.036	0.537	3.75	58.97

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.35
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.8191

| CALIB |
| STANDHYD (0206)| Area (ha)= 25.23
|ID= 1 DT= 5.0 min | Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

				TOTALS
Max.Eff.Inten.(mm/hr)=		60.35	69.41	
over (min)		5.00	20.00	
Storage Coeff. (min)=		7.29 (ii)	15.46 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.17	0.07	
PEAK FLOW	(cms)=	2.93	1.04	3.952 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	64.59	59.11	62.95
TOTAL RAINFALL	(mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT	=	0.98	0.90	0.96

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(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 | 0.5830 1.1750
0.2100 0.6900 | 0.6860 1.3000
0.3470 0.8750 | 0.7930 1.4200
0.4490 1.0100 | 0.0000 0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	3.952	2.75	62.95
OUTFLOW: ID= 1 (0006)	25.232	0.582	3.83	62.91

PEAK FLOW REDUCTION [Qout/Qin](%)= 14.72
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 1.1737

| CALIB |
| STANDHYD (0207)| Area (ha)= 16.37
|ID= 1 DT= 5.0 min | Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

				TOTALS
Max.Eff.Inten.(mm/hr)=		60.35	50.37	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.40 (ii)	15.69 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.07	
PEAK FLOW	(cms)=	1.28	0.71	1.924 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	64.59	35.04	48.93
TOTAL RAINFALL	(mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT	=	0.98	0.53	0.75

(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(0007)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6810	0.4150
	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	1.924	2.75	48.93
OUTFLOW: ID= 1 (0007)	16.372	0.676	3.33	48.92

PEAK FLOW REDUCTION [Qout/Qin](%)= 35.13
TIME SHIFT OF PEAK FLOW (min)= 35.00
MAXIMUM STORAGE USED (ha.m.)= 0.4128

CALIB			
STANDHYD (0202)	Area (ha)= 15.28		
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	8.71	6.57	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	319.17	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

			TOTALS
Max.Eff.Inten.(mm/hr)=	60.35	68.50	
over (min)	5.00	15.00	
Storage Coeff. (min)=	6.27 (ii)	14.48 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.19	0.08	
PEAK FLOW (cms)=	1.27	1.05	2.321 (iii)
TIME TO PEAK (hrs)=	2.75	2.75	2.75
RUNOFF VOLUME (mm)=	64.59	55.20	59.90
TOTAL RAINFALL (mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT =	0.98	0.84	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	2.321	2.75	59.90
OUTFLOW: ID= 1 (0002)	15.280	1.124	3.08	59.89

PEAK FLOW REDUCTION [Qout/Qin](%)= 48.45
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.4027

CALIB			
STANDHYD (0205)	Area (ha)= 27.24		
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 49.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	15.53	11.71	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	426.16	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

			TOTALS
Max.Eff.Inten.(mm/hr)=	60.35	49.26	
over (min)	5.00	20.00	
Storage Coeff. (min)=	7.46 (ii)	16.83 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.17	0.06	
PEAK FLOW (cms)=	2.21	1.10	3.200 (iii)
TIME TO PEAK (hrs)=	2.75	2.92	2.75
RUNOFF VOLUME (mm)=	64.59	34.75	49.37
TOTAL RAINFALL (mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT =	0.98	0.53	0.75

(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(0038) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0205)	27.241	3.200	2.75	49.37
OUTFLOW: ID= 1	(0038)	27.241	0.006	6.92	11.05

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.20
TIME SHIFT OF PEAK FLOW (min)=250.00
MAXIMUM STORAGE USED (ha.m.)= 1.3362

CALIB STANDHYD (0208) ID= 1 DT= 5.0 min	Area (ha)= 14.48	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

Max.Eff.Inten.(mm/hr)=		60.35	51.27	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.17 (ii)	15.39 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.19	0.07	
				TOTALS
PEAK FLOW	(cms)=	1.21	0.60	1.752 (iii)
TIME TO PEAK	(hrs)=	2.75	2.92	2.75
RUNOFF VOLUME	(mm)=	64.59	35.27	49.93
TOTAL RAINFALL	(mm)=	65.59	65.59	65.59
RUNOFF COEFFICIENT	=	0.98	0.54	0.76

(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(0040) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0208)	14.479	1.752	2.75	49.93
OUTFLOW: ID= 1	(0040)	14.479	0.006	6.75	17.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.36
TIME SHIFT OF PEAK FLOW (min)=240.00
MAXIMUM STORAGE USED (ha.m.)= 0.7145

CALIB STANDHYD (0209) ID= 1 DT= 5.0 min	Area (ha)= 5.13	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.02	2.10
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	184.85	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	7.87	3.250	17.06	4.83	1.31
0.167	0.00	1.750	7.87	3.333	9.18	4.92	1.31
0.250	0.00	1.833	22.30	3.417	9.18	5.00	1.31
0.333	1.31	1.917	22.30	3.500	9.18	5.08	1.31
0.417	1.31	2.000	22.30	3.583	9.18	5.17	1.31
0.500	1.31	2.083	22.30	3.667	9.18	5.25	1.31
0.583	1.31	2.167	22.30	3.750	9.18	5.33	1.31
0.667	1.31	2.250	22.30	3.833	5.25	5.42	1.31
0.750	1.31	2.333	60.35	3.917	5.25	5.50	1.31
0.833	1.31	2.417	60.35	4.000	5.25	5.58	1.31
0.917	1.31	2.500	60.35	4.083	5.25	5.67	1.31
1.000	1.31	2.583	60.35	4.167	5.25	5.75	1.31
1.083	1.31	2.667	60.35	4.250	5.25	5.83	1.31
1.167	1.31	2.750	60.35	4.333	2.62	5.92	1.31
1.250	1.31	2.833	17.06	4.417	2.62	6.00	1.31
1.333	7.87	2.917	17.06	4.500	2.62	6.08	1.31
1.417	7.87	3.000	17.06	4.583	2.62	6.17	1.31
1.500	7.87	3.083	17.06	4.667	2.62	6.25	1.31
1.583	7.87	3.167	17.06	4.750	2.62		

Max.Eff.Inten.(mm/hr)=		60.35	70.96	
over (min)		5.00	15.00	
Storage Coeff. (min)=		4.52 (ii)	12.62 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.23	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.43	0.36	0.786 (iii)
TIME TO PEAK	(hrs)=	2.75	2.75	2.75
RUNOFF VOLUME	(mm)=	64.59	53.88	59.24

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     TOTAL RAINFALL   (mm)=      65.59        65.59          65.59
     RUNOFF COEFFICIENT   =       0.98         0.82           0.90

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  96.0    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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)    5.125     0.786      2.75      59.24
   OUTFLOW: ID= 1 (  0041)    5.125     0.007      6.42      38.57

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.95
                  TIME SHIFT OF PEAK FLOW         (min)=220.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2943

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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\aa2ad27c-8b6f-4886-a876-18fd5cdae521\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\aa2ad27c-8b6f-4886-a876-18fd5cdae521\sce


DATE: 12-13-2024                          TIME: 11:58:41

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : 5.0 - 50Yr 6Hr AES            **
  ************************************************

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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\e2edfdd6
| Ptotal= 73.00 mm |    Comments: 50 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   24.82 |  3.50   10.22 |  5.25    1.46
                0.25    1.46 |  2.00   24.82 |  3.75    5.84 |  5.50    1.46
                0.50    1.46 |  2.25   67.16 |  4.00    5.84 |  5.75    1.46
                0.75    1.46 |  2.50   67.16 |  4.25    2.92 |  6.00    1.46
                1.00    1.46 |  2.75   18.98 |  4.50    2.92 |
                1.25    8.76 |  3.00   18.98 |  4.75    1.46 |
                1.50    8.76 |  3.25   10.22 |  5.00    1.46 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         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    8.76 | 3.250   18.98 |  4.83    1.46
               0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
               0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
               0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
               0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
               0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
               0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
               0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
               0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
               0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
               0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
               1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
               1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
               1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
               1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
               1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
               1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
               1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
               1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        73.70
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      6.05 (ii)   14.03 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.19         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=      1.31         1.23         2.540 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=     72.00        57.20        63.86
     TOTAL RAINFALL   (mm)=     73.00        73.00        73.00
     RUNOFF COEFFICIENT   =      0.99         0.78         0.87

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  94.0    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(  0004)|     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    |  1.4710     0.2600
                          0.6340     0.1300    |  1.6870     0.2900
                          0.9580     0.1800    |  1.9040     0.3300
                          1.1830     0.2100    |  0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)     15.642     2.540      2.75      63.86
   OUTFLOW: ID= 1 (  0004)     15.642     1.684      2.92      63.86

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 66.30
                TIME SHIFT OF PEAK FLOW          (min)= 10.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.2897

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--------------------
| CALIB            |
| STANDHYD (  0201)|   Area    (ha)=  27.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.91        11.52
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     427.61        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    8.76 | 3.250   18.98 |  4.83    1.46
              0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
              0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
              0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
              0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
              0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
              0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
              0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
              0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
              0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
              0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
              1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
              1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
              1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
              1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
              1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
              1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
              1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
              1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        57.66
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      7.16 (ii)   15.96 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.17         0.07
                                                      *TOTALS*
     PEAK FLOW       (cms)=      2.53         1.30       3.721 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.92        2.75
     RUNOFF VOLUME    (mm)=     72.00        40.93       56.47
     TOTAL RAINFALL   (mm)=     73.00        73.00       73.00
     RUNOFF COEFFICIENT   =      0.99         0.56        0.77

       (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(  0001)|     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    |  0.7170     0.8740
                          0.2650     0.4502    |  0.8410     0.9835
                          0.4330     0.6160    |  0.9670     1.0927
                          0.5550     0.7304    |  0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     27.428     3.721      2.75      56.47
   OUTFLOW: ID= 1 (  0001)     27.428     0.840      3.67      56.45

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.59
                TIME SHIFT OF PEAK FLOW          (min)= 55.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.9833

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--------------------
| CALIB            |
| STANDHYD (  0203)|   Area    (ha)=  20.04
|ID= 1 DT= 5.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  57.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.62         7.41
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     365.48        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    8.76 | 3.250   18.98 |  4.83    1.46
              0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
              0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
              0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
              0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
              0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
              0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
              0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
              0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
              0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
              0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
              1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
              1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
              1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
              1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
              1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
              1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
              1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
              1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        74.39
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      6.52 (ii)   14.46 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.18         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=      2.12         1.26       3.375 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.75        2.75
     RUNOFF VOLUME    (mm)=     72.00        58.84       66.34
     TOTAL RAINFALL   (mm)=     73.00        73.00       73.00
     RUNOFF COEFFICIENT   =      0.99         0.81        0.91

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  95.0     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(0003) / IN= 2---> OUT= 1 / DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5390	0.8200
	0.1920	0.4600	0.6370	0.9100
	0.3190	0.6000	0.7370	1.0000
	0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	3.375	2.75	66.34
OUTFLOW: ID= 1 (0003)	20.036	0.636	3.75	66.31

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.85
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.9093

CALIB / STANDHYD (0206) / ID= 1 DT= 5.0 min	Area (ha)= 25.23	Total Imp(%)= 74.00	Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	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	8.76	3.250	18.98	4.83	1.46
0.167	0.00	1.750	8.76	3.333	10.22	4.92	1.46
0.250	0.00	1.833	24.82	3.417	10.22	5.00	1.46
0.333	1.46	1.917	24.82	3.500	10.22	5.08	1.46
0.417	1.46	2.000	24.82	3.583	10.22	5.17	1.46
0.500	1.46	2.083	24.82	3.667	10.22	5.25	1.46
0.583	1.46	2.167	24.82	3.750	10.22	5.33	1.46
0.667	1.46	2.250	24.82	3.833	5.84	5.42	1.46
0.750	1.46	2.333	67.16	3.917	5.84	5.50	1.46
0.833	1.46	2.417	67.16	4.000	5.84	5.58	1.46
0.917	1.46	2.500	67.16	4.083	5.84	5.67	1.46
1.000	1.46	2.583	67.16	4.167	5.84	5.75	1.46
1.083	1.46	2.667	67.16	4.250	5.84	5.83	1.46
1.167	1.46	2.750	67.16	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.98	4.417	2.92	6.00	1.46
1.333	8.76	2.917	18.98	4.500	2.92	6.08	1.46
1.417	8.76	3.000	18.98	4.583	2.92	6.17	1.46
1.500	8.76	3.083	18.98	4.667	2.92	6.25	1.46
1.583	8.76	3.167	18.98	4.750	2.92		

				TOTALS
Max.Eff.Inten.(mm/hr)=		67.16	77.29	
over (min)		5.00	15.00	
Storage Coeff. (min)=		6.99 (ii)	14.81 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.17	0.08	
PEAK FLOW	(cms)=	3.27	1.21	4.476 (iii)
TIME TO PEAK	(hrs)=	2.75	2.75	2.75
RUNOFF VOLUME	(mm)=	72.00	66.51	70.35
TOTAL RAINFALL	(mm)=	73.00	73.00	73.00
RUNOFF COEFFICIENT	=	0.99	0.91	0.96

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006) / IN= 2---> OUT= 1 / DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5830	1.1750
	0.2100	0.6900	0.6860	1.3000
	0.3470	0.8750	0.7930	1.4200
	0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	4.476	2.75	70.35
OUTFLOW: ID= 1 (0006)	25.232	0.684	3.83	70.32

PEAK FLOW REDUCTION [Qout/Qin](%)= 15.28
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 1.2981

CALIB / STANDHYD (0207) / ID= 1 DT= 5.0 min	Area (ha)= 16.37	Total Imp(%)= 56.00	Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	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	8.76	3.250	18.98	4.83	1.46
0.167	0.00	1.750	8.76	3.333	10.22	4.92	1.46
0.250	0.00	1.833	24.82	3.417	10.22	5.00	1.46
0.333	1.46	1.917	24.82	3.500	10.22	5.08	1.46
0.417	1.46	2.000	24.82	3.583	10.22	5.17	1.46
0.500	1.46	2.083	24.82	3.667	10.22	5.25	1.46
0.583	1.46	2.167	24.82	3.750	10.22	5.33	1.46
0.667	1.46	2.250	24.82	3.833	5.84	5.42	1.46
0.750	1.46	2.333	67.16	3.917	5.84	5.50	1.46
0.833	1.46	2.417	67.16	4.000	5.84	5.58	1.46
0.917	1.46	2.500	67.16	4.083	5.84	5.67	1.46
1.000	1.46	2.583	67.16	4.167	5.84	5.75	1.46
1.083	1.46	2.667	67.16	4.250	5.84	5.83	1.46
1.167	1.46	2.750	67.16	4.333	2.92	5.92	1.46
1.250	1.46	2.833	18.98	4.417	2.92	6.00	1.46
1.333	8.76	2.917	18.98	4.500	2.92	6.08	1.46
1.417	8.76	3.000	18.98	4.583	2.92	6.17	1.46
1.500	8.76	3.083	18.98	4.667	2.92	6.25	1.46
1.583	8.76	3.167	18.98	4.750	2.92		

				TOTALS
Max.Eff.Inten.(mm/hr)=		67.16	58.61	
over (min)		5.00	15.00	
Storage Coeff. (min)=		6.14 (ii)	14.88 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.19	0.08	
PEAK FLOW	(cms)=	1.43	0.88	2.277 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	72.00	41.17	55.66
TOTAL RAINFALL	(mm)=	73.00	73.00	73.00
RUNOFF COEFFICIENT	=	0.99	0.56	0.76

```
      (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(  0007)|     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   |   0.6810     0.4150
                         0.2530     0.2100   |   0.8000     0.4700
                         0.4120     0.2900   |   0.9210     0.5250
                         0.5280     0.3450   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0207)     16.372     2.277     2.75      55.66
   OUTFLOW: ID= 1 (  0007)     16.372     0.795     3.33      55.65

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 34.93
                  TIME SHIFT OF PEAK FLOW          (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4687
```

```
-------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=  15.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  50.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.71         6.57
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     319.17        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    8.76 | 3.250   18.98 |  4.83    1.46
  0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
  0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
  0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
  0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
  0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
  0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
  0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
  0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
  0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
  0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
  1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
  1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
  1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
  1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
  1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
  1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
  1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
  1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        76.57
               over (min)        5.00        15.00
     Storage Coeff.  (min)=      6.01 (ii)   13.86 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.19         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.42         1.19        2.611 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=     72.00        62.55        67.27
     TOTAL RAINFALL   (mm)=     73.00        73.00        73.00
     RUNOFF COEFFICIENT   =      0.99         0.86         0.92
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  97.0    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(  0002)|     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   |   1.1400     0.4050
                         0.4200     0.2250   |   1.3390     0.4450
                         0.6870     0.3000   |   1.5430     0.5000
                         0.8820     0.3500   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     15.280     2.611     2.75      67.27
   OUTFLOW: ID= 1 (  0002)     15.280     1.329     3.00      67.27

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 50.88
                  TIME SHIFT OF PEAK FLOW          (min)= 15.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4432
```

```
-------------------
| CALIB            |
| STANDHYD (  0205)|   Area    (ha)=  27.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  49.00
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.53        11.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     426.16        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    8.76 | 3.250   18.98 |  4.83    1.46
  0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
  0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
  0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
  0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
  0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
  0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
  0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
  0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
  0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
  0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
  1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
  1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
  1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
  1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
  1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
  1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
  1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
  1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        57.36
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      7.15 (ii)   15.96 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.17         0.07
                                                    *TOTALS*
     PEAK FLOW       (cms)=      2.47         1.31        3.666 (iii)
     TIME TO PEAK    (hrs)=      2.75         2.92         2.75
```

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     RUNOFF VOLUME     (mm)=      72.00        40.86          56.12
     TOTAL RAINFALL    (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.56           0.77

       (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(  0038)|     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   |   0.0075     1.5119
                         0.0024     0.7743   |   0.0091     1.7018
                         0.0042     1.0612   |   0.0107     1.8935
                         0.0057     1.2596   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0205)     27.241     3.666      2.75      56.12
   OUTFLOW: ID= 1 (  0038)     27.241     0.008      6.92      13.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.21
                  TIME SHIFT OF PEAK FLOW          (min)=250.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5181

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0208)|   Area     (ha)=  14.48
|ID= 1 DT= 5.0 min |   Total Imp(%)=  59.00   Dir. Conn.(%)=  50.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.54         5.94
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     310.68        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    8.76 | 3.250   18.98 |  4.83    1.46
    0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
    0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
    0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
    0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
    0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
    0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
    0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
    0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
    0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
    0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
    1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
    1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
    1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
    1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
    1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
    1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
    1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
    1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        59.63
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       5.91 (ii)   14.59 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.19         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.35         0.74          2.063 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.83           2.75
     RUNOFF VOLUME    (mm)=      72.00        41.42          56.71
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.57           0.78

       (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(  0040)|     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   |   0.0075     0.8037
                         0.0024     0.4145   |   0.0090     0.9034
                         0.0042     0.5664   |   0.0107     1.0038
                         0.0056     0.6710   |   0.0000     0.0000

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0208)     14.479     2.063      2.75      56.71
   OUTFLOW: ID= 1 (  0040)     14.479     0.008      6.67      21.49

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.37
                  TIME SHIFT OF PEAK FLOW          (min)=235.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8110

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-------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  59.00   Dir. Conn.(%)=  50.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.02         2.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     184.85        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    8.76 | 3.250   18.98 |  4.83    1.46
    0.167    0.00 | 1.750    8.76 | 3.333   10.22 |  4.92    1.46
    0.250    0.00 | 1.833   24.82 | 3.417   10.22 |  5.00    1.46
    0.333    1.46 | 1.917   24.82 | 3.500   10.22 |  5.08    1.46
    0.417    1.46 | 2.000   24.82 | 3.583   10.22 |  5.17    1.46
    0.500    1.46 | 2.083   24.82 | 3.667   10.22 |  5.25    1.46
    0.583    1.46 | 2.167   24.82 | 3.750   10.22 |  5.33    1.46
    0.667    1.46 | 2.250   24.82 | 3.833    5.84 |  5.42    1.46
    0.750    1.46 | 2.333   67.16 | 3.917    5.84 |  5.50    1.46
    0.833    1.46 | 2.417   67.16 | 4.000    5.84 |  5.58    1.46
    0.917    1.46 | 2.500   67.16 | 4.083    5.84 |  5.67    1.46
    1.000    1.46 | 2.583   67.16 | 4.167    5.84 |  5.75    1.46
    1.083    1.46 | 2.667   67.16 | 4.250    5.84 |  5.83    1.46
    1.167    1.46 | 2.750   67.16 | 4.333    2.92 |  5.92    1.46
    1.250    1.46 | 2.833   18.98 | 4.417    2.92 |  6.00    1.46
    1.333    8.76 | 2.917   18.98 | 4.500    2.92 |  6.08    1.46
    1.417    8.76 | 3.000   18.98 | 4.583    2.92 |  6.17    1.46
    1.500    8.76 | 3.083   18.98 | 4.667    2.92 |  6.25    1.46
    1.583    8.76 | 3.167   18.98 | 4.750    2.92 |

     Max.Eff.Inten.(mm/hr)=      67.16        79.48
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       4.33 (ii)   12.07 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
```

```
     Unit Hyd. peak  (cms)=       0.23         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.48         0.41          0.884 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      72.00        61.19          66.59
     TOTAL RAINFALL   (mm)=      73.00        73.00          73.00
     RUNOFF COEFFICIENT   =       0.99         0.84           0.91

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  96.0     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(  0041)|     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   |   0.0086     0.3208
                          0.0028     0.1768   |   0.0104     0.3558
                          0.0049     0.2347   |   0.0123     0.3905
                          0.0065     0.2732   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)     5.125     0.884      2.75      66.59
   OUTFLOW: ID= 1 (  0041)     5.125     0.009      6.42      44.45

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.03
                  TIME SHIFT OF PEAK FLOW          (min)=220.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3300

--------------------------------------------------------------------------------
================================================================================
======

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\72bffd02-a276-447c-881f-b7d20fd3a4f1\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\72bffd02-a276-447c-881f-b7d20fd3a4f1\sce


DATE: 12-13-2024                          TIME: 11:58:41

USER:



COMMENTS: _____

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```

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  ************************************************
  ** SIMULATION : 6.0 - 100Yr 6Hr AES           **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              280d411a-9b6d-4321-9788-091d93550ce5\c33c8419
| 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 |

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--------------------
| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        8.29          7.35
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      322.93         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         81.87
               over (min)        5.00         15.00
     Storage Coeff.  (min)=      5.83 (ii)    13.47 (ii)
     Unit Hyd. Tpeak (min)=      5.00         15.00
     Unit Hyd. peak  (cms)=      0.20          0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=      1.44          1.40          2.836 (iii)
     TIME TO PEAK    (hrs)=      2.75          2.75           2.75
     RUNOFF VOLUME    (mm)=     79.31         64.32          71.06
     TOTAL RAINFALL   (mm)=     80.31         80.31          80.31
     RUNOFF COEFFICIENT   =      0.99          0.80           0.88

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  94.0     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(0004)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.4710	0.2600
0.6340	0.1300	1.6870	0.2900
0.9580	0.1800	1.9040	0.3300
1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	2.836	2.75	71.06
OUTFLOW: ID= 1 (0004)	15.642	1.864	2.92	71.06

PEAK FLOW REDUCTION [Qout/Qin](%)= 65.73
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.3229

CALIB	
STANDHYD (0201)	Area (ha)= 27.43
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	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		

				TOTALS
Max.Eff.Inten.(mm/hr)=		73.88	65.79	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.90 (ii)	15.24 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.07	
PEAK FLOW	(cms)=	2.79	1.51	4.194 (iii)
TIME TO PEAK	(hrs)=	2.75	2.83	2.75
RUNOFF VOLUME	(mm)=	79.31	47.12	63.21
TOTAL RAINFALL	(mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT	=	0.99	0.59	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(0001)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.7170	0.8740
0.2650	0.4502	0.8410	0.9835
0.4330	0.6160	0.9670	1.0927
0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	4.194	2.75	63.21
OUTFLOW: ID= 1 (0001)	27.428	0.967	3.67	63.20

PEAK FLOW REDUCTION [Qout/Qin](%)= 23.05
TIME SHIFT OF PEAK FLOW (min)= 55.00
MAXIMUM STORAGE USED (ha.m.)= 1.0926

CALIB	
STANDHYD (0203)	Area (ha)= 20.04
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	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		

				TOTALS
Max.Eff.Inten.(mm/hr)=		73.88	82.45	
over (min)		5.00	15.00	
Storage Coeff. (min)=		6.28 (ii)	13.90 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.19	0.08	
PEAK FLOW	(cms)=	2.33	1.42	3.753 (iii)
TIME TO PEAK	(hrs)=	2.75	2.75	2.75
RUNOFF VOLUME	(mm)=	79.31	66.02	73.59
TOTAL RAINFALL	(mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT	=	0.99	0.82	0.92

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  95.0     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(  0003)|     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   |   0.5390     0.8200
                          0.1920     0.4600   |   0.6370     0.9100
                          0.3190     0.6000   |   0.7370     1.0000
                          0.4130     0.7000   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0203)     20.036     3.753      2.75      73.59
   OUTFLOW: ID= 1 (  0003)     20.036     0.734      3.67      73.56

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 19.57
                  TIME SHIFT OF PEAK FLOW          (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.9978

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--------------------
| CALIB            |
| STANDHYD (  0206)|   Area    (ha)=  25.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  74.00   Dir. Conn.(%)=  70.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.67         6.56
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     410.14        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        85.07
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       6.72 (ii)   14.25 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.18         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.60         1.35        4.945 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75         2.75
     RUNOFF VOLUME    (mm)=      79.31        73.82        77.66
     TOTAL RAINFALL   (mm)=      80.31        80.31        80.31
     RUNOFF COEFFICIENT   =       0.99         0.92         0.97


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  99.0     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(  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   |   0.5830     1.1750
                          0.2100     0.6900   |   0.6860     1.3000
                          0.3470     0.8750   |   0.7930     1.4200
                          0.4490     1.0100   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0206)     25.232     4.945      2.75      77.66
   OUTFLOW: ID= 1 (  0006)     25.232     0.790      3.75      77.63

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.98
                  TIME SHIFT OF PEAK FLOW          (min)= 60.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.4180

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--------------------
| CALIB            |
| STANDHYD (  0207)|   Area    (ha)=  16.37
|ID= 1 DT= 5.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  47.00
--------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.17         7.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     330.38        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        66.85
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       5.91 (ii)   14.20 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.19         0.08
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.57         1.03        2.569 (iii)
```

TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	79.31	47.37	62.38
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.59	0.78

(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(0007)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6810	0.4150
	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	2.569	2.75	62.38
OUTFLOW: ID= 1 (0007)	16.372	0.911	3.25	62.37

PEAK FLOW REDUCTION [Qout/Qin](%)= 35.44
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.5215

CALIB		
STANDHYD (0202)	Area (ha)= 15.28	
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	8.71	6.57
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	319.17	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	84.51
over (min)	5.00	15.00
Storage Coeff. (min)=	5.79 (ii)	13.33 (ii)
Unit Hyd. Tpeak (min)=	5.00	15.00
Unit Hyd. peak (cms)=	0.20	0.08

			TOTALS
PEAK FLOW (cms)=	1.56	1.34	2.898 (iii)
TIME TO PEAK (hrs)=	2.75	2.75	2.75
RUNOFF VOLUME (mm)=	79.31	69.81	74.56
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.87	0.93

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	2.898	2.75	74.56
OUTFLOW: ID= 1 (0002)	15.280	1.487	3.00	74.55

PEAK FLOW REDUCTION [Qout/Qin](%)= 51.31
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.4850

CALIB		
STANDHYD (0205)	Area (ha)= 27.24	
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 49.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	15.53	11.71
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	426.16	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	65.45
over (min)	5.00	20.00
Storage Coeff. (min)=	6.88 (ii)	15.24 (ii)

Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.18	0.07	
			TOTALS
PEAK FLOW (cms)=	2.72	1.53	4.135 (iii)
TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	79.31	47.04	62.85
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.59	0.78

(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(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	4.135	2.75	62.85
OUTFLOW: ID= 1 (0038)	27.241	0.009	6.83	15.82

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.22
TIME SHIFT OF PEAK FLOW (min)=245.00
MAXIMUM STORAGE USED (ha.m.)= 1.6995

CALIB		
STANDHYD (0208)	Area (ha)= 14.48	
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	8.54	5.94
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	310.68	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 67.98

over (min)	5.00	15.00	
Storage Coeff. (min)=	5.69 (ii)	13.93 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.20	0.08	
			TOTALS
PEAK FLOW (cms)=	1.48	0.86	2.323 (iii)
TIME TO PEAK (hrs)=	2.75	2.83	2.75
RUNOFF VOLUME (mm)=	79.31	47.63	63.47
TOTAL RAINFALL (mm)=	80.31	80.31	80.31
RUNOFF COEFFICIENT =	0.99	0.59	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(0040)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	2.323	2.75	63.47
OUTFLOW: ID= 1 (0040)	14.479	0.009	6.67	25.23

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.39
TIME SHIFT OF PEAK FLOW (min)=235.00
MAXIMUM STORAGE USED (ha.m.)= 0.9070

CALIB		
STANDHYD (0209)	Area (ha)= 5.13	
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	3.02	2.10
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	184.85	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        87.86
                 over (min)       5.00        15.00
     Storage Coeff.  (min)=       4.17 (ii)   11.60 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.24         0.09
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.53         0.46          0.981 (iii)
     TIME TO PEAK    (hrs)=       2.75         2.75           2.75
     RUNOFF VOLUME    (mm)=      79.31        68.42          73.86
     TOTAL RAINFALL   (mm)=      80.31        80.31          80.31
     RUNOFF COEFFICIENT   =       0.99         0.85           0.92

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  96.0    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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)     5.125      0.981      2.75      73.86
   OUTFLOW: ID= 1 (  0041)     5.125      0.011      6.42      50.45

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.11
                  TIME SHIFT OF PEAK FLOW         (min)=220.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3651

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 FINISH
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Project #: 0708-3446
Project Name: Bolton North Hill – Option 1 & 2 Lands
Town of Caledon, Region of Peel

VO Modelling Results – Pond Design
2, 5, 10, 25, 50, 100-Year 12-hour AES Design Storm
December, 2024

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================================================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\b774ae66-f12c-4c35-9fea-d7f60301e3e1\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\b774ae66-f12c-4c35-9fea-d7f60301e3e1\sce


DATE: 12-13-2024                          TIME: 12:00:59

USER:


COMMENTS: _____________________________________________________

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  ************************************************
  ** SIMULATION : 1.1 - 2Yr 12Hr AES            **
  ************************************************


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|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              d09a7b46-edc7-472c-9db2-1fc07697fe6e\ba54b946
| Ptotal= 42.00 mm |    Comments: 2 Year 12 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 |  3.25    7.14 |  6.50    2.94 |  9.75    0.42
                0.25    0.42 |  3.50    7.14 |  6.75    2.94 | 10.00    0.42
                0.50    0.42 |  3.75    7.14 |  7.00    2.94 | 10.25    0.42
                0.75    0.42 |  4.00    7.14 |  7.25    1.68 | 10.50    0.42
                1.00    0.42 |  4.25   19.32 |  7.50    1.68 | 10.75    0.42
                1.25    0.42 |  4.50   19.32 |  7.75    1.68 | 11.00    0.42
                1.50    0.42 |  4.75   19.32 |  8.00    1.68 | 11.25    0.42
                1.75    0.42 |  5.00   19.32 |  8.25    0.84 | 11.50    0.42
                2.00    0.42 |  5.25    5.46 |  8.50    0.84 | 11.75    0.42
                2.25    2.52 |  5.50    5.46 |  8.75    0.84 | 12.00    0.42
                2.50    2.52 |  5.75    5.46 |  9.00    0.84 |
                2.75    2.52 |  6.00    5.46 |  9.25    0.42 |
                3.00    2.52 |  6.25    2.94 |  9.50    0.42 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        8.29          7.35
     Dep. Storage     (mm)=        1.00          5.00
     Average Slope     (%)=        1.00          2.00
     Length            (m)=      322.93         40.00
     Mannings n           =       0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.52 | 6.250    5.46 |  9.33    0.42
             0.167    0.00 | 3.250    2.52 | 6.333    2.94 |  9.42    0.42
             0.250    0.00 | 3.333    7.14 | 6.417    2.94 |  9.50    0.42
             0.333    0.42 | 3.417    7.14 | 6.500    2.94 |  9.58    0.42
             0.417    0.42 | 3.500    7.14 | 6.583    2.94 |  9.67    0.42
             0.500    0.42 | 3.583    7.14 | 6.667    2.94 |  9.75    0.42
             0.583    0.42 | 3.667    7.14 | 6.750    2.94 |  9.83    0.42
             0.667    0.42 | 3.750    7.14 | 6.833    2.94 |  9.92    0.42
             0.750    0.42 | 3.833    7.14 | 6.917    2.94 | 10.00    0.42
             0.833    0.42 | 3.917    7.14 | 7.000    2.94 | 10.08    0.42
             0.917    0.42 | 4.000    7.14 | 7.083    2.94 | 10.17    0.42
             1.000    0.42 | 4.083    7.14 | 7.167    2.94 | 10.25    0.42
             1.083    0.42 | 4.167    7.14 | 7.250    2.94 | 10.33    0.42
             1.167    0.42 | 4.250    7.14 | 7.333    1.68 | 10.42    0.42
             1.250    0.42 | 4.333   19.32 | 7.417    1.68 | 10.50    0.42
             1.333    0.42 | 4.417   19.32 | 7.500    1.68 | 10.58    0.42
             1.417    0.42 | 4.500   19.32 | 7.583    1.68 | 10.67    0.42
             1.500    0.42 | 4.583   19.32 | 7.667    1.68 | 10.75    0.42
             1.583    0.42 | 4.667   19.32 | 7.750    1.68 | 10.83    0.42
             1.667    0.42 | 4.750   19.32 | 7.833    1.68 | 10.92    0.42
             1.750    0.42 | 4.833   19.32 | 7.917    1.68 | 11.00    0.42
             1.833    0.42 | 4.917   19.32 | 8.000    1.68 | 11.08    0.42
             1.917    0.42 | 5.000   19.32 | 8.083    1.68 | 11.17    0.42
             2.000    0.42 | 5.083   19.32 | 8.167    1.68 | 11.25    0.42
             2.083    0.42 | 5.167   19.32 | 8.250    1.68 | 11.33    0.42
             2.167    0.42 | 5.250   19.32 | 8.333    0.84 | 11.42    0.42
             2.250    0.42 | 5.333    5.46 | 8.417    0.84 | 11.50    0.42
             2.333    2.52 | 5.417    5.46 | 8.500    0.84 | 11.58    0.42
             2.417    2.52 | 5.500    5.46 | 8.583    0.84 | 11.67    0.42
             2.500    2.52 | 5.583    5.46 | 8.667    0.84 | 11.75    0.42
             2.583    2.52 | 5.667    5.46 | 8.750    0.84 | 11.83    0.42
             2.667    2.52 | 5.750    5.46 | 8.833    0.84 | 11.92    0.42
             2.750    2.52 | 5.833    5.46 | 8.917    0.84 | 12.00    0.42
             2.833    2.52 | 5.917    5.46 | 9.000    0.84 | 12.08    0.42
             2.917    2.52 | 6.000    5.46 | 9.083    0.84 | 12.17    0.42
             3.000    2.52 | 6.083    5.46 | 9.167    0.84 | 12.25    0.42
             3.083    2.52 | 6.167    5.46 | 9.250    0.84 |

     Max.Eff.Inten.(mm/hr)=      19.32         19.42
               over (min)        10.00         25.00
     Storage Coeff.  (min)=       9.96 (ii)    23.56 (ii)
     Unit Hyd. Tpeak (min)=      10.00         25.00
     Unit Hyd. peak  (cms)=       0.11          0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.38          0.33          0.697 (iii)
     TIME TO PEAK    (hrs)=       5.25          5.33          5.25
     RUNOFF VOLUME    (mm)=      41.00         27.59         33.63
     TOTAL RAINFALL   (mm)=      42.00         42.00         42.00
     RUNOFF COEFFICIENT   =       0.98          0.66          0.80


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
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CN* = 94.0 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(0004)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.4710	0.2600
	0.6340	0.1300	1.6870	0.2900
	0.9580	0.1800	1.9040	0.3300
	1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	0.697	5.25	33.63
OUTFLOW: ID= 1 (0004)	15.642	0.535	5.42	33.62

PEAK FLOW REDUCTION [Qout/Qin](%)= 76.74
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.1101

CALIB			
STANDHYD (0201)	Area (ha)= 27.43		
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	15.91	11.52	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	427.61	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.(mm/hr)=	19.32	12.45		
over (min)	10.00	30.00		
Storage Coeff. (min)=	11.79 (ii)	28.03 (ii)		
Unit Hyd. Tpeak (min)=	10.00	30.00		
Unit Hyd. peak (cms)=	0.10	0.04		
			TOTALS	
PEAK FLOW (cms)=	0.73	0.28	0.992 (iii)	
TIME TO PEAK (hrs)=	5.25	5.50	5.25	
RUNOFF VOLUME (mm)=	41.00	16.88	28.94	
TOTAL RAINFALL (mm)=	42.00	42.00	42.00	
RUNOFF COEFFICIENT =	0.98	0.40	0.69	

(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(0001)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	0.992	5.25	28.94
OUTFLOW: ID= 1 (0001)	27.428	0.265	6.58	28.93

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.69
TIME SHIFT OF PEAK FLOW (min)= 80.00
MAXIMUM STORAGE USED (ha.m.)= 0.4500

CALIB			
STANDHYD (0203)	Area (ha)= 20.04		
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00	Dir. Conn.(%)= 57.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	12.62	7.41	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	365.48	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42

1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.(mm/hr)=	19.32	19.96	
over (min)	10.00	25.00	
Storage Coeff. (min)=	10.73 (ii)	24.18 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.11	0.05	
			TOTALS
PEAK FLOW (cms)=	0.61	0.34	0.945 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	41.00	28.88	35.79
TOTAL RAINFALL (mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT =	0.98	0.69	0.85

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5390	0.8200
	0.1920	0.4600	0.6370	0.9100
	0.3190	0.6000	0.7370	1.0000
	0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	0.945	5.25	35.79
OUTFLOW: ID= 1 (0003)	20.036	0.191	6.83	35.76

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.18
TIME SHIFT OF PEAK FLOW (min)= 95.00
MAXIMUM STORAGE USED (ha.m.)= 0.4570

CALIB		
STANDHYD (0206)	Area (ha)= 25.23	
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00	Dir. Conn.(%)= 70.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	18.67	6.56
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	410.14	40.00

Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.(mm/hr)=	19.32	22.12	
over (min)	10.00	25.00	
Storage Coeff. (min)=	11.50 (ii)	24.41 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.10	0.05	
			TOTALS
PEAK FLOW (cms)=	0.94	0.36	1.302 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	41.00	35.57	39.37
TOTAL RAINFALL (mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT =	0.98	0.85	0.94

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5830	1.1750
	0.2100	0.6900	0.6860	1.3000
	0.3470	0.8750	0.7930	1.4200
	0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	1.302	5.25	39.37
OUTFLOW: ID= 1 (0006)	25.232	0.210	7.33	39.34

PEAK FLOW REDUCTION [Qout/Qin](%)= 16.11
TIME SHIFT OF PEAK FLOW (min)=125.00
MAXIMUM STORAGE USED (ha.m.)= 0.6890

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

				TOTALS
Max.Eff.Inten.(mm/hr)=		19.32	12.70	
over (min)		10.00	30.00	
Storage Coeff. (min)=		10.10 (ii)	26.21 (ii)	
Unit Hyd. Tpeak (min)=		10.00	30.00	
Unit Hyd. peak (cms)=		0.11	0.04	
PEAK FLOW	(cms)=	0.41	0.19	0.583 (iii)
TIME TO PEAK	(hrs)=	5.25	5.42	5.25
RUNOFF VOLUME	(mm)=	41.00	17.03	28.29
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.41	0.67

(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(0007)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6810	0.4150
0.2530	0.2100	0.8000	0.4700
0.4120	0.2900	0.9210	0.5250
0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	0.583	5.25	28.29
OUTFLOW: ID= 1 (0007)	16.372	0.241	6.00	28.28

PEAK FLOW REDUCTION [Qout/Qin](%)= 41.33
TIME SHIFT OF PEAK FLOW (min)= 45.00
MAXIMUM STORAGE USED (ha.m.)= 0.1999

CALIB	
STANDHYD (0202)	Area (ha)= 15.28
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42

2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.(mm/hr)=		19.32	21.31	
over (min)		10.00	25.00	
Storage Coeff. (min)=		9.89 (ii)	22.99 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.11	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.41	0.34	0.743 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	41.00	31.97	36.48
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.76	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.1400	0.4050
0.4200	0.2250	1.3390	0.4450
0.6870	0.3000	1.5430	0.5000
0.8820	0.3500	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)		15.280	0.743	5.25	36.48
OUTFLOW: ID= 1 (0002)		15.280	0.388	5.67	36.48

PEAK FLOW REDUCTION [Qout/Qin](%)= 52.22
TIME SHIFT OF PEAK FLOW (min)= 25.00
MAXIMUM STORAGE USED (ha.m.)= 0.2082

CALIB	
STANDHYD (0205)	Area (ha)= 27.24
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.(mm/hr)=		19.32	12.38	
over (min)		10.00	30.00	
Storage Coeff. (min)=		11.77 (ii)	28.05 (ii)	
Unit Hyd. Tpeak (min)=		10.00	30.00	
Unit Hyd. peak (cms)=		0.10	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.71	0.29	0.975 (iii)
TIME TO PEAK	(hrs)=	5.25	5.50	5.25
RUNOFF VOLUME	(mm)=	41.00	16.84	28.68
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.40	0.68

(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(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	1.5119
0.0024	0.7743	0.0091	1.7018
0.0042	1.0612	0.0107	1.8935
0.0057	1.2596	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)		27.241	0.975	5.25	28.68
OUTFLOW: ID= 1 (0038)		27.241	0.002	13.25	4.71

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.25
TIME SHIFT OF PEAK FLOW (min)=480.00
MAXIMUM STORAGE USED (ha.m.)= 0.7743

CALIB	
STANDHYD (0208)	Area (ha)= 14.48
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.	(mm/hr)=	19.32	12.95	
over	(min)	10.00	30.00	
Storage Coeff.	(min)=	9.73 (ii)	25.72 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	30.00	
Unit Hyd. peak	(cms)=	0.11	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.39	0.16	0.533 (iii)
TIME TO PEAK	(hrs)=	5.25	5.42	5.25
RUNOFF VOLUME	(mm)=	41.00	17.18	29.09
TOTAL RAINFALL	(mm)=	42.00	42.00	42.00
RUNOFF COEFFICIENT	=	0.98	0.41	0.69

(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(0040) IN= 2---> OUT= 1 DT= 5.0 min	OVERFLOW IS OFF			
	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	0.533	5.25	29.09
OUTFLOW: ID= 1 (0040)	14.479	0.002	12.92	8.29

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.45
TIME SHIFT OF PEAK FLOW (min)=460.00
MAXIMUM STORAGE USED (ha.m.)= 0.4145

CALIB STANDHYD (0209) ID= 1 DT= 5.0 min	Area (ha)= 5.13 Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.02	2.10
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	184.85	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.52	6.250	5.46	9.33	0.42
0.167	0.00	3.250	2.52	6.333	2.94	9.42	0.42
0.250	0.00	3.333	7.14	6.417	2.94	9.50	0.42
0.333	0.42	3.417	7.14	6.500	2.94	9.58	0.42
0.417	0.42	3.500	7.14	6.583	2.94	9.67	0.42
0.500	0.42	3.583	7.14	6.667	2.94	9.75	0.42
0.583	0.42	3.667	7.14	6.750	2.94	9.83	0.42
0.667	0.42	3.750	7.14	6.833	2.94	9.92	0.42
0.750	0.42	3.833	7.14	6.917	2.94	10.00	0.42
0.833	0.42	3.917	7.14	7.000	2.94	10.08	0.42
0.917	0.42	4.000	7.14	7.083	2.94	10.17	0.42
1.000	0.42	4.083	7.14	7.167	2.94	10.25	0.42
1.083	0.42	4.167	7.14	7.250	2.94	10.33	0.42
1.167	0.42	4.250	7.14	7.333	1.68	10.42	0.42
1.250	0.42	4.333	19.32	7.417	1.68	10.50	0.42
1.333	0.42	4.417	19.32	7.500	1.68	10.58	0.42
1.417	0.42	4.500	19.32	7.583	1.68	10.67	0.42
1.500	0.42	4.583	19.32	7.667	1.68	10.75	0.42
1.583	0.42	4.667	19.32	7.750	1.68	10.83	0.42
1.667	0.42	4.750	19.32	7.833	1.68	10.92	0.42
1.750	0.42	4.833	19.32	7.917	1.68	11.00	0.42
1.833	0.42	4.917	19.32	8.000	1.68	11.08	0.42
1.917	0.42	5.000	19.32	8.083	1.68	11.17	0.42
2.000	0.42	5.083	19.32	8.167	1.68	11.25	0.42
2.083	0.42	5.167	19.32	8.250	1.68	11.33	0.42
2.167	0.42	5.250	19.32	8.333	0.84	11.42	0.42
2.250	0.42	5.333	5.46	8.417	0.84	11.50	0.42
2.333	2.52	5.417	5.46	8.500	0.84	11.58	0.42
2.417	2.52	5.500	5.46	8.583	0.84	11.67	0.42
2.500	2.52	5.583	5.46	8.667	0.84	11.75	0.42
2.583	2.52	5.667	5.46	8.750	0.84	11.83	0.42
2.667	2.52	5.750	5.46	8.833	0.84	11.92	0.42
2.750	2.52	5.833	5.46	8.917	0.84	12.00	0.42
2.833	2.52	5.917	5.46	9.000	0.84	12.08	0.42
2.917	2.52	6.000	5.46	9.083	0.84	12.17	0.42
3.000	2.52	6.083	5.46	9.167	0.84	12.25	0.42
3.083	2.52	6.167	5.46	9.250	0.84		

Max.Eff.Inten.	(mm/hr)=	19.32	21.82	
over	(min)	5.00	25.00	
Storage Coeff.	(min)=	7.13 (ii)	20.11 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	25.00	
Unit Hyd. peak	(cms)=	0.17	0.05	
				TOTALS

```
     PEAK FLOW       (cms)=       0.14         0.11          0.249 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33           5.25
     RUNOFF VOLUME    (mm)=      41.00        30.84          35.92
     TOTAL RAINFALL   (mm)=      42.00        42.00          42.00
     RUNOFF COEFFICIENT   =       0.98         0.73           0.86

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  96.0    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(  0041)|     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   |   0.0086     0.3208
                         0.0028     0.1768   |   0.0104     0.3558
                         0.0049     0.2347   |   0.0123     0.3905
                         0.0065     0.2732   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)      5.125     0.249      5.25      35.92
   OUTFLOW: ID= 1 (  0041)      5.125     0.003     12.50      21.57

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  1.12
                  TIME SHIFT OF PEAK FLOW         (min)=435.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1767

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
  Output  filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\e2411f82-a13e-473d-a248-8ba225ad31b1\sce
  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\e2411f82-a13e-473d-a248-8ba225ad31b1\sce


DATE: 12-13-2024                          TIME: 12:01:00

USER:


COMMENTS: _____

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  ************************************************
  ** SIMULATION : 2.1 - 5Yr 12Hr AES            **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\jlysecki\AppD
|                  |              ata\Local\Temp\
|                  |              d09a7b46-edc7-472c-9db2-1fc07697fe6e\0a894a7c
| Ptotal= 54.38 mm |    Comments: 5 Year 12 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 |  3.25    9.25 |  6.50    3.81 |  9.75    0.54
                0.25    0.54 |  3.50    9.25 |  6.75    3.81 | 10.00    0.54
                0.50    0.54 |  3.75    9.25 |  7.00    3.81 | 10.25    0.54
                0.75    0.54 |  4.00    9.25 |  7.25    2.18 | 10.50    0.54
                1.00    0.54 |  4.25   25.02 |  7.50    2.18 | 10.75    0.54
                1.25    0.54 |  4.50   25.02 |  7.75    2.18 | 11.00    0.54
                1.50    0.54 |  4.75   25.02 |  8.00    2.18 | 11.25    0.54
                1.75    0.54 |  5.00   25.02 |  8.25    1.09 | 11.50    0.54
                2.00    0.54 |  5.25    7.07 |  8.50    1.09 | 11.75    0.54
                2.25    3.26 |  5.50    7.07 |  8.75    1.09 | 12.00    0.54
                2.50    3.26 |  5.75    7.07 |  9.00    1.09 |
                2.75    3.26 |  6.00    7.07 |  9.25    0.54 |
                3.00    3.26 |  6.25    3.81 |  9.50    0.54 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------

                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
               0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
               0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
               0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
               0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
               0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
               0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
               0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
               0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
               0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
               0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
               1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
               1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
               1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
               1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
               1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
               1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
               1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
               1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
               1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
               1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
               1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
               1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
               2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
               2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
               2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
               2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
               2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
               2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
               2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
               2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
               2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
```

2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=	25.02	26.50	
over (min)	10.00	25.00	
Storage Coeff. (min)=	8.98 (ii)	20.99 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.12	0.05	
			TOTALS
PEAK FLOW (cms)=	0.49	0.47	0.954 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	53.38	39.25	45.61
TOTAL RAINFALL (mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT =	0.98	0.72	0.84

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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(0004)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.4710	0.2600
0.6340	0.1300	1.6870	0.2900
0.9580	0.1800	1.9040	0.3300
1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	0.954	5.25	45.61
OUTFLOW: ID= 1 (0004)	15.642	0.764	5.42	45.61

PEAK FLOW REDUCTION [Qout/Qin](%)= 80.06
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.1500

CALIB	
STANDHYD (0201)	Area (ha)= 27.43
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=	25.02	19.06	
over (min)	10.00	25.00	
Storage Coeff. (min)=	10.63 (ii)	24.33 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.11	0.05	
			TOTALS
PEAK FLOW (cms)=	0.95	0.47	1.401 (iii)
TIME TO PEAK (hrs)=	5.25	5.42	5.25
RUNOFF VOLUME (mm)=	53.38	25.95	39.67
TOTAL RAINFALL (mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT =	0.98	0.48	0.73

(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(0001)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.7170	0.8740
0.2650	0.4502	0.8410	0.9835
0.4330	0.6160	0.9670	1.0927
0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	1.401	5.25	39.67
OUTFLOW: ID= 1 (0001)	27.428	0.420	6.42	39.65

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.95
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.6028

CALIB	
STANDHYD (0203)	Area (ha)= 20.04
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	40.00

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=	25.02	26.95		
over (min)	10.00	25.00		
Storage Coeff. (min)=	9.68 (ii)	21.60 (ii)		
Unit Hyd. Tpeak (min)=	10.00	25.00		
Unit Hyd. peak (cms)=	0.11	0.05		
			TOTALS	
PEAK FLOW (cms)=	0.79	0.48	1.273 (iii)	
TIME TO PEAK (hrs)=	5.25	5.33	5.25	
RUNOFF VOLUME (mm)=	53.38	40.72	47.94	
TOTAL RAINFALL (mm)=	54.38	54.38	54.38	
RUNOFF COEFFICIENT =	0.98	0.75	0.88	

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5390	0.8200
0.1920	0.4600	0.6370	0.9100
0.3190	0.6000	0.7370	1.0000
0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	1.273	5.25	47.94
OUTFLOW: ID= 1 (0003)	20.036	0.313	6.50	47.91

PEAK FLOW REDUCTION [Qout/Qin](%)= 24.61
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.5937

CALIB	
STANDHYD (0206)	Area (ha)= 25.23
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=	25.02	28.74		
over (min)	10.00	25.00		
Storage Coeff. (min)=	10.37 (ii)	21.99 (ii)		
Unit Hyd. Tpeak (min)=	10.00	25.00		
Unit Hyd. peak (cms)=	0.11	0.05		
			TOTALS	
PEAK FLOW (cms)=	1.22	0.48	1.704 (iii)	
TIME TO PEAK (hrs)=	5.25	5.25	5.25	
RUNOFF VOLUME (mm)=	53.38	47.92	51.74	
TOTAL RAINFALL (mm)=	54.38	54.38	54.38	

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     RUNOFF COEFFICIENT   =       0.98         0.88          0.95


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  99.0    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(  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   |   0.5830     1.1750
                         0.2100     0.6900   |   0.6860     1.3000
                         0.3470     0.8750   |   0.7930     1.4200
                         0.4490     1.0100   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0206)     25.232     1.704      5.25      51.74
   OUTFLOW: ID= 1 (  0006)     25.232     0.346      6.67      51.71

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 20.33
                  TIME SHIFT OF PEAK FLOW          (min)= 85.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.8744

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| CALIB             |
| STANDHYD (  0207)|   Area     (ha)=  16.37
|ID= 1 DT= 5.0 min |   Total Imp(%)=  56.00   Dir. Conn.(%)=  47.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       9.17         7.20
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     330.38        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                      ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
 0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
 0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
 0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
 0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
 0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
 0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
 0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
 0.750    0.54 | 3.833    9.25 | 6.917    3.81 | 10.00    0.54
 0.833    0.54 | 3.917    9.25 | 7.000    3.81 | 10.08    0.54
 0.917    0.54 | 4.000    9.25 | 7.083    3.81 | 10.17    0.54
 1.000    0.54 | 4.083    9.25 | 7.167    3.81 | 10.25    0.54
 1.083    0.54 | 4.167    9.25 | 7.250    3.81 | 10.33    0.54
 1.167    0.54 | 4.250    9.25 | 7.333    2.18 | 10.42    0.54
 1.250    0.54 | 4.333   25.02 | 7.417    2.18 | 10.50    0.54
 1.333    0.54 | 4.417   25.02 | 7.500    2.18 | 10.58    0.54
 1.417    0.54 | 4.500   25.02 | 7.583    2.18 | 10.67    0.54
 1.500    0.54 | 4.583   25.02 | 7.667    2.18 | 10.75    0.54
 1.583    0.54 | 4.667   25.02 | 7.750    2.18 | 10.83    0.54
 1.667    0.54 | 4.750   25.02 | 7.833    2.18 | 10.92    0.54
 1.750    0.54 | 4.833   25.02 | 7.917    2.18 | 11.00    0.54
 1.833    0.54 | 4.917   25.02 | 8.000    2.18 | 11.08    0.54
 1.917    0.54 | 5.000   25.02 | 8.083    2.18 | 11.17    0.54
 2.000    0.54 | 5.083   25.02 | 8.167    2.18 | 11.25    0.54
 2.083    0.54 | 5.167   25.02 | 8.250    2.18 | 11.33    0.54
 2.167    0.54 | 5.250   25.02 | 8.333    1.09 | 11.42    0.54
 2.250    0.54 | 5.333    7.07 | 8.417    1.09 | 11.50    0.54
 2.333    3.26 | 5.417    7.07 | 8.500    1.09 | 11.58    0.54
 2.417    3.26 | 5.500    7.07 | 8.583    1.09 | 11.67    0.54
 2.500    3.26 | 5.583    7.07 | 8.667    1.09 | 11.75    0.54
 2.583    3.26 | 5.667    7.07 | 8.750    1.09 | 11.83    0.54
 2.667    3.26 | 5.750    7.07 | 8.833    1.09 | 11.92    0.54
 2.750    3.26 | 5.833    7.07 | 8.917    1.09 | 12.00    0.54
 2.833    3.26 | 5.917    7.07 | 9.000    1.09 | 12.08    0.54
 2.917    3.26 | 6.000    7.07 | 9.083    1.09 | 12.17    0.54
 3.000    3.26 | 6.083    7.07 | 9.167    1.09 | 12.25    0.54
 3.083    3.26 | 6.167    7.07 | 9.250    1.09 |

     Max.Eff.Inten.(mm/hr)=      25.02        19.40
               over (min)        10.00        25.00
     Storage Coeff.  (min)=       9.11 (ii)   22.71 (ii)
     Unit Hyd. Tpeak (min)=      10.00        25.00
     Unit Hyd. peak  (cms)=       0.12         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.53         0.30       0.828 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.33        5.25
     RUNOFF VOLUME    (mm)=      53.38        26.14       38.94
     TOTAL RAINFALL   (mm)=      54.38        54.38       54.38
     RUNOFF COEFFICIENT   =       0.98         0.48        0.72


       (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(  0007)|     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   |   0.6810     0.4150
                         0.2530     0.2100   |   0.8000     0.4700
                         0.4120     0.2900   |   0.9210     0.5250
                         0.5280     0.3450   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0207)     16.372     0.828      5.25      38.94
   OUTFLOW: ID= 1 (  0007)     16.372     0.375      5.75      38.93

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.34
                  TIME SHIFT OF PEAK FLOW          (min)= 30.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.2717

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| CALIB             |
| STANDHYD (  0202)|   Area     (ha)=  15.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  50.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.71         6.57
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     319.17        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                      ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    0.00 | 3.167    3.26 | 6.250    7.07 |  9.33    0.54
 0.167    0.00 | 3.250    3.26 | 6.333    3.81 |  9.42    0.54
 0.250    0.00 | 3.333    9.25 | 6.417    3.81 |  9.50    0.54
 0.333    0.54 | 3.417    9.25 | 6.500    3.81 |  9.58    0.54
 0.417    0.54 | 3.500    9.25 | 6.583    3.81 |  9.67    0.54
 0.500    0.54 | 3.583    9.25 | 6.667    3.81 |  9.75    0.54
 0.583    0.54 | 3.667    9.25 | 6.750    3.81 |  9.83    0.54
 0.667    0.54 | 3.750    9.25 | 6.833    3.81 |  9.92    0.54
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0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.	(mm/hr)=	25.02	28.16	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	8.92 (ii)	20.64 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	25.00	
Unit Hyd. peak	(cms)=	0.12	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.53	0.46	0.993 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	53.38	44.13	48.75
TOTAL RAINFALL	(mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT	=	0.98	0.81	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	0.993	5.25	48.75
OUTFLOW: ID= 1 (0002)	15.280	0.591	5.58	48.74

PEAK FLOW REDUCTION [Qout/Qin](%)= 59.47
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.2730

CALIB				
STANDHYD (0205)	Area	(ha)= 27.24		
ID= 1 DT= 5.0 min	Total Imp	(%)= 57.00	Dir. Conn.(%)=	49.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)= 15.53	11.71
Dep. Storage	(mm)= 1.00	5.00
Average Slope	(%)= 1.00	2.00
Length	(m)= 426.16	40.00
Mannings n	= 0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.	(mm/hr)=	25.02	18.95	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	10.61 (ii)	24.34 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	25.00	
Unit Hyd. peak	(cms)=	0.11	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.92	0.47	1.380 (iii)
TIME TO PEAK	(hrs)=	5.25	5.42	5.25
RUNOFF VOLUME	(mm)=	53.38	25.90	39.36
TOTAL RAINFALL	(mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT	=	0.98	0.48	0.72

(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(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119

	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	1.380	5.25	39.36
OUTFLOW: ID= 1 (0038)	27.241	0.004	13.00	7.60

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.30
TIME SHIFT OF PEAK FLOW (min)=465.00
MAXIMUM STORAGE USED (ha.m.)= 1.0612

CALIB	
STANDHYD (0208)	Area (ha)= 14.48
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54
2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=		25.02	19.77	
over (min)		10.00	25.00	
Storage Coeff. (min)=		8.78 (ii)	22.28 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.12	0.05	
				TOTALS
PEAK FLOW (cms)=		0.50	0.26	0.751 (iii)
TIME TO PEAK (hrs)=		5.25	5.33	5.25
RUNOFF VOLUME (mm)=		53.38	26.33	39.86
TOTAL RAINFALL (mm)=		54.38	54.38	54.38
RUNOFF COEFFICIENT =		0.98	0.48	0.73

(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(0040)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	0.8037
0.0024	0.4145	0.0090	0.9034
0.0042	0.5664	0.0107	1.0038
0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	0.751	5.25	39.86
OUTFLOW: ID= 1 (0040)	14.479	0.004	12.75	12.53

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.56
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 0.5664

CALIB	
STANDHYD (0209)	Area (ha)= 5.13
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	3.02	2.10
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	184.85	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.26	6.250	7.07	9.33	0.54
0.167	0.00	3.250	3.26	6.333	3.81	9.42	0.54
0.250	0.00	3.333	9.25	6.417	3.81	9.50	0.54
0.333	0.54	3.417	9.25	6.500	3.81	9.58	0.54
0.417	0.54	3.500	9.25	6.583	3.81	9.67	0.54
0.500	0.54	3.583	9.25	6.667	3.81	9.75	0.54
0.583	0.54	3.667	9.25	6.750	3.81	9.83	0.54
0.667	0.54	3.750	9.25	6.833	3.81	9.92	0.54
0.750	0.54	3.833	9.25	6.917	3.81	10.00	0.54
0.833	0.54	3.917	9.25	7.000	3.81	10.08	0.54
0.917	0.54	4.000	9.25	7.083	3.81	10.17	0.54
1.000	0.54	4.083	9.25	7.167	3.81	10.25	0.54
1.083	0.54	4.167	9.25	7.250	3.81	10.33	0.54
1.167	0.54	4.250	9.25	7.333	2.18	10.42	0.54
1.250	0.54	4.333	25.02	7.417	2.18	10.50	0.54
1.333	0.54	4.417	25.02	7.500	2.18	10.58	0.54
1.417	0.54	4.500	25.02	7.583	2.18	10.67	0.54
1.500	0.54	4.583	25.02	7.667	2.18	10.75	0.54
1.583	0.54	4.667	25.02	7.750	2.18	10.83	0.54
1.667	0.54	4.750	25.02	7.833	2.18	10.92	0.54
1.750	0.54	4.833	25.02	7.917	2.18	11.00	0.54
1.833	0.54	4.917	25.02	8.000	2.18	11.08	0.54
1.917	0.54	5.000	25.02	8.083	2.18	11.17	0.54
2.000	0.54	5.083	25.02	8.167	2.18	11.25	0.54

2.083	0.54	5.167	25.02	8.250	2.18	11.33	0.54
2.167	0.54	5.250	25.02	8.333	1.09	11.42	0.54
2.250	0.54	5.333	7.07	8.417	1.09	11.50	0.54
2.333	3.26	5.417	7.07	8.500	1.09	11.58	0.54
2.417	3.26	5.500	7.07	8.583	1.09	11.67	0.54
2.500	3.26	5.583	7.07	8.667	1.09	11.75	0.54
2.583	3.26	5.667	7.07	8.750	1.09	11.83	0.54
2.667	3.26	5.750	7.07	8.833	1.09	11.92	0.54
2.750	3.26	5.833	7.07	8.917	1.09	12.00	0.54
2.833	3.26	5.917	7.07	9.000	1.09	12.08	0.54
2.917	3.26	6.000	7.07	9.083	1.09	12.17	0.54
3.000	3.26	6.083	7.07	9.167	1.09	12.25	0.54
3.083	3.26	6.167	7.07	9.250	1.09		

Max.Eff.Inten.(mm/hr)=		25.02	29.07	
over (min)		5.00	20.00	
Storage Coeff. (min)=		6.43 (ii)	18.00 (ii)	
Unit Hyd. Tpeak (min)=		5.00	20.00	
Unit Hyd. peak (cms)=		0.18	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.18	0.16	0.336 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	53.38	42.88	48.13
TOTAL RAINFALL	(mm)=	54.38	54.38	54.38
RUNOFF COEFFICIENT	=	0.98	0.79	0.89

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 96.0 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(0041)		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		0.0086	0.3208
		0.0028	0.1768		0.0104	0.3558
		0.0049	0.2347		0.0123	0.3905
		0.0065	0.2732		0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0209)	5.125	0.336	5.25	48.13
OUTFLOW: ID= 1 (0041)	5.125	0.005	12.33	29.83

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.46
TIME SHIFT OF PEAK FLOW (min)=425.00
MAXIMUM STORAGE USED (ha.m.)= 0.2346

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\90a7bdc0-3a36-411c-91e9-92a1f131c9b8\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\90a7bdc0-3a36-411c-91e9-92a1f131c9b8\sce

DATE: 12-13-2024 TIME: 12:01:00

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : 3.1 - 10Yr 12Hr AES           **
  ************************************************
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READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\d09a7b46-edc7-472c-9db2-1fc07697fe6e\bf5938a7
Ptotal= 62.71 mm	Comments: 10 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	10.66	6.50	4.39	9.75	0.63
0.25	0.63	3.50	10.66	6.75	4.39	10.00	0.63
0.50	0.63	3.75	10.66	7.00	4.39	10.25	0.63
0.75	0.63	4.00	10.66	7.25	2.51	10.50	0.63
1.00	0.63	4.25	28.84	7.50	2.51	10.75	0.63
1.25	0.63	4.50	28.84	7.75	2.51	11.00	0.63
1.50	0.63	4.75	28.84	8.00	2.51	11.25	0.63
1.75	0.63	5.00	28.84	8.25	1.25	11.50	0.63
2.00	0.63	5.25	8.15	8.50	1.25	11.75	0.63
2.25	3.76	5.50	8.15	8.75	1.25	12.00	0.63
2.50	3.76	5.75	8.15	9.00	1.25		
2.75	3.76	6.00	8.15	9.25	0.63		
3.00	3.76	6.25	4.39	9.50	0.63		

CALIB	
STANDHYD (0204)	Area (ha)= 15.64
ID= 1 DT= 5.0 min	Total Imp(%)= 53.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.29	7.35
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	322.93	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63

1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=	28.84	31.20	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.49 (ii)	19.73 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	0.56	0.57	1.137 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	61.71	47.24	53.75
TOTAL RAINFALL (mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT =	0.98	0.75	0.86

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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(0004)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.4710	0.2600
	0.6340	0.1300	1.6870	0.2900
	0.9580	0.1800	1.9040	0.3300
	1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	1.137	5.25	53.75
OUTFLOW: ID= 1 (0004)	15.642	0.937	5.42	53.75

PEAK FLOW REDUCTION [Qout/Qin](%)= 82.43
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.1776

CALIB			
STANDHYD (0201)	Area (ha)= 27.43		
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	15.91	11.52	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	427.61	40.00	

Mannings n = 0.013 0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=	28.84	23.52	
over (min)	10.00	25.00	
Storage Coeff. (min)=	10.05 (ii)	22.64 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.11	0.05	
			TOTALS
PEAK FLOW (cms)=	1.10	0.60	1.677 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	61.71	32.50	47.10
TOTAL RAINFALL (mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT =	0.98	0.52	0.75

(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(0001)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0201)	27.428	1.677	5.25	47.10
OUTFLOW: ID= 1	(0001)	27.428	0.527	6.42	47.09

PEAK FLOW REDUCTION [Qout/Qin](%)= 31.40
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.7042

CALIB	
STANDHYD (0203)	Area (ha)= 20.04
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.	(mm/hr)=	28.84	31.59	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	9.14 (ii)	20.33 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	25.00	
Unit Hyd. peak	(cms)=	0.12	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.91	0.58	1.492 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	61.71	48.80	56.16
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.78	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5390	0.8200
0.1920	0.4600	0.6370	0.9100
0.3190	0.6000	0.7370	1.0000
0.4130	0.7000	0.0000	0.0000

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2	(0203)	20.036	1.492	5.25	56.16
OUTFLOW: ID= 1	(0003)	20.036	0.396	6.42	56.13

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.54
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 0.6818

CALIB	
STANDHYD (0206)	Area (ha)= 25.23
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63

2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=		28.84	33.17	
over (min)		10.00	25.00	
Storage Coeff. (min)=		9.80 (ii)	20.77 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.11	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.41	0.56	1.973 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	61.71	56.23	60.07
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.90	0.96

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5830	1.1750
0.2100	0.6900	0.6860	1.3000
0.3470	0.8750	0.7930	1.4200
0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	1.973	5.25	60.07
OUTFLOW: ID= 1 (0006)	25.232	0.438	6.50	60.03

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.19
TIME SHIFT OF PEAK FLOW (min)= 75.00
MAXIMUM STORAGE USED (ha.m.)= 0.9955

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=		28.84	23.93	
over (min)		10.00	25.00	
Storage Coeff. (min)=		8.60 (ii)	21.11 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.12	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.62	0.39	0.993 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	61.71	32.71	46.34
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.52	0.74

(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(0007)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.6810	0.4150
0.2530	0.2100	0.8000	0.4700
0.4120	0.2900	0.9210	0.5250
0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	0.993	5.25	46.34
OUTFLOW: ID= 1 (0007)	16.372	0.472	5.75	46.32

PEAK FLOW REDUCTION [Qout/Qin](%)= 47.56
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.3188

CALIB	
STANDHYD (0202)	Area (ha)= 15.28
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.	(mm/hr)=	28.84	32.72	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	8.43 (ii)	19.46 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.12	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.61	0.56	1.167 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	61.71	52.35	57.03
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.83	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.167	5.25	57.03
OUTFLOW: ID= 1 (0002)	15.280	0.745	5.50	57.02

PEAK FLOW REDUCTION [Qout/Qin](%)= 63.79
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.3149

CALIB	
STANDHYD (0205)	Area (ha)= 27.24
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.	(mm/hr)=	28.84	23.40	
over	(min)	10.00	25.00	
Storage Coeff.	(min)=	10.03 (ii)	22.64 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	25.00	
Unit Hyd. peak	(cms)=	0.11	0.05	
				TOTALS

PEAK FLOW	(cms)=	1.07	0.60	1.654 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	61.71	32.43	46.78
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.52	0.75

(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(0038)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	1.654	5.25	46.78
OUTFLOW: ID= 1 (0038)	27.241	0.006	12.92	10.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.34
TIME SHIFT OF PEAK FLOW (min)=460.00
MAXIMUM STORAGE USED (ha.m.)= 1.2596

CALIB			
STANDHYD (0208)	Area (ha)= 14.48		
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 8.54	5.94	
Dep. Storage	(mm)= 1.00	5.00	
Average Slope	(%)= 1.00	2.00	
Length	(m)= 310.68	40.00	
Mannings n	= 0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63
0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=		28.84	24.36	
over (min)		10.00	25.00	
Storage Coeff. (min)=		8.29 (ii)	20.71 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.13	0.05	
				TOTALS
PEAK FLOW	(cms)=	0.58	0.33	0.898 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	61.71	32.93	47.32
TOTAL RAINFALL	(mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT	=	0.98	0.53	0.75

(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(0040)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	0.8037
	0.0024	0.4145	0.0090	0.9034
	0.0042	0.5664	0.0107	1.0038
	0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	0.898	5.25	47.32
OUTFLOW: ID= 1 (0040)	14.479	0.006	12.75	16.28

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.62
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 0.6710

CALIB			
STANDHYD (0209)	Area (ha)= 5.13		
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)= 3.02	2.10	
Dep. Storage	(mm)= 1.00	5.00	
Average Slope	(%)= 1.00	2.00	
Length	(m)= 184.85	40.00	
Mannings n	= 0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	3.76	6.250	8.15	9.33	0.63
0.167	0.00	3.250	3.76	6.333	4.39	9.42	0.63
0.250	0.00	3.333	10.66	6.417	4.39	9.50	0.63
0.333	0.63	3.417	10.66	6.500	4.39	9.58	0.63

0.417	0.63	3.500	10.66	6.583	4.39	9.67	0.63
0.500	0.63	3.583	10.66	6.667	4.39	9.75	0.63
0.583	0.63	3.667	10.66	6.750	4.39	9.83	0.63
0.667	0.63	3.750	10.66	6.833	4.39	9.92	0.63
0.750	0.63	3.833	10.66	6.917	4.39	10.00	0.63
0.833	0.63	3.917	10.66	7.000	4.39	10.08	0.63
0.917	0.63	4.000	10.66	7.083	4.39	10.17	0.63
1.000	0.63	4.083	10.66	7.167	4.39	10.25	0.63
1.083	0.63	4.167	10.66	7.250	4.39	10.33	0.63
1.167	0.63	4.250	10.66	7.333	2.51	10.42	0.63
1.250	0.63	4.333	28.84	7.417	2.51	10.50	0.63
1.333	0.63	4.417	28.84	7.500	2.51	10.58	0.63
1.417	0.63	4.500	28.84	7.583	2.51	10.67	0.63
1.500	0.63	4.583	28.84	7.667	2.51	10.75	0.63
1.583	0.63	4.667	28.84	7.750	2.51	10.83	0.63
1.667	0.63	4.750	28.84	7.833	2.51	10.92	0.63
1.750	0.63	4.833	28.84	7.917	2.51	11.00	0.63
1.833	0.63	4.917	28.84	8.000	2.51	11.08	0.63
1.917	0.63	5.000	28.84	8.083	2.51	11.17	0.63
2.000	0.63	5.083	28.84	8.167	2.51	11.25	0.63
2.083	0.63	5.167	28.84	8.250	2.51	11.33	0.63
2.167	0.63	5.250	28.84	8.333	1.25	11.42	0.63
2.250	0.63	5.333	8.15	8.417	1.25	11.50	0.63
2.333	3.76	5.417	8.15	8.500	1.25	11.58	0.63
2.417	3.76	5.500	8.15	8.583	1.25	11.67	0.63
2.500	3.76	5.583	8.15	8.667	1.25	11.75	0.63
2.583	3.76	5.667	8.15	8.750	1.25	11.83	0.63
2.667	3.76	5.750	8.15	8.833	1.25	11.92	0.63
2.750	3.76	5.833	8.15	8.917	1.25	12.00	0.63
2.833	3.76	5.917	8.15	9.000	1.25	12.08	0.63
2.917	3.76	6.000	8.15	9.083	1.25	12.17	0.63
3.000	3.76	6.083	8.15	9.167	1.25	12.25	0.63
3.083	3.76	6.167	8.15	9.250	1.25		

Max.Eff.Inten.(mm/hr)=	28.84	33.88	
over (min)	5.00	20.00	
Storage Coeff. (min)=	6.07 (ii)	16.95 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.19	0.06	
			TOTALS
PEAK FLOW (cms)=	0.21	0.19	0.392 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	61.71	51.05	56.38
TOTAL RAINFALL (mm)=	62.71	62.71	62.71
RUNOFF COEFFICIENT =	0.98	0.81	0.90

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 96.0 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(0041)	OVERFLOW IS OFF				
IN= 2---> OUT= 1					
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)	
	0.0000	0.0000	0.0086	0.3208	
	0.0028	0.1768	0.0104	0.3558	
	0.0049	0.2347	0.0123	0.3905	
	0.0065	0.2732	0.0000	0.0000	

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0209)	5.125	0.392	5.25	56.38
OUTFLOW: ID= 1 (0041)	5.125	0.006	12.33	36.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.66
TIME SHIFT OF PEAK FLOW (min)=425.00
MAXIMUM STORAGE USED (ha.m.)= 0.2730

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
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```

***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\5c5b99a3-89fe-4132-9336-376b85000cd9\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\5c5b99a3-89fe-4132-9336-376b85000cd9\sce

DATE: 12-13-2024 TIME: 12:01:00

USER:

COMMENTS: _____

```
  ************************************************
  ** SIMULATION : 4.1 - 25Yr 12Hr AES           **
  ************************************************
```

READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\d09a7b46-edc7-472c-9db2-1fc07697fe6e\e7f98af0
Ptotal= 73.10 mm	Comments: 25 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	12.43	6.50	5.12	9.75	0.73
0.25	0.73	3.50	12.43	6.75	5.12	10.00	0.73
0.50	0.73	3.75	12.43	7.00	5.12	10.25	0.73
0.75	0.73	4.00	12.43	7.25	2.92	10.50	0.73
1.00	0.73	4.25	33.63	7.50	2.92	10.75	0.73
1.25	0.73	4.50	33.63	7.75	2.92	11.00	0.73
1.50	0.73	4.75	33.63	8.00	2.92	11.25	0.73
1.75	0.73	5.00	33.63	8.25	1.46	11.50	0.73
2.00	0.73	5.25	9.50	8.50	1.46	11.75	0.73
2.25	4.39	5.50	9.50	8.75	1.46	12.00	0.73
2.50	4.39	5.75	9.50	9.00	1.46		
2.75	4.39	6.00	9.50	9.25	0.73		
3.00	4.39	6.25	5.12	9.50	0.73		

CALIB	
STANDHYD (0204)	Area (ha)= 15.64
ID= 1 DT= 5.0 min	Total Imp(%)= 53.00 Dir. Conn.(%)= 45.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.29	7.35
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	322.93	40.00

Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=		33.63	37.04	
over (min)		10.00	20.00	
Storage Coeff. (min)=		7.98 (ii)	18.48 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.13	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.66	0.70	1.353 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	72.10	57.29	63.96
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT	=	0.99	0.78	0.87

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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(0004)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.4710	0.2600
0.6340	0.1300	1.6870	0.2900
0.9580	0.1800	1.9040	0.3300
1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	1.353	5.25	63.96
OUTFLOW: ID= 1 (0004)	15.642	1.147	5.42	63.95

PEAK FLOW REDUCTION [Qout/Qin](%)= 84.77
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.2068

CALIB	
STANDHYD (0201)	Area (ha)= 27.43
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=		33.63	29.25	
over (min)		10.00	25.00	
Storage Coeff. (min)=		9.45 (ii)	20.99 (ii)	
Unit Hyd. Tpeak (min)=		10.00	25.00	
Unit Hyd. peak (cms)=		0.12	0.05	
				TOTALS
PEAK FLOW	(cms)=	1.28	0.77	2.031 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	72.10	41.02	56.56
TOTAL RAINFALL	(mm)=	73.10	73.10	73.10

```
     RUNOFF COEFFICIENT   =       0.99         0.56          0.77

       (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(  0001)|     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   |   0.7170     0.8740
                         0.2650     0.4502   |   0.8410     0.9835
                         0.4330     0.6160   |   0.9670     1.0927
                         0.5550     0.7304   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0201)     27.428     2.031      5.25      56.56
   OUTFLOW: ID= 1 (  0001)     27.428     0.668      6.33      56.54

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.87
                  TIME SHIFT OF PEAK FLOW          (min)= 65.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.8302

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| CALIB             |
| STANDHYD (  0203)|   Area     (ha)=  20.04
|ID= 1 DT= 5.0 min |   Total Imp(%)=  63.00   Dir. Conn.(%)=  57.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      12.62         7.41
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     365.48        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    0.00 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
  0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
  0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
  0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
  0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
  0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
  0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
  0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
  0.750    0.73 | 3.833   12.43 | 6.917    5.12 | 10.00    0.73
  0.833    0.73 | 3.917   12.43 | 7.000    5.12 | 10.08    0.73
  0.917    0.73 | 4.000   12.43 | 7.083    5.12 | 10.17    0.73
  1.000    0.73 | 4.083   12.43 | 7.167    5.12 | 10.25    0.73
  1.083    0.73 | 4.167   12.43 | 7.250    5.12 | 10.33    0.73
  1.167    0.73 | 4.250   12.43 | 7.333    2.92 | 10.42    0.73
  1.250    0.73 | 4.333   33.63 | 7.417    2.92 | 10.50    0.73
  1.333    0.73 | 4.417   33.63 | 7.500    2.92 | 10.58    0.73
  1.417    0.73 | 4.500   33.63 | 7.583    2.92 | 10.67    0.73
  1.500    0.73 | 4.583   33.63 | 7.667    2.92 | 10.75    0.73
  1.583    0.73 | 4.667   33.63 | 7.750    2.92 | 10.83    0.73
  1.667    0.73 | 4.750   33.63 | 7.833    2.92 | 10.92    0.73
  1.750    0.73 | 4.833   33.63 | 7.917    2.92 | 11.00    0.73
  1.833    0.73 | 4.917   33.63 | 8.000    2.92 | 11.08    0.73
  1.917    0.73 | 5.000   33.63 | 8.083    2.92 | 11.17    0.73
  2.000    0.73 | 5.083   33.63 | 8.167    2.92 | 11.25    0.73
  2.083    0.73 | 5.167   33.63 | 8.250    2.92 | 11.33    0.73
  2.167    0.73 | 5.250   33.63 | 8.333    1.46 | 11.42    0.73
  2.250    0.73 | 5.333    9.50 | 8.417    1.46 | 11.50    0.73
  2.333    4.39 | 5.417    9.50 | 8.500    1.46 | 11.58    0.73
  2.417    4.39 | 5.500    9.50 | 8.583    1.46 | 11.67    0.73
  2.500    4.39 | 5.583    9.50 | 8.667    1.46 | 11.75    0.73
  2.583    4.39 | 5.667    9.50 | 8.750    1.46 | 11.83    0.73
  2.667    4.39 | 5.750    9.50 | 8.833    1.46 | 11.92    0.73
  2.750    4.39 | 5.833    9.50 | 8.917    1.46 | 12.00    0.73
  2.833    4.39 | 5.917    9.50 | 9.000    1.46 | 12.08    0.73
  2.917    4.39 | 6.000    9.50 | 9.083    1.46 | 12.17    0.73
  3.000    4.39 | 6.083    9.50 | 9.167    1.46 | 12.25    0.73
  3.083    4.39 | 6.167    9.50 | 9.250    1.46 |

     Max.Eff.Inten.(mm/hr)=      33.63        37.36
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       8.60 (ii)   19.06 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.12         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.07         0.71      1.776 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25       5.25
     RUNOFF VOLUME    (mm)=      72.10        58.94      66.44
     TOTAL RAINFALL   (mm)=      73.10        73.10      73.10
     RUNOFF COEFFICIENT   =       0.99         0.81       0.91

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN*  =  95.0    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(  0003)|     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   |   0.5390     0.8200
                         0.1920     0.4600   |   0.6370     0.9100
                         0.3190     0.6000   |   0.7370     1.0000
                         0.4130     0.7000   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0203)     20.036     1.776      5.25      66.44
   OUTFLOW: ID= 1 (  0003)     20.036     0.507      6.33      66.41

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.54
                  TIME SHIFT OF PEAK FLOW          (min)= 65.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  0.7896

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-------------------
| CALIB             |
| STANDHYD (  0206)|   Area     (ha)=  25.23
|ID= 1 DT= 5.0 min |   Total Imp(%)=  74.00   Dir. Conn.(%)=  70.00
-------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      18.67         6.56
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     410.14        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 | 3.167    4.39 | 6.250    9.50 |  9.33    0.73
  0.167    0.00 | 3.250    4.39 | 6.333    5.12 |  9.42    0.73
  0.250    0.00 | 3.333   12.43 | 6.417    5.12 |  9.50    0.73
  0.333    0.73 | 3.417   12.43 | 6.500    5.12 |  9.58    0.73
  0.417    0.73 | 3.500   12.43 | 6.583    5.12 |  9.67    0.73
  0.500    0.73 | 3.583   12.43 | 6.667    5.12 |  9.75    0.73
  0.583    0.73 | 3.667   12.43 | 6.750    5.12 |  9.83    0.73
  0.667    0.73 | 3.750   12.43 | 6.833    5.12 |  9.92    0.73
```

0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	38.71	
over (min)	10.00	20.00	
Storage Coeff. (min)=	9.21 (ii)	19.53 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	1.65	0.67	2.317 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	72.10	66.61	70.45
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.91	0.96

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5830	1.1750
	0.2100	0.6900	0.6860	1.3000
	0.3470	0.8750	0.7930	1.4200
	0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	2.317	5.25	70.45
OUTFLOW: ID= 1 (0006)	25.232	0.558	6.42	70.42

PEAK FLOW REDUCTION [Qout/Qin](%)= 24.09
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 1.1446

CALIB			
STANDHYD (0207)	Area (ha)= 16.37		
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00	Dir. Conn.(%)= 47.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	9.17	7.20	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	330.38	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	29.73	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.09 (ii)	19.56 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	0.72	0.51	1.221 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	72.10	41.25	55.75
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.56	0.76

(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(0007)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6810	0.4150

	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	1.221	5.25	55.75
OUTFLOW: ID= 1 (0007)	16.372	0.605	5.67	55.74

PEAK FLOW REDUCTION [Qout/Qin](%)= 49.56
TIME SHIFT OF PEAK FLOW (min)= 25.00
MAXIMUM STORAGE USED (ha.m.)= 0.3806

CALIB
STANDHYD (0202)| Area (ha)= 15.28
ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.71	6.57
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	319.17	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=		33.63	38.39	
over (min)		10.00	20.00	
Storage Coeff. (min)=		7.93 (ii)	18.28 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.13	0.06	
				TOTALS
PEAK FLOW (cms)=		0.71	0.66	1.375 (iii)
TIME TO PEAK (hrs)=		5.25	5.25	5.25
RUNOFF VOLUME (mm)=		72.10	62.65	67.37
TOTAL RAINFALL (mm)=		73.10	73.10	73.10
RUNOFF COEFFICIENT =		0.99	0.86	0.92

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)| OVERFLOW IS OFF
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	1.1400	0.4050
0.4200	0.2250	1.3390	0.4450
0.6870	0.3000	1.5430	0.5000
0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.375	5.25	67.37
OUTFLOW: ID= 1 (0002)	15.280	0.933	5.50	67.37

PEAK FLOW REDUCTION [Qout/Qin](%)= 67.83
TIME SHIFT OF PEAK FLOW (min)= 15.00
MAXIMUM STORAGE USED (ha.m.)= 0.3617

CALIB
STANDHYD (0205)| Area (ha)= 27.24
ID= 1 DT= 5.0 min | Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73

2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	29.10	
over (min)	10.00	25.00	
Storage Coeff. (min)=	9.43 (ii)	20.99 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.12	0.05	
			TOTALS
PEAK FLOW (cms)=	1.25	0.78	2.005 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	72.10	40.94	56.21
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.56	0.77

(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(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	1.5119
0.0024	0.7743	0.0091	1.7018
0.0042	1.0612	0.0107	1.8935
0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	2.005	5.25	56.21
OUTFLOW: ID= 1 (0038)	27.241	0.007	12.92	13.27

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.37
TIME SHIFT OF PEAK FLOW (min)=460.00
MAXIMUM STORAGE USED (ha.m.)= 1.5119

CALIB	
STANDHYD (0208)	Area (ha)= 14.48
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	30.24	
over (min)	10.00	20.00	
Storage Coeff. (min)=	7.80 (ii)	19.19 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	0.68	0.43	1.099 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	72.10	41.50	56.80
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.57	0.78

(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(0040)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	0.8037
0.0024	0.4145	0.0090	0.9034
0.0042	0.5664	0.0107	1.0038
0.0056	0.6710	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0208)	14.479	1.099	5.25	56.80
OUTFLOW: ID= 1 (0040)	14.479	0.007	12.67	21.29

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.68
TIME SHIFT OF PEAK FLOW (min)=445.00
MAXIMUM STORAGE USED (ha.m.)= 0.8037

CALIB

| STANDHYD (0209)| Area (ha)= 5.13
|ID= 1 DT= 5.0 min | Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	3.02	2.10
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	184.85	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.39	6.250	9.50	9.33	0.73
0.167	0.00	3.250	4.39	6.333	5.12	9.42	0.73
0.250	0.00	3.333	12.43	6.417	5.12	9.50	0.73
0.333	0.73	3.417	12.43	6.500	5.12	9.58	0.73
0.417	0.73	3.500	12.43	6.583	5.12	9.67	0.73
0.500	0.73	3.583	12.43	6.667	5.12	9.75	0.73
0.583	0.73	3.667	12.43	6.750	5.12	9.83	0.73
0.667	0.73	3.750	12.43	6.833	5.12	9.92	0.73
0.750	0.73	3.833	12.43	6.917	5.12	10.00	0.73
0.833	0.73	3.917	12.43	7.000	5.12	10.08	0.73
0.917	0.73	4.000	12.43	7.083	5.12	10.17	0.73
1.000	0.73	4.083	12.43	7.167	5.12	10.25	0.73
1.083	0.73	4.167	12.43	7.250	5.12	10.33	0.73
1.167	0.73	4.250	12.43	7.333	2.92	10.42	0.73
1.250	0.73	4.333	33.63	7.417	2.92	10.50	0.73
1.333	0.73	4.417	33.63	7.500	2.92	10.58	0.73
1.417	0.73	4.500	33.63	7.583	2.92	10.67	0.73
1.500	0.73	4.583	33.63	7.667	2.92	10.75	0.73
1.583	0.73	4.667	33.63	7.750	2.92	10.83	0.73
1.667	0.73	4.750	33.63	7.833	2.92	10.92	0.73
1.750	0.73	4.833	33.63	7.917	2.92	11.00	0.73
1.833	0.73	4.917	33.63	8.000	2.92	11.08	0.73
1.917	0.73	5.000	33.63	8.083	2.92	11.17	0.73
2.000	0.73	5.083	33.63	8.167	2.92	11.25	0.73
2.083	0.73	5.167	33.63	8.250	2.92	11.33	0.73
2.167	0.73	5.250	33.63	8.333	1.46	11.42	0.73
2.250	0.73	5.333	9.50	8.417	1.46	11.50	0.73
2.333	4.39	5.417	9.50	8.500	1.46	11.58	0.73
2.417	4.39	5.500	9.50	8.583	1.46	11.67	0.73
2.500	4.39	5.583	9.50	8.667	1.46	11.75	0.73
2.583	4.39	5.667	9.50	8.750	1.46	11.83	0.73
2.667	4.39	5.750	9.50	8.833	1.46	11.92	0.73
2.750	4.39	5.833	9.50	8.917	1.46	12.00	0.73
2.833	4.39	5.917	9.50	9.000	1.46	12.08	0.73
2.917	4.39	6.000	9.50	9.083	1.46	12.17	0.73
3.000	4.39	6.083	9.50	9.167	1.46	12.25	0.73
3.083	4.39	6.167	9.50	9.250	1.46		

Max.Eff.Inten.(mm/hr)=	33.63	39.87	
over (min)	5.00	20.00	
Storage Coeff. (min)=	5.71 (ii)	15.91 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.20	0.07	
			TOTALS
PEAK FLOW (cms)=	0.24	0.22	0.462 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	72.10	61.29	66.69
TOTAL RAINFALL (mm)=	73.10	73.10	73.10
RUNOFF COEFFICIENT =	0.99	0.84	0.91

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 96.0 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(0041)| OVERFLOW IS OFF

| IN= 2---> OUT= 1 |
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0086	0.3208
	0.0028	0.1768	0.0104	0.3558
	0.0049	0.2347	0.0123	0.3905
	0.0065	0.2732	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0209)	5.125	0.462	5.25	66.69
OUTFLOW: ID= 1 (0041)	5.125	0.009	12.33	44.17

PEAK FLOW REDUCTION [Qout/Qin](%)= 1.86
TIME SHIFT OF PEAK FLOW (min)=425.00
MAXIMUM STORAGE USED (ha.m.)= 0.3207

```
      V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
        V V    I      SS   U   U  A   A  L
         VV    I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
```


***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.2\VO2\voin.dat
Output filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\2e6f3de2-6785-4f4e-9553-3cfa0a82effd\sce
Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-5bc5a1b3e645\2e6f3de2-6785-4f4e-9553-3cfa0a82effd\sce

DATE: 12-13-2024 TIME: 12:01:00

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : 5.1 - 50Yr 12Hr AES           **
  ************************************************
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READ STORM	Filename: C:\Users\jlysecki\AppData\Local\Temp\d09a7b46-edc7-472c-9db2-1fc07697fe6e\a7bbae2e
Ptotal= 80.82 mm	Comments: 50 Year 12 Hour AES (Bloor, TRCA)

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	13.74	6.50	5.66	9.75	0.81
0.25	0.81	3.50	13.74	6.75	5.66	10.00	0.81
0.50	0.81	3.75	13.74	7.00	5.66	10.25	0.81
0.75	0.81	4.00	13.74	7.25	3.23	10.50	0.81
1.00	0.81	4.25	37.17	7.50	3.23	10.75	0.81
1.25	0.81	4.50	37.17	7.75	3.23	11.00	0.81

1.50	0.81	4.75	37.17	8.00	3.23	11.25	0.81
1.75	0.81	5.00	37.17	8.25	1.62	11.50	0.81
2.00	0.81	5.25	10.50	8.50	1.62	11.75	0.81
2.25	4.85	5.50	10.50	8.75	1.62	12.00	0.81
2.50	4.85	5.75	10.50	9.00	1.62		
2.75	4.85	6.00	10.50	9.25	0.81		
3.00	4.85	6.25	5.66	9.50	0.81		

CALIB			
STANDHYD (0204)	Area (ha)= 15.64		
ID= 1 DT= 5.0 min	Total Imp(%)= 53.00	Dir. Conn.(%)= 45.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.29	7.35
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	322.93	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

Max.Eff.Inten.	(mm/hr)=	37.17	41.33	
over	(min)	10.00	20.00	
Storage Coeff.	(min)=	7.67 (ii)	17.72 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.13	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.73	0.79	1.513 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	79.82	64.81	71.57
TOTAL RAINFALL	(mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT	=	0.99	0.80	0.89

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 94.0 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(0004)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.4710	0.2600
	0.6340	0.1300	1.6870	0.2900
	0.9580	0.1800	1.9040	0.3300
	1.1830	0.2100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0204)	15.642	1.513	5.25	71.57
OUTFLOW: ID= 1 (0004)	15.642	1.280	5.33	71.56

PEAK FLOW REDUCTION [Qout/Qin](%)= 84.60
TIME SHIFT OF PEAK FLOW (min)= 5.00
MAXIMUM STORAGE USED (ha.m.)= 0.2286

CALIB			
STANDHYD (0201)	Area (ha)= 27.43		
ID= 1 DT= 5.0 min	Total Imp(%)= 58.00	Dir. Conn.(%)= 50.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.91	11.52
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	427.61	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81

2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	33.55	
over (min)	10.00	20.00	
Storage Coeff. (min)=	9.08 (ii)	20.00 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	1.41	0.91	2.323 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	79.82	47.55	63.69
TOTAL RAINFALL (mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT =	0.99	0.59	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(0001)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.7170	0.8740
0.2650	0.4502	0.8410	0.9835
0.4330	0.6160	0.9670	1.0927
0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	2.323	5.25	63.69
OUTFLOW: ID= 1 (0001)	27.428	0.775	6.25	63.67

PEAK FLOW REDUCTION [Qout/Qin](%)= 33.36
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.9253

CALIB	
STANDHYD (0203)	Area (ha)= 20.04
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00 Dir. Conn.(%)= 57.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	12.62	7.41
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	365.48	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	41.60	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.26 (ii)	18.28 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	1.18	0.80	1.978 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	79.82	66.52	74.10
TOTAL RAINFALL (mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT =	0.99	0.82	0.92

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5390	0.8200
0.1920	0.4600	0.6370	0.9100
0.3190	0.6000	0.7370	1.0000
0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	1.978	5.25	74.10
OUTFLOW: ID= 1 (0003)	20.036	0.590	6.33	74.07

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.81
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 0.8668

CALIB	
STANDHYD (0206)	Area (ha)= 25.23
ID= 1 DT= 5.0 min	Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)

Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

				TOTALS
Max.Eff.Inten.(mm/hr)=		37.17	42.81	
over (min)		10.00	20.00	
Storage Coeff. (min)=		8.85 (ii)	18.76 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.12	0.06	
PEAK FLOW	(cms)=	1.82	0.74	2.566 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	79.82	74.33	78.17
TOTAL RAINFALL	(mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT	=	0.99	0.92	0.97

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.5830	1.1750
	0.2100	0.6900	0.6860	1.3000
	0.3470	0.8750	0.7930	1.4200
	0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	2.566	5.25	78.17
OUTFLOW: ID= 1 (0006)	25.232	0.647	6.42	78.14

PEAK FLOW REDUCTION [Qout/Qin](%)= 25.21
TIME SHIFT OF PEAK FLOW (min)= 70.00
MAXIMUM STORAGE USED (ha.m.)= 1.2529

CALIB	
STANDHYD (0207)	Area (ha)= 16.37
ID= 1 DT= 5.0 min	Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

				TOTALS
Max.Eff.Inten.(mm/hr)=		37.17	34.09	
over (min)		10.00	20.00	
Storage Coeff. (min)=		7.77 (ii)	18.63 (ii)	
Unit Hyd. Tpeak (min)=		10.00	20.00	
Unit Hyd. peak (cms)=		0.13	0.06	

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     PEAK FLOW       (cms)=       0.79          0.59          1.382 (iii)
     TIME TO PEAK    (hrs)=       5.25          5.33           5.25
     RUNOFF VOLUME    (mm)=      79.82         47.81          62.85
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.59           0.78

       (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(  0007)|     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   |   0.6810     0.4150
                         0.2530     0.2100   |   0.8000     0.4700
                         0.4120     0.2900   |   0.9210     0.5250
                         0.5280     0.3450   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0207)     16.372      1.382      5.25      62.85
   OUTFLOW: ID= 1 (  0007)     16.372      0.702      5.58      62.84

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 50.79
                  TIME SHIFT OF PEAK FLOW          (min)= 20.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.4250

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------------------
| CALIB            |
| STANDHYD (  0202)|   Area    (ha)=  15.28
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  50.00
------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.71          6.57
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     319.17         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
  0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
  0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
  0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
  0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
  0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
  0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
  0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
  0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
  0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
  0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
  1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
  1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
  1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
  1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
  1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
  1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
  1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
  1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
  1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
  1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
  1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
  1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
  2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
  2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
  2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
  2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
  2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
  2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
  2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
  2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
  2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
  2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
  2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
  2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
  3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
  3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

     Max.Eff.Inten.(mm/hr)=      37.17         42.61
               over (min)        10.00         20.00
     Storage Coeff.  (min)=       7.62 (ii)    17.54 (ii)
     Unit Hyd. Tpeak (min)=      10.00         20.00
     Unit Hyd. peak  (cms)=       0.13          0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.79          0.74          1.528 (iii)
     TIME TO PEAK    (hrs)=       5.25          5.25           5.25
     RUNOFF VOLUME    (mm)=      79.82         70.31          75.07
     TOTAL RAINFALL   (mm)=      80.82         80.82          80.82
     RUNOFF COEFFICIENT   =       0.99          0.87           0.93

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  97.0    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(  0002)|     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   |   1.1400     0.4050
                         0.4200     0.2250   |   1.3390     0.4450
                         0.6870     0.3000   |   1.5430     0.5000
                         0.8820     0.3500   |   0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0202)     15.280      1.528      5.25      75.07
   OUTFLOW: ID= 1 (  0002)     15.280      1.082      5.42      75.06

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 70.81
                  TIME SHIFT OF PEAK FLOW          (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3935

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------------------
| CALIB            |
| STANDHYD (  0205)|   Area    (ha)=  27.24
|ID= 1 DT= 5.0 min |   Total Imp(%)=  57.00   Dir. Conn.(%)=  49.00
------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.53         11.71
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     426.16         40.00
     Mannings n           =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                        ---- TRANSFORMED HYETOGRAPH ----
   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
  0.083    0.00 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
  0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
  0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
  0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
```

0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	33.38	
over (min)	10.00	25.00	
Storage Coeff. (min)=	9.06 (ii)	20.00 (ii)	
Unit Hyd. Tpeak (min)=	10.00	25.00	
Unit Hyd. peak (cms)=	0.12	0.05	
			TOTALS
PEAK FLOW (cms)=	1.38	0.91	2.270 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	79.82	47.47	63.32
TOTAL RAINFALL (mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT =	0.99	0.59	0.78

(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(0038)|	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0075	1.5119
	0.0024	0.7743	0.0091	1.7018
	0.0042	1.0612	0.0107	1.8935
	0.0057	1.2596	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	2.270	5.25	63.32
OUTFLOW: ID= 1 (0038)	27.241	0.009	12.83	15.76

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.40
TIME SHIFT OF PEAK FLOW (min)=455.00
MAXIMUM STORAGE USED (ha.m.)= 1.7018

CALIB |

STANDHYD (0208)|	Area (ha)= 14.48		
ID= 1 DT= 5.0 min |	Total Imp(%)= 59.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	8.54	5.94	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	310.68	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	4.85	6.250	10.50	9.33	0.81
0.167	0.00	3.250	4.85	6.333	5.66	9.42	0.81
0.250	0.00	3.333	13.74	6.417	5.66	9.50	0.81
0.333	0.81	3.417	13.74	6.500	5.66	9.58	0.81
0.417	0.81	3.500	13.74	6.583	5.66	9.67	0.81
0.500	0.81	3.583	13.74	6.667	5.66	9.75	0.81
0.583	0.81	3.667	13.74	6.750	5.66	9.83	0.81
0.667	0.81	3.750	13.74	6.833	5.66	9.92	0.81
0.750	0.81	3.833	13.74	6.917	5.66	10.00	0.81
0.833	0.81	3.917	13.74	7.000	5.66	10.08	0.81
0.917	0.81	4.000	13.74	7.083	5.66	10.17	0.81
1.000	0.81	4.083	13.74	7.167	5.66	10.25	0.81
1.083	0.81	4.167	13.74	7.250	5.66	10.33	0.81
1.167	0.81	4.250	13.74	7.333	3.23	10.42	0.81
1.250	0.81	4.333	37.17	7.417	3.23	10.50	0.81
1.333	0.81	4.417	37.17	7.500	3.23	10.58	0.81
1.417	0.81	4.500	37.17	7.583	3.23	10.67	0.81
1.500	0.81	4.583	37.17	7.667	3.23	10.75	0.81
1.583	0.81	4.667	37.17	7.750	3.23	10.83	0.81
1.667	0.81	4.750	37.17	7.833	3.23	10.92	0.81
1.750	0.81	4.833	37.17	7.917	3.23	11.00	0.81
1.833	0.81	4.917	37.17	8.000	3.23	11.08	0.81
1.917	0.81	5.000	37.17	8.083	3.23	11.17	0.81
2.000	0.81	5.083	37.17	8.167	3.23	11.25	0.81
2.083	0.81	5.167	37.17	8.250	3.23	11.33	0.81
2.167	0.81	5.250	37.17	8.333	1.62	11.42	0.81
2.250	0.81	5.333	10.50	8.417	1.62	11.50	0.81
2.333	4.85	5.417	10.50	8.500	1.62	11.58	0.81
2.417	4.85	5.500	10.50	8.583	1.62	11.67	0.81
2.500	4.85	5.583	10.50	8.667	1.62	11.75	0.81
2.583	4.85	5.667	10.50	8.750	1.62	11.83	0.81
2.667	4.85	5.750	10.50	8.833	1.62	11.92	0.81
2.750	4.85	5.833	10.50	8.917	1.62	12.00	0.81
2.833	4.85	5.917	10.50	9.000	1.62	12.08	0.81
2.917	4.85	6.000	10.50	9.083	1.62	12.17	0.81
3.000	4.85	6.083	10.50	9.167	1.62	12.25	0.81
3.083	4.85	6.167	10.50	9.250	1.62		

Max.Eff.Inten.(mm/hr)=	37.17	34.66	
over (min)	5.00	20.00	
Storage Coeff. (min)=	7.49 (ii)	18.28 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.17	0.06	
			TOTALS
PEAK FLOW (cms)=	0.75	0.49	1.242 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	79.82	48.07	63.95
TOTAL RAINFALL (mm)=	80.82	80.82	80.82
RUNOFF COEFFICIENT =	0.99	0.59	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(0040)|	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    |  0.0075      0.8037
                         0.0024     0.4145    |  0.0090      0.9034
                         0.0042     0.5664    |  0.0107      1.0038
                         0.0056     0.6710    |  0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0208)     14.479     1.242      5.25      63.95
   OUTFLOW: ID= 1 (  0040)     14.479     0.009     12.58      25.21

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.72
                    TIME SHIFT OF PEAK FLOW          (min)=440.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.9034

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--------------------
| CALIB            |
| STANDHYD (  0209)|   Area    (ha)=   5.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  59.00   Dir. Conn.(%)=  50.00
--------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.02          2.10
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     184.85         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 | 3.167    4.85 | 6.250   10.50 |  9.33    0.81
     0.167    0.00 | 3.250    4.85 | 6.333    5.66 |  9.42    0.81
     0.250    0.00 | 3.333   13.74 | 6.417    5.66 |  9.50    0.81
     0.333    0.81 | 3.417   13.74 | 6.500    5.66 |  9.58    0.81
     0.417    0.81 | 3.500   13.74 | 6.583    5.66 |  9.67    0.81
     0.500    0.81 | 3.583   13.74 | 6.667    5.66 |  9.75    0.81
     0.583    0.81 | 3.667   13.74 | 6.750    5.66 |  9.83    0.81
     0.667    0.81 | 3.750   13.74 | 6.833    5.66 |  9.92    0.81
     0.750    0.81 | 3.833   13.74 | 6.917    5.66 | 10.00    0.81
     0.833    0.81 | 3.917   13.74 | 7.000    5.66 | 10.08    0.81
     0.917    0.81 | 4.000   13.74 | 7.083    5.66 | 10.17    0.81
     1.000    0.81 | 4.083   13.74 | 7.167    5.66 | 10.25    0.81
     1.083    0.81 | 4.167   13.74 | 7.250    5.66 | 10.33    0.81
     1.167    0.81 | 4.250   13.74 | 7.333    3.23 | 10.42    0.81
     1.250    0.81 | 4.333   37.17 | 7.417    3.23 | 10.50    0.81
     1.333    0.81 | 4.417   37.17 | 7.500    3.23 | 10.58    0.81
     1.417    0.81 | 4.500   37.17 | 7.583    3.23 | 10.67    0.81
     1.500    0.81 | 4.583   37.17 | 7.667    3.23 | 10.75    0.81
     1.583    0.81 | 4.667   37.17 | 7.750    3.23 | 10.83    0.81
     1.667    0.81 | 4.750   37.17 | 7.833    3.23 | 10.92    0.81
     1.750    0.81 | 4.833   37.17 | 7.917    3.23 | 11.00    0.81
     1.833    0.81 | 4.917   37.17 | 8.000    3.23 | 11.08    0.81
     1.917    0.81 | 5.000   37.17 | 8.083    3.23 | 11.17    0.81
     2.000    0.81 | 5.083   37.17 | 8.167    3.23 | 11.25    0.81
     2.083    0.81 | 5.167   37.17 | 8.250    3.23 | 11.33    0.81
     2.167    0.81 | 5.250   37.17 | 8.333    1.62 | 11.42    0.81
     2.250    0.81 | 5.333   10.50 | 8.417    1.62 | 11.50    0.81
     2.333    4.85 | 5.417   10.50 | 8.500    1.62 | 11.58    0.81
     2.417    4.85 | 5.500   10.50 | 8.583    1.62 | 11.67    0.81
     2.500    4.85 | 5.583   10.50 | 8.667    1.62 | 11.75    0.81
     2.583    4.85 | 5.667   10.50 | 8.750    1.62 | 11.83    0.81
     2.667    4.85 | 5.750   10.50 | 8.833    1.62 | 11.92    0.81
     2.750    4.85 | 5.833   10.50 | 8.917    1.62 | 12.00    0.81
     2.833    4.85 | 5.917   10.50 | 9.000    1.62 | 12.08    0.81
     2.917    4.85 | 6.000   10.50 | 9.083    1.62 | 12.17    0.81
     3.000    4.85 | 6.083   10.50 | 9.167    1.62 | 12.25    0.81
     3.083    4.85 | 6.167   10.50 | 9.250    1.62 |

    Max.Eff.Inten.(mm/hr)=      37.17         44.34
               over (min)        5.00         20.00

    Storage Coeff.  (min)=       5.49 (ii)    15.26 (ii)
    Unit Hyd. Tpeak (min)=       5.00         20.00
    Unit Hyd. peak  (cms)=       0.20          0.07
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.26          0.25      0.513 (iii)
    TIME TO PEAK    (hrs)=       5.25          5.25       5.25
    RUNOFF VOLUME    (mm)=      79.82         68.92      74.37
    TOTAL RAINFALL   (mm)=      80.82         80.82      80.82
    RUNOFF COEFFICIENT   =       0.99          0.85       0.92

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  96.0    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(  0041)|     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    |  0.0086      0.3208
                         0.0028     0.1768    |  0.0104      0.3558
                         0.0049     0.2347    |  0.0123      0.3905
                         0.0065     0.2732    |  0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)     5.125     0.513      5.25      74.37
   OUTFLOW: ID= 1 (  0041)     5.125     0.010     12.25      50.49

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.02
                    TIME SHIFT OF PEAK FLOW          (min)=420.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  0.3556

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================================================================================
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       V    V   I    SSSSS  U   U    A    L              (v 6.2.2015)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

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  Summary filename: C:\Users\jlysecki\AppData\Local\Civica\VH5\3e4dc0fa-3f7b-44e5-bcd4-
5bc5a1b3e645\6b118802-ef3c-42f4-a4a3-a5968cf057bd\sce

DATE: 12-13-2024                          TIME: 12:01:01

USER:


COMMENTS: _____________________________________________________
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  ***********************************************
  ** SIMULATION : 6.1 - 100Yr 12Hr AES          **
  ***********************************************


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|    READ STORM    |    Filename: C:\Users\j1ysecki\AppD
|                  |              ata\Local\Temp\
|                  |              d09a7b46-edc7-472c-9db2-1fc07697fe6e\99fe35d3
| Ptotal= 88.54 mm |    Comments: 100 Year 12 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 |  3.25   15.05 |  6.50    6.20 |  9.75    0.89
                0.25    0.89 |  3.50   15.05 |  6.75    6.20 | 10.00    0.89
                0.50    0.89 |  3.75   15.05 |  7.00    6.20 | 10.25    0.89
                0.75    0.89 |  4.00   15.05 |  7.25    3.54 | 10.50    0.89
                1.00    0.89 |  4.25   40.71 |  7.50    3.54 | 10.75    0.89
                1.25    0.89 |  4.50   40.71 |  7.75    3.54 | 11.00    0.89
                1.50    0.89 |  4.75   40.71 |  8.00    3.54 | 11.25    0.89
                1.75    0.89 |  5.00   40.71 |  8.25    1.77 | 11.50    0.89
                2.00    0.89 |  5.25   11.51 |  8.50    1.77 | 11.75    0.89
                2.25    5.31 |  5.50   11.51 |  8.75    1.77 | 12.00    0.89
                2.50    5.31 |  5.75   11.51 |  9.00    1.77 |
                2.75    5.31 |  6.00   11.51 |  9.25    0.89 |
                3.00    5.31 |  6.25    6.20 |  9.50    0.89 |

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| CALIB            |
| STANDHYD (  0204)|   Area     (ha)=  15.64
|ID= 1 DT= 5.0 min |   Total Imp(%)=  53.00   Dir. Conn.(%)=  45.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.29          7.35
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     322.93         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
               0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
               0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
               0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
               0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
               0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
               0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
               0.667    0.89 | 3.750   15.05 | 6.833    6.20 |  9.92    0.89
               0.750    0.89 | 3.833   15.05 | 6.917    6.20 | 10.00    0.89
               0.833    0.89 | 3.917   15.05 | 7.000    6.20 | 10.08    0.89
               0.917    0.89 | 4.000   15.05 | 7.083    6.20 | 10.17    0.89
               1.000    0.89 | 4.083   15.05 | 7.167    6.20 | 10.25    0.89
               1.083    0.89 | 4.167   15.05 | 7.250    6.20 | 10.33    0.89
               1.167    0.89 | 4.250   15.05 | 7.333    3.54 | 10.42    0.89
               1.250    0.89 | 4.333   40.71 | 7.417    3.54 | 10.50    0.89
               1.333    0.89 | 4.417   40.71 | 7.500    3.54 | 10.58    0.89
               1.417    0.89 | 4.500   40.71 | 7.583    3.54 | 10.67    0.89
               1.500    0.89 | 4.583   40.71 | 7.667    3.54 | 10.75    0.89
               1.583    0.89 | 4.667   40.71 | 7.750    3.54 | 10.83    0.89
               1.667    0.89 | 4.750   40.71 | 7.833    3.54 | 10.92    0.89
               1.750    0.89 | 4.833   40.71 | 7.917    3.54 | 11.00    0.89
               1.833    0.89 | 4.917   40.71 | 8.000    3.54 | 11.08    0.89
               1.917    0.89 | 5.000   40.71 | 8.083    3.54 | 11.17    0.89
               2.000    0.89 | 5.083   40.71 | 8.167    3.54 | 11.25    0.89
               2.083    0.89 | 5.167   40.71 | 8.250    3.54 | 11.33    0.89
               2.167    0.89 | 5.250   40.71 | 8.333    1.77 | 11.42    0.89
               2.250    0.89 | 5.333   11.51 | 8.417    1.77 | 11.50    0.89
               2.333    5.31 | 5.417   11.51 | 8.500    1.77 | 11.58    0.89
               2.417    5.31 | 5.500   11.51 | 8.583    1.77 | 11.67    0.89
               2.500    5.31 | 5.583   11.51 | 8.667    1.77 | 11.75    0.89
               2.583    5.31 | 5.667   11.51 | 8.750    1.77 | 11.83    0.89
               2.667    5.31 | 5.750   11.51 | 8.833    1.77 | 11.92    0.89
               2.750    5.31 | 5.833   11.51 | 8.917    1.77 | 12.00    0.89
               2.833    5.31 | 5.917   11.51 | 9.000    1.77 | 12.08    0.89
               2.917    5.31 | 6.000   11.51 | 9.083    1.77 | 12.17    0.89
               3.000    5.31 | 6.083   11.51 | 9.167    1.77 | 12.25    0.89
               3.083    5.31 | 6.167   11.51 | 9.250    1.77 |

    Max.Eff.Inten.(mm/hr)=      40.71         45.72
              over (min)         5.00         20.00
    Storage Coeff.  (min)=       7.39 (ii)    17.05 (ii)
    Unit Hyd. Tpeak (min)=       5.00         20.00
    Unit Hyd. peak  (cms)=       0.17          0.06
                                                      *TOTALS*
    PEAK FLOW       (cms)=       0.80          0.88          1.672 (iii)
    TIME TO PEAK    (hrs)=       5.25          5.25          5.25
    RUNOFF VOLUME    (mm)=      87.54         72.37         79.20
    TOTAL RAINFALL   (mm)=      88.54         88.54         88.54
    RUNOFF COEFFICIENT   =       0.99          0.82          0.89

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
          CN*  =  94.0    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(  0004)|     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    |  1.4710     0.2600
                         0.6340     0.1300    |  1.6870     0.2900
                         0.9580     0.1800    |  1.9040     0.3300
                         1.1830     0.2100    |  0.0000     0.0000

                              AREA     QPEAK     TPEAK       R.V.
                              (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0204)   15.642     1.672      5.25      79.20
   OUTFLOW: ID= 1 (  0004)   15.642     1.405      5.33      79.19

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 84.07
                TIME SHIFT OF PEAK FLOW          (min)=  5.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.2491

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| CALIB            |
| STANDHYD (  0201)|   Area     (ha)=  27.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  58.00   Dir. Conn.(%)=  50.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      15.91         11.52
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     427.61         40.00
     Mannings n            =      0.013         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    5.31 | 6.250   11.51 |  9.33    0.89
               0.167    0.00 | 3.250    5.31 | 6.333    6.20 |  9.42    0.89
               0.250    0.00 | 3.333   15.05 | 6.417    6.20 |  9.50    0.89
               0.333    0.89 | 3.417   15.05 | 6.500    6.20 |  9.58    0.89
               0.417    0.89 | 3.500   15.05 | 6.583    6.20 |  9.67    0.89
               0.500    0.89 | 3.583   15.05 | 6.667    6.20 |  9.75    0.89
               0.583    0.89 | 3.667   15.05 | 6.750    6.20 |  9.83    0.89
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0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

Max.Eff.Inten.(mm/hr)=	40.71	37.89	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.75 (ii)	19.16 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	
			TOTALS
PEAK FLOW (cms)=	1.55	1.05	2.595 (iii)
TIME TO PEAK (hrs)=	5.25	5.33	5.25
RUNOFF VOLUME (mm)=	87.54	54.23	70.88
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	0.99	0.61	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.

RESERVOIR(0001)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.7170	0.8740
	0.2650	0.4502	0.8410	0.9835
	0.4330	0.6160	0.9670	1.0927
	0.5550	0.7304	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0201)	27.428	2.595	5.25	70.88
OUTFLOW: ID= 1 (0001)	27.428	0.883	6.08	70.87

PEAK FLOW REDUCTION [Qout/Qin](%)= 34.04
TIME SHIFT OF PEAK FLOW (min)= 50.00
MAXIMUM STORAGE USED (ha.m.)= 1.0203

CALIB			
STANDHYD (0203)	Area (ha)= 20.04		
ID= 1 DT= 5.0 min	Total Imp(%)= 63.00	Dir. Conn.(%)= 57.00	

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	12.62	7.41
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	365.48	40.00
Mannings n =	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

Max.Eff.Inten.(mm/hr)=	40.71	45.90	
over (min)	10.00	20.00	
Storage Coeff. (min)=	7.96 (ii)	17.60 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.13	0.06	
			TOTALS
PEAK FLOW (cms)=	1.29	0.89	2.180 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	87.54	74.12	81.77
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	0.99	0.84	0.92

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 95.0 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(0003)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)

0.0000	0.0000	0.5390	0.8200
0.1920	0.4600	0.6370	0.9100
0.3190	0.6000	0.7370	1.0000
0.4130	0.7000	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0203)	20.036	2.180	5.25	81.77
OUTFLOW: ID= 1 (0003)	20.036	0.674	6.25	81.74

PEAK FLOW REDUCTION [Qout/Qin](%)= 30.91
TIME SHIFT OF PEAK FLOW (min)= 60.00
MAXIMUM STORAGE USED (ha.m.)= 0.9431

CALIB
STANDHYD (0206) | Area (ha)= 25.23
ID= 1 DT= 5.0 min | Total Imp(%)= 74.00 Dir. Conn.(%)= 70.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	18.67	6.56
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	410.14	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

Max.Eff.Inten.(mm/hr)=	40.71	46.90	
over (min)	10.00	20.00	
Storage Coeff. (min)=	8.54 (ii)	18.09 (ii)	
Unit Hyd. Tpeak (min)=	10.00	20.00	
Unit Hyd. peak (cms)=	0.12	0.06	

				TOTALS
PEAK FLOW	(cms)=	2.00	0.82	2.815 (iii)
TIME TO PEAK	(hrs)=	5.25	5.25	5.25
RUNOFF VOLUME	(mm)=	87.54	82.04	85.89
TOTAL RAINFALL	(mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT	=	0.99	0.93	0.97

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 99.0 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(0006) | OVERFLOW IS OFF
IN= 2---> OUT= 1 |
DT= 5.0 min |

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.5830	1.1750
0.2100	0.6900	0.6860	1.3000
0.3470	0.8750	0.7930	1.4200
0.4490	1.0100	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0206)	25.232	2.815	5.25	85.89
OUTFLOW: ID= 1 (0006)	25.232	0.739	6.33	85.86

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.24
TIME SHIFT OF PEAK FLOW (min)= 65.00
MAXIMUM STORAGE USED (ha.m.)= 1.3597

CALIB
STANDHYD (0207) | Area (ha)= 16.37
ID= 1 DT= 5.0 min | Total Imp(%)= 56.00 Dir. Conn.(%)= 47.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	9.17	7.20
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	330.38	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89

2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

Max.Eff.Inten.(mm/hr)=	40.71	38.48	
over (min)	5.00	20.00	
Storage Coeff. (min)=	7.50 (ii)	17.84 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.17	0.06	
			TOTALS
PEAK FLOW (cms)=	0.87	0.67	1.544 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	87.54	54.50	70.03
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	0.99	0.62	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(0007)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6810	0.4150
	0.2530	0.2100	0.8000	0.4700
	0.4120	0.2900	0.9210	0.5250
	0.5280	0.3450	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0207)	16.372	1.544	5.25	70.03
OUTFLOW: ID= 1 (0007)	16.372	0.793	5.58	70.01

PEAK FLOW REDUCTION [Qout/Qin](%)= 51.33
TIME SHIFT OF PEAK FLOW (min)= 20.00
MAXIMUM STORAGE USED (ha.m.)= 0.4667

CALIB			
STANDHYD (0202)	Area (ha)= 15.28		
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00	Dir. Conn.(%)= 50.00	
	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	8.71	6.57	
Dep. Storage (mm)=	1.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	319.17	40.00	
Mannings n =	0.013	0.250	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

Max.Eff.Inten.(mm/hr)=	40.71	46.77	
over (min)	5.00	20.00	
Storage Coeff. (min)=	7.34 (ii)	16.91 (ii)	
Unit Hyd. Tpeak (min)=	5.00	20.00	
Unit Hyd. peak (cms)=	0.17	0.06	
			TOTALS
PEAK FLOW (cms)=	0.86	0.82	1.681 (iii)
TIME TO PEAK (hrs)=	5.25	5.25	5.25
RUNOFF VOLUME (mm)=	87.54	77.99	82.76
TOTAL RAINFALL (mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT =	0.99	0.88	0.93

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 97.0 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(0002)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	1.1400	0.4050
	0.4200	0.2250	1.3390	0.4450
	0.6870	0.3000	1.5430	0.5000
	0.8820	0.3500	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0202)	15.280	1.681	5.25	82.76
OUTFLOW: ID= 1 (0002)	15.280	1.217	5.42	82.75

PEAK FLOW REDUCTION [Qout/Qin](%)= 72.41
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.4215

CALIB	
STANDHYD (0205)	Area (ha)= 27.24
ID= 1 DT= 5.0 min	Total Imp(%)= 57.00 Dir. Conn.(%)= 49.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	15.53	11.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	426.16	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

				TOTALS
Max.Eff.Inten.	(mm/hr)=	40.71	37.70	
	over (min)	10.00	20.00	
Storage Coeff.	(min)=	8.73 (ii)	19.16 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	20.00	
Unit Hyd. peak	(cms)=	0.12	0.06	
PEAK FLOW	(cms)=	1.51	1.06	2.565 (iii)
TIME TO PEAK	(hrs)=	5.25	5.33	5.25
RUNOFF VOLUME	(mm)=	87.54	54.14	70.51
TOTAL RAINFALL	(mm)=	88.54	88.54	88.54
RUNOFF COEFFICIENT	=	0.99	0.61	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.

RESERVOIR(0038)	OVERFLOW IS OFF
IN= 2---> OUT= 1	
DT= 5.0 min	

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0075	1.5119
0.0024	0.7743	0.0091	1.7018
0.0042	1.0612	0.0107	1.8935
0.0057	1.2596	0.0000	0.0000

**** WARNING : STORAGE-DISCHARGE TABLE WAS EXCEEDED.

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0205)	27.241	2.565	5.25	70.51
OUTFLOW: ID= 1 (0038)	27.241	0.011	12.75	18.40

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.42
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 1.8935

CALIB	
STANDHYD (0208)	Area (ha)= 14.48
ID= 1 DT= 5.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 50.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	8.54	5.94
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	310.68	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	5.31	6.250	11.51	9.33	0.89
0.167	0.00	3.250	5.31	6.333	6.20	9.42	0.89
0.250	0.00	3.333	15.05	6.417	6.20	9.50	0.89
0.333	0.89	3.417	15.05	6.500	6.20	9.58	0.89
0.417	0.89	3.500	15.05	6.583	6.20	9.67	0.89
0.500	0.89	3.583	15.05	6.667	6.20	9.75	0.89
0.583	0.89	3.667	15.05	6.750	6.20	9.83	0.89
0.667	0.89	3.750	15.05	6.833	6.20	9.92	0.89
0.750	0.89	3.833	15.05	6.917	6.20	10.00	0.89
0.833	0.89	3.917	15.05	7.000	6.20	10.08	0.89
0.917	0.89	4.000	15.05	7.083	6.20	10.17	0.89
1.000	0.89	4.083	15.05	7.167	6.20	10.25	0.89
1.083	0.89	4.167	15.05	7.250	6.20	10.33	0.89
1.167	0.89	4.250	15.05	7.333	3.54	10.42	0.89
1.250	0.89	4.333	40.71	7.417	3.54	10.50	0.89
1.333	0.89	4.417	40.71	7.500	3.54	10.58	0.89
1.417	0.89	4.500	40.71	7.583	3.54	10.67	0.89
1.500	0.89	4.583	40.71	7.667	3.54	10.75	0.89
1.583	0.89	4.667	40.71	7.750	3.54	10.83	0.89
1.667	0.89	4.750	40.71	7.833	3.54	10.92	0.89
1.750	0.89	4.833	40.71	7.917	3.54	11.00	0.89
1.833	0.89	4.917	40.71	8.000	3.54	11.08	0.89
1.917	0.89	5.000	40.71	8.083	3.54	11.17	0.89
2.000	0.89	5.083	40.71	8.167	3.54	11.25	0.89
2.083	0.89	5.167	40.71	8.250	3.54	11.33	0.89
2.167	0.89	5.250	40.71	8.333	1.77	11.42	0.89
2.250	0.89	5.333	11.51	8.417	1.77	11.50	0.89
2.333	5.31	5.417	11.51	8.500	1.77	11.58	0.89
2.417	5.31	5.500	11.51	8.583	1.77	11.67	0.89
2.500	5.31	5.583	11.51	8.667	1.77	11.75	0.89
2.583	5.31	5.667	11.51	8.750	1.77	11.83	0.89
2.667	5.31	5.750	11.51	8.833	1.77	11.92	0.89
2.750	5.31	5.833	11.51	8.917	1.77	12.00	0.89
2.833	5.31	5.917	11.51	9.000	1.77	12.08	0.89
2.917	5.31	6.000	11.51	9.083	1.77	12.17	0.89
3.000	5.31	6.083	11.51	9.167	1.77	12.25	0.89
3.083	5.31	6.167	11.51	9.250	1.77		

```
     Max.Eff.Inten.(mm/hr)=      40.71        39.11
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       7.23 (ii)   17.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.06
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.82         0.57          1.386 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        54.78          71.16
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.62           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.

--------------------------------------------------------------------------------
-------------------
| RESERVOIR(  0040)|     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   |   0.0075      0.8037
                         0.0024      0.4145   |   0.0090      0.9034
                         0.0042      0.5664   |   0.0107      1.0038
                         0.0056      0.6710   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0208)     14.479     1.386      5.25      71.16
   OUTFLOW: ID= 1 (  0040)     14.479     0.011     12.58      29.31

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.77
                  TIME SHIFT OF PEAK FLOW          (min)=440.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.0037

--------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0209)|   Area     (ha)=   5.13
|ID= 1 DT= 5.0 min |   Total Imp(%)=  59.00   Dir. Conn.(%)=  50.00
-------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.02         2.10
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     184.85        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 | 3.167     5.31 | 6.250    11.51 |  9.33     0.89
     0.167     0.00 | 3.250     5.31 | 6.333     6.20 |  9.42     0.89
     0.250     0.00 | 3.333    15.05 | 6.417     6.20 |  9.50     0.89
     0.333     0.89 | 3.417    15.05 | 6.500     6.20 |  9.58     0.89
     0.417     0.89 | 3.500    15.05 | 6.583     6.20 |  9.67     0.89
     0.500     0.89 | 3.583    15.05 | 6.667     6.20 |  9.75     0.89
     0.583     0.89 | 3.667    15.05 | 6.750     6.20 |  9.83     0.89
     0.667     0.89 | 3.750    15.05 | 6.833     6.20 |  9.92     0.89
     0.750     0.89 | 3.833    15.05 | 6.917     6.20 | 10.00     0.89
     0.833     0.89 | 3.917    15.05 | 7.000     6.20 | 10.08     0.89
     0.917     0.89 | 4.000    15.05 | 7.083     6.20 | 10.17     0.89
     1.000     0.89 | 4.083    15.05 | 7.167     6.20 | 10.25     0.89
     1.083     0.89 | 4.167    15.05 | 7.250     6.20 | 10.33     0.89
     1.167     0.89 | 4.250    15.05 | 7.333     3.54 | 10.42     0.89
     1.250     0.89 | 4.333    40.71 | 7.417     3.54 | 10.50     0.89
     1.333     0.89 | 4.417    40.71 | 7.500     3.54 | 10.58     0.89
     1.417     0.89 | 4.500    40.71 | 7.583     3.54 | 10.67     0.89
     1.500     0.89 | 4.583    40.71 | 7.667     3.54 | 10.75     0.89
     1.583     0.89 | 4.667    40.71 | 7.750     3.54 | 10.83     0.89
     1.667     0.89 | 4.750    40.71 | 7.833     3.54 | 10.92     0.89
     1.750     0.89 | 4.833    40.71 | 7.917     3.54 | 11.00     0.89
     1.833     0.89 | 4.917    40.71 | 8.000     3.54 | 11.08     0.89
     1.917     0.89 | 5.000    40.71 | 8.083     3.54 | 11.17     0.89
     2.000     0.89 | 5.083    40.71 | 8.167     3.54 | 11.25     0.89
     2.083     0.89 | 5.167    40.71 | 8.250     3.54 | 11.33     0.89
     2.167     0.89 | 5.250    40.71 | 8.333     1.77 | 11.42     0.89
     2.250     0.89 | 5.333    11.51 | 8.417     1.77 | 11.50     0.89
     2.333     5.31 | 5.417    11.51 | 8.500     1.77 | 11.58     0.89
     2.417     5.31 | 5.500    11.51 | 8.583     1.77 | 11.67     0.89
     2.500     5.31 | 5.583    11.51 | 8.667     1.77 | 11.75     0.89
     2.583     5.31 | 5.667    11.51 | 8.750     1.77 | 11.83     0.89
     2.667     5.31 | 5.750    11.51 | 8.833     1.77 | 11.92     0.89
     2.750     5.31 | 5.833    11.51 | 8.917     1.77 | 12.00     0.89
     2.833     5.31 | 5.917    11.51 | 9.000     1.77 | 12.08     0.89
     2.917     5.31 | 6.000    11.51 | 9.083     1.77 | 12.17     0.89
     3.000     5.31 | 6.083    11.51 | 9.167     1.77 | 12.25     0.89
     3.083     5.31 | 6.167    11.51 | 9.250     1.77 |

     Max.Eff.Inten.(mm/hr)=      40.71        48.73
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       5.29 (ii)   14.70 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.21         0.08
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.28          0.566 (iii)
     TIME TO PEAK    (hrs)=       5.25         5.25           5.25
     RUNOFF VOLUME    (mm)=      87.54        76.57          82.05
     TOTAL RAINFALL   (mm)=      88.54        88.54          88.54
     RUNOFF COEFFICIENT   =       0.99         0.86           0.93


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  96.0    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(  0041)|     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   |   0.0086      0.3208
                         0.0028      0.1768   |   0.0104      0.3558
                         0.0049      0.2347   |   0.0123      0.3905
                         0.0065      0.2732   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0209)      5.125     0.566      5.25      82.05
   OUTFLOW: ID= 1 (  0041)      5.125     0.012     12.25      56.99

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  2.17
                  TIME SHIFT OF PEAK FLOW          (min)=420.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3903

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

 FINISH
================================================================================
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APPENDIX D

Floodplain Analysis Documentation

D1 – HEC-RAS Model Schematics
D2 – HEC-RAS Flow Change Locations and Peak Flow Rates
D3 – HEC-RAS Water Surface Elevation and Velocity Results
D4 – Correspondence with Toronto and Region Conservation Authority

Appendix D1 – HEC-RAS Model Schematics

Emil Kolb Pkwy

HWY 50

Duffys Ln

Tributary E

Tributary D

Tributary C

Tributary B

Tributary A

Main Humber River

Bridge Crossing
Span: 21 m
Rise: 6.55 m

Culvert Crossing
Corrugated Steel Pipe
Length: 30.4 m
US Invert Elev.: 246.13 m
DS Invert Elev.: 242.53 m

0 0.25 0.5 1 Kilometres

Crossing
Watercourse
Cross Section
Bolton North Hills Property Boundary

CROZIER
CELEBRATING 20 YEARS SINCE 2004

Bolton North Hills

Middle Main HEC-RAS
Model Schematic

Mt Hope Rd

Cold Creek

Tributary E

Tributary F

Tributary D

Hwy 50

Columbia Way

4370.082
4370.081
4370.079
4370.073
4370.043
4369.909
4368.863
4344
4308.669
4196.075
4007.722
3956.844
3899.436
3821.818
3789.828
3711.272
3653.272
3602.49
3483.216
3413.879
3378.892
3308.731
3216.276
3198.314
3190.241
3115.165
3054.114
3040.584
2972.104
1399.710
1373
1318
1245
1184
1126
992
993

Culvert Crossing
Corrugated Steel Pipe
Length: 62.51 m
US Invert Elev.: 252.86 m
DS Invert Elev.: 252.78 m

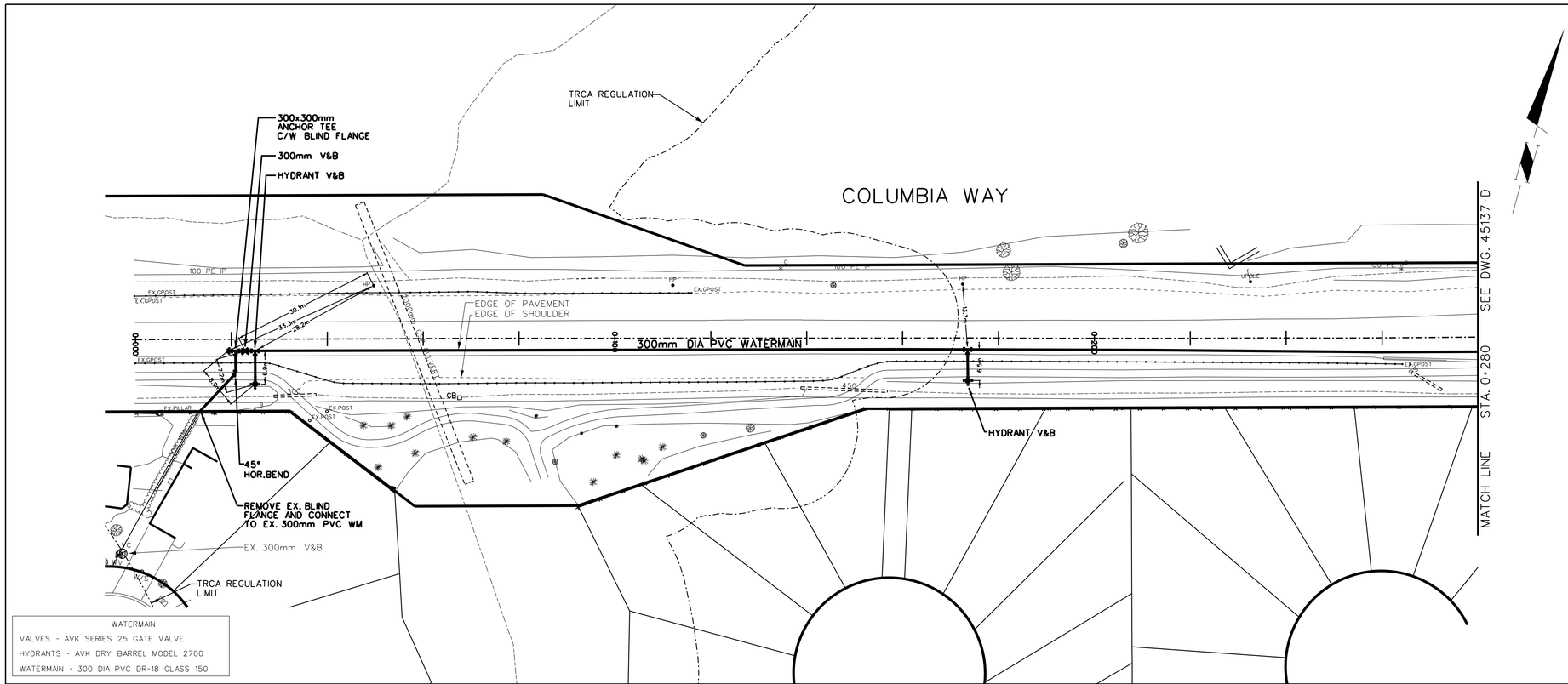
Crossing
Watercourse
Cross Section
Bolton North Hills Property Boundary

0 0.25 0.5 1 Kilometres

CROZIER

Bolton North Hills

Cold Creek HEC-RAS
Model Schematic



WATERMAIN

VALVES - AVK SERIES 25 GATE VALVE

HYDRANTS - AVK DRY BARREL MODEL 2700

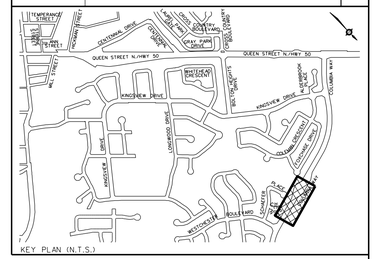
WATERMAIN - 300 DIA PVC DR-18 CLASS 150

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.
JUN.13/2012	ISSUED FOR CONSTRUCTION	B.G.G.
APR.29/2013	AS-BUILT SUBMISSION	B.G.G.



LEGEND

W/S — 20mm DIA. or 25mm DIA. COPPER AS STATED ON THE DRAWING.

35 — HOUSE NUMBER

25mmC — W/S SIZE AND TYPE

Disclaimer

As-constructed dimensions, measurements and other details contained in this record drawing have been obtained by AECOM CANADA LTD. ("AECOM") from various sources. Such information represents the best information available to AECOM at the time of preparation of this record drawing. AECOM does not in any way represent or warrant that such information is accurate and assumes no responsibility for any errors or omissions contained therein.

AECOM

	255.81	255.81	255.81	255.85	256.03	256.27	256.58	256.88	257.18	257.48	257.78	258.08	258.36	258.62	BOT.EL. OF WM.
258.37	258.03	257.89	257.81	257.95	258.10	258.38	258.70	259.06	259.30	259.69	260.00	260.17	260.37	260.65	EX. ROAD ELEV.
0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240	0+260	0+280	ROAD CHAINAGE

General Notes

- All Driveways ASPHALT Unless Otherwise Noted.
- All Service Locations Are Approximate And Must Be Located Accurately In The Field
- Denotes Building - Not Located
- Denotes Building Located
- Type 'B' Bedding Unless Otherwise Noted (SAN)

Region of Peel BM NO.73- On The North Face, West Corner Of A Red Brick House, No.166 King Street West Bolton. Elev. 226.567

B.M. No. 73 Elev. 226.567m

The Contractor Is Responsible For Locating And Protecting All Existing Utilities Prior To And During Construction Location of Existing Utilities Approximate Only, To Be Verified In Field By Contractor.

ORIGINAL DESIGN STAMPED BY B.G.GRATRIX, P.ENG. JUNE 13, 2012

Designed by ____ Chkd. ____ Approved by ____

NOTICE TO CONTRACTOR

48 HOURS PRIOR TO COMMENCING WORK NOTIFY THE FOLLOWING

THE REGIONAL MUNICIPALITY OF PEEL	CABLE TELEVISION/FIBREOPTIC PROVIDERS:
CITY OF MISSISSAUGA WORKS DEPT.	BELL CANADA
CITY OF BRAMPTON WORKS DEPT.	ENERSOURCE TELECOM
TOWN OF CALEDON WORKS DEPT.	HYDRO ONE TELECOM
BELL CANADA	ROGERS CABLE
ENBRIDGE INCORPORATED-GAS DISTRIBUTION	ALLSTREAM
ONTARIO MINISTRY OF TRANSPORTATION	PSN (PUBLIC SECTOR NETWORK)
ONTARIO CLEAN WATER AGENCY	FUTUREWAY (FCI/BROADBAND)
HYDRO ONE NETWORKS	
ENERSOURCE, HYDRO MISSISSAUGA	
HYDRO ONE BRAMPTON	

10m 0 10 20 30m — HORIZONTAL SCALE

1m 0 1 2 3m — VERTICAL SCALE

Region of Peel
Working for you

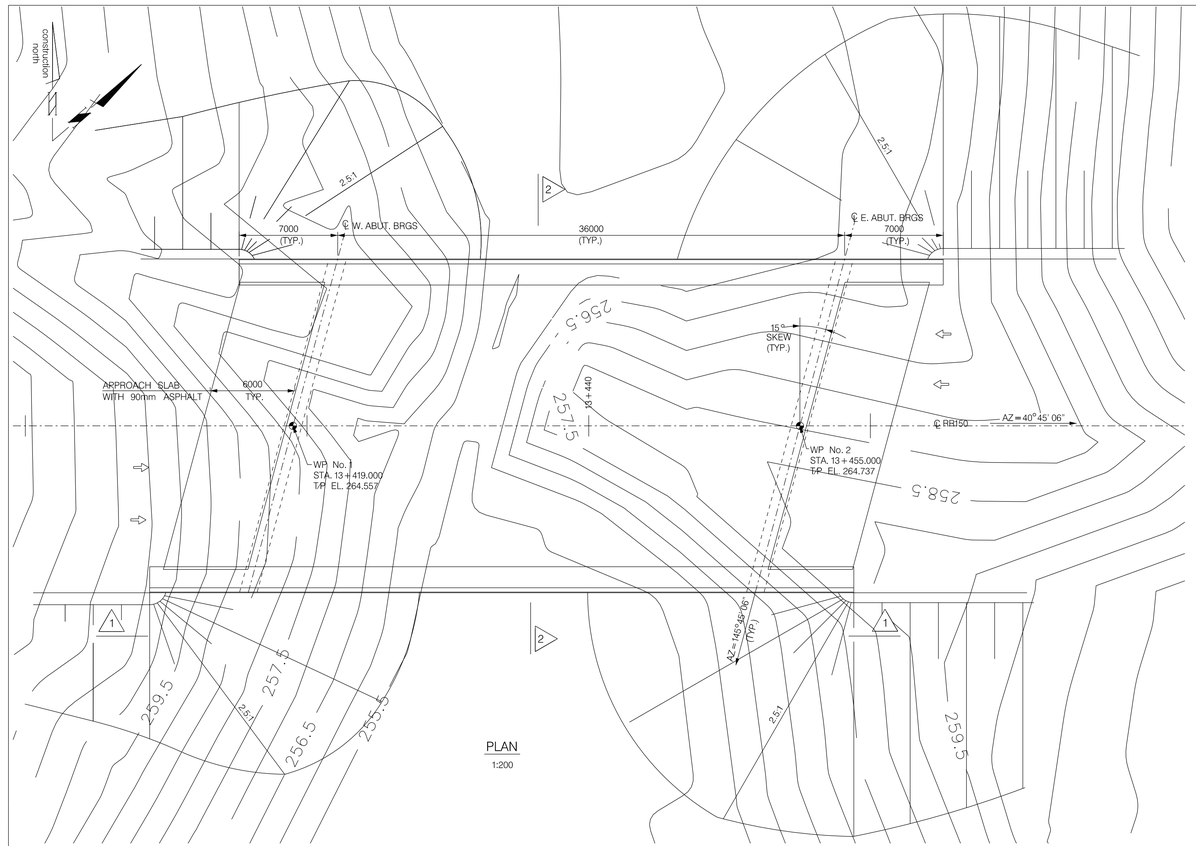
QUEEN ST. N/HIGHWAY 50

(FROM HUMBER RIVER TO COLUMBIA WAY)

300mm WATERMAIN PLAN AND PROFILE

STA. 0+000 TO STA. 0+280

CAD Area	Area C-22	Project No.	09-1970 09-1115
Checked by B.G.G.	Drawn by A.L.G.		
Date JUN. 13, 2012	Sheet 16 of 45	Plan No.	45136-D



PLAN

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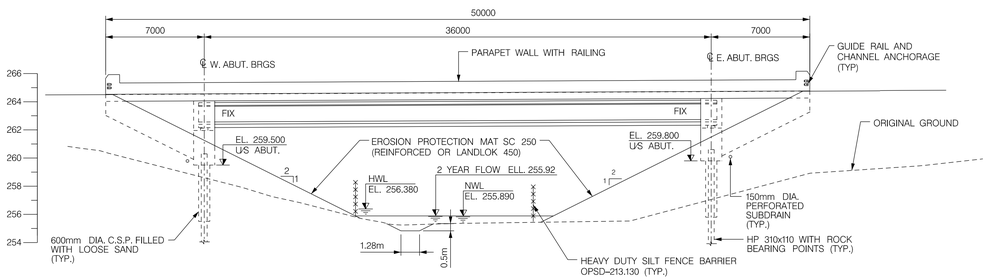
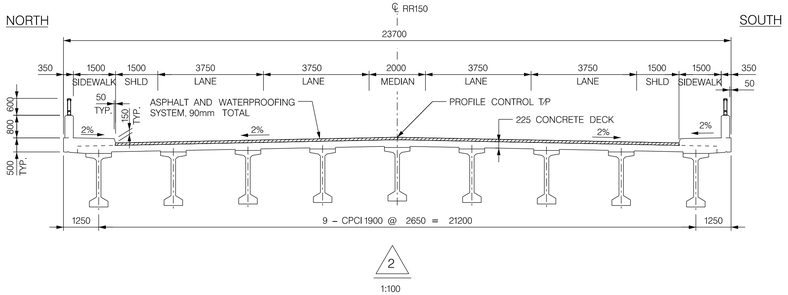


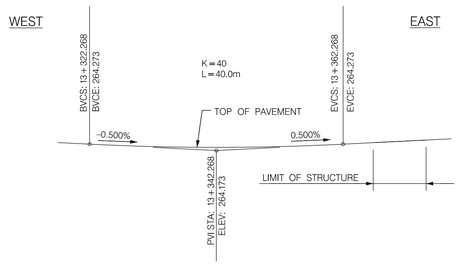
1 ELEVATION

1:200



2

1:100



PROFILE OF RR150

N.T.S.

ENVIRONMENTAL REQUIREMENTS

FOR DETAILS OF CHANNEL CROSS SECTION SEE CHANNEL RESTORATION DWGS

ALL SEDIMENT AND EROSION CONTROL MEASURES MUST BE INSTALLED PRIOR TO DISTURBING ANY AREAS. THE CONTROL MEASURES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE BEEN STABILIZED AND RESTORED.

ALL WORK MUST BE CARRIED OUT IN THE DRY. THE CONTRACTOR IS RESPONSIBLE FOR ANY UNWATERING REQUIRED TO REMOVE THE EXISTING STRUCTURE AND FOOTINGS AND TO CONSTRUCT THE NEW STRUCTURE AND FOOTINGS.

NO WORK IS PERMITTED IN THE CREEK WITH THE EXCEPTION OF DIVERSION BERMING AND NO MATERIAL SHALL BE RELEASED INTO THE CREEK, INCLUDING UNTREATED WATER FROM UNWATERING ACTIVITIES.

THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING PROTECTION MEASURES TO PREVENT ANY CONCRETE, RUBBLE, DUST OR EFFLUENT FROM ENTERING THE WATERCOURSE. ALL TEMPORARY SEDIMENT CONTROL MEASURES TO BE UNDERTAKEN OUTSIDE OF THE WATERCOUSE.

CROSSING THROUGH THE CREEK BY CONSTRUCTION EQUIPMENT IS NOT PERMITTED.

FISH TRAPPED DURING UNWATERING OF THE WORK ZONE SHALL BE NETTED BY A QUALIFIED FISHERIES BIOLOGIST AND RELEASED TO THE STREAM CHANNEL IMMEDIATELY UPSTREAM OF THE WORK ZONE TO ALLOW MIGRATORY FISH TO ACCESS THE WATERCOURSE UPSTREAM OF THE WORK ZONE.

LIST OF DRAWINGS:

LEGEND

W.P. DENOTES WORKING POINT
T/P DENOTES TOP OF PAVEMENT
U/S ABUT. DENOTES UNDERSIDE OF ABUTMENT.

APPLICABLE STANDARD DRAWINGS:

OPSD – 3101.150 WALLS, ABUTMENT, BACKFILL, MINIMUM GRANULAR REQUIREMENT

OPSD – 3370.100 DECK, WATERPROOFING HOT APPLIED ASPHALT MEMEBRANE WITH PROTECTION BOARD.

OPSD – 3370.101 DECK, WATERPROOFING HOT APPLIED ASPHALT MEMBRANE AT ACTIVE CRACKS GREATER THAN 2mm WIDE AND CONSTRUCTION JOINTS.

OPSD – 3419.100 BARRIERS AND RAILINGS, STEEL BEAM, GUIDE RAIL AND CHANNEL ANCHORAGE.

OPSD – 3941.200 FIGURES IN CONCRETE, SITE NUMBER AND DATE, LAYOUT.

SERVICE DATA

SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		
TRANSIT			HYDRO ONE		
PARKS & REC.			CTV		
ONT. CLEAN WATER			COMMUNIC. CABLES		

REVISIONS

DATE	DETAILS	INIT.
2013 /01 /16	ISSUED FOR CONSTRUCTION	
2014 /04 /30	ISSUED FOR FIELD REVISION	
2015 /11 /30	AS-RECORDED	A.S.C.

GENERAL NOTES

DESIGN CODE: CHBDC CANCSA-S6-06
DESIGN LOAD: CL-625 ONT

1. CLASS OF CONCRETE

CLASS OF CONCRETE FOR PRECAST GIRDERS ARE GIVEN ON THE PRESTRESSED GIRDER DRAWINGS

REMAINDER,
UNLESS NOTED OTHERWISE.....35 MPa

2. CLEAR COVER TO REINFORCING STEEL

FOOTINGS.....100 + 25mm
DECK:
TOP.....70 + 20mm
BOTTOM.....40 + 10mm
REMAINDER (UNLESS OTHERWISE NOTED) .....70 + 20mm

3. REINFORCING STEEL

REINFORCING STEEL SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED. BAR MARKS WITH PREFIX 'C' DENOTE COATED BARS.

STAINLESS REINFORCING STEEL SHALL BE TYPE 316 LN, DUPLEX 2205 OR XM-28 AND HAVE A MINIMUM YIELD STRENGTH OF 500 MPa. BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS.

UNLESS SHOWN OTHERWISE, TENSION LAP LENGTHS NOT INDICATED ON CONTRACT DRAWINGS SHALL BE CLASS B.

BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL STANDARD DRAWINGS SS12-1 AND SS12-2, UNLESS INDICATED OTHERWISE.

4. CONSTRUCTION NOTES

THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESSES FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESS IS DIFFERENT FROM THOSE GIVEN WITH THE BEARING DESIGN DATA, THE CONTRACTOR SHALL ADJUST THE REINFORCING STEEL TO SUIT.

NO BACKFILL SHALL BE PLACED UNTIL DECK CONCRETE HAS REACHED 75% OF ITS SPECIFIED STRENGTH.

BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS KEEPING THE HEIGHT OF BACKFILL APPROXIMATELY THE SAME, AT NO TIME SHALL THE DIFFERENCE IN BACKFILL ELEVATION BE GREATER THAN 0.5m.

THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND ELEVATIONS SHOWN ON THE STRUCTURE DRAWINGS AGAINST OTHER CONTRACT DOCUMENTS AND REPORT DISCREPANCIES TO ENGINEER BEFORE PROCEEDING WITH WORK.

PROVIDE MINIMUM 1.2m FROST PROTECTION TO BOTTOM OF ALL FOOTINGS UNTIL COMPLETION OF FINAL GRADING.

IBI GROUP
100-175 Galaxy Boulevard
Toronto ON M9W 0C9 Canada
tel 416 679 1930 fax 416 675 4620
ibigroup.com

Designed by Chkd.

Approved by

Region of Peel
Working for you

REGIONAL ROAD 150

(FROM KING STREET TO REGIONAL ROAD 50)

CROSSING No. 11
GENERAL ARRANGEMENT

CAD Area	Area C-12 /C-23	Project No.	05-4030
Checked by D.M.	Drawn by S.Z.		
Date MAR, 2013	Sheet 137 of 190	Plan No.	55280-D

Appendix D2 – HEC-RAS Flow Change Locations and Peak Flow Rates

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Hydraulic Model - Regional Event

Tributary	VO Flow Node	HEC-RAS Station	Regional Flow Rate (m^3/s)	
			Existing	Proposed
A	ADDHYD 177[1]	1017	0.52	0.37
	ADDHYD 177	996	3.99	3.34
B	ADDHYD 120	1005	4.01	5.19
	ADDHYD 121	999	5.10	7.07
C	ADDHYD 131	2179.936	7.36	5.39
	ADDHYD 134	1855.838	8.80	8.43
	ADDHYD 294	993.3609	12.25	11.22
D	ADDHYD 156	1195.92	6.49	11.12
	ADDHYD 183	1192.146	13.11	15.27
	ADDHYD 335	886.4161	15.61	17.98
C + D	ADDHYD 178	294	28.55	29.46
E	ADDHYD 296	4370.082	7.04	7.50
	ADDHYD 175	4369.909	10.39	11.21
	ADDHYD 176	3789.828	16.76	16.41
F	ADDHYD 88[1]	1571	1.43	1.04
	ADDHYD 88[1]	1399.71	2.58	2.79
	ADDHYD 88	1184	7.02	6.97

1: Flows have been prorated

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Cold Creek Hydraulic Model - Existing Condtions Flow Change Locations

Tributary E			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 296	4370.082	2	0.7
		5	1.2
		10	1.7
		25	2.3
		50	2.7
		100	3.2
		Regional	7.0
ADDHYD 175	4369.909	2	1.0
		5	1.9
		10	2.5
		25	3.3
		50	4.0
		100	4.7
		Regional	10.4
ADDHYD 176	3789.828	2	1.6
		5	2.9
		10	3.9
		25	5.2
		50	6.2
		100	7.3
		Regional	16.8

Tributary F			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 88[1]	1571	2	0.16
		5	0.28
		10	0.37
		25	0.49
		50	0.59
		100	0.68
		Regional	1.43
ADDHYD 88[1]	1399.71	2	0.28
		5	0.50
		10	0.66
		25	0.88
		50	1.05
		100	1.22
		Regional	2.58
ADDHYD 88	1184	2	0.73
		5	1.29
		10	1.71
		25	2.28
		50	2.73
		100	3.18
		Regional	7.02

1: Flows have been prorated

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Cold Creek Hydraulic Model - Proposed Condtions Flow Change Locations

Tributary E			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 172	4370.082	2	1.45
		5	2.16
		10	2.76
		25	3.34
		50	3.88
		100	4.44
		Regional	7.50
ADDHYD 175	4369.909	2	2.31
		5	3.37
		10	4.24
		25	5.39
		50	6.33
		100	7.21
		Regional	11.21
ADDHYD 176	3789.828	2	2.28
		5	3.42
		10	4.39
		25	5.53
		50	6.50
		100	7.46
		Regional	16.41

Tributary F			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 88[1]	1571	2	0.11
		5	0.19
		10	0.25
		25	0.33
		50	0.40
		100	0.46
		Regional	1.04
ADDHYD 88[1]	1399.71	2	0.21
		5	0.38
		10	0.50
		25	0.66
		50	0.79
		100	0.93
		Regional	2.79
ADDHYD 88	1184	2	0.66
		5	1.17
		10	1.56
		25	2.07
		50	2.48
		100	2.89
		Regional	6.97

1: Flows have been prorated

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Main Humber Hydraulic Model - Existing Condtions Flow Change Locations

Tributary A			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 177[1]	1017	2	0.05
		5	0.10
		10	0.13
		25	0.18
		50	0.22
		100	0.26
		Regional	0.52
ADDHYD 177	996	2	0.39
		5	0.75
		10	1.01
		25	1.38
		50	1.68
		100	1.97
		Regional	3.99

1: Flows have been prorated

Tributary B			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 120	1005	2	0.45
		5	0.80
		10	1.07
		25	1.43
		50	1.72
		100	2.01
		Regional	4.01
ADDHYD 121	999	2	0.51
		5	0.95
		10	1.27
		25	1.73
		50	2.08
		100	2.45
		Regional	5.10

Tributary C			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 131	2179.936	2	0.56
		5	1.04
		10	1.40
		25	1.90
		50	2.30
		100	2.70
		Regional	7.36
ADDHYD 134	1855.838	2	0.67
		5	1.25
		10	1.70
		25	2.32
		50	2.81
		100	3.32
		Regional	8.80
ADDHYD 294	993.3609	2	0.89
		5	1.72
		10	2.35
		25	3.24
		50	3.96
		100	4.71
		Regional	12.25

Tributary D			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 156	1195.122	2	0.90
		5	1.49
		10	1.91
		25	2.48
		50	2.93
		100	3.39
		Regional	6.49
ADDHYD 183	1192.146	2	1.54
		5	2.64
		10	3.47
		25	4.59
		50	5.47
		100	6.37
		Regional	13.11
ADDHYD 295	886.4161	2	1.80
		5	3.13
		10	4.13
		25	5.48
		50	6.54
		100	7.62
		Regional	15.61

Tributary C + D			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 178	294	2	2.70
		5	4.90
		10	6.55
		25	8.85
		50	10.68
		100	12.54
		Regional	28.55

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Main Humber Hydraulic Model - Proposed Condtions Flow Change Locations

Tributary A			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 177[1]	1017	2	0.0372
		5	0.0689
		10	0.0933
		25	0.1267
		50	0.1537
		100	0.1815
		Regional	0.3655
ADDHYD 177	996	2	0.34
		5	0.63
		10	0.853
		25	1.158
		50	1.405
		100	1.659
		Regional	3.341

1: Flows have been prorated

Tributary B			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 120	1005	2	0.4380
		5	0.7440
		10	0.9670
		25	1.2660
		50	1.4980
		100	1.7330
		Regional	5.1870
ADDHYD 121	999	2	0.564
		5	0.996
		10	1.309
		25	1.756
		50	2.103
		100	2.45
		Regional	7.069

Tributary C			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 131	2179.94	2	0.33
		5	0.60
		10	0.82
		25	1.11
		50	1.36
		100	1.60
		Regional	5.39
ADDHYD 134	1855.84	2	0.87
		5	1.51
		10	1.99
		25	2.63
		50	3.13
		100	3.65
		Regional	8.43
ADDHYD 334	993.361	2	1.10
		5	1.97
		10	2.63
		25	3.53
		50	4.24
		100	4.96
		Regional	11.22

Tributary D			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 156	1195.92	2	1.05
		5	1.55
		10	1.97
		25	2.57
		50	3.04
		100	3.51
		Regional	11.12
ADDHYD 183	1192.15	2	1.60
		5	2.51
		10	3.20
		25	4.21
		50	4.95
		100	5.70
		Regional	15.27
ADDHYD 335	886.416	2	1.94
		5	3.11
		10	4.01
		25	5.29
		50	6.25
		100	7.24
		Regional	17.98

Tributary C + D			
VO Flow Node	**HEC-RAS Station**	**Design Storm**	**Flow (m^3/s)**
ADDHYD 178	294	2	3.08
		5	5.21
		10	6.80
		25	9.08
		50	10.79
		100	12.55
		Regional	29.46

Appendix D3 – HEC-RAS Water Surface Elevation and Velocity Results

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary A HEC-RAS Model Regional Results

Tributary A Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE (masl)			Left Bank Vel. (m/s)			Main Channel Vel. (m/s)			Right Bank Vel. (m/s)		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
1017	254.86	254.84	-0.02	-	-	-	0.99	0.86	-0.13	-	-	-
1000	253.53	253.51	-0.02	-	-	-	0.9	0.87	-0.03	-	-	-
999	252.41	252.38	-0.03	-	-	-	0.13	0.11	-0.02	-	-	-
998.6	252.38	252.36	-0.02	-	-	-	0.21	0.17	-0.04	-	-	-
998.4	252.34	252.33	-0.01	-	-	-	0.34	0.3	-0.04	-	-	-
998	251.93	251.91	-0.02	-	-	-	0.86	0.79	-0.07	-	-	-
997.7	249.47	249.42	-0.05	-	-	-	1.3	1.23	-0.07	-	-	-
997	245.8	245.75	-0.05	-	-	-	1.04	1.15	0.11	-	-	-
996.6	242.27	242.25	-0.02	-	-	-	1.02	0.92	-0.1	-	-	-
996	237.83	237.81	-0.02	-	-	-	1.27	1.21	-0.06	-	-	-
995.8	236.08	236.06	-0.02	-	-	-	1.47	1.38	-0.09	-	-	-
995.6	234.74	234.71	-0.03	-	-	-	1.17	1.1	-0.07	-	-	-
995	232.66	232.63	-0.03	-	-	-	1.78	1.69	-0.09	-	-	-
932	232.15	232.15	0	0.01	0.01	0	0.06	0.05	-0.01	0.02	0.02	0

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary A HEC-RAS Model Results

Tributary A HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1017	254.73	254.72	-	-	0.70	0.66	-	-
1000	253.40	253.39	-	-	0.69	0.65	-	-
999	252.29	252.28	-	-	0.04	0.03	-	-
998.6	252.28	252.27	-	-	0.05	0.04	-	-
998.4	252.27	252.27	-	-	0.16	0.15	-	-
998	251.83	251.82	-	-	0.55	0.50	-	-
997.7	249.26	249.24	-	-	0.83	0.77	-	-
997	245.59	245.58	-	-	0.80	0.75	-	-
996.6	242.16	242.15	-	-	0.63	0.59	-	-
996	237.66	237.65	-	-	0.69	0.71	-	-
995.8	235.91	235.90	-	-	0.69	0.66	-	-
995.6	234.46	234.45	-	-	0.76	0.73	-	-
995	232.30	232.29	-	-	1.13	1.11	-	-
932	228.54	228.53	-	-	1.06	1.02	-	-

Tributary A HEC-RAS Exisitng and Proposed Conditions Model Results
25-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1017	254.8	254.8	-	-	0.8	0.8	-	-
1000	253.5	253.5	-	-	0.8	0.8	-	-
999	252.3	252.3	-	-	0.1	0.1	-	-
998.6	252.3	252.3	-	-	0.1	0.1	-	-
998.4	252.3	252.3	-	-	0.2	0.2	-	-
998	251.9	251.9	-	-	0.8	0.7	-	-
997.7	249.4	249.3	-	-	1.1	1.0	-	-
997	245.7	245.7	-	-	1.0	1.0	-	-
996.6	242.2	242.2	-	-	0.8	0.6	-	-
996	237.7	237.7	-	-	1.0	1.0	-	-
995.8	236.0	236.0	-	-	1.0	1.0	-	-
995.6	234.6	234.6	-	-	0.8	0.8	-	-
995	232.5	232.5	-	-	1.3	1.3	-	-
932	228.7	228.7	-	-	1.5	1.5	-	-

Tributary A HEC-RAS Exisitng and Proposed Conditions Model Results

100-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1017	254.82	254.80	-	-	0.79	0.76	-	-
1000	253.49	253.47	-	-	0.78	0.77	-	-
999	252.36	252.34	-	-	0.09	0.08	-	-
998.6	252.34	252.32	-	-	0.14	0.12	-	-
998.4	252.31	252.30	-	-	0.26	0.24	-	-
998	251.89	251.87	-	-	0.75	0.78	-	-
997.7	249.38	249.35	-	-	1.15	1.07	-	-
997	245.71	245.68	-	-	1.07	1.03	-	-
996.6	242.22	242.21	-	-	0.84	0.76	-	-
996	237.77	237.75	-	-	1.03	1.02	-	-
995.8	236.00	235.98	-	-	1.17	1.11	-	-
995.6	234.65	234.63	-	-	0.92	0.86	-	-
995	232.53	232.50	-	-	1.49	1.42	-	-
932	228.76	228.72	-	-	1.68	1.60	-	-

Tributary A HEC-RAS Exisitng and Proposed Conditions Model Results

Regional Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1017	254.86	254.84	-	-	0.99	0.86	-	-
1000	253.53	253.51	-	-	0.90	0.87	-	-
999	252.41	252.38	-	-	0.13	0.11	-	-
998.6	252.38	252.36	-	-	0.21	0.17	-	-
998.4	252.34	252.33	-	-	0.34	0.30	-	-
998	251.93	251.91	-	-	0.86	0.79	-	-
997.7	249.47	249.42	-	-	1.30	1.23	-	-
997	245.80	245.75	-	-	1.04	1.15	-	-
996.6	242.27	242.25	-	-	1.02	0.92	-	-
996	237.83	237.81	-	-	1.27	1.21	-	-
995.8	236.08	236.06	-	-	1.47	1.38	-	-
995.6	234.74	234.71	-	-	1.17	1.10	-	-
995	232.66	232.63	-	-	1.78	1.69	-	-
932	232.15	232.15	0.01	0.01	0.06	0.05	0.02	0.02

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary B HEC-RAS Model Regional Results

Tributary B Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE (masl)			Left Bank Vel. (m/s)			Main Channel Vel. (m/s)			Right Bank Vel. (m/s)		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
1005	257.37	257.47	0.1	-	-	-	2.01	2.07	0.06	-	-	-
1004.6	256.19	256.28	0.09	-	-	-	2.13	2.28	0.15	-	-	-
1004	255.17	255.25	0.08	-	-	-	1.99	2.13	0.14	-	-	-
1003	251.9	251.97	0.07	-	-	-	1.81	1.94	0.13	-	-	-
1002	251.08	251.14	0.06	-	-	-	0.35	0.44	0.09	-	-	-
1001.4	251.09	251.14	0.05	-	-	-	0.13	0.17	0.04	-	-	-
1001	251.09	251.14	0.05	-	-	-	0.11	0.14	0.03	-	-	-
1000.8	251.09	251.14	0.05	-	-	-	0.02	0.02	0	-	-	-
1000.2	251.09	251.14	0.05	-	-	-	0.03	0.04	0.01	-	-	-
1000	251.09	251.14	0.05	-	-	-	0.03	0.04	0.01	-	-	-
999.64	Culvert											
999	243.72	244.01	0.29	-	-	-	3.46	3.88	0.42	-	-	-
998	241.67	241.83	0.16	-	-	-	2.4	2.57	0.17	-	-	-
997.4	239.66	239.78	0.12	-	-	-	2.1	2.27	0.17	-	-	-
997	237.54	237.62	0.08	-	-	-	1.68	1.84	0.16	-	-	-
996	234.92	234.99	0.07	-	-	-	1.69	1.89	0.2	-	-	-
995.4	232.48	232.66	0.18	-	-	-	2.15	1.98	-0.17	-	-	-
994.4	232.02	232.02	0	0.02	0.03	0.01	0.05	0.06	0.01	0.02	0.02	0
994	232.02	232.02	0	0.01	0.01	0	0.01	0.02	0.01	0.01	0.01	0

Project: Bolton North Hill
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Design By: JW
Created Date: 2024.06.07

Tributary B HEC-RAS Model Results

Tributary B HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1005	256.89	256.88	-	-	1.27	1.27	-	-
1004.6	255.75	255.75	-	-	1.18	1.16	-	-
1004	254.80	254.80	-	-	1.09	1.08	-	-
1003	251.50	251.50	-	-	1.21	1.21	-	-
1002	249.35	249.34	-	-	1.30	1.29	-	-
1001.4	248.23	248.22	-	-	0.70	0.69	-	-
1001	247.98	247.98	-	-	1.01	1.00	-	-
1000.8	247.34	247.34	-	-	0.82	0.82	-	-
1000.2	246.88	246.87	-	-	0.16	0.17	-	-
1000	246.88	246.87	-	-	0.24	0.24	-	-
999.64	Culvert							
999	242.75	242.77	-	-	1.61	1.66	-	-
998	241.03	241.04	-	-	1.42	1.45	-	-
997.4	239.22	239.23	-	-	1.19	1.22	-	-
997	237.26	237.26	-	-	0.96	0.99	-	-
996	234.53	234.55	-	-	1.30	1.31	-	-
995.4	231.95	231.96	-	-	1.25	1.28	-	-
994.4	229.18	229.18	0.80	0.82	-	-	-	-
994	227.33	227.34	-	-	1.25	1.31	-	-

Tributary B HEC-RAS Exisitng and Proposed Conditions Model Results

25-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1005	257.08	257.05	-	-	1.66	1.61	-	-
1004.6	255.92	255.90	-	-	1.62	1.57	-	-
1004	254.94	254.92	-	-	1.50	1.45	-	-
1003	251.68	251.66	-	-	1.51	1.48	-	-
1002	249.64	249.52	-	-	1.26	1.66	-	-
1001.4	249.70	249.00	-	-	0.12	0.24	-	-
1001	249.70	249.00	-	-	0.10	0.17	-	-
1000.8	249.70	249.00	-	-	0.01	0.02	-	-
1000.2	249.70	249.00	-	-	0.02	0.02	-	-
1000	249.69	248.99	-	-	0.28	0.29	-	-
999.64	Culvert							
999	243.08	243.09	-	-	2.42	2.43	-	-
998	241.28	241.29	-	-	1.89	1.89	-	-
997.4	239.39	239.40	-	-	1.59	1.60	-	-
997	237.37	237.37	-	-	1.25	1.24	-	-
996	234.74	234.74	-	-	1.27	1.29	-	-
995.4	232.15	232.15	-	-	1.72	1.73	-	-
994.4	229.26	229.26	1.04	1.04	1.11	1.13	-	-
994	227.97	227.97	0.07	0.07	0.61	0.62	-	-

Tributary B HEC-RAS Exisitng and Proposed Conditions Model Results
100-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1005	257.16	257.12	-	-	1.78	1.73	-	-
1004.6	255.99	255.96	-	-	1.77	1.71	-	-
1004	255.00	254.97	-	-	1.65	1.59	-	-
1003	251.75	251.72	-	-	1.57	1.53	-	-
1002	250.95	250.90	-	-	0.20	0.19	-	-
1001.4	250.95	250.90	-	-	0.07	0.06	-	-
1001	250.95	250.90	-	-	0.06	0.05	-	-
1000.8	250.95	250.90	-	-	0.01	0.01	-	-
1000.2	250.95	250.90	-	-	0.02	0.02	-	-
1000	250.95	250.90	-	-	0.02	0.01	-	-
999.64	Culvert							
999	243.24	243.24	-	-	2.72	2.71	-	-
998	241.39	241.39	-	-	2.04	2.04	-	-
997.4	239.47	239.46	-	-	1.73	1.73	-	-
997	237.41	237.41	-	-	1.37	1.37	-	-
996	234.79	234.79	-	-	1.38	1.38	-	-
995.4	232.24	232.24	-	-	1.87	1.87	-	-
994.4	229.29	229.29	1.13	1.13	1.43	1.43	-	-
994	228.27	228.27	0.08	0.08	0.24	0.24	0.02	0.02

Tributary B HEC-RAS Exisitng and Proposed Conditions Model Results
Regional Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1005	257.37	257.47	-	-	2.01	2.07	-	-
1004.6	256.19	256.28	-	-	2.13	2.28	-	-
1004	255.17	255.25	-	-	1.99	2.13	-	-
1003	251.90	251.97	-	-	1.81	1.94	-	-
1002	251.08	251.14	-	-	0.35	0.44	-	-
1001.4	251.09	251.14	-	-	0.13	0.17	-	-
1001	251.09	251.14	-	-	0.11	0.14	-	-
1000.8	251.09	251.14	-	-	0.02	0.02	-	-
1000.2	251.09	251.14	-	-	0.03	0.04	-	-
1000	251.09	251.14	-	0.01	0.03	0.04	-	-
999.64	Culvert							
999	243.72	244.01	-	-	3.46	3.88	-	-
998	241.67	241.83	-	-	2.40	2.57	-	-
997.4	239.66	239.78	-	-	2.10	2.27	-	-
997	237.54	237.62	-	-	1.68	1.84	-	-
996	234.92	234.99	-	-	1.69	1.89	-	-
995.4	232.48	232.66	-	-	2.15	1.98	-	-
994.4	232.02	232.02	0.02	0.03	0.05	0.06	0.02	0.02
994	232.02	232.02	0.01	0.01	0.01	0.02	0.01	0.01

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary C HEC-RAS Model Regional Results

Tributary C Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
2179.936	257.14	257.09	-0.05	-	-	-	0.76	0.73	-0.03	-	-	-
2159.385	257.08	257.02	-0.06	-	-	-	0.56	0.52	-0.04	-	-	-
2097.132	256.92	256.86	-0.06	-	-	-	0.66	0.6	-0.06	-	-	-
2030.564	256.42	256.37	-0.05	-	-	-	1.66	1.53	-0.13	-	-	-
1994	256.37	256.24	-0.13	-	-	-	0.4	0.37	-0.03	-	-	-
1970.384	256.36	256.24	-0.12	-	-	-	0.25	0.22	-0.03	-	-	-
1911.614	256.36	256.24	-0.12	-	-	-	0.27	0.24	-0.03	-	-	-
1881.066	Bridge											
1855.838	255.92	255.91	-0.01	-	-	-	1.59	1.58	-0.01	-	-	-
1813.506	255.07	255.06	-0.01	-	-	-	1.4	1.38	-0.02	-	-	-
1775.696	254.48	254.48	0	-	-	-	1.14	1.12	-0.02	-	-	-
1726.57	253.39	253.38	-0.01	-	-	-	1.51	1.5	-0.01	-	-	-
1684.01	252.22	252.21	-0.01	-	-	-	1.32	1.3	-0.02	-	-	-
1603.573	252.07	252.06	-0.01	-	-	-	0.29	0.28	-0.01	-	-	-
1539.326	251.95	251.95	0	-	-	-	0.78	0.78	0	-	-	-
1486.021	251.45	251.44	-0.01	-	-	-	1.38	1.36	-0.02	-	-	-
1450.067	250.89	250.88	-0.01	-	-	-	1.86	1.83	-0.03	-	-	-
1406.638	250.31	250.3	-0.01	-	-	-	1.41	1.4	-0.01	-	-	-
1338.455	249.43	249.43	0	-	-	-	1.82	1.77	-0.05	-	-	-
1304.352	248.75	248.74	-0.01	-	-	-	1.68	1.68	0	-	-	-
1265.187	248.08	248.07	-0.01	-	-	-	1.78	1.76	-0.02	-	-	-
1206.875	246.95	246.93	-0.02	-	-	-	1.95	1.92	-0.03	-	-	-
1175.661	246.39	246.38	-0.01	-	-	-	1.82	1.8	-0.02	-	-	-
1120.613	245.55	245.53	-0.02	-	-	-	1.24	1.22	-0.02	-	-	-
1083.716	245.05	245.04	-0.01	-	-	-	1.74	1.71	-0.03	-	-	-
1042.153	243.84	243.83	-0.01	-	-	-	1.34	1.32	-0.02	-	-	-
1006.177	243.3	243.29	-0.01	-	-	-	2.01	1.99	-0.02	-	-	-
993.3609	243.19	243.16	-0.03	-	-	-	1.15	1.13	-0.02	-	-	-
935.4169	242.56	242.53	-0.03	-	-	-	2.13	2.08	-0.05	-	-	-
870.5434	240.88	240.83	-0.05	-	-	-	2.87	2.81	-0.06	-	-	-
836.4684	239.79	239.73	-0.06	-	-	-	2.85	2.8	-0.05	-	-	-
799.8246	238.98	238.93	-0.05	-	-	-	2.71	2.65	-0.06	-	-	-
745.4448	236.74	236.7	-0.04	-	-	-	2.58	2.52	-0.06	-	-	-
716.4415	235.66	235.63	-0.03	-	-	-	2.45	2.39	-0.06	-	-	-
687.3773	235.19	235.17	-0.02	-	-	-	1.9	1.86	-0.04	-	-	-
661.4518	234.48	234.43	-0.05	-	-	-	2.65	2.59	-0.06	-	-	-
627.6722	233.62	233.57	-0.05	-	-	-	2.62	2.57	-0.05	-	-	-
589.2625	232.97	232.92	-0.05	-	-	-	1.52	1.48	-0.04	-	-	-
540.5079	232.37	232.32	-0.05	-	-	-	2.55	2.51	-0.04	-	-	-
510.2238	231.38	231.33	-0.05	-	-	-	2.08	2.15	0.07	-	-	-
457.5412	230.18	230.12	-0.06	-	-	-	2.76	2.72	-0.04	-	-	-
414.0466	229.62	229.56	-0.06	-	-	-	1.57	1.69	0.12	-	-	-
374.4607	228.91	228.86	-0.05	-	-	-	2.01	2.09	0.08	-	-	-
330.2584	228.07	228.07	0	-	-	-	0.75	0.69	-0.06	-	-	-

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Tributary C HEC-RAS Model Results

Tributary C HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
2179.936	256.9	256.9	-	-	0.5	0.4	-	-
2159.385	256.8	256.8	-	-	0.3	0.2	-	-
2097.132	256.6	256.6	-	-	0.3	0.2	-	-
2030.564	256.2	256.1	-	-	0.8	0.7	-	-
1994	255.8	255.7	-	-	0.2	0.2	-	-
1970.384	255.8	255.7	-	-	0.1	0.1	-	-
1911.614	255.8	255.7	-	-	0.1	0.0	-	-
1881.066	Bridge							
1855.838	255.6	255.7	-	-	0.8	0.9	-	-
1813.506	254.8	254.8	-	-	0.5	0.6	-	-
1775.696	254.3	254.3	-	-	0.5	0.5	-	-
1726.57	253.0	253.1	-	-	1.0	1.1	-	-
1684.01	252.0	252.0	-	-	0.7	0.7	-	-
1603.573	251.8	251.8	-	-	0.1	0.1	-	-
1539.326	251.8	251.8	-	-	0.5	0.5	-	-
1486.021	251.1	251.1	-	-	0.6	0.6	-	-
1450.067	250.6	250.6	-	-	1.0	1.1	-	-
1406.638	250.0	250.0	-	-	0.6	0.6	-	-
1338.455	249.0	249.0	-	-	1.3	1.4	-	-
1304.352	248.3	248.3	-	-	0.8	0.9	-	-
1265.187	247.6	247.6	-	-	1.1	1.2	-	-
1206.875	246.5	246.5	-	-	0.8	0.8	-	-
1175.661	246.1	246.1	-	-	0.9	0.9	-	-
1120.613	245.0	245.0	-	-	0.8	0.9	-	-
1083.716	244.3	244.4	-	-	1.4	1.4	-	-
1042.153	243.4	243.4	-	-	1.0	0.9	-	-
1006.177	242.7	242.8	-	-	1.3	1.3	-	-
993.3609	242.3	242.4	-	-	0.7	0.8	-	-
935.4169	241.7	241.7	-	-	1.6	1.6	-	-
870.5434	239.9	239.9	-	-	1.6	1.7	-	-
836.4684	238.9	238.9	-	-	1.3	1.4	-	-
799.8246	238.2	238.2	-	-	1.4	1.4	-	-
745.4448	236.0	236.0	-	-	1.3	1.4	-	-
716.4415	235.1	235.1	-	-	0.9	1.0	-	-
687.3773	234.6	234.6	-	-	1.4	1.4	-	-
661.4518	233.8	233.8	-	-	1.3	1.3	-	-
627.6722	232.9	232.9	-	-	1.3	1.4	-	-
589.2625	232.2	232.2	-	-	0.8	0.8	-	-
540.5079	231.7	231.7	-	-	1.3	1.4	-	-
510.2238	230.8	230.8	-	-	1.2	1.2	-	-
457.5412	229.3	229.3	-	-	1.4	1.5	-	-
414.0466	228.8	228.8	-	-	1.0	1.1	-	-
374.4607	228.3	228.3	-	-	1.2	1.2	-	-
330.2584	227.7	227.7	-	-	0.3	0.3	-	-

Tributary C HEC-RAS Exisitng and Proposed Conditions Model Results

25-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
2179.936	256.97	256.93	-	-	0.61	0.55	-	-
2159.385	256.88	256.84	-	-	0.40	0.34	-	-
2097.132	256.71	256.66	-	-	0.44	0.36	-	-
2030.564	256.24	256.19	-	-	1.13	0.99	-	-
1994	255.99	255.88	-	-	0.26	0.24	-	-
1970.384	255.99	255.88	-	-	0.13	0.11	-	-
1911.614	255.98	255.87	-	-	0.13	0.10	-	-
1881.066	Bridge							
1855.838	255.73	255.74	-	-	1.16	1.19	-	-
1813.506	254.90	254.91	-	-	0.84	0.86	-	-
1775.696	254.33	254.33	-	-	0.72	0.77	-	-
1726.57	253.18	253.20	-	-	1.21	1.20	-	-
1684.01	252.09	252.10	-	-	0.95	0.96	-	-
1603.573	251.91	251.92	-	-	0.16	0.17	-	-
1539.326	251.81	251.82	-	-	0.59	0.62	-	-
1486.021	251.22	251.24	-	-	0.92	0.94	-	-
1450.067	250.66	250.67	-	-	1.24	1.33	-	-
1406.638	250.07	250.09	-	-	0.85	0.88	-	-
1338.455	249.21	249.22	-	-	1.25	1.33	-	-
1304.352	248.41	248.43	-	-	1.27	1.33	-	-
1265.187	247.71	247.73	-	-	1.59	1.65	-	-
1206.875	246.64	246.67	-	-	1.27	1.31	-	-
1175.661	246.18	246.19	-	-	1.18	1.26	-	-
1120.613	245.15	245.18	-	-	1.08	1.08	-	-
1083.716	244.54	244.58	-	-	1.87	1.93	-	-
1042.153	243.56	243.58	-	-	1.03	1.06	-	-
1006.177	242.94	242.96	-	-	1.63	1.69	-	-
993.3609	242.63	242.66	-	-	1.02	1.04	-	-
935.4169	242.02	242.05	-	-	2.08	2.10	-	-
870.5434	240.22	240.25	-	-	2.17	2.21	-	-
836.4684	239.18	239.21	-	-	2.05	2.10	-	-
799.8246	238.46	238.48	-	-	1.90	1.95	-	-
745.4448	236.25	236.27	-	-	1.86	1.90	-	-
716.4415	235.31	235.32	-	-	1.40	1.45	-	-
687.3773	234.86	234.88	-	-	1.59	1.60	-	-
661.4518	234.00	234.02	-	-	1.83	1.87	-	-
627.6722	233.11	233.13	-	-	1.90	1.93	-	-
589.2625	232.47	232.49	-	-	1.06	1.09	-	-
540.5079	231.88	231.90	-	-	1.84	1.88	-	-
510.2238	230.99	231.01	-	-	1.56	1.60	-	-
457.5412	229.61	229.63	-	-	1.92	1.97	-	-
414.0466	229.06	229.08	-	-	1.57	1.62	-	-
374.4607	228.45	228.47	-	-	1.68	1.72	-	-
330.2584	227.85	227.86	-	-	0.44	0.46	-	-

Tributary C HEC-RAS Exisitng and Proposed Conditions Model Results

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
2179.936	257.00	256.96	-	-	0.66	0.59	-	-
2159.385	256.92	256.86	-	-	0.45	0.38	-	-
2097.132	256.75	256.69	-	-	0.50	0.41	-	-
2030.564	256.27	256.22	-	-	1.24	1.07	-	-
1994	256.06	255.94	-	-	0.29	0.26	-	-
1970.384	256.06	255.94	-	-	0.16	0.13	-	-
1911.614	256.06	255.94	-	-	0.16	0.12	-	-
1881.066	Bridge							
1855.838	255.77	255.78	-	-	1.27	1.29	-	-
1813.506	254.94	254.94	-	-	0.95	0.99	-	-
1775.696	254.36	254.37	-	-	0.82	0.82	-	-
1726.57	253.23	253.24	-	-	1.29	1.36	-	-
1684.01	252.11	252.13	-	-	1.05	1.05	-	-
1603.573	251.94	251.95	-	-	0.19	0.20	-	-
1539.326	251.84	251.85	-	-	0.65	0.67	-	-
1486.021	251.27	251.29	-	-	1.01	1.04	-	-
1450.067	250.71	250.72	-	-	1.42	1.45	-	-
1406.638	250.12	250.13	-	-	0.98	1.02	-	-
1338.455	249.26	249.27	-	-	1.38	1.41	-	-
1304.352	248.47	248.49	-	-	1.44	1.48	-	-
1265.187	247.78	247.80	-	-	1.75	1.79	-	-
1206.875	246.71	246.72	-	-	1.45	1.52	-	-
1175.661	246.22	246.23	-	-	1.36	1.39	-	-
1120.613	245.24	245.27	-	-	1.09	1.09	-	-
1083.716	244.64	244.68	-	-	2.06	2.09	-	-
1042.153	243.64	243.65	-	-	1.03	1.05	-	-
1006.177	243.01	243.04	-	-	1.79	1.79	-	-
993.3609	242.78	242.81	-	-	1.10	1.09	-	-
935.4169	242.17	242.19	-	-	2.18	2.18	-	-
870.5434	240.37	240.40	-	-	2.33	2.35	-	-
836.4684	239.31	239.33	-	-	2.26	2.30	-	-
799.8246	238.56	238.58	-	-	2.12	2.15	-	-
745.4448	236.36	236.37	-	-	2.03	2.06	-	-
716.4415	235.38	235.40	-	-	1.65	1.69	-	-
687.3773	234.93	234.95	-	-	1.73	1.76	-	-
661.4518	234.09	234.11	-	-	2.04	2.07	-	-
627.6722	233.21	233.23	-	-	2.08	2.11	-	-
589.2625	232.57	232.59	-	-	1.17	1.19	-	-
540.5079	231.98	232.00	-	-	2.02	2.05	-	-
510.2238	231.06	231.07	-	-	1.75	1.78	-	-
457.5412	229.73	229.75	-	-	2.14	2.16	-	-
414.0466	229.15	229.16	-	-	1.83	1.88	-	-
374.4607	228.54	228.55	-	-	1.87	1.89	-	-
330.2584	227.90	227.91	-	-	0.50	0.52	-	-

Tributary C HEC-RAS Exisitng and Proposed Conditions Model Results

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
2179.936	257.14	257.09	-	-	0.76	0.73	-	-
2159.385	257.08	257.02	-	-	0.56	0.52	-	-
2097.132	256.92	256.86	-	-	0.66	0.60	-	-
2030.564	256.42	256.37	-	-	1.66	1.53	-	-
1994	256.37	256.24	-	-	0.40	0.37	-	-
1970.384	256.36	256.24	-	-	0.25	0.22	-	-
1911.614	256.36	256.24	-	-	0.27	0.24	-	-
1881.066	Bridge							
1855.838	255.92	255.91	-	-	1.59	1.58	-	-
1813.506	255.07	255.06	-	-	1.40	1.38	-	-
1775.696	254.48	254.48	-	-	1.14	1.12	-	-
1726.57	253.39	253.38	-	-	1.51	1.50	-	-
1684.01	252.22	252.21	-	-	1.32	1.30	-	-
1603.573	252.07	252.06	-	-	0.29	0.28	-	-
1539.326	251.95	251.95	-	-	0.78	0.78	-	-
1486.021	251.45	251.44	-	-	1.38	1.36	-	-
1450.067	250.89	250.88	-	-	1.86	1.83	-	-
1406.638	250.31	250.30	-	-	1.41	1.40	-	-
1338.455	249.43	249.43	-	-	1.82	1.77	-	-
1304.352	248.75	248.74	-	-	1.68	1.68	-	-
1265.187	248.08	248.07	-	-	1.78	1.76	-	-
1206.875	246.95	246.93	-	-	1.95	1.92	-	-
1175.661	246.39	246.38	-	-	1.82	1.80	-	-
1120.613	245.55	245.53	-	-	1.24	1.22	-	-
1083.716	245.05	245.04	-	-	1.74	1.71	-	-
1042.153	243.84	243.83	-	-	1.34	1.32	-	-
1006.177	243.30	243.29	-	-	2.01	1.99	-	-
993.3609	243.19	243.16	-	-	1.15	1.13	-	-
935.4169	242.56	242.53	-	-	2.13	2.08	-	-
870.5434	240.88	240.83	-	-	2.87	2.81	-	-
836.4684	239.79	239.73	-	-	2.85	2.80	-	-
799.8246	238.98	238.93	-	-	2.71	2.65	-	-
745.4448	236.74	236.70	-	-	2.58	2.52	-	-
716.4415	235.66	235.63	-	-	2.45	2.39	-	-
687.3773	235.19	235.17	-	-	1.90	1.86	-	-
661.4518	234.48	234.43	-	-	2.65	2.59	-	-
627.6722	233.62	233.57	-	-	2.62	2.57	-	-
589.2625	232.97	232.92	-	-	1.52	1.48	-	-
540.5079	232.37	232.32	-	-	2.55	2.51	-	-
510.2238	231.38	231.33	-	-	2.08	2.15	-	-
457.5412	230.18	230.12	-	-	2.76	2.72	-	-
414.0466	229.62	229.56	-	-	1.57	1.69	-	-
374.4607	228.91	228.86	-	-	2.01	2.09	-	-
330.2584	228.07	228.07	-	-	0.75	0.69	-	-

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary C+D HEC-RAS Model Regional Results

Tributary C + D Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE (masl)			Left Bank Vel. (m/s)			Main Channel Vel. (m/s)			Right Bank Vel. (m/s)		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
294	227.49	227.5	0.01	-	-	-	1.76	1.78	0.02	-	-	-
266.3048	226.03	226.04	0.01	-	-	-	2.24	2.26	0.02	-	-	-
236.2558	225.23	225.25	0.02	-	-	-	2.11	2.13	0.02	-	-	-
205.6305	224.73	224.75	0.02	-	-	-	2.79	2.81	0.02	-	-	-
173.8239	224.08	224.07	-0.01	-	-	-	2.46	2.58	0.12	-	-	-
151.7834	224.24	224.24	0	-	-	-	0.86	0.89	0.03	-	-	-
116.6732	224.26	224.26	0	-	-	-	0.36	0.37	0.01	-	-	-
66.5837	224.26	224.26	0	0.01	0.01	0	0.2	0.2	0	0.03	0.03	0
34.76245	224.26	224.26	0	0.02	0.03	0.01	0.11	0.11	0	0.03	0.03	0
236.2558	225.23	225.25	0.02	-	-	-	2.11	2.13	0.02	-	-	-
205.6305	224.73	224.75	0.02	-	-	-	2.79	2.81	0.02	-	-	-
173.8239	224.08	224.07	-0.01	-	-	-	2.46	2.58	0.12	-	-	-
151.7834	224.24	224.24	0	-	-	-	0.86	0.89	0.03	-	-	-
116.6732	224.26	224.26	0	-	-	-	0.36	0.37	0.01	-	-	-
66.5837	224.26	224.26	0	0.01	0.01	0	0.2	0.2	0	0.03	0.03	0
34.76245	224.26	224.26	0	0.02	0.03	0.01	0.11	0.11	0	0.03	0.03	0

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Tributary F HEC-RAS Model Results

Tributary C+D HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
294	227.21	227.22	-	-	0.92	0.96	-	-
266.3048	225.38	225.4	-	-	1.41	1.42	-	-
236.2558	224.1	224.13	-	-	1.39	1.45	-	-
205.6305	223.59	223.63	-	-	1.8	1.87	-	-
173.8239	222.73	222.76	-	-	1.73	1.79	-	-
151.7834	222.19	222.23	-	-	1.1	1.15	-	-
116.6732	221.78	221.88	-	-	1.79	1.29	-	-
66.5837	220.85	220.91	-	-	1.64	1.59	-	-
34.76245	220.59	220.59	-	-	1.16	1.33	-	-

Tributary C+D HEC-RAS Exisitng and Proposed Conditions Model Results
25-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
294	227.32	227.32	-	-	1.19	1.20	-	-
266.3048	225.62	225.63	-	-	1.86	1.86	-	-
236.2558	224.50	224.51	-	-	1.95	1.96	-	-
205.6305	223.99	224.00	-	-	2.50	2.52	-	-
173.8239	223.10	223.11	-	-	2.37	2.38	-	-
151.7834	222.50	222.51	-	-	1.91	1.94	-	-
116.6732	222.05	222.05	-	-	1.62	1.63	-	-
66.5837	221.44	221.44	-	-	0.89	0.91	-	-
34.76245	221.42	221.42	-	-	0.39	0.40	-	-

Tributary C+D HEC-RAS Exisitng and Proposed Conditions Model Results

100-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
294	227.36	227.36	-	-	1.37	1.37	-	-
266.3048	225.72	225.72	-	-	2.00	2.00	-	-
236.2558	224.71	224.71	-	-	1.98	1.98	-	-
205.6305	224.17	224.17	-	-	2.72	2.72	-	-
173.8239	223.26	223.26	-	-	2.58	2.58	-	-
151.7834	222.61	222.61	-	-	2.26	2.26	-	-
116.6732	222.12	222.12	-	-	1.79	1.79	-	-
66.5837	221.70	221.70	-	-	0.79	0.79	-	-
34.76245	221.71	221.71	-	-	0.29	0.29	-	-

Tributary C+D HEC-RAS Exisitng and Proposed Conditions Model Results

Regional Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
294	227.49	227.50	-	-	1.76	1.78	-	-
266.3048	226.03	226.04	-	-	2.24	2.26	-	-
236.2558	225.23	225.25	-	-	2.11	2.13	-	-
205.6305	224.73	224.75	-	-	2.79	2.81	-	-
173.8239	224.08	224.07	-	-	2.46	2.58	-	-
151.7834	224.24	224.24	-	-	0.86	0.89	-	-
116.6732	224.26	224.26	-	-	0.36	0.37	-	-
66.5837	224.26	224.26	0.01	-	0.20	0.20	0.03	-
34.76245	224.26	224.26	0.02	-	0.11	0.11	0.03	-

CROZIER & ASSOCIATES
Consulting Engineers

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary D HEC-RAS Model Regional Results

Tributary D Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE (masl)			Left Bank Vel. (m/s)			Main Channel Vel. (m/s)			Right Bank Vel. (m/s)		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
1195.922	264.37	-	-	0.63	-	-	1.56	-	-	0.46	-	-
1194	263.75	-	-	0.49	-	-	1.32	-	-	-	-	-
1193.146	263.44	-	-	-	-	-	0.56	-	-	0.34	-	-
1193.1	263.22	-	-	1.07	-	-	1.71	-	-	-	-	-
1193.002	263.21	-	-	0.07	-	-	0.23	-	-	0.08	-	-
1193.001	263.12	-	-	0.76	-	-	1.53	-	-	-	-	-
1193	262.54	-	-	0.16	-	-	0.83	-	-	-	-	-
1192.777	262.41	-	-	-	-	-	1	-	-	-	-	-
1192.631	262.13	-	-	-	-	-	0.99	-	-	-	-	-
1192.407	261.36	-	-	0.19	-	-	1.82	-	-	-	-	-
1192.296	260.67	-	-	-	-	-	2.08	-	-	-	-	-
1192.146	257.58	257.65	0.07	-	-	-	2.35	2.43	0.08	-	-	-
1158.742	255.99	256.05	0.06	-	-	-	1.57	1.6	0.03	-	-	-
1117.042	255.27	255.36	0.09	-	-	-	2.54	2.61	0.07	-	-	-
1085.498	254.63	254.7	0.07	-	-	-	2.41	2.48	0.07	-	-	-
1056.979	253.54	253.56	0.02	-	-	-	1.59	1.67	0.08	-	-	-
1006.094	250.57	250.67	0.1	-	-	-	2.68	2.75	0.07	-	-	-
954.6843	248.44	248.54	0.1	-	-	-	2.82	2.92	0.1	-	-	-
927.8772	247.79	247.9	0.11	-	-	-	3.01	3.12	0.11	-	-	-
886.4161	247.12	247.26	0.14	-	-	-	2.16	2.1	-0.06	-	-	-
830.2587	246.31	246.41	0.1	-	-	-	2.89	2.97	0.08	-	-	-
765.2102	245.33	245.37	0.04	-	-	-	1.77	1.85	0.08	-	-	-
719.386	244.62	244.66	0.04	-	-	-	1.89	1.98	0.09	-	-	-
691.6686	244.23	244.26	0.03	-	-	-	1.64	1.71	0.07	-	-	-
639.0789	243.32	243.36	0.04	-	-	-	2	2.08	0.08	-	-	-
605.7167	242.65	242.69	0.04	-	-	-	2.01	2.08	0.07	-	-	-
552.2101	241.03	241.07	0.04	-	-	-	1.91	1.98	0.07	-	-	-
508.8769	240.31	240.37	0.06	-	-	-	2.23	2.29	0.06	-	-	-
457.6058	239.22	239.26	0.04	-	-	-	1.9	2	0.1	-	-	-
393.3919	237.84	237.9	0.06	-	-	-	2.33	2.4	0.07	-	-	-
345.8717	237.3	237.34	0.04	-	-	-	1.61	1.73	0.12	-	-	-
308.4069	236.86	236.9	0.04	-	-	-	1.9	1.98	0.08	-	-	-
261.2717	236.16	236.24	0.08	-	-	-	1.62	1.6	-0.02	-	-	-
237.4458	235.61	235.69	0.08	-	-	-	2.76	2.87	0.11	-	-	-
197.6155	234.2	234.24	0.04	-	-	-	1.54	1.63	0.09	-	-	-
176.7205	233.9	233.93	0.03	-	-	-	1.93	2.03	0.1	-	-	-
163.5648	233.58	233.62	0.04	-	-	-	1.96	2	0.04	-	-	-
151.4771	232.48	232.58	0.1	-	-	-	2.75	2.76	0.01	-	-	-
140.92	231.93	231.98	0.05	-	-	-	2.22	2.31	0.09	-	-	-
123.28	231.07	231.14	0.07	-	-	-	2.63	2.72	0.09	-	-	-
89.70679	230.46	230.55	0.09	-	-	-	2.76	2.85	0.09	-	-	-
72.5771	229.82	229.9	0.08	-	-	-	2.25	2.2	-0.05	-	-	-
51.16022	229.01	229.04	0.03	-	-	-	1.66	1.72	0.06	-	-	-
26.54893	228.28	228.32	0.04	-	-	-	1.8	1.84	0.04	-	-	-
1193.001	263.12	-	-	0.76	-	-	1.53	-	-	-	-	-
1193	262.54	-	-	0.16	-	-	0.83	-	-	-	-	-
1192.777	262.41	-	-	-	-	-	1	-	-	-	-	-
1192.631	262.13	-	-	-	-	-	0.99	-	-	-	-	-
1192.407	261.36	-	-	0.19	-	-	1.82	-	-	-	-	-
1192.296	260.67	-	-	-	-	-	2.08	-	-	-	-	-
1192.146	257.58	257.65	0.07	-	-	-	2.35	2.43	0.08	-	-	-
1158.742	255.99	256.05	0.06	-	-	-	1.57	1.6	0.03	-	-	-
1117.042	255.27	255.36	0.09	-	-	-	2.54	2.61	0.07	-	-	-
1085.498	254.63	254.7	0.07	-	-	-	2.41	2.48	0.07	-	-	-
1056.979	253.54	253.56	0.02	-	-	-	1.59	1.67	0.08	-	-	-
1006.094	250.57	250.67	0.1	-	-	-	2.68	2.75	0.07	-	-	-
954.6843	248.44	248.54	0.1	-	-	-	2.82	2.92	0.1	-	-	-
927.8772	247.79	247.9	0.11	-	-	-	3.01	3.12	0.11	-	-	-
886.4161	247.12	247.26	0.14	-	-	-	2.16	2.1	-0.06	-	-	-
830.2587	246.31	246.41	0.1	-	-	-	2.89	2.97	0.08	-	-	-
765.2102	245.33	245.37	0.04	-	-	-	1.77	1.85	0.08	-	-	-
719.386	244.62	244.66	0.04	-	-	-	1.89	1.98	0.09	-	-	-
691.6686	244.23	244.26	0.03	-	-	-	1.64	1.71	0.07	-	-	-
639.0789	243.32	243.36	0.04	-	-	-	2	2.08	0.08	-	-	-
605.7167	242.65	242.69	0.04	-	-	-	2.01	2.08	0.07	-	-	-
552.2101	241.03	241.07	0.04	-	-	-	1.91	1.98	0.07	-	-	-
508.8769	240.31	240.37	0.06	-	-	-	2.23	2.29	0.06	-	-	-
457.6058	239.22	239.26	0.04	-	-	-	1.9	2	0.1	-	-	-
393.3919	237.84	237.9	0.06	-	-	-	2.33	2.4	0.07	-	-	-
345.8717	237.3	237.34	0.04	-	-	-	1.61	1.73	0.12	-	-	-
308.4069	236.86	236.9	0.04	-	-	-	1.9	1.98	0.08	-	-	-
261.2717	236.16	236.24	0.08	-	-	-	1.62	1.6	-0.02	-	-	-
237.4458	235.61	235.69	0.08	-	-	-	2.76	2.87	0.11	-	-	-
197.6155	234.2	234.24	0.04	-	-	-	1.54	1.63	0.09	-	-	-
176.7205	233.9	233.93	0.03	-	-	-	1.93	2.03	0.1	-	-	-
163.5648	233.58	233.62	0.04	-	-	-	1.96	2	0.04	-	-	-
151.4771	232.48	232.58	0.1	-	-	-	2.75	2.76	0.01	-	-	-
140.92	231.93	231.98	0.05	-	-	-	2.22	2.31	0.09	-	-	-
123.28	231.07	231.14	0.07	-	-	-	2.63	2.72	0.09	-	-	-
89.70679	230.46	230.55	0.09	-	-	-	2.76	2.85	0.09	-	-	-
72.5771	229.82	229.9	0.08	-	-	-	2.25	2.2	-0.05	-	-	-
51.16022	229.01	229.04	0.03	-	-	-	1.66	1.72	0.06	-	-	-
26.54893	228.28	228.32	0.04	-	-	-	1.8	1.84	0.04	-	-	-

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Tributary D HEC-RAS Model Results

Tributary D HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1195.922	263.88	N/A	-	N/A	1.40	N/A	-	N/A
1194	263.41	N/A	0.14	N/A	1.05	N/A	-	N/A
1193.146	263.18	N/A	-	N/A	0.27	N/A	0.14	N/A
1193.1	263.08	N/A	0.48	N/A	0.93	N/A	-	N/A
1193.002	262.98	N/A	0.01	N/A	0.05	N/A	0.01	N/A
1193.001	262.94	N/A	0.48	N/A	0.92	N/A	-	N/A
1193	262.20	N/A	-	N/A	0.36	N/A	-	N/A
1192.777	262.06	N/A	-	N/A	0.74	N/A	-	N/A
1192.631	261.65	N/A	-	N/A	0.68	N/A	-	N/A
1192.407	261.00	N/A	-	N/A	0.94	N/A	-	N/A
1192.296	260.23	N/A	-	N/A	1.34	N/A	-	N/A
1192.146	257.01	257.02	-	-	1.39	1.41	-	-
1158.742	255.48	255.58	-	-	1.74	1.10	-	-
1117.042	254.63	254.63	-	-	1.37	1.39	-	-
1085.498	254.06	254.07	-	-	1.35	1.37	-	-
1056.979	253.32	253.32	-	-	0.91	0.91	-	-
1006.094	249.74	249.75	-	-	1.71	1.73	-	-
954.6843	247.63	247.64	-	-	1.65	1.67	-	-
927.8772	246.86	246.87	-	-	1.80	1.82	-	-
886.4161	246.14	246.16	-	-	1.31	1.33	-	-
830.2587	245.48	245.49	-	-	1.41	1.46	-	-
765.2102	244.75	244.77	-	-	1.24	1.25	-	-
719.386	244.34	244.34	-	-	0.71	0.75	-	-
691.6686	243.93	243.94	-	-	0.96	0.93	-	-
639.0789	242.50	242.52	-	-	1.65	1.70	-	-
605.7167	241.90	241.92	-	-	1.76	1.79	-	-
552.2101	240.19	240.21	-	-	1.78	1.80	-	-
508.8769	239.51	239.53	-	-	1.21	1.25	-	-
457.6058	238.91	238.92	-	-	1.03	1.06	-	-
393.3919	237.29	237.30	-	-	1.38	1.41	-	-
345.8717	236.85	236.86	-	-	0.61	0.63	-	-
308.4069	236.58	236.59	-	-	0.86	0.87	-	-
261.2717	235.52	235.56	-	-	1.68	1.55	-	-
237.4458	234.88	234.90	-	-	1.55	1.59	-	-
197.6155	233.74	233.75	-	-	0.79	0.81	-	-
176.7205	233.42	233.43	-	-	1.26	1.30	-	-
163.5648	233.11	233.12	-	-	1.27	1.31	-	-
151.4771	231.75	231.76	-	-	1.51	1.55	-	-
140.92	231.49	231.50	-	-	1.24	1.27	-	-
123.28	230.27	230.29	-	-	1.92	1.95	-	-
89.70679	229.49	229.51	-	-	1.89	1.93	-	-
72.5771	228.98	229.00	-	-	1.67	1.70	-	-
51.16022	228.51	228.53	-	-	1.69	1.73	-	-
26.54893	227.69	227.70	-	-	1.36	1.40	-	-

Tributary D HEC-RAS Exisitng and Proposed Conditions Model Results
25-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1195.922	264.09	N/A	-	N/A	1.73	N/A	-	N/A
1194	263.58	N/A	0.37	N/A	1.09	N/A	-	N/A
1193.146	263.30	N/A	-	N/A	0.39	N/A	0.24	N/A
1193.1	263.13	N/A	0.74	N/A	1.32	N/A	-	N/A
1193.002	263.08	N/A	0.03	N/A	0.12	N/A	0.03	N/A
1193.001	263.01	N/A	0.68	N/A	1.31	N/A	-	N/A
1193	262.33	N/A	-	N/A	0.56	N/A	-	N/A
1192.777	262.19	N/A	-	N/A	0.86	N/A	-	N/A
1192.631	261.84	N/A	-	N/A	0.92	N/A	-	N/A
1192.407	261.14	N/A	-	N/A	1.33	N/A	-	N/A
1192.296	260.40	N/A	-	N/A	1.69	N/A	-	N/A
1192.146	257.22	257.20	-	-	1.85	1.81	-	-
1158.742	255.71	255.70	-	-	1.32	1.29	-	-
1117.042	254.85	254.83	-	-	2.00	1.95	-	-
1085.498	254.26	254.24	-	-	1.86	1.82	-	-
1056.979	253.41	253.39	-	-	1.13	1.14	-	-
1006.094	250.06	250.03	-	-	2.20	2.16	-	-
954.6843	247.92	247.89	-	-	2.23	2.18	-	-
927.8772	247.22	247.19	-	-	2.33	2.29	-	-
886.4161	246.47	246.45	-	-	1.81	1.81	-	-
830.2587	245.84	245.83	-	-	1.96	1.92	-	-
765.2102	245.03	245.02	-	-	1.52	1.50	-	-
719.386	244.45	244.45	-	-	1.16	1.14	-	-
691.6686	244.03	244.03	-	-	1.27	1.26	-	-
639.0789	242.85	242.84	-	-	2.19	2.17	-	-
605.7167	242.25	242.24	-	-	2.19	2.15	-	-
552.2101	240.56	240.56	-	-	1.91	1.87	-	-
508.8769	239.80	239.79	-	-	2.00	1.97	-	-
457.6058	239.03	239.02	-	-	1.36	1.35	-	-
393.3919	237.51	237.49	-	-	1.81	1.86	-	-
345.8717	237.02	237.02	-	-	1.01	0.99	-	-
308.4069	236.70	236.69	-	-	1.22	1.21	-	-
261.2717	235.77	235.76	-	-	1.70	1.68	-	-
237.4458	235.15	235.14	-	-	2.10	2.08	-	-
197.6155	233.93	233.92	-	-	1.07	1.07	-	-
176.7205	233.60	233.60	-	-	1.71	1.69	-	-
163.5648	233.30	233.29	-	-	1.65	1.64	-	-
151.4771	232.00	231.99	-	-	2.10	2.08	-	-
140.92	231.66	231.65	-	-	1.63	1.62	-	-
123.28	230.63	230.62	-	-	2.03	2.00	-	-
89.70679	229.90	229.88	-	-	2.32	2.31	-	-
72.5771	229.30	229.28	-	-	2.26	2.24	-	-
51.16022	228.83	228.83	-	-	1.33	1.32	-	-
26.54893	227.90	227.89	-	-	1.81	1.80	-	-

100-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1195.922	264.18	N/A	0.33	N/A	1.70	N/A	-	N/A
1194	263.63	N/A	0.46	N/A	1.13	N/A	-	N/A
1193.146	263.34	N/A	-	N/A	0.44	N/A	0.27	N/A
1193.1	263.16	N/A	0.82	N/A	1.42	N/A	-	N/A
1193.002	263.12	N/A	0.04	N/A	0.15	N/A	0.05	N/A
1193.001	263.05	N/A	0.63	N/A	1.30	N/A	-	N/A
1193	262.39	N/A	-	N/A	0.64	N/A	-	N/A
1192.777	262.26	N/A	-	N/A	0.88	N/A	-	N/A
1192.631	261.94	N/A	-	N/A	0.93	N/A	-	N/A
1192.407	261.20	N/A	-	N/A	1.48	N/A	-	N/A
1192.296	260.48	N/A	-	N/A	1.79	N/A	-	N/A
1192.146	257.31	257.28	-	-	2.02	1.97	-	-
1158.742	255.77	255.75	-	-	1.41	1.38	-	-
1117.042	254.96	254.92	-	-	2.17	2.11	-	-
1085.498	254.35	254.32	-	-	2.04	1.97	-	-
1056.979	253.44	253.43	-	-	1.25	1.20	-	-
1006.094	250.19	250.15	-	-	2.35	2.30	-	-
954.6843	248.06	248.00	-	-	2.41	2.37	-	-
927.8772	247.37	247.31	-	-	2.51	2.46	-	-
886.4161	246.65	246.62	-	-	1.88	1.87	-	-
830.2587	245.93	245.91	-	-	2.34	2.27	-	-
765.2102	245.12	245.10	-	-	1.55	1.54	-	-
719.386	244.50	244.49	-	-	1.38	1.34	-	-
691.6686	244.09	244.08	-	-	1.35	1.33	-	-
639.0789	243.06	243.03	-	-	1.96	1.97	-	-
605.7167	242.46	242.46	-	-	1.70	1.66	-	-
552.2101	240.69	240.67	-	-	1.93	1.94	-	-
508.8769	239.91	239.89	-	-	2.22	2.20	-	-
457.6058	239.08	239.07	-	-	1.50	1.47	-	-
393.3919	237.60	237.59	-	-	1.92	1.89	-	-
345.8717	237.10	237.08	-	-	1.17	1.14	-	-
308.4069	236.74	236.73	-	-	1.42	1.39	-	-
261.2717	235.87	235.85	-	-	1.70	1.75	-	-
237.4458	235.27	235.25	-	-	2.29	2.26	-	-
197.6155	234.01	234.00	-	-	1.17	1.16	-	-
176.7205	233.69	233.68	-	-	1.76	1.74	-	-
163.5648	233.37	233.36	-	-	1.76	1.75	-	-
151.4771	232.12	232.09	-	-	2.32	2.29	-	-
140.92	231.73	231.72	-	-	1.80	1.78	-	-
123.28	230.74	230.72	-	-	2.20	2.18	-	-
89.70679	230.06	230.03	-	-	2.45	2.43	-	-
72.5771	229.44	229.41	-	-	2.44	2.42	-	-
51.16022	228.88	228.87	-	-	1.39	1.39	-	-
26.54893	227.99	227.97	-	-	1.95	1.93	-	-

Tributary D HEC-RAS Exisitng and Proposed Conditions Model Results

Regional Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1195.922	264.37	N/A	0.63	N/A	1.56	N/A	0.46	N/A
1194	263.75	N/A	0.49	N/A	1.32	N/A	-	N/A
1193.146	263.44	N/A	-	N/A	0.56	N/A	0.34	N/A
1193.1	263.22	N/A	1.07	N/A	1.71	N/A	-	N/A
1193.002	263.21	N/A	0.07	N/A	0.23	N/A	0.08	N/A
1193.001	263.12	N/A	0.76	N/A	1.53	N/A	-	N/A
1193	262.54	N/A	0.16	N/A	0.83	N/A	-	N/A
1192.777	262.41	N/A	-	N/A	1.00	N/A	-	N/A
1192.631	262.13	N/A	-	N/A	0.99	N/A	-	N/A
1192.407	261.36	N/A	0.19	N/A	1.82	N/A	-	N/A
1192.296	260.67	N/A	-	N/A	2.08	N/A	-	N/A
1192.146	257.58	257.65	-	-	2.35	2.43	-	-
1158.742	255.99	256.05	-	-	1.57	1.60	-	-
1117.042	255.27	255.36	-	-	2.54	2.61	-	-
1085.498	254.63	254.70	-	-	2.41	2.48	-	-
1056.979	253.54	253.56	-	-	1.59	1.67	-	-
1006.094	250.57	250.67	-	-	2.68	2.75	-	-
954.6843	248.44	248.54	-	-	2.82	2.92	-	-
927.8772	247.79	247.90	-	-	3.01	3.12	-	-
886.4161	247.12	247.26	-	-	2.16	2.10	-	-
830.2587	246.31	246.41	-	-	2.89	2.97	-	-
765.2102	245.33	245.37	-	-	1.77	1.85	-	-
719.386	244.62	244.66	-	-	1.89	1.98	-	-
691.6686	244.23	244.26	-	-	1.64	1.71	-	-
639.0789	243.32	243.36	-	-	2.00	2.08	-	-
605.7167	242.65	242.69	-	-	2.01	2.08	-	-
552.2101	241.03	241.07	-	-	1.91	1.98	-	-
508.8769	240.31	240.37	-	-	2.23	2.29	-	-
457.6058	239.22	239.26	-	-	1.90	2.00	-	-
393.3919	237.84	237.90	-	-	2.33	2.40	-	-
345.8717	237.30	237.34	-	-	1.61	1.73	-	-
308.4069	236.86	236.90	-	-	1.90	1.98	-	-
261.2717	236.16	236.24	-	-	1.62	1.60	-	-
237.4458	235.61	235.69	-	-	2.76	2.87	-	-
197.6155	234.20	234.24	-	-	1.54	1.63	-	-
176.7205	233.90	233.93	-	-	1.93	2.03	-	-
163.5648	233.58	233.62	-	-	1.96	2.00	-	-
151.4771	232.48	232.58	-	-	2.75	2.76	-	-
140.92	231.93	231.98	-	-	2.22	2.31	-	-
123.28	231.07	231.14	-	-	2.63	2.72	-	-
89.70679	230.46	230.55	-	-	2.76	2.85	-	-
72.5771	229.82	229.90	-	-	2.25	2.20	-	-
51.16022	229.01	229.04	-	-	1.66	1.72	-	-
26.54893	228.28	228.32	-	-	1.80	1.84	-	-

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary E HEC-RAS Model Regional Results

Tributary E Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE (masl)			Left Bank Vel. (m/s)			Main Channel Vel. (m/s)			Right Bank Vel. (m/s)		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
4370.082	265.37	265.37	0	-	-	-	0.98	0.98	0	-	-	-
4370.081	264.68	264.68	0	-	-	-	0.96	0.96	0	-	-	-
4370.079	262.77	262.77	0	0.3	0.3	0	1.53	1.53	0	0.6	0.6	0
4370.073	262.16	262.16	0	0.01	0.01	0	0.26	0.26	0	0.08	0.08	0
4370.043	262.13	262.13	0	0.06	0.06	0	0.23	0.23	0	0.07	0.07	0
4369.909	262.12	262.12	0	0.03	0.03	0	0.1	0.1	0	0.02	0.02	0
4368.863	262.11	262.11	0	0.04	0.04	0	0.36	0.36	0	0.01	0.01	0
4344	261.9	261.9	0	0.16	0.16	0	0.68	0.68	0	0.23	0.23	0
4308.669	261.68	261.68	0	-	-	-	0.55	0.55	0	-	-	-
4196.075	260.25	260.25	0	-	-	-	1.54	1.54	0	-	-	-
4007.722	259.13	259.13	0	0.15	0.15	0	0.38	0.38	0	0.14	0.14	0
3956.844	259.12	259.12	0	0.07	0.07	0	0.22	0.22	0	0.07	0.07	0
3899.436	259.12	259.12	0	0.02	0.02	0	0.1	0.1	0	0.03	0.03	0
3821.818	259.11	259.11	0	0.07	0.07	0	0.22	0.22	0	0.06	0.06	0
3789.828	258.89	258.89	0	0.5	0.5	0	1.87	1.87	0	0.33	0.33	0
3711.272	258.76	258.76	0	0.16	0.16	0	0.51	0.51	0	0.16	0.16	0
3653.272	258.66	258.66	0	0.25	0.25	0	0.78	0.78	0	0.23	0.23	0
3602.49	258.52	258.52	0	0.26	0.26	0	0.88	0.88	0	0.24	0.24	0
3483.216	257.85	257.85	0	0.2	0.2	0	1.22	1.22	0	0.18	0.18	0
3413.879	257.77	257.77	0	0.18	0.18	0	0.5	0.5	0	0.2	0.2	0
3378.862	257.77	257.77	0	0.07	0.07	0	0.32	0.32	0	0.1	0.1	0
3308.731	257.77	257.77	0	0.05	0.05	0	0.17	0.17	0	0.05	0.05	0
3216.276	257.77	257.77	0	0.06	0.06	0	0.21	0.21	0	0.05	0.05	0
3198.314	257.77	257.77	0	0.05	0.05	0	0.19	0.19	0	0.04	0.04	0
3190.241	257.77	257.77	0	0.01	0.01	0	0.05	0.05	0	0.01	0.01	0
3115.165	257.77	257.77	0	0.01	0.01	0	0.08	0.08	0	0.02	0.02	0
3083.999	Culvert											
3054.114	256.08	256.08	0			0	1.28	1.28	0			0
3040.584	256.1	256.1	0	0.06	0.06	0	0.19	0.19	0	0.05	0.05	0
2972.104	256.1	256.1	0	0.03	0.03	0	0.09	0.09	0	0.03	0.03	0
4370.073	262.16	262.16	0	0.01	0.01	0	0.26	0.26	0	0.08	0.08	0
4370.043	262.13	262.13	0	0.06	0.06	0	0.23	0.23	0	0.07	0.07	0
4369.909	262.12	262.12	0	0.03	0.03	0	0.1	0.1	0	0.02	0.02	0
4368.863	262.11	262.11	0	0.04	0.04	0	0.36	0.36	0	0.01	0.01	0
4344	261.9	261.9	0	0.16	0.16	0	0.68	0.68	0	0.23	0.23	0
4308.669	261.68	261.68	0	-	-	-	0.55	0.55	0	-	-	-
4196.075	260.25	260.25	0	-	-	-	1.54	1.54	0	-	-	-
4007.722	259.13	259.13	0	0.15	0.15	0	0.38	0.38	0	0.14	0.14	0
3956.844	259.12	259.12	0	0.07	0.07	0	0.22	0.22	0	0.07	0.07	0
3899.436	259.12	259.12	0	0.02	0.02	0	0.1	0.1	0	0.03	0.03	0
3821.818	259.11	259.11	0	0.07	0.07	0	0.22	0.22	0	0.06	0.06	0
3789.828	258.89	258.89	0	0.5	0.5	0	1.87	1.87	0	0.33	0.33	0
3711.272	258.76	258.76	0	0.16	0.16	0	0.51	0.51	0	0.16	0.16	0
3653.272	258.66	258.66	0	0.25	0.25	0	0.78	0.78	0	0.23	0.23	0
3602.49	258.52	258.52	0	0.26	0.26	0	0.88	0.88	0	0.24	0.24	0
3483.216	257.85	257.85	0	0.2	0.2	0	1.22	1.22	0	0.18	0.18	0
3413.879	257.77	257.77	0	0.18	0.18	0	0.5	0.5	0	0.2	0.2	0
3378.862	257.77	257.77	0	0.07	0.07	0	0.32	0.32	0	0.1	0.1	0
3308.731	257.77	257.77	0	0.05	0.05	0	0.17	0.17	0	0.05	0.05	0
3216.276	257.77	257.77	0	0.06	0.06	0	0.21	0.21	0	0.05	0.05	0
3198.314	257.77	257.77	0	0.05	0.05	0	0.19	0.19	0	0.04	0.04	0
3190.241	257.77	257.77	0	0.01	0.01	0	0.05	0.05	0	0.01	0.01	0
3115.165	257.77	257.77	0	0.01	0.01	0	0.08	0.08	0	0.02	0.02	0
3083.999	Culvert											
3054.114	256.08	256.08	0			0	1.28	1.28	0			0
3040.584	256.1	256.1	0	0.06	0.06	0	0.19	0.19	0	0.05	0.05	0
2972.104	256.1	256.1	0	0.03	0.03	0	0.09	0.09	0	0.03	0.03	0

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Tributary E HEC-RAS Model Results

Tributary E HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
4370.082	265.06	265.13	-	-	0.49	0.59	-	-
4370.081	264.39	264.44	-	-	0.43	0.55	-	-
4370.079	262.37	262.50	-	-	1.31	1.36	-	-
4370.073	261.79	261.88	-	-	0.09	0.13	-	-
4370.043	261.78	261.87	-	0.02	0.05	0.08	-	-
4369.909	261.78	261.87	-	0.01	0.02	0.04	-	-
4368.863	261.78	261.86	-	-	0.17	0.21	-	-
4344	261.58	261.65	-	-	0.52	0.53	-	-
4308.669	260.92	261.09	-	-	0.81	0.74	-	-
4196.075	260.03	260.17	-	-	0.35	0.45	-	-
4007.722	258.68	258.73	-	-	0.72	0.81	-	-
3956.844	258.54	258.61	-	-	0.08	0.14	-	-
3899.436	258.53	258.61	-	-	0.03	0.05	-	-
3821.818	258.53	258.60	-	-	0.07	0.13	-	-
3789.828	258.44	258.49	-	-	1.24	1.29	-	-
3711.272	258.15	258.21	-	-	0.21	0.24	-	0.02
3653.272	258.08	258.14	-	-	0.29	0.34	-	-
3602.49	257.99	258.03	-	-	0.35	0.40	-	-
3483.216	257.51	257.54	-	-	0.46	0.52	-	-
3413.879	256.91	256.94	-	-	0.50	0.56	-	-
3378.862	256.16	256.18	-	-	0.88	0.95	-	-
3308.731	255.73	255.78	-	-	0.14	0.17	0.00	-
3216.276	255.73	255.78	0.01	0.01	0.06	0.08	0.01	0.01
3198.314	255.73	255.78	0.00	0.00	0.06	0.08	0.01	0.01
3190.241	255.73	255.78	-	-	0.02	0.02	0.00	-
3115.165	255.73	255.78	-	-	0.14	0.20	-	-
3083.999	Culvert							
3054.114	255.68	255.68	-	-	0.14	0.20	-	-
3040.584	255.68	255.68	0.01	0.01	0.02	0.03	0.01	0.01
2972.104	256.10	255.68	-	0.00	0.01	0.01	-	0.00

Tributary E HEC-RAS Exisitng and Proposed Conditions Model Results

25-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
4370.082	265.17	265.22	-	-	0.69	0.79	-	-
4370.081	264.49	264.55	-	-	0.63	0.72	-	-
4370.079	262.58	262.65	-	-	1.31	1.28	-	-
4370.073	261.93	262.00	-	-	0.16	0.18	-	0.03
4370.043	261.91	261.98	0.03	0.04	0.11	0.14	0.00	0.02
4369.909	261.91	261.98	0.01	0.02	0.05	0.06	0.00	0.01
4368.863	261.91	261.97	-	-	0.23	0.28	-	-
4344	261.69	261.75	-	-	0.58	0.62	-	-
4308.669	261.21	261.33	-	-	0.66	0.69	-	-
4196.075	260.21	260.30	-	-	0.54	0.60	-	-
4007.722	258.78	258.82	-	0.12	0.65	0.71	-	-
3956.844	258.77	258.79	0.03	0.04	0.12	0.19	0.02	0.03
3899.436	258.77	258.79	0.01	0.01	0.05	0.08	0.01	0.01
3821.818	258.76	258.79	0.02	0.04	0.12	0.18	0.01	0.02
3789.828	258.62	258.63			1.52	1.53		
3711.272	258.38	258.39	0.07	0.07	0.33	0.34	0.09	0.09
3653.272	258.30	258.31	0.10	0.11	0.47	0.49	0.08	0.08
3602.49	258.18	258.19	0.07	0.08	0.55	0.57	0.08	0.08
3483.216	257.66	257.68	-	-	0.69	0.67	-	-
3413.879	257.03	257.02	-	-	0.77	0.86	0.05	0.02
3378.862	256.25	256.28	-	-	1.23	1.08		
3308.731	256.24	256.31	0.01	0.01	0.17	0.17	0.01	0.02
3216.276	256.24	256.30	0.03	0.03	0.13	0.13	0.03	0.03
3198.314	256.24	256.30	0.02	0.02	0.12	0.13	0.02	0.02
3190.241	256.24	256.30	0.00	0.00	0.04	0.04	0.00	0.00
3115.165	256.22	256.29	-	-	0.39	0.41	-	-
3083.999	Culvert							
3054.114	255.72	255.72	-	-	0.46	0.49	-	-
3040.584	255.72	255.72	0.02	0.02	0.07	0.07	0.02	0.02
2972.104	255.72	255.72	0.01	0.01	0.03	0.03	0.01	0.01

Tributary E HEC-RAS Exisitng and Proposed Conditions Model Results

100-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
4370.082	265.22	265.26	-	-	0.77	0.86	-	-
4370.081	264.54	264.59	-	-	0.71	0.79	-	-
4370.079	262.65	262.70	-	0.02	1.28	1.32	-	0.27
4370.073	261.98	262.06	-	-	0.18	0.20	0.02	0.04
4370.043	261.96	262.04	0.04	0.05	0.14	0.17	0.01	0.03
4369.909	261.96	262.03	0.01	0.02	0.06	0.08	0.01	0.01
4368.863	261.95	262.02	-	-	0.26	0.31	-	-
4344	261.71	261.79	-	-	0.68	0.67	-	0.02
4308.669	261.37	261.46	-	-	0.53	0.61	-	-
4196.075	260.18	260.29	-	-	0.85	0.84	-	-
4007.722	258.87	258.90	0.09	0.15	0.44	0.56	0.09	0.15
3956.844	258.86	258.87	0.04	0.06	0.14	0.21	0.03	0.05
3899.436	258.85	258.87	0.01	0.02	0.06	0.09	0.01	0.02
3821.818	258.85	258.86	0.03	0.05	0.14	0.21	0.02	0.04
3789.828	258.69	258.69			1.59	1.59		
3711.272	258.46	258.47	0.09	0.10	0.38	0.38	0.09	0.09
3653.272	258.38	258.38	0.15	0.15	0.56	0.56	0.11	0.11
3602.49	258.24	258.24	0.12	0.12	0.67	0.68	0.13	0.14
3483.216	257.77	257.77	0.05	0.05	0.66	0.67	0.01	0.02
3413.879	256.98	256.99	-	-	1.35	1.36	-	-
3378.862	256.80	256.84	0.10	0.10	0.35	0.34	0.08	0.08
3308.731	256.80	256.84	0.03	0.03	0.14	0.13	0.03	0.03
3216.276	256.80	256.84	0.03	0.03	0.14	0.14	0.03	0.03
3198.314	256.80	256.84	0.03	0.03	0.13	0.13	0.02	0.03
3190.241	256.80	256.84	0.01	0.01	0.04	0.04	0.01	0.01
3115.165	256.78	256.82	-	-	0.47	0.48	-	-
3083.999	Culvert							
3054.114	255.78	255.78	-	-	0.63	0.64	-	-
3040.584	255.78	255.78	0.03	0.03	0.10	0.10	0.02	0.03
2972.104	255.78	255.78	0.01	0.02	0.04	0.04	0.01	0.01

Tributary E HEC-RAS Exisitng and Proposed Conditions Model Results

Regional Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
4370.082	265.37	265.37	-	-	0.98	0.98	-	-
4370.081	264.68	264.68	-	-	0.96	0.96	-	-
4370.079	262.77	262.77	0.30	0.30	1.53	1.53	0.60	0.60
4370.073	262.16	262.16	0.01	0.01	0.26	0.26	0.08	0.08
4370.043	262.13	262.13	0.06	0.06	0.23	0.23	0.07	0.07
4369.909	262.12	262.12	0.03	0.03	0.10	0.10	0.02	0.02
4368.863	262.11	262.11	0.04	0.04	0.36	0.36	0.01	0.01
4344	261.90	261.90	0.16	0.16	0.68	0.68	0.23	0.23
4308.669	261.68	261.68	-	-	0.55	0.55	-	-
4196.075	260.25	260.25	-	-	1.54	1.54	-	-
4007.722	259.13	259.13	0.15	0.15	0.38	0.38	0.14	0.14
3956.844	259.12	259.12	0.07	0.07	0.22	0.22	0.07	0.07
3899.436	259.12	259.12	0.02	0.02	0.10	0.10	0.03	0.03
3821.818	259.11	259.11	0.07	0.07	0.22	0.22	0.06	0.06
3789.828	258.89	258.89	0.50	0.50	1.87	1.87	0.33	0.33
3711.272	258.76	258.76	0.16	0.16	0.51	0.51	0.16	0.16
3653.272	258.66	258.66	0.25	0.25	0.78	0.78	0.23	0.23
3602.49	258.52	258.52	0.26	0.26	0.88	0.88	0.24	0.24
3483.216	257.85	257.85	0.20	0.20	1.22	1.22	0.18	0.18
3413.879	257.77	257.77	0.18	0.18	0.50	0.50	0.20	0.20
3378.862	257.77	257.77	0.07	0.07	0.32	0.32	0.10	0.10
3308.731	257.77	257.77	0.05	0.05	0.17	0.17	0.05	0.05
3216.276	257.77	257.77	0.06	0.06	0.21	0.21	0.05	0.05
3198.314	257.77	257.77	0.05	0.05	0.19	0.19	0.04	0.04
3190.241	257.77	257.77	0.01	0.01	0.05	0.05	0.01	0.01
3115.165	257.77	257.77	0.01	0.01	0.08	0.08	0.02	0.02
3083.999	Culvert							
3054.114	256.08	256.08			1.28	1.28		
3040.584	256.10	256.10	0.06	0.06	0.19	0.19	0.05	0.05
2972.104	256.10	256.10	0.03	0.03	0.09	0.09	0.03	0.03

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date 2024.06.07

Tributary F HEC-RAS Model Regional Results

Tributary F Exisitng and Proposed Conditions Difference for Regional Water Surface Elevations and Velocity

River Station	WSE			Left Bank Vel.			Main Channel Vel.			Right Bank Vel.		
	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference	Existing	Proposed	Difference
1571.71	254.63	254.56	-0.07	-	-	-	1.66	1.55	-0.11	-	-	-
1539.69	253.6	253.55	-0.05	-	-	-	1.42	1.26	-0.16	-	-	-
1511.34	252.75	252.72	-0.03	-	-	-	0.99	0.89	-0.1	-	-	-
1450.99	250.42	250.34	-0.08	-	-	-	1.83	1.72	-0.11	-	-	-
1399.71	248.72	248.74	0.02	-	-	-	0.88	0.9	0.02	-	-	-
1373	247.25	247.26	0.01	-	-	-	1.13	1.18	0.05	-	-	-
1318	244.34	244.35	0.01	-	-	-	1.3	1.34	0.04	-	-	-
1245	239.52	239.53	0.01	-	-	-	1.6	1.63	0.03	-	-	-
1184	236.72	236.72	0	-	-	-	1.65	1.64	-0.01	-	-	-
1126	234.88	234.87	-0.01	-	-	-	1.02	1.02	0	-	-	-
993	232.06	232.05	-0.01	-	-	-	2.48	2.48	0	-	-	-
992	230.63	230.63	0	-	-	-	0.58	0.57	-0.01	-	-	-

Project: Bolton North Hill
Project No.: 708-3446
Design By: JW
Created Date: 2024.06.07

Tributary F HEC-RAS Model Results

Tributary F HEC-RAS Exisitng and Proposed Conditions Model Results
2-Year Water Surface Elevations and Velocity

River Station	WSE (masl)		Left Bank Vel. (m/s)		Main Channel Vel. (m/s)		Right Bank Vel. (m/s)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1571.71	254.27	254.22	-	-	0.94	1	-	-
1539.69	253.37	253.36	-	-	0.62	0.45	-	-
1511.34	252.62	252.59	-	-	0.46	0.64	-	-
1450.99	250.04	250.06	-	-	1.17	0.66	-	-
1399.71	248.33	248.21	-	-	0.43	0.89	-	-
1373	247.05	247.03	-	-	0.89	0.85	-	-
1318	244	243.97	-	-	1.07	1	-	-
1245	239.17	239.15	-	-	1.06	0.89	-	-
1184	236.37	236.37	-	-	1.01	1.03	-	-
1126	234.09	234.1	-	-	1.24	1.25	-	-
993	231.48	231.48	-	-	0.98	0.99	-	-
992	228.81	228.81	-	-	1.52	1.53	-	-

Tributary F HEC-RAS Exisitng and Proposed Conditions Model Results
25-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1571.71	254.41	254.35	-	-	1.3	1.18	-	-
1539.69	253.46	253.42	-	-	0.95	0.82	-	-
1511.34	252.67	252.65	-	-	0.69	0.6	-	-
1450.99	250.19	250.13	-	-	1.47	1.35	-	-
1399.71	248.5	248.45	-	-	0.58	0.55	-	-
1373	247.14	247.12	-	-	1.04	0.94	-	-
1318	244.13	244.09	-	-	1.37	1.29	-	-
1245	239.34	239.3	-	-	1.26	1.23	-	-
1184	236.49	236.49	-	-	1.43	1.42	-	-
1126	234.39	234.38	-	-	1.44	1.43	-	-
993	231.76	231.75	-	-	1.4	1.39	-	-
992	229.07	229.07	-	-	2.02	2	-	-

Tributary F HEC-RAS Exisitng and Proposed Conditions Model Results

100-Year Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1571.71	254.47	254.4	-	-	1.4	1.28	-	-
1539.69	253.5	253.46	-	-	1.07	0.93	-	-
1511.34	252.69	252.66	-	-	0.78	0.68	-	-
1450.99	250.25	250.19	-	-	1.57	1.45	-	-
1399.71	248.56	248.51	-	-	0.65	0.59	-	-
1373	247.17	247.14	-	-	1.06	1.1	-	-
1318	244.18	244.14	-	-	1.48	1.39	-	-
1245	239.38	239.35	-	-	1.39	1.28	-	-
1184	236.54	236.54	-	-	1.57	1.54	-	-
1126	234.49	234.48	-	-	1.5	1.5	-	-
993	231.88	231.86	-	-	1.54	1.53	-	-
992	229.19	229.17	-	-	2.18	2.16	-	-

Tributary F HEC-RAS Exisitng and Proposed Conditions Model Results

Regional Water Surface Elevations and Velocity

River Station	WSE		Left Bank Vel.		Main Channel Vel.		Right Bank Vel.	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1571.71	254.63	254.56	-	-	1.66	1.55	-	-
1539.69	253.6	253.55	-	-	1.42	1.26	-	-
1511.34	252.75	252.72	-	-	0.99	0.89	-	-
1450.99	250.42	250.34	-	-	1.83	1.72	-	-
1399.71	248.72	248.74	-	-	0.88	0.9	-	-
1373	247.25	247.26	-	-	1.13	1.18	-	-
1318	244.34	244.35	-	-	1.3	1.34	-	-
1245	239.52	239.53	-	-	1.6	1.63	-	-
1184	236.72	236.72	-	-	1.65	1.64	-	-
1126	234.88	234.87	-	-	1.02	1.02	-	-
993	232.06	232.05	-	-	2.48	2.48	-	-
992	230.63	230.63	-	-	0.58	0.57	-	-

Appendix D4 – Correspondence with Toronto and Region Conservation Authority

Hi Josh,
Thanks for your email.
I noticed that the engineered model was not properly transferred into the shared online folder. Please access the shared folder now and check whether you can download the engineered model.

Please let me know if you have any difficulty.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

Toronto and Region Conservation Authority

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: November 23, 2021 10:16 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Jessica Lysecki <jlysecki@cfcrozier.ca>; Travis Gibson <tgibson@cfcrozier.ca>; Erin Dodd <edodd@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

I have been working on the estimated portion of the hydraulic model and need to begin looking at the engineered watercourses of the Main Humber and Cold Creek. As per our data sharing agreement, we had requested the hec ras projects for the engineered and estimated models. From what I can see, the Cold Creek and Main Humber models only contain the estimated reaches (no geometry for the engineered model).

Can you please confirm that the engineered hydraulic models were sent to us? I think that I only received the CAD drawings for the engineered model.

Thank you,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: November 4, 2021 2:43 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Jessica Lysecki <jlysecki@cfcrozier.ca>; Travis Gibson <tgibson@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Please access the following link to download the Hydraulic models.

Regional Road 50 and Emil Kolb Parkway_Corzier(Josh Wagemaker)

As mentioned in my previous emails, please note that TRCA's Estimated floodplain modeling and mapping was intended to be used as a screening tool for development applications submitted to the TRCA, to determine whether existing or proposed sites, properties, or structures are potentially susceptible to flooding. This information is the best available at this time but is not appropriate for many uses since the model doesn't include crossing structures, doesn't have refined Manning's n values, and the crossing geometry is not detailed. Thus, the TRCA water resources engineering staff recommend that the proponent use TRCA's available modeling and mapping to conduct the hydraulic analysis for their project, refine the model and create an engineered HEC-RAS model. The Estimated HEC-RAS model is based on old topographic information and therefore updating the topographic information will also be required.

If you need any clarification, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480

E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Priyantha Hunukumbura
Sent: November 2, 2021 12:03 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Jessica Lysecki <jlysecki@cfcrozier.ca>; Travis Gibson <tgibson@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Thanks for completing the online payment. Please access the following link to download the Hydrologic model, hydrology report, subcatchment shape file and the floodplain mapping (CAD) sheets(hum_81, hum_82 & hum_77). Once I prepare the hydraulic models, I will copy them to the same location and let you know.

Regional Road 50 and Emil Kolb Parkway_Corzier(Josh Wagemaker)

If you have any difficulty to access the above link, please let me know.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: November 2, 2021 10:18 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Jessica Lysecki

<jlysecki@cfcrozier.ca>; Travis Gibson <tgibson@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

I have processed payment. Thanks again for your help.

Based on past experience, the hydraulic model usually takes some time to prepare. If this is the case, and if it isn't too much trouble, would it be possible to receive the subcatchments as soon as possible?

Regards,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Monday, November 1, 2021 1:22 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Thanks for sending us the completed data sharing agreement.
The invoice for the requested data has been sent through TRCA's online payment system. Once we have received the payment and data has been prepared, I will direct you on how to access the data.

If you need any other information, please let me know.

Thank you.

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources

Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 29, 2021 2:15 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Jessica Lysecki <jlysecki@cfcrozier.ca>; Andrea Giampuzzi <agiampuzzi@cfcrozier.ca>; Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>; Travis Gibson <tgibson@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

Thank you for your help. I have attached our data sharing agreement. Please send the invoice and we will provide payment as soon as possible.

Regards,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Friday, October 29, 2021 10:01 AM

To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
The buffer shown in the figure (in Pink Color) is just for the Floodplain Mapping Sheet reference.
You can get some information on regulatory area mapping from Regulated Area Search - Toronto and Region Conservation Authority (TRCA) .
if you need the engineered HEC-RAS model as well, we can provide. In this case we will charge only $150 for the hydraulic Modelling.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 29, 2021 9:32 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

I am a little concerned about the buffer from **hum_82** and **hum_77** encroaching on the property. The shapefile provided may be a little coarse, it is possible that the property boundary is touching.
I wasn't aware that the estimated and engineered models were completely separate. Would it be another $150 for the engineered model?

I am having an internal meeting to discuss if we will need the sheets. I will get back to you with the Data Sharing Agreeement shortly.

Thanks,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

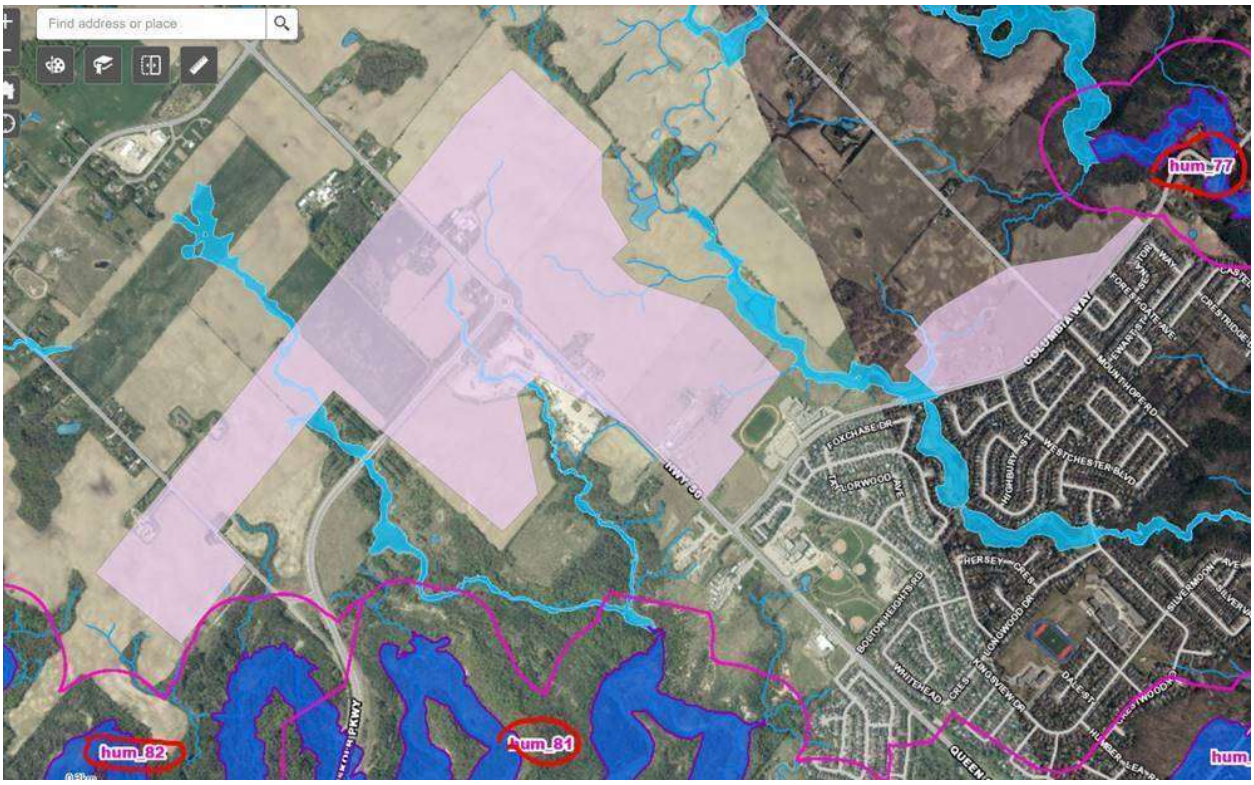
From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Thursday, October 28, 2021 3:31 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
No worries.
Please see the figure below. As I mentioned before, your subject area is outside of TRCA's Engineered Floodplain. However, if you need the Engineered Floodplain sheets (Hum_82, Hum_81 or Hum_77), please include them in the data sharing agreement. Those sheets are available in CAD($125 +Tax per sheet) or in PDF ($30+ Tax per sheet) . We typically do not provide Estimated floodplain shapefile as you will be able to generate it from the Estimated HEC-RAS model.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca



From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 28, 2021 3:01 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

I apologize for the number of emails but could we get the shapefile for the combined engineered-estimated floodplain map. I think that I have downloaded this before but the link on the TRCA website appears to be broken right now..

Thanks,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

CROZIER
CONSULTING ENGINEERS

Crozier Connections:

Read our latest news and announcements here.

From: Josh Wagemaker
Sent: Thursday, October 28, 2021 2:56 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

Thank you for your response. Would it be possible to get the shapefile of subcatchments without requesting the entire hydrologic model? Or does the $150 fee still apply?

Thanks,

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Thursday, October 28, 2021 2:24 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Cc: Jason Wagler <Jason.Wagler@trca.ca>; Dilnesaw Chekol <Dilnesaw.Chekol@trca.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Thanks for your email.
Information on the data availability is shown in Red below.

1. **The hydraulic model for the area previously identified. – You can purchase the Estimated Hydraulic model ($150 + Tax)**
2. **Shapefile of Subcatchments (not subwatersheds) – (If you need the hydrologic model for the Humber River($150 + Tax), please list it in the data sharing agreement. We can provide the Subcatchment shapefile)**
3. **Shapefile of Floodplain and Associated Maps - The subject area is within our Estimated Hydraulic modeling area. therefore, we do not have Engineered Floodplain maps for the area.**
4. **Infrastructure – Crossings (culverts and bridges only)- Please contact the Region/Town to obtain culvert information**
5. **Shapefile of Erosion/Hazardous Areas – Not available**

Based on the information provided, the subject site is within TRCA's Estimated Hydraulic Modeling boundary. Therefore, please note that the Estimated floodplain modeling and mapping was intended to be used as a screening tool for development applications submitted to the TRCA, to determine whether existing or proposed sites, properties, or structures are potentially susceptible to flooding. This information is the best available at this time but is not appropriate for many uses since the model doesn't include crossing structures, doesn't have refined Manning's n values, and the crossing geometry is not detailed. Thus, the TRCA water resources engineering staff recommend that the proponent use TRCA's available modeling and mapping to conduct the hydraulic analysis for their project, refine the model and create an engineered HEC-RAS model. The Estimated HEC-RAS model is based on old topographic information and therefore updating the topographic information will also be required.

Herewith I attached TRCA's data sharing agreement. Please complete it and send me back. Once we received the signed data sharing agreement, I will prepare the requested data and send you an invoice. Once we have received the necessary fee, I will make an arrangement to send you the data.

If you need further clarification, please do contact me.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 28, 2021 1:22 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

I have found some of the information that I had requested before. I thought that I should send you an updated list so that you don't have to collect everything. The reduced list of items includes:

1. **The hydraulic model for the area previously identified.**
2. **Shapefile of Subcatchments (not subwatersheds)**
3. **Shapefile of Floodplain and Associated Maps**
4. **Infrastructure – Crossings (culverts and bridges only)**
5. **Shapefile of Erosion/Hazardous Areas**

I understand that this process takes some time but if you are able to provide an approximate ETA it would be much appreciated.

Thank you,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Tuesday, October 26, 2021 2:56 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Thanks.
I will discuss with the planner and will let you know if I need to clarify anything.
Otherwise, I will send you TRCA's data sharing agreement for you to complete and send me back.

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 26, 2021 2:53 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

Hello,

No permit applications have been made yet. Let me know if there is anything I can do.

Thanks,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Tuesday, October 26, 2021 2:25 PM
To: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Yes, I received the data you sent yesterday. Thanks.
As you need various types of data, I will discuss with the corresponding planner and get back to you on how we should proceed.
Can you please let me know whether the data is for a current/ existing permit application?

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 26, 2021 2:18 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

Could you please confirm receipt of my email that was sent yesterday? I have provided the same information in a zip file just in case there is an issue with file size. Thank you for your help.

Sincerely,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

Read our latest news and announcements here.

From: Josh Wagemaker
Sent: Monday, October 25, 2021 12:47 PM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Subject: RE: TRCA Data Request

Hi Priyantha,

I apologize but I believe that your email went to my spam. I was just about to email you asking for an update. Below is the information that you had requested.

There is not a specific address for the project. It is owned the Bolton North Hill Landowners Group and is a collection of properties. One of the addresses is 14475 Hwy 50, Kleinburg, ON. One of the large areas is located north of Columbia Way, at Columbia Way and Mount Hope Rd. The other Site is located at HWY 50 and Emil Kolb Parkway. I have attached a map and shapefile for reference.

Assuming that the entire hydraulic model is too much data to send, I had sent Alwish a shapefile of the extents of the watercourse that we require. I have attached this shapefile and map as well.

In addition to the **Hydraulic Model**, we would like to request the following data.

2. **Hydrologic Model of Humber River Watershed**
3. **Shapefile of Subwatershed Drainage Areas or Subcatchments**
4. **Shapefile of Existing Land Use Conditions**
5. **Any Available Contour/Topographic Data**
6. **Shapefile of Floodplain and Associated Maps**
7. **Stormwater Management Ponds and Infrastructure**
8. **Shapefile of Erosion/Hazardous Areas**

We are running a little short on time for this project, so please let me know if there is anything that I can do to help with the process. I would really appreciate it if you could send the data that is immediately available, just in case the hydraulics part takes a some time to complete.

Please do not hesitate to call at (807)-356-4282. We are happy to take care of any licensing agreements or fees.

Thank you,

From: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Sent: Tuesday, October 19, 2021 1:03 PM
To: Jessica Lysecki <jlysecki@cfcrozier.ca>
Cc: Andrea Giampuzzi <agiampuzzi@cfcrozier.ca>; Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: RE: TRCA Data Request

Hi Josh,
Can you please provide me the address of the subject property and a clear map (or Shape File) showing the project boundary for me to check the data availability?

Thanks,

Priyantha Hunukumbura, Ph.D., P.Eng.
Technologist, Water Resources
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 6480
E: priyantha.hunukumbura@trca.ca
A: 101 Exchange Avenue, Vaughan, ON, L4K 5R6 | trca.ca

From: Alwish Gnanaraj <Alwish.Gnanaraj@trca.ca>
Sent: October 19, 2021 10:01 AM
To: Priyantha Hunukumbura <PRIYANTHA.HUNUKUMBURA@trca.ca>
Cc: Jessica Lysecki <jlysecki@cfcrozier.ca>; Andrea Giampuzzi <agiampuzzi@cfcrozier.ca>; Josh Wagemaker <jwagemaker@cfcrozier.ca>
Subject: Fw: TRCA Data Request

Hi Priyantha,

Could you please send this data request to Josh Wagemaker <jwagemaker@cfcrozier.ca>?

Josh: Peel region is in Priyantha's jurisdiction. He will be able to help you.

Thanks,
Alwish.

Alwish Gnanaraj, M.A.Sc.
Technologist, Water Resources Engineering
Engineering Services | Development and Engineering Services

T: (416) 661-6600 ext. 5390
E: alwish.gnanaraj@trca.ca
A: 101 Exchange Avenue, Vaughan, Ontario L4K 5R6

Toronto and Region Conservation Authority (TRCA) | trca.ca

From: Josh Wagemaker <jwagemaker@cfcrozier.ca>
Sent: October 19, 2021 9:56 AM
To: Alwish Gnanaraj <Alwish.Gnanaraj@trca.ca>
Cc: Jessica Lysecki <jlysecki@cfcrozier.ca>; Andrea Giampuzzi <agiampuzzi@cfcrozier.ca>
Subject: FW: TRCA Data Request

Hey Alwish,

I just wanted to follow up on my email last week. Would you be able to provide the license agreement and timeline for this information?

I could also try going through Development Planning if you are very busy right now.

Thank you,

Josh Wagemaker | Engineering Intern
2800 High Point Drive, Suite 100 | Milton, ON L9T 6P4
T: 905.875.0026

Crozier Connections:

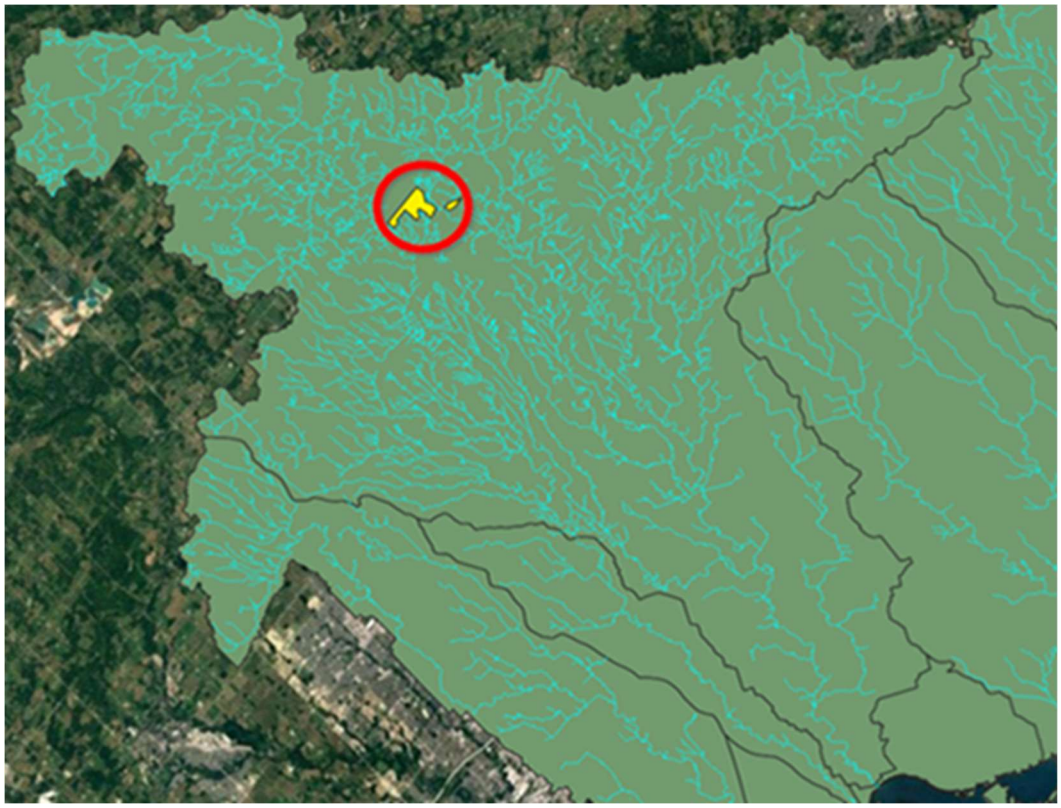
Read our latest news and announcements here.

From: Josh Wagemaker
Sent: Thursday, October 14, 2021 2:27 PM
To: alwish.gnanaraj@trca.ca
Cc: Jessica Lysecki <jlysecki@cfcrozier.ca>
Subject: TRCA Data Request

Hi Alwish,

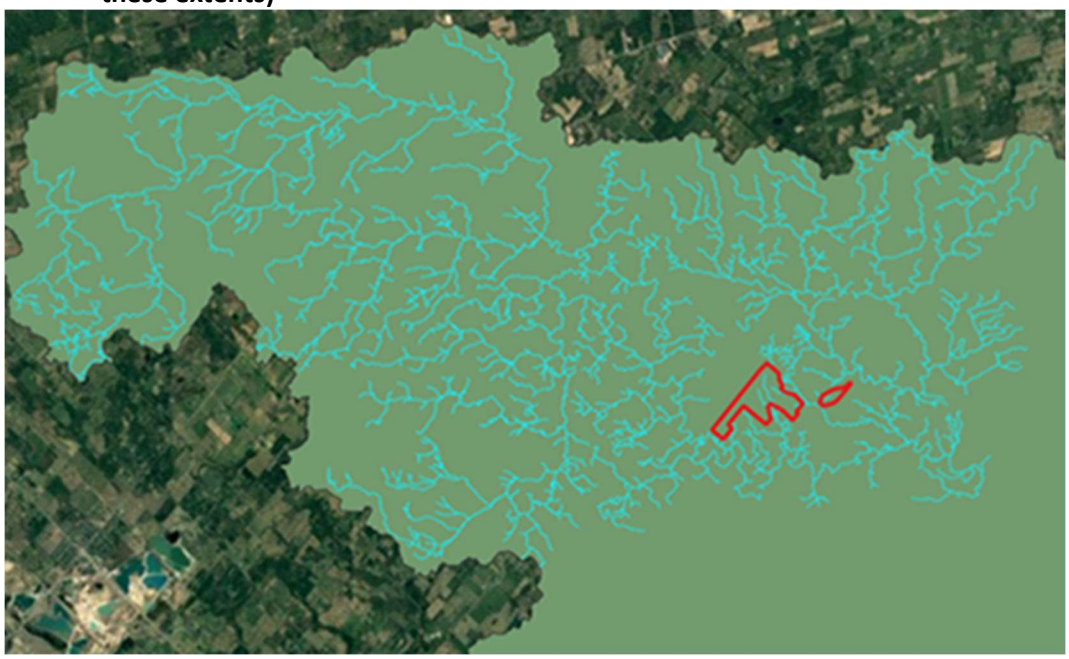
I hope that you are doing well. I am emailing you because I require some data that is not available on the TRCA's online portal. Last year I was in a similar situation and I remember that you were very helpful.

I am currently working on a project for the Bolton North Hill Landowners Group. We are developing the Functional Servicing Report with a focus on stormwater management. Our project is located within the Humber River Watershed at the intersection of Regional Road 50 and Emil Kolb Parkway. An overview of our sites location is shown below.



Below is a list of the data that I would like to request:

1. **Hydraulic Model for Watercourse Area Shown Below (I have attached a shapefile that includes these extents)**



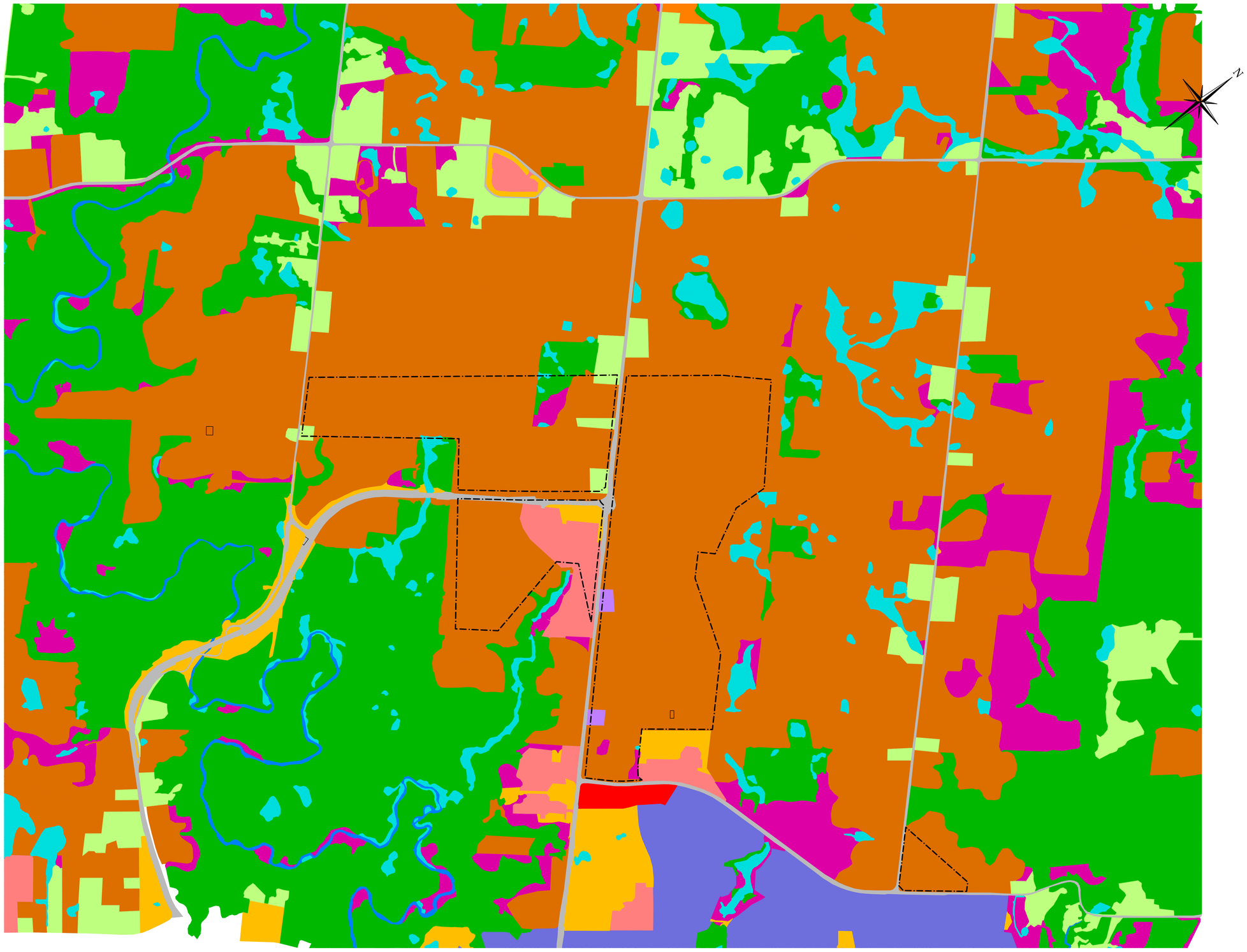
2. **Hydrologic Model of Humber River Watershed**

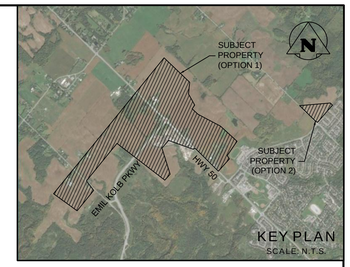
3. **Shapefile of Subwatershed Drainage Areas or Subcatchments**
4. **Shapefile of Existing Land Use Conditions**
5. **Any Available Contour/Topographic Data**
6. **Shapefile of Floodplain and Associated Maps**
7. **Stormwater Management Ponds and Infrastructure**
8. **Shapefile of Erosion/Hazardous Areas**

Please let me know if you require any more information. Feel free to email me back or call me directly at (807) 356-4282.

Thank you and have a great day,

Appendix E – FIGURES





LEGEND

- PROPERTY BOUNDARY
- AGRICULTURAL LAND
- COMMERCIAL
- FOREST
- HIGH-DENSITY RESIDENTIAL
- INDUSTRIAL/INSTITUIONAL
- MEADOW
- MEDIUM-DENSITY RESIDENTIAL
- RECREATIONAL / OPEN SPACE
- RIVERINE
- ROADS
- RURAL RESIDENTIAL
- WETLANDS

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EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

No.	ISSUE	DATE: MM/DD/YYYY
A	ISSUED FOR COORDINATION	12/03/2021

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

BOLTON NORTH HILL
TOWN OF CALEDON

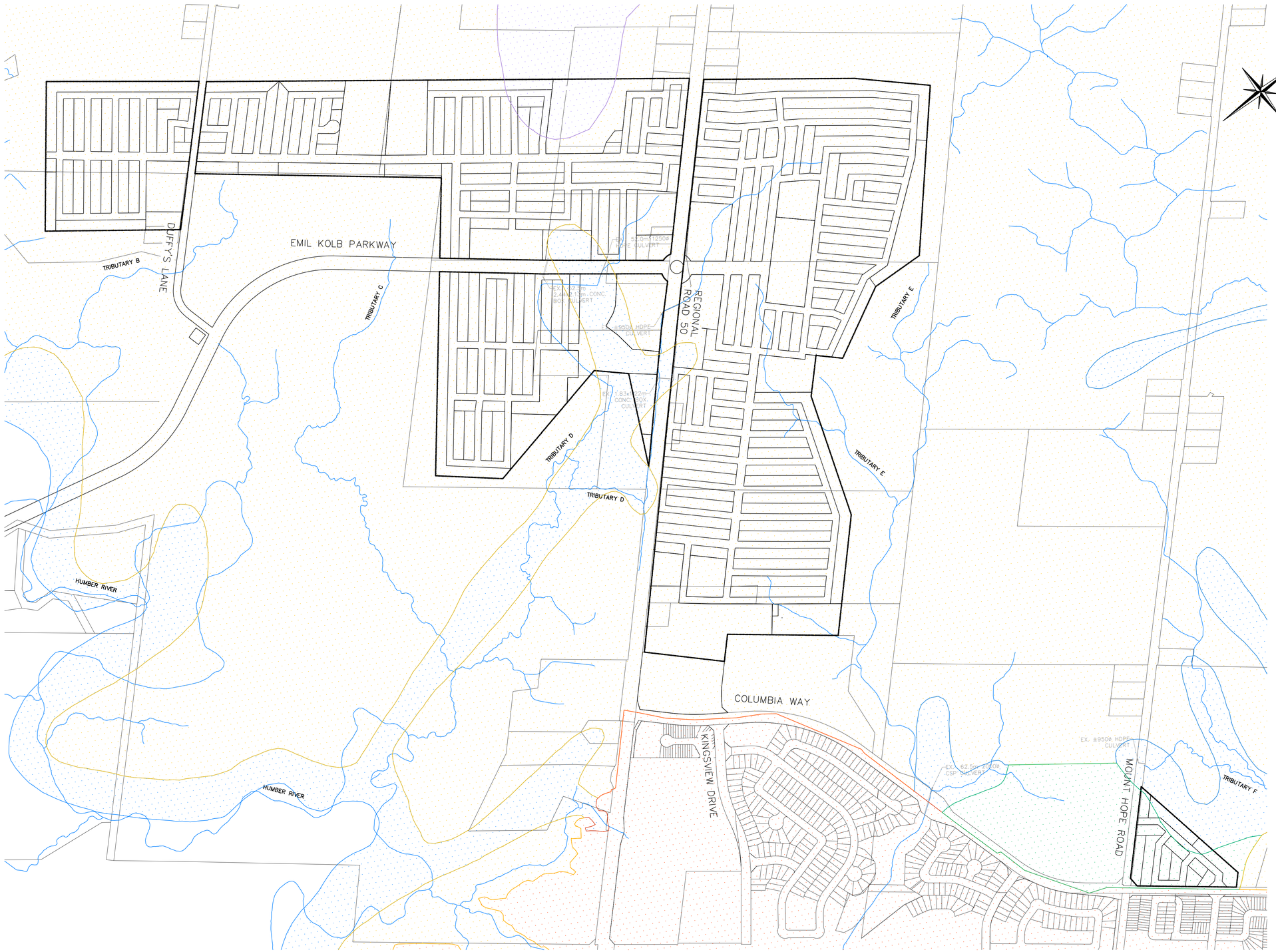
Drawing

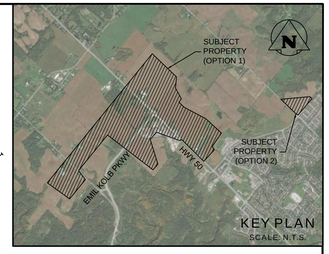
EXISTING LANDUSE
CONDITIONS

CROZIER
CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn By	Design By	Project	
E.D.	T.G.		708-3446
Check By	Check By	Scale	Figure
T.G.	S.C.	1: 5000	LAND-1

N:\700-799 Bolton NH Landowners Grp\3446 Bolton North Hill\CAD\Civil_Sheets\Figures\3446_LANDUSE.dwg, LANDUSE, 2021-12-06 10:14:14 AM, steidl





KEY PLAN
SCALE: N.T.S.

LEGEND

- 198.00 — EXISTING MAJOR CONTOURS
- 198.50 — EXISTING MINOR CONTOURS
- x199.11 — EXISTING ELEVATION
- PROPERTY BOUNDARY
- BOTTOM LAND
- BUILT–UP AREA
- KING CLAY LOAM
- MONOGHAN CLAY LOAM
- PONTYPOOL SANDY LOAM

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No.	ISSUE	DATE: MM/DD/YYYY
A	ISSUED FOR COORDINATION	12/03/2021

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

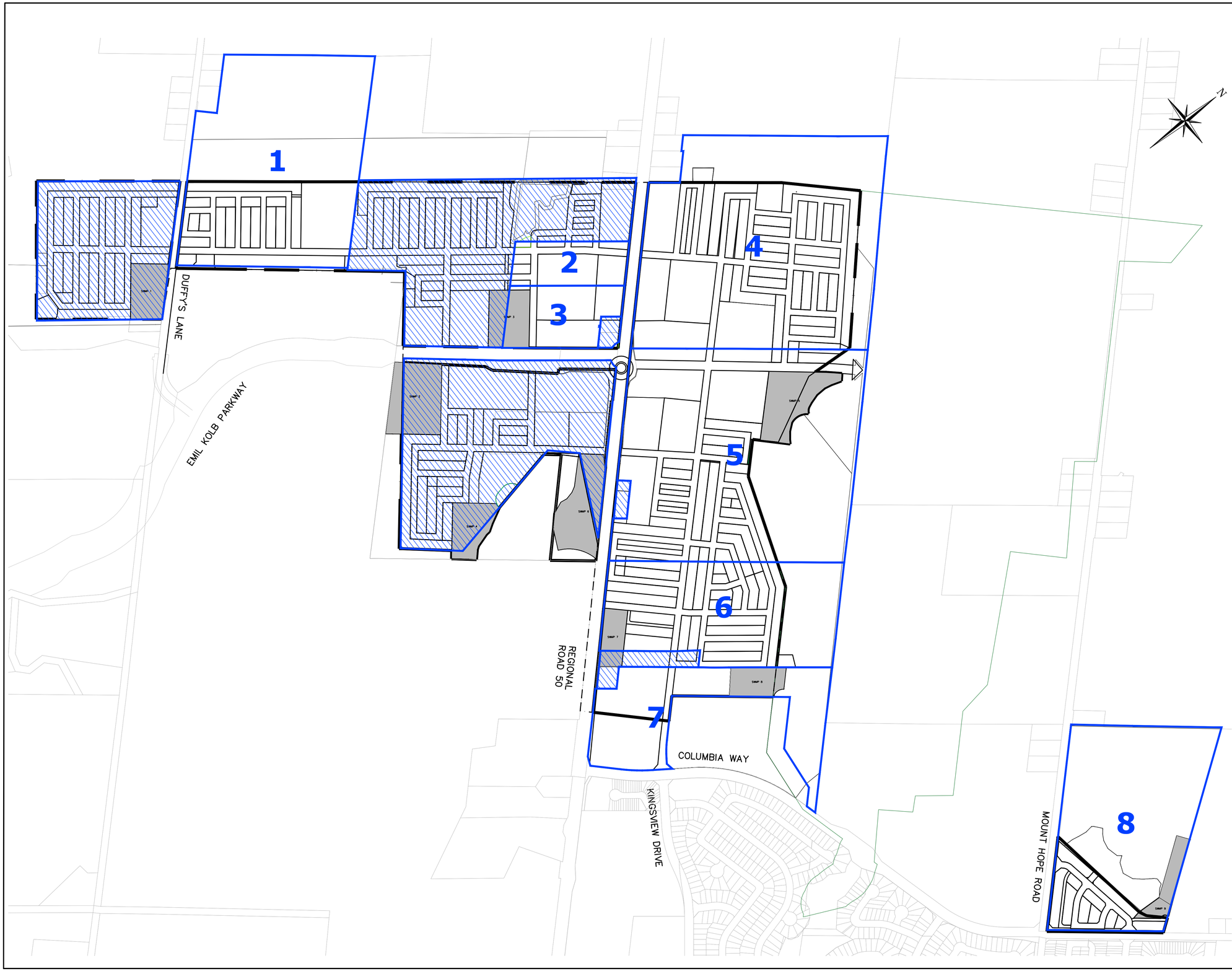
SOIL MAPPING PLAN

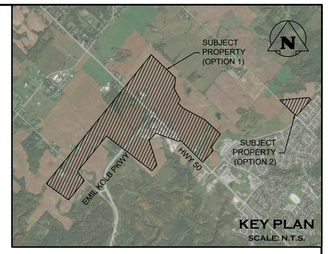
CROZIER CONSULTING ENGINEERS
2800 High Point Drive
Suite 100
Milton, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn By	Design By	Project	
E.D.	T.G.		708–3446
Check By	Check By	Scale	Figure
T.G.	S.C.	1:5000	SOIL–1

N:\700\708-Bolton NH Landowners Grp\3446-Bolton North Hill\CAD\Civil_Sheets\Figures\3446_SOIL.dwg, SOIL, 2021-12-06 10:13:50 AM, edodd

APPENDIX F – DRAWINGS





LEGEND

1 — PROPERTY BOUNDARY AND BOLTON NORTH HILL OWNERSHIP ID

HOLDOUT PROPERTY

PROPERTY BOUNDARY

OWNERS

1 – PACIFIC
2 – POLSINELLI
3 – PACIFIC
4 – COUNTRY HOMES
5 – OAKBANK ESTATES INC.
6 – MARHOME VENTURES
7 – GEORGIAN HUMBERVALE INC.
8 – COLD CREEK DEVELOPMENTS

PLAN PREPARED BY BOUSFIELDS INC. DATED NOVEMBER 2021

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5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR FIRST SUBMISSION	12/17/2021
2	ISSUED FOR SECOND SUBMISSION	02/14/2025

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

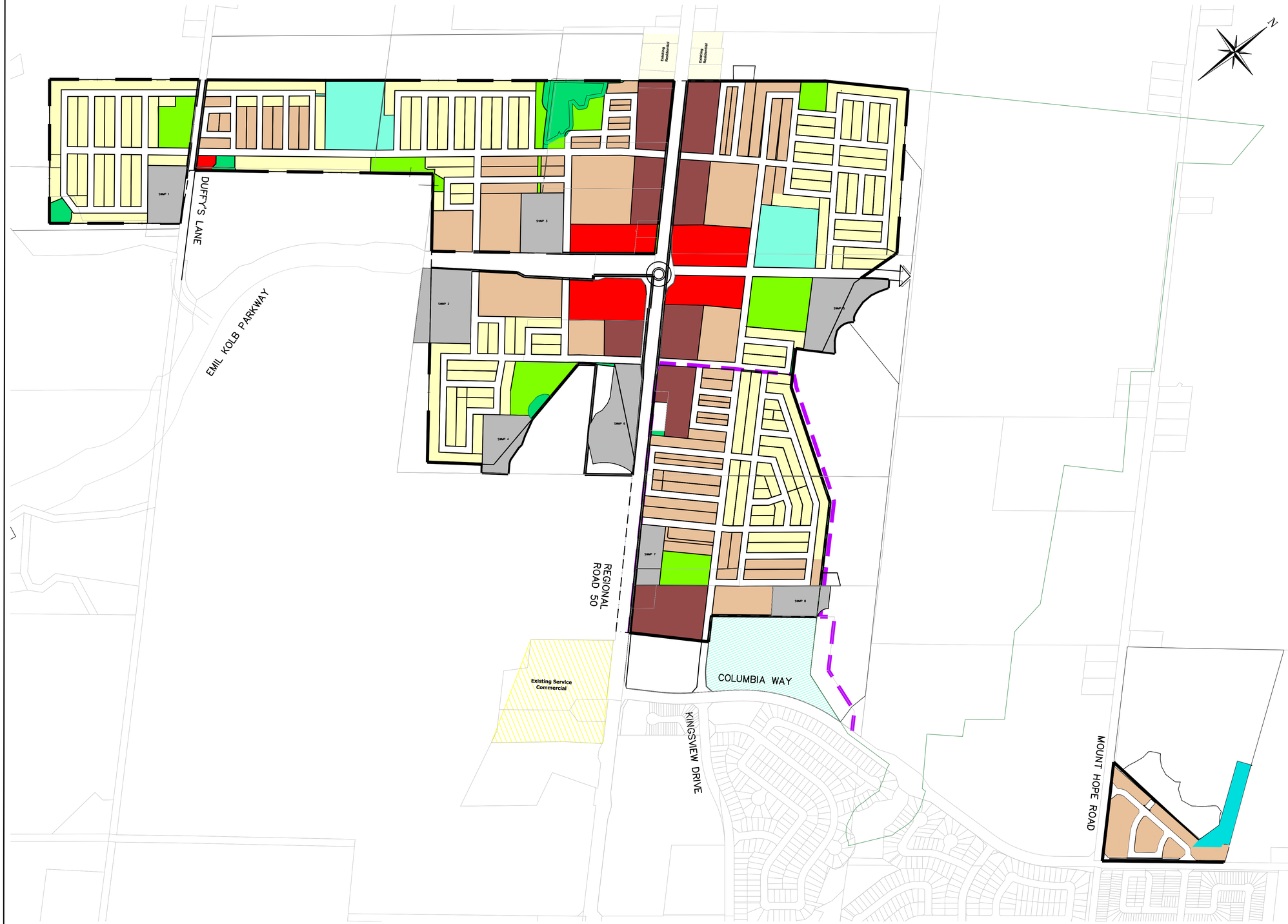
BOLTON NORTH HILL
TOWN OF CALEDON

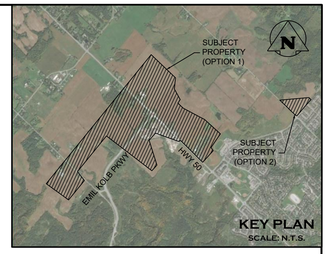
Drawing

LANDOWNERSHIP MAP

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708–3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C701





LEGEND

- PROPERTY BOUNDARY
- LOW DENSITY SINGLES
- MEDIUM DENSITY (TOWNS)
- MEDIUM/HIGH DENSITY
- MIXED USE
- SCHOOLS
- PARKS
- OPEN SPACE
- STORM WATER PONDS
- ROUNDING OUT AREA
- EXISTING SEPARATE SECONDARY SCHOOL
- EXISTING RESIDENTIAL
- ROPA 30 BOUNDARY

PLAN PREPARED BY BOUSFIELDS INC. DATED JANUARY 27, 2025

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
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4. DO NOT SCALE THE DRAWINGS.
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EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR FIRST SUBMISSION	12/17/2021
2	ISSUED FOR SECOND SUBMISSION	02/14/2025

Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

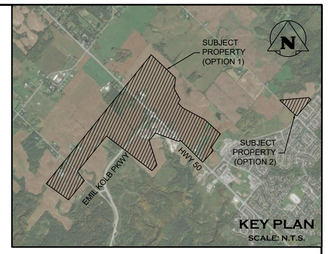
BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

PRELIMINARY FRAMEWORK PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C702



KEY PLAN
SCALE: N.T.S.

N

EXT1 3.24 84
EXT2 13.39 84
EXT3 4.11 84
EXT4 44.26 71
EXT5 8.36 65
EXT6 6.35 86
EXT7 15.80 85
EXT8 18.96 84
EXT9 24.02 83
EXT10 9.26 81
EXT11 5.25 80
EXT12 10.28 82
EXT13 13.24 81
EXT14 15.14 76
EXT15 12.92 85
EXT16 22.05 83
EXT17 10.44 76
EXT18 6.98 79
EXT19 23.88 82
EXT20 17.82 83
EXT21 51.56 82
EXT22 59.54 83
EXT62 0.31 38%
EXT70 0.35 38%
EXT86 0.62 44%
EXT65 1.64 44%
EXT64 1.42 31%
EXT66 0.62 44%
EXT165 0.48 31%
EXT166 0.68 31%
EXT139 0.59 31%
EXT138 0.63 31%
100 5.39 82
101 7.87 82
102 1.99 82
103 5.54 82
104 6.52 82
105 11.51 82
106 15.65 81
107 5.36 83
108 6.68 82
109 19.85 89
110 15.34 82
111 22.12 82
112 4.62 82
113 12.78 82
114 9.91 83
115 9.87 82
116 7.40 83
117 5.14 83

EMIL KOLB PARKWAY
DUFFY'S LANE
REGIONAL ROAD 50
COLUMBIA WAY
KINGSVIEW DRIVE
MOUNT HOPE ROAD
HUMBER RIVER
HUMBER RIVER
COLD CREEK
TRIBUTARY A
TRIBUTARY B
TRIBUTARY C
TRIBUTARY D
TRIBUTARY E
TRIBUTARY E
2.0m 125 HDPE CULVERT
EX. 2.22m CONC. BOX CULVERT
EX. 1.95m CSP CULVERT
EX. 1.800P CSP CULVERT
EX. 1.950P HDPE CULVERT

LEGEND

198.00 EXISTING MAJOR CONTOURS (2.0m)
197.00 EXISTING MINOR CONTOURS (1.0m)
DRAINAGE AREA
PROPERTY BOUNDARY
EXISTING OVERLAND FLOW ARROW
100 / 5.28 / 92 CATCHMENT ID
CN NUMBER (PERVIOUS AREAS)
% IMPERVIOUS (IMPERVIOUS AREAS)
CATCHMENT AREA (ha)

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EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

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Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

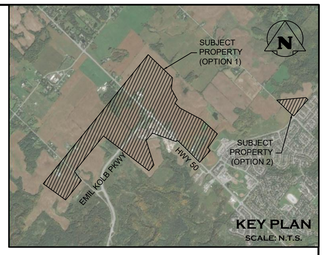
BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

PRE-DEVELOPMENT STORM DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.V. / E.D.	E.D.		708-3446
Check By	Check By	Scale	Drawing
J.L. / J.B.	T.G.	1:6000	C703



KEY PLAN
SCALE: N.T.S.

N

LEGEND

263.42	EXISTING ELEVATION
×198.11	PROPOSED ELEVATION
1.6%	PROPOSED SLOPE
	PROPERTY BOUNDARY
	OVERLAND FLOW ARROW
264.00	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOUR

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Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

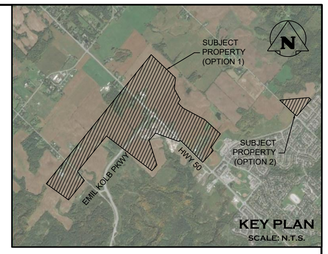
BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

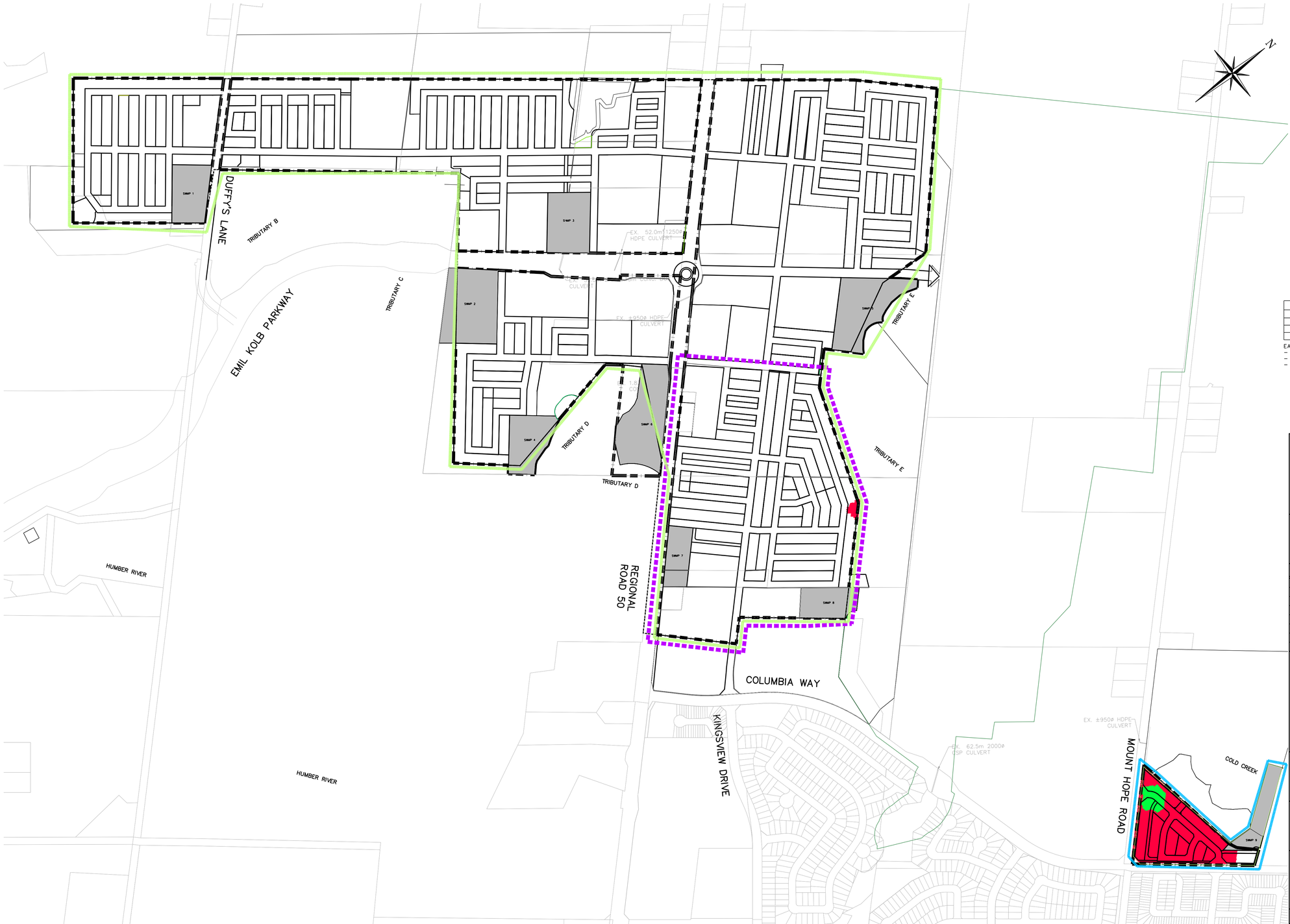
GENERAL GRADING

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C704



KEY PLAN
SCALE: N.T.S.



LEGEND

- PROPERTY BOUNDARY
- CUT AREA
- FILL AREA
- ROPA 30 BOUNDARY
- OPTION 1
- OPTION 2

EARTHWORKS SUMMARY

	CUT (m^3)	FILL (m^3)	NET (m^3)
OPTION 1 LAND	1,353,976	1,133,439	220,537(CUT)
OPTION 2 LAND	12,516	1,434	11,082(CUT)
ROPA 30 LAND	153,330	133,091	20,239(CUT)

EARTHWORKS NOTES
- ASSUMED TOPSOIL STRIPPING DEPTH = 0.30m
- ASSUMED AVERAGE PRE-GRADE DEPTH = 0.80m
- OPTION 1 VOLUMES ARE INCLUSIVE OF ROPA 30 LAND

EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

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Engineer

Engineer

PRELIMINARY
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Project

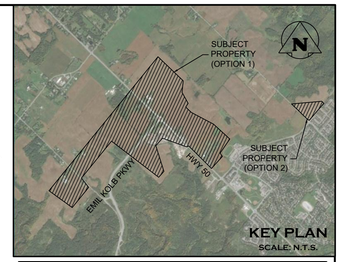
BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

PRELIMINARY
EARTHWORKS MAP

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C705



LEGEND

- EXISTING MAJOR CONTOURS (2.0m)
- EXISTING MINOR CONTOURS (1.0m)
- PROPERTY BOUNDARY
- INTERNAL DRAINAGE AREA
- EXTERNAL DRAINAGE AREA
- WATERCOURSE (FROM TRCA MODEL)
- PROPOSED STORM SEWER
- 209 / 26.6 / 55 — CATCHMENT ID; CN NUMBER (PERVIOUS AREAS) % IMPERVIOUS (IMPERVIOUS AREAS); CATCHMENT AREA (ha)

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Engineer

Engineer

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

Project

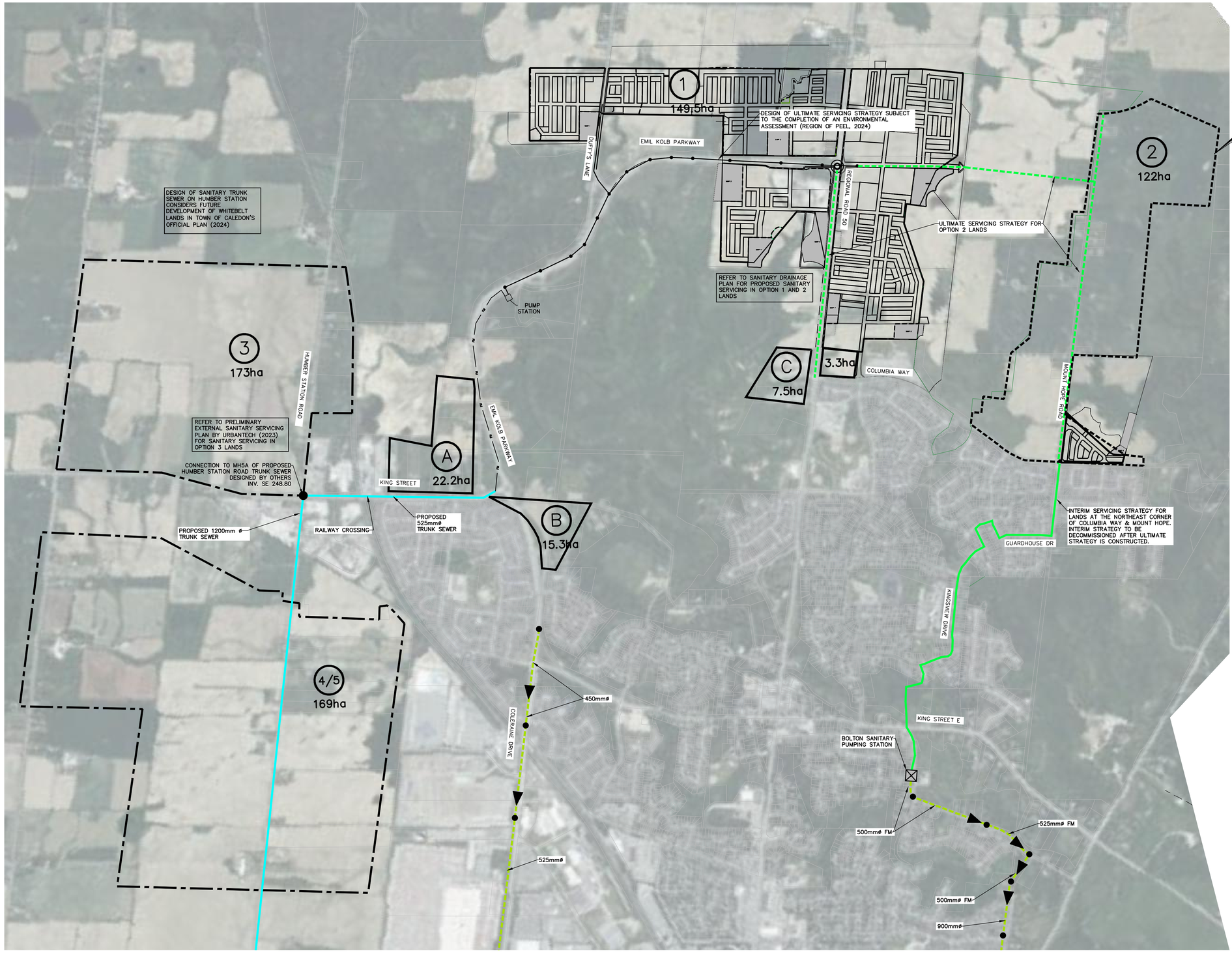
BOLTON NORTH HILL
TOWN OF CALEDON

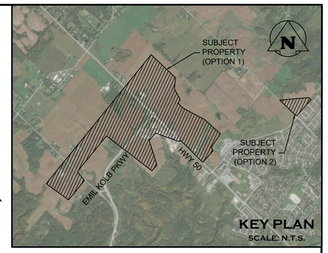
Drawing

PRELIMINARY POST DEVELOPMENT STORM DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-675-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C706





LEGEND

- PROPOSED GRAVITY SEWER TRUNK ON EMIL KOLB PKWY
- EX. SANITARY SEWER UPGRADE TO 300mm
- EX. SANITARY SEWER UPGRADE TO 450mm
- EX. SANITARY SEWER WITH NO UPGRADE
- PROPOSED FORCEMAIN
- PROPOSED LOT LINES
- PROPERTY LIMITS
- PROPOSED SANITARY CATCHMENT
- 3 — AREA I.D.; 173ha — LAND AREA (ha)
- B.R.E.S. OPTION LANDS
- B.R.E.S. ROUNDING OUT AREAS
- EX. SANITARY PUMPING STATION
- EX. SANITARY SEWER
- PROPOSED SANITARY TRUNK SEWER BY OTHERS

TO LIMIT THE EXTENT OF DISTURBANCE IN THE EXISTING SYSTEM SOUTH OF COLUMBIA WAY, THE CAPACITY ANALYSIS WAS LIMITED TO INDIVIDUAL LEGS OF SEWER, RATHER THAN UPGRADING THE ENTIRE SYSTEM DOWNSTREAM.

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EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR-DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

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Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Engineer

Project

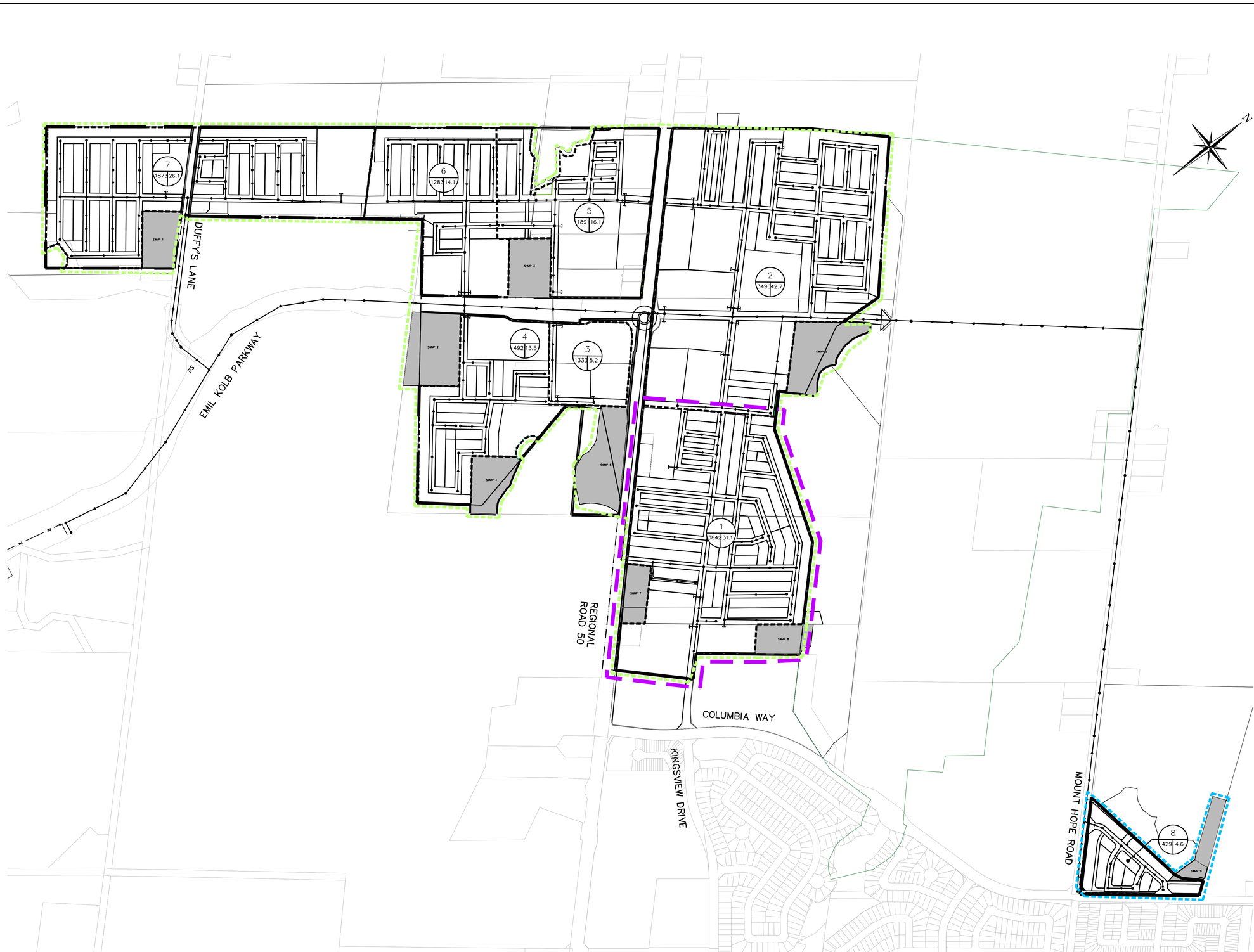
BOLTON NORTH HILL
TOWN OF CALEDON

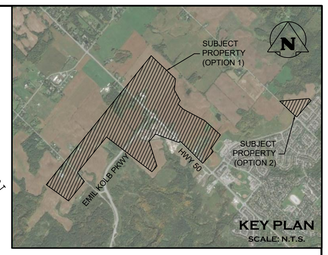
Drawing

PRELIMINARY EXTERNAL SANITARY SERVICING PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By: S.V.N./J.B.	Design By: S.V.N./J.L.	Project: 708-3446	
Check By: J.L./J.B.	Check By: T.G.	Scale: 1:10000	Drawing: C708





KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPOSED SANITARY SEWER
- PROPOSED 150mmø FORCEMAIN
- PS — PROPOSED PUMP STATION
- PROPOSED SANITARY CATCHMENT
- PROPOSED LOT LINES
- PROPERTY LIMITS
- EXISTING SANITARY SEWER
- 1 / 320 / 3.8 — CATCHMENT AREA ID; AREA (ha); POPULATION
- ROPA 30 BOUNDARY
- OPTION 1
- OPTION 2

NOTE: ALL SANITARY PIPES ARE 250mmø @ 0.5% UNLESS STATED OTHERWISE

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Engineer | Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

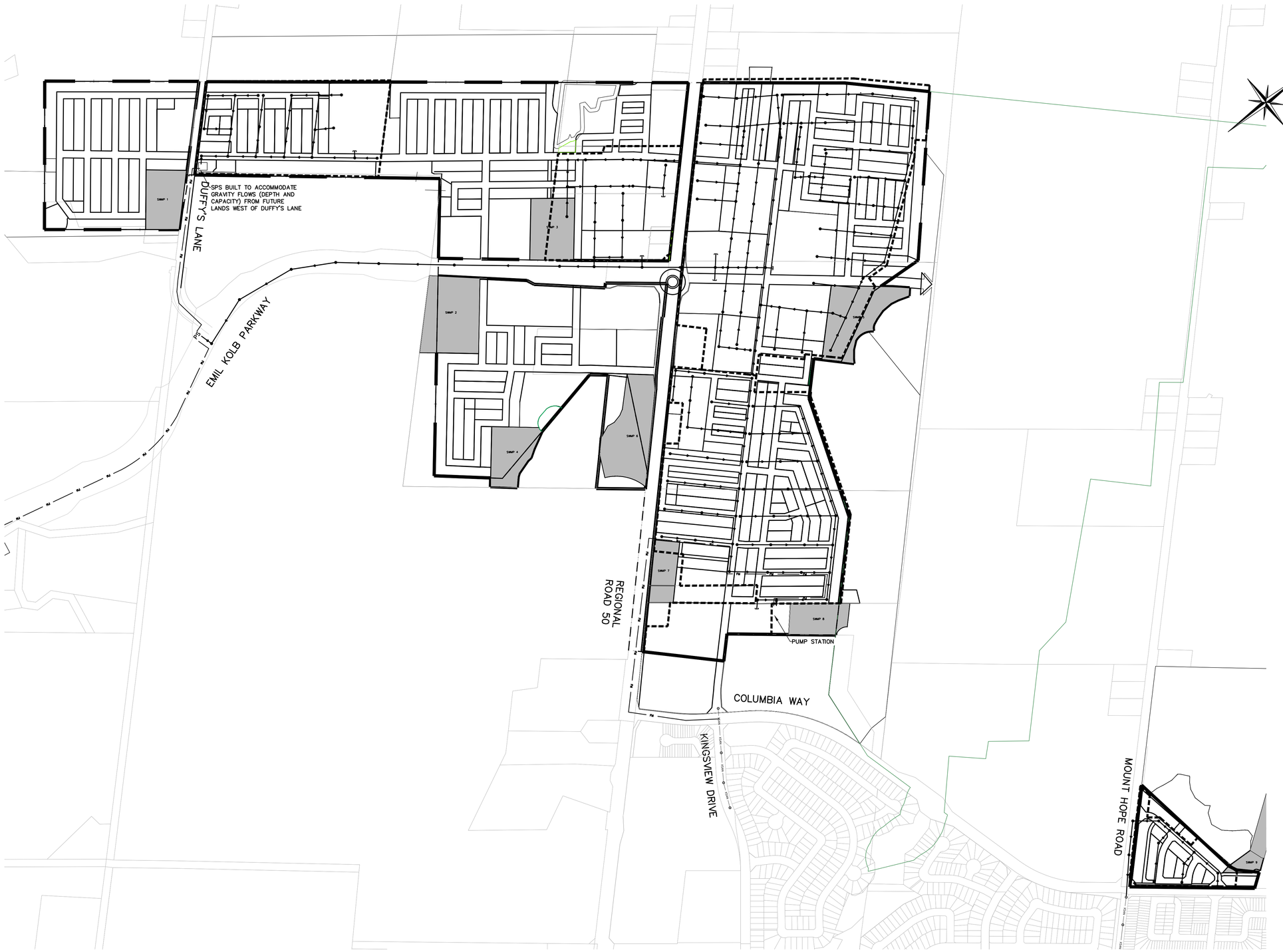
BOLTON NORTH HILL
TOWN OF CALEDON

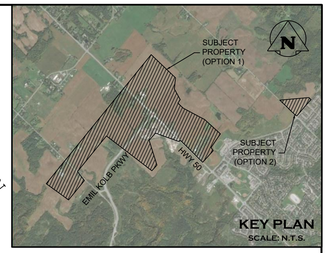
Drawing

PRELIMINARY INTERNAL
SANITARY DRAINAGE PLAN

CROZIER CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON. L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C709





KEY PLAN
SCALE: N.T.S.

LEGEND

- PROPOSED SANITARY SEWER
- PROPOSED 150mmø FORCEMAIN
- PS — PROPOSED PUMP STATION
- PROPOSED SANITARY CATCHMENT
- PROPOSED LOT LINES
- PROPERTY LIMITS
- EXISTING SANITARY SEWER

NOTE: ALL SANITARY PIPES ARE 250mmø @ 0.5% UNLESS STATED OTHERWISE

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Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

BOLTON NORTH HILL
TOWN OF CALEDON

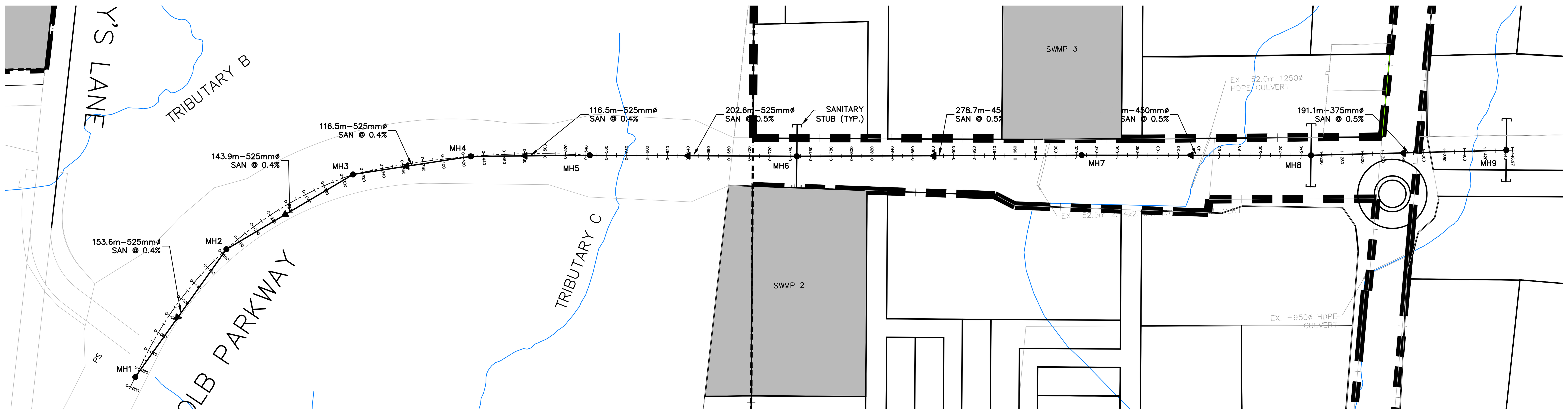
Drawing

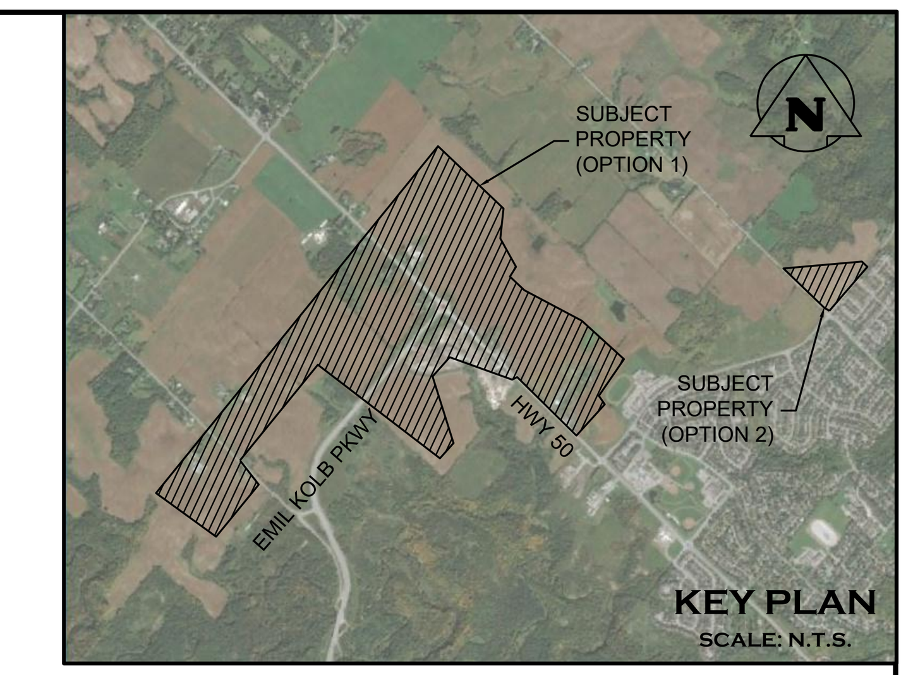
INTERIM INTERNAL
SANITARY SERVICING PLAN
(LANDOWNER AREAS)

CROZIER
CONSULTING ENGINEERS
2800 HIGH POINT DRIVE
SUITE 100
MILTON, ON, L9T 6P4
905-875-0026 T
905-875-4915 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project	708-3446
S.v.N./J.B.	S.v.N./J.L.		
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C709B

REFER TO SANITARY DRAINAGE PLAN FOR EXTENT OF INTERNAL SANITARY PIPES CONNECTING TO EXTERNAL SANITARY TRUNK



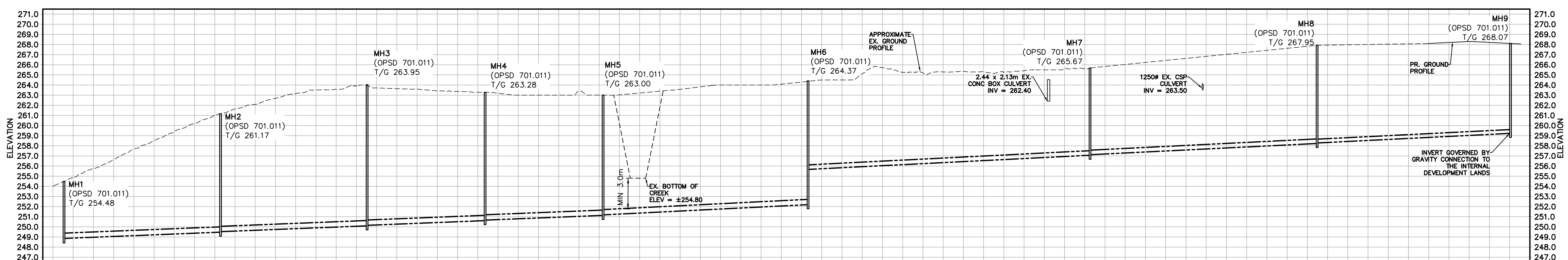


LEGEND

—●—▶—	PROPOSED EXTERNAL SANITARY SEWER
PS	PROPOSED PUMP STATION
———	PROPOSED LOT LINES
—·—·—	PROPERTY LIMITS

EMIL KOLB PARKWAY

SCALE: HOR–1:2500
VERT–1:200



SANITARY INVERT

Sanitary invert	Pipe
N 248.86	
	153.6m–525mmø PVC SAN @ 0.4%
S 249.48 N 249.52	
	143.9m–525mmø PVC SAN @ 0.4%
S 250.10 NE 250.15	
	116.5m–525mmø PVC SAN @ 0.4%
SW 250.62 NE 250.66	
	116.5m–525mmø PVC SAN @ 0.4%
SW 251.13 NE 251.18	
	202.6m–525mmø PVC SAN @ 0.5%
SW 252.19 NE 255.67	
	278.7m–450mmø PVC SAN @ 0.5%
SW 257.07 NE 257.12	
	224.5m–450mmø PVC SAN @ 0.5%
SW 258.23 NE 258.28	
	191.1m–375mmø PVC SAN @ 0.5%
SW 259.23	

STATION	EXISTING CENTERLINE
–0+010	
0+000	254.02
0+020	254.89
0+040	255.76
0+060	256.64
0+080	257.66
0+100	258.52
0+120	259.38
0+140	260.21
0+160	261.02
0+180	261.64
0+200	262.09
0+220	262.69
0+240	263.16
0+260	263.51
0+280	263.58
0+300	263.88
0+320	263.72
0+340	263.64
0+360	263.58
0+380	263.44
0+400	263.37
0+420	263.28
0+440	263.19
0+460	263.00
0+480	263.00
0+500	263.00
0+520	263.36
0+540	263.01
0+560	260.81
0+580	256.93
0+600	257.69
0+620	263.58
0+640	263.82
0+660	264.00
0+680	264.00
0+700	264.00
0+720	264.09
0+740	264.30
0+760	264.50
0+780	264.50
0+800	265.13
0+820	265.73
0+840	265.26
0+860	265.19
0+880	265.29
0+900	265.35
0+920	265.31
0+940	265.26
0+960	265.41
0+980	265.50
1+000	265.57
1+020	265.59
1+040	266.38
1+060	267.12
1+080	267.51
1+100	266.85
1+120	266.85
1+140	266.50
1+160	266.50
1+180	266.70
1+200	267.50
1+220	267.26
1+240	267.83
1+260	268.68
1+280	266.63
1+300	266.50
1+320	267.50
1+340	267.90
1+360	268.16
1+380	267.00
1+400	264.12
1+420	263.96
1+440	265.26
1+460	

EMIL KOLB SANITARY TRUNK PROPSOED TO BE INSTALLED ENTIRELY BY TRENCHLESS METHODOLOGY (MICROTUNNELLING OR APPROVED EQUIVALENT), WHICH WOULD BE REQUIRED TO PASS UNDER WATERCOURSES AND WILL MINIMIZE IMPACT TO EXISTING ROADWAY. PVC PIPES ARE PROPOSED TO LIMIT INFILTRATION

MANHOLES COINCIDE WITH ACCESS / EGRESS SHAFTS. SPACING 300m MAX

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, LEVELS, AND DATUMS ON SITE AND REPORT ANY DISCREPANCIES OR OMISSIONS TO THIS OFFICE PRIOR TO CONSTRUCTION.
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4. DO NOT SCALE THE DRAWINGS.
5. ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

EXISTING GROUND CONTOURS DERIVED FROM AERIAL SURVEY BY DRONE SURVEY CANADA (JULY 2021). ADDITIONAL CONTOUR DATA ADAPTED FROM THE ONTARIO DIGITAL TERRAIN MODEL (LIDAR–DERIVED) LAND INFORMATION ONTARIO (LIO) DATASET (MINISTRY OF NATURAL RESOURCES AND FORESTRY, 2017).

No.	ISSUE	DATE: MM/DD/YYYY
1	ISSUED FOR FIRST SUBMISSION	12/17/2021
2	ISSUED FOR SECOND SUBMISSION	02/14/2025

Engineer | Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project
BOLTON NORTH HILL
TOWN OF CALEDON

Drawing
PRELIMINARY EXTERNAL SANITARY TRUNK PROFILE

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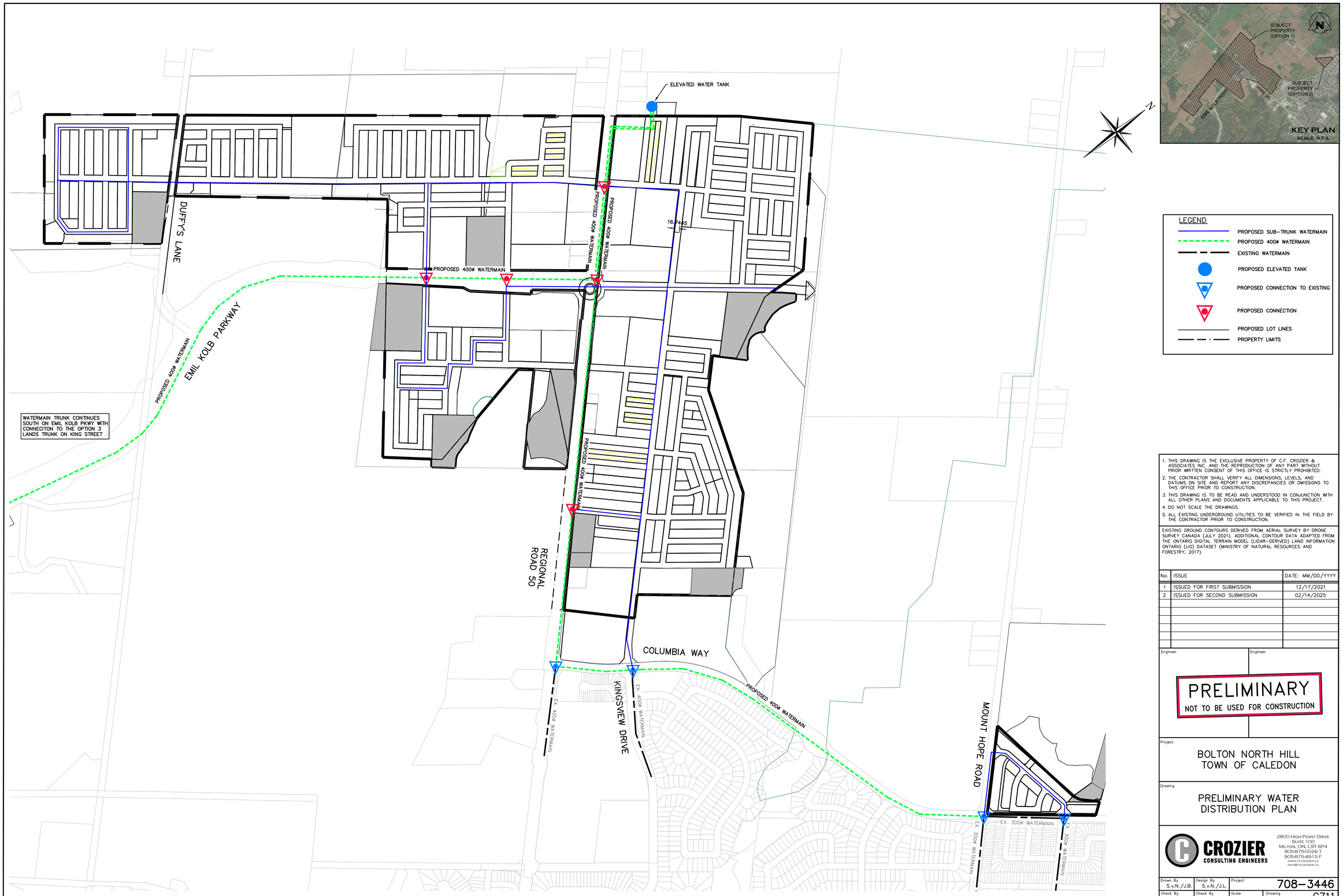
Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.	708–3446	
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	AS SHOWN	C710



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Engineer

Engineer

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Project

BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

PRELIMINARY WATER DISTRIBUTION PLAN

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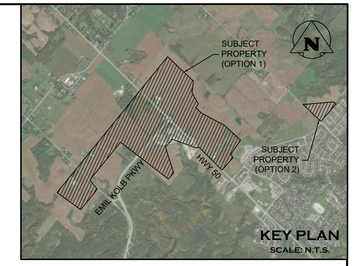
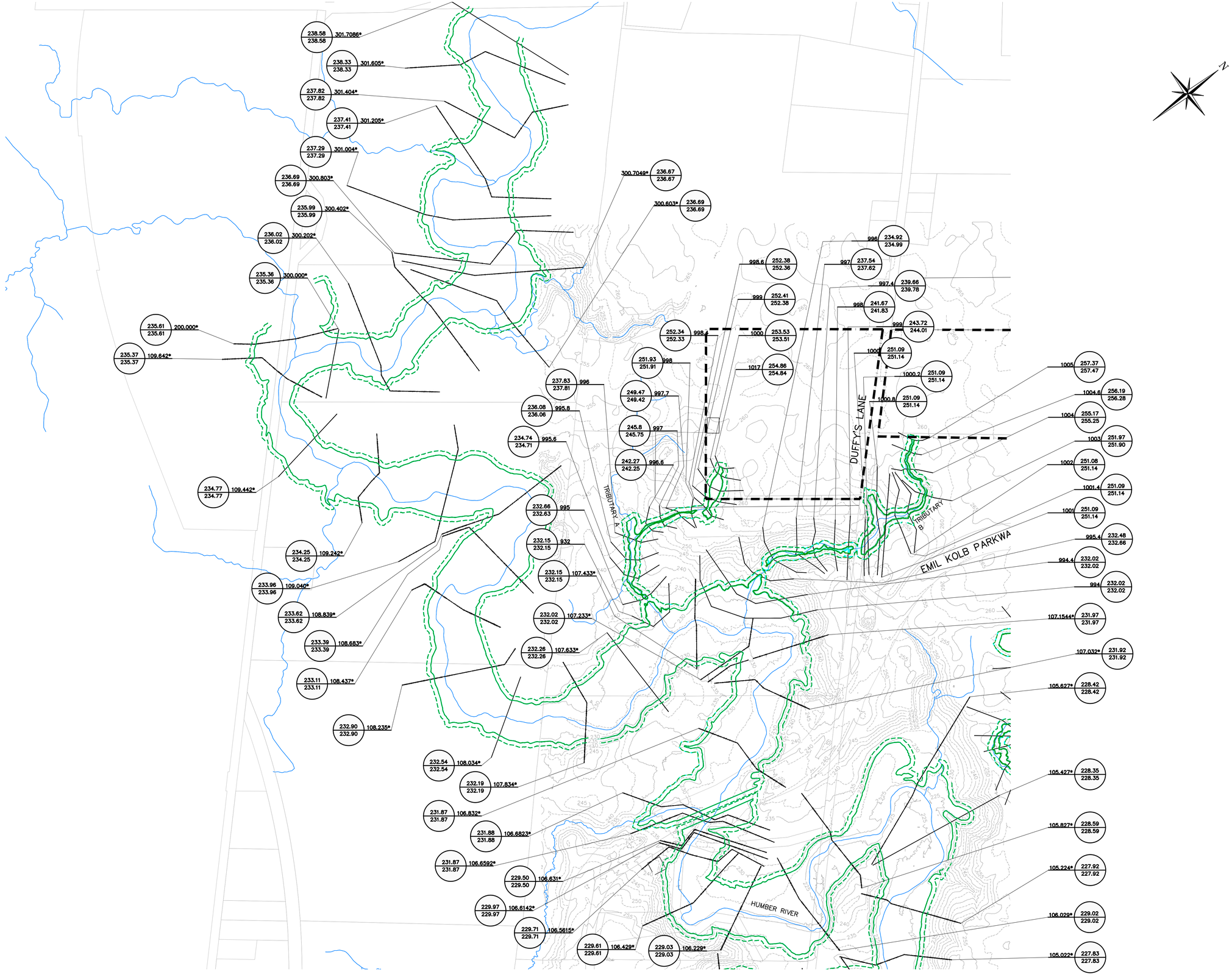
Drawn By	Design By	Project	
S.v.N./J.B.	S.v.N./J.L.		708-3446
Check By	Check By	Scale	Drawing
J.L./J.B.	T.G.	1:5000	C711





LEGEND

- PROPERTY BOUNDARY
- PROP. REGIONAL FLOODLINE
- EX. REGIONAL FLOODLINE
- PROP. REGIONAL FLOODLINE BUFFER (10m)
- EX. REGIONAL FLOODLINE BUFFER (10 m)
- TRCA WATERCOURSE
- EXISTING REGIONAL FLOODLINE – CHANNEL TO BE REALIGNED AND CONVERTED TO STORM SEWER UNDER THE PROPOSED CONDITION

CROSS-SECTION ID — 1830.512 — 268.49 / 268.44 — EXISTING REGIONAL WSEL / PROPOSED REGIONAL WSEL

AN ASTERISK (*) BEFORE THE CROSS-SECTION ID INDICATES A CROSS-SECTION FROM THE ENGINEERED TRCA MODEL. THE WATER SURFACE ELEVATION HAS NOT CHANGED FROM EXISTING TO PROPOSED CONDITIONS.

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Engineer

Engineer

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Project

BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

REGIONAL STORM FLOODPLAIN MAPPING

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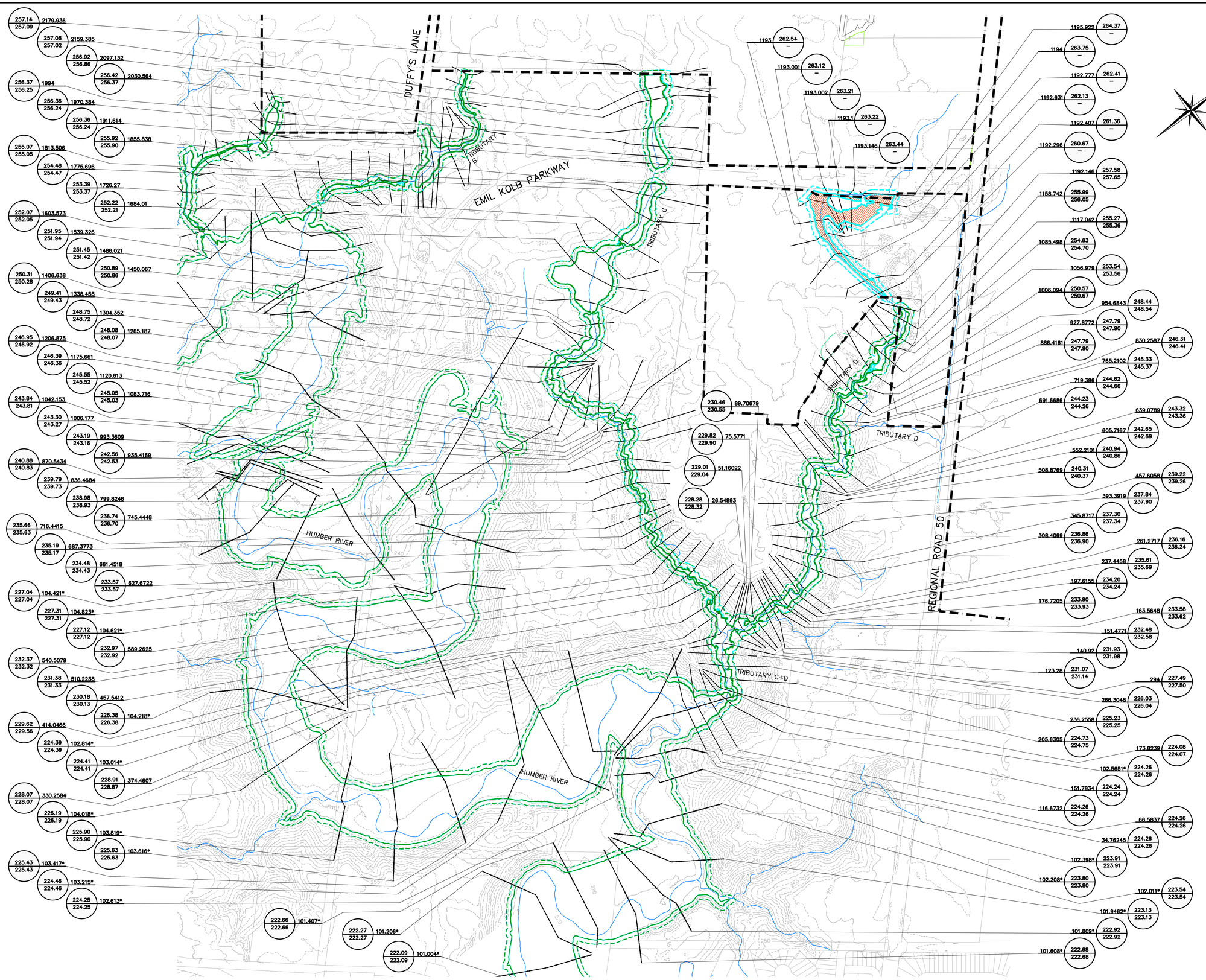
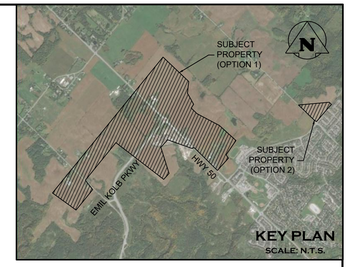
Drawn By	Design By	Project	
A.O.	J.W.		708-3446
Check By	Check By	Scale	Drawing
J.L.	T.G.	1: 4000	C712A





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Engineer

Engineer

PRELIMINARY

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Project

BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

REGIONAL STORM
FLOODPLAIN MAPPING

CROZIER CONSULTING ENGINEERS
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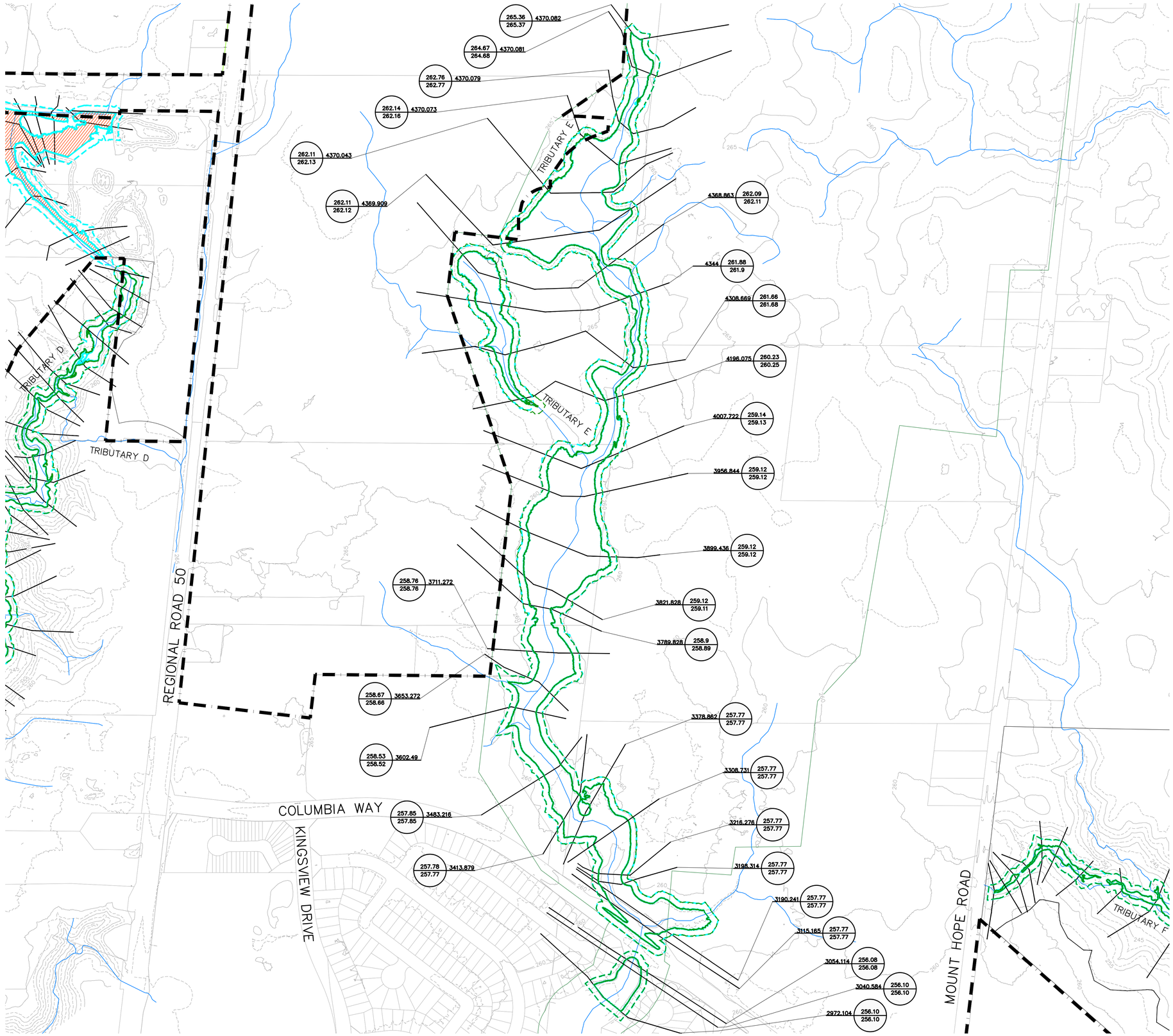
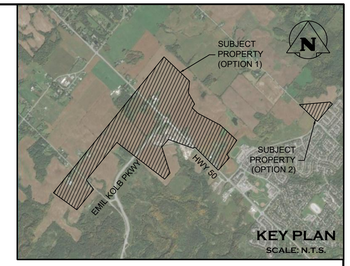
Check By	Check By	Scale / Drawing
J.L.	T.G.	1: 4000 / C712B





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Project

BOLTON NORTH HILL
TOWN OF CALEDON

Drawing

REGIONAL STORM
FLOODPLAIN MAPPING

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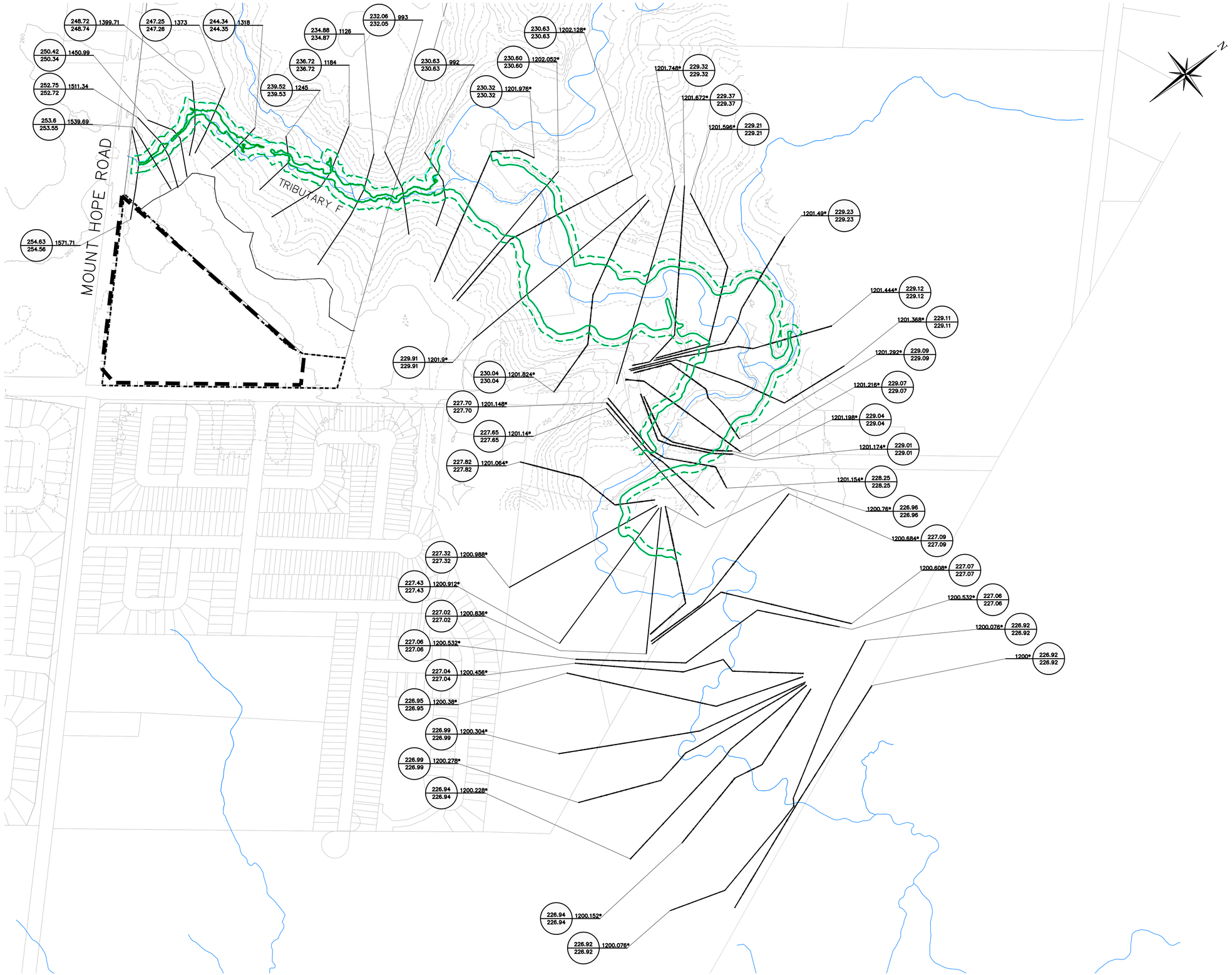
Drawn By A.O.	Design By J.W.	Project	708-3446
Check By J.L.	Check By T.C.	Scale 1: 3000	Drawing C712C



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Check By	Check By	Scale	Drawing
J.L.	T.G.	1: 2500	C712D